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## Teachers' Problems and Challenges in Conducting Online Assessment

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**Abstract:** Assessment is an essential activity in learning and teaching. It is classified into two categories based on its function: summative and formative assessments. During the pandemic, school learning activities, such as assessment, have been altered into online learning, which is quite challenging to carry out. This study investigated the kinds of summative and formative assessments used by EFL teachers during online learning and the problems as well as challenges encountered when conducting the assessment. This study utilized a qualitative approach with narrative design, involving five EFL teachers from five different senior high schools in Bandung, Indonesia. The research participants were chosen using a purposive sampling technique. The data was collected through semi-structured interviews via virtual meetings and WhatsApp video calls to collect the required data. The results of this study showed that the EFL teachers implemented both summative and formative assessments during online learning; for summative, the teachers followed the school policy using midterm and final exams with multiple choice. Meanwhile, in formative assessment, teachers used different kinds of assignments, such as portfolios, videos, podcasts, attendance, and presentations. However, they also found problems and challenges, such as students' academic dishonesty, lack of motivation, internet connection issues, and technicality issues with technology.

**Keywords:** Online assessment, summative assessment, formative assessment, problems, challenges.

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### Introduction

In 2019, the world abruptly changed because of COVID-19. As a result, all the activities carried out outside, such as working, religious prayers, and learning must be done from home. Due to the unprecedented COVID-19 incident, learning and teaching are some of the most affected activities as it is usually conducted in face-to-face classes (Guangul et al., 2020). Nasir et al. (2021) stated that the COVID-19 outbreak had forced learning settings to take place online to avoid the spread of the outbreak among children. UNESCO noticed that 188 countries have suspended schools and carried out learning-teaching processes outside of school using online learning. Indonesia also declared a regulation by issuing circular letter Number 4 of 2020 concerning the implementation of Educational Policies during the Emergency Period for the Spread of COVID-19 to transform offline classes into online classes for all levels of education (Werdiyanti, 2021).

Conducting online learning was challenging. Most learning methods and media had to be altered using the appropriate technology. According to Kuama & Intharaksa (2016), teaching and learning using technology represented a shift away from conventional learning techniques to online learning. Using an online system, teaching and learning become student-centered, allowing students to find their style in learning. The continuously growing learning media technology and internet in online learning proved to deliver a more effective learning and teaching process (Clarke & Hermens, 2001). A variety of new learning models involved technology which is usually utilised in Indonesia, for instance, Google Classroom, WhatsApp, *Kelas Cerdas*, Zoom Meeting, Google Meeting, Zenius, Quipper, Quizziz, Kahoot!, and Microsoft Teams (Hermanto & Srimulyani, 2021). Moreover, Kumar & Nanda (2019) added that social media applications could be used in online learning processes, such as Instagram and Facebook. It is widely approved that many kinds of technology can be used for online learning activities.

Utilizing technology as an online learning tool can be used as a resource throughout the evaluation or assessment process in various subjects in school, such as English (Kristiyanti, 2021). In the online learning and teaching process, EFL teachers still need to assess and evaluate students' needs and abilities, as well as understanding the materials that students obtain from online learning (Lisyowati et al., 2021). Assessment plays a vital role in foreign language teaching (Fitriani, 2019). It is also stated by Fulcher & Davidson (2006) that assessment is considered essential to enhance students' performance in improving teaching and learning. Brown & Abeywickrama (2010) stated that assessment is divided into two types, namely formative and summative assessment. Both types evaluate the students' teaching and learning process.

## **Summative Assessment**

Summative assessment is aimed to evaluate students' understanding by measuring students' progress concerning language learning through the distribution of midterm tests and final exams throughout the semester (Torres, 2019). The results of summative assessment can help teachers determine to what extent students are capable of the materials and decide for materials used in the next lesson. In addition, summative assessment usually analyzes quantitative data from students' academic performance when conducting the midterm tests and final exams following the Ministry of Education policy or the school policy (Siegler & Pyke, 2011). This assessment aims to seek documents comprehensively and describe students' academic performance from their midterm tests or final semester exam scores that mostly involve closed-book activity (Naughton et al., 2011). However, in an online situation, Lesnick & Miller (2004) stated that summative assessment needs to facilitate and document the student's ability with students' perfective and personal experience when learning takes place in a midterm or final exam. The goal of summative assessment in online learning is not to memorize all the learning materials, but to involve the optimization of the use of assessment tools that focus on problem-solving, critical analysis on media sources, and students' experience.

There are several techniques in conducting summative assessment in online learning, according to Perera-Diltz

& Moe (2014). They stated that there were three techniques in summative assessment, namely Rubrics: Case Studies, Tests and Examinations, journals, Blogs, and WIKIS. The use of case studies to assess students' abilities that focus on problem-solving and decision-making skills, the textual construction of students' perspective and engagement with the materials, and students' experience. The Rubrics of Case Studies prevent students from closing books that do not impact their achievement (Williams, 2005). Another technique is Tests and Examinations, which were compared by Williams and Wong (2009) when carried out online and when it was implemented face-to-face. Both formats disregard academic dishonesty or cheating. It was then discovered that students preferred having online tests because they were allowed to access any resource and the exam was held asynchronously. Meanwhile, face-to-face situations required students to have closed-resource (book) examinations which were time-limited, synchronous, and allowed only single-attempt submission of exams.

Furthermore, multiple-choice tests are one of the types of summative assessments. A multiple-choice test is a formal and objective test that assesses certain skills, such as English skills (listening, vocabulary, structure, and reading). There are several advantages of multiple-choice tests, such as efficiency, the possibility of bias that teacher grade students' scores, and easier to identify students' mistakes. The disadvantages of multiple-choice in conducting summative assessment include the opportunity for students to randomly guess the answer, students' tendency to have subjective opinions, students becoming less knowledgeable, and the luck factor (Qu & Zhang, 2013). Besides, in conducting summative assessment, the types of tests can be in the form of mid-term tests, final tests in the forms of multiple-choice, short answers, essays, and final projects. Teachers can create summative assessment questions using Google Forms during online learning and share them via online chat, WhatsApp, or Google Classroom (Werdiyanti, 2021)

## **Formative Assessment**

Formative assessment is the ongoing evaluation conducted by teachers in students' learning activities. According to Qu & Zhang (2013), formative assessment investigates, evaluates, and analyzes students' comprehension in learning activities. Formative assessment can often examine student performance, whether formal or informal. It provides the teacher with feedback and students' comprehensive understanding to help them decide on the appropriate teaching methods.

According to Torres (2019), when conducting formative assessments, teachers are able to use alternative instruments, for instance, journals, task-based projects, self-evaluation exercises, and peer assessments. Formative assessments can be evaluated through students' presentation of homework assignments, student attendance, student participation, and their quality of language skills during classroom activities. Gikandi et al. (2011) determined the characteristics of validity when conducting a formative assessment; assessment activity is authentic (i.e., engage students in making decisions and solving problems), effective formative assessment (i.e., feedback is comprehensive), multi-dimensional perspectives, and student support with teacher mentoring. Informative assessment, such as student dishonesty, is not associated with this assessment.

EFL teachers find conducting assessments as a difficult task as they ought to prepare the relevant methods, techniques, and possibilities that may happen in online classes. Teachers encounter problems and challenges in assessments during online learning as there were no clear policies and guidelines. They had difficulties with teaching strategies, applicable assessment alternatives, as well as the growing duties of students and teachers (Guangul et al., 2020). Thus, based on the phenomena of online learning and the difficulties teachers engage when assessing students, the researcher tries to identify EFL teachers' problems and challenges in conducting summative and formative assessments during online learning.

Various related literature reviews have explored other aspects relevant to this study. Mohamadi (2018) examined the comparative effects of online summative and formative assessment on EFL students' writing ability. In his study, an online summative assessment with an IELTS rating scale and an online portfolio writing assessment in the e-writing forum was conducted. The results concluded that the use of engaging technology and techniques when combined with the appropriate assessment strategies contributed to having efficient and powerful learning activities. This research focuses on the challenges of remote assessment in higher education during the outbreak of the COVID-19. This research only focuses on the main challenge identified in the remote assessment: dishonesty, and aligned with the research stated by Guangul, et al. (2020), the best option to solve the problem was using online presentation. Another research carried out by Zhang, et al. (2021) explained that six EFL teachers in China had their first time conducting online assessments. Most of them had to change the formative assessments which were usually distributed and rearrange the summative assessments. Furthermore, Werdiyanti (2021) identified the method teachers utilized in conducting assessments and overcoming the challenges of online learning. She elaborated that the teachers used e-portfolios, self-assessments, and final exams for summative assessment.

This research involved EFL teachers from five different senior high schools in Bandung, West Java, Indonesia, to examine the problems and challenges found in the use of summative and formative assessments during online learning. This research addresses the following research questions:

1. What are the kinds of assessments employed during online learning?
2. What are the problems and challenges in conducting summative and formative assessments in English classes during online learning?

## Method

This research utilized a qualitative approach with a narrative design that involved five English teachers from senior high schools in Bandung, West Java, Indonesia, as participants. These English teachers were chosen through purposive sampling technique. They were selected based on some requirements from different senior high schools in Bandung, the teachers' genders, and their experience.

Table 1. Research Participants

Participant	Sex	Age	Teachers' Experience	Type of School
Teacher 1	Female	47	20	Private school
Teacher 2	Male	41	16	Public School
Teacher 3	Male	30	6	Public School
Teacher 4	Female	25	4	Public School
Teacher 5	Female	24	3	Private School

The researcher used semi-structured interviews conducted online through virtual meeting softwares such as WhatsApp voice calling to gather the data. The interviews were conducted in a relaxed and conducive atmosphere to ensure that the teachers were at ease to express their opinions and explain in detail how they assessed students during online learning. The collected data were analyzed descriptively using an in-depth qualitative analysis completed with detailed descriptions and argumentation. Some excerpts from the interviews were also quoted in the finding section.

## Results

### Summative and Formative Assessment during Online Learning

In online learning activities, the most supporting tools for the learning and teaching process that can be implemented well are the media or technology that teachers use. Based on the interviews with five English teachers from Bandung (West Java), Indonesia, all schools have their own media for the teaching-learning process, including media for assessment. It can be seen from the teachers' statements below:

*"...Media which I usually use for learning activity are Google Meet and edulogy.id (platform for learning)." (Teacher 1)*

*"...Mostly using WhatsApp and Google Classroom, we seldom use virtual meeting softwares because we have to consider students' economic background." (Teacher 2)*

*"...Basically, all of the technology can be used as the media to conduct teaching and learning activities. For me, I will try to use media that make students feel comfortable, for instance, WhatsApp or web-based applications." (Teacher 3)*

*"...As far as I know, most public schools in Bandung mostly use edulogy.id or Seon application, which is a platform for learning. In my school, we use Seon because it can be used synchronously and asynchronously." (Teacher 4)*

*"...In my institution, there are two media that we use which are synchronous and asynchronous. Usually, I will use Zoom Meetings for synchronous activities that the school has facilitated, and for asynchronous activities, I will use LMS (Learning Management System) developed by the school." (Teacher 5)*

Regarding the teachers' statements, it can be concluded that every school in Bandung has different teaching and learning media. The media that teachers use in Bandung are usually the same as in other schools. Most schools use virtual meeting softwares such as *Zoom Meetings*, *Google Meet*, and *WhatsApp* to implement online learning and academic assessment (Rahman Hz & Daulay, 2021). Concisely, the learning media used such as *Seon*, *edulogy.id*, and *LMS* were used as instructed by the school policy in order to make teaching and learning activities more effective (Clarke & Hermens, 2001). According to Kuama & Intharaksa (2016), teaching and learning using technology began to shift from conventional learning techniques to online learning. People had more freedom to select what media they will use to find the suitable learning styles.

### ***Summative Assessment***

Summative assessment is to evaluate students' comprehension by measuring their academic performance through midterm tests and final exams (Torres, 2019). This assessment is still used in online learning situations, but it has different types of questions, portions, and media. In summative assessment teachers were instructed to follow the school policy, despite some teachers having different opinions about the assessment used. It is stated from the interviews:

*"... For midterm and final exams, usually the school will handle it. The teacher only creates the questions and follows the rules that the school made such as using multiple choice and the number of questions." (Teacher 1)*

*"...For summative assessment in midterm and final exam, I actually follow the school policy because in this school, midterm and final exams are held at different times and simultaneously with all courses. This exam uses an application, namely Exam 7, in which all the questions use multiple choices. There is no essay or other type of question, maybe because of the application, so the exam only used 40 multiple choices. In my opinion, it will be better if the exam can be altered to the teacher's favor." (Teacher 3)*

The statement of Teacher 3 was similar with that of Teachers 2 and 4. They also had to adhere the school policy, but they agreed that the structures of the final and midterm exams can be changed by the teacher because it is an online situation. In that case, the teacher has more power to try to avoid dishonesty. This was inferred from the interview:

*"...Yes, we have to follow the school policy for conducting the final and midterms. For the final exam, the students only answer 25 multiple choices. It is the rule of our institution. Meanwhile, at the time, the students answered in only five or ten minutes. I think the exam will be good if the teacher is responsible for it because he/she can create the questions in different ways such as in the form of oral exam, direct exam, etc. So, for me, the midterm and the final exam are not the final decision to give students' scores. For this situation, I think students' habits or students' daily learning style is the main aspect of the assessment." (Teacher 2)*

Likewise with the statement of teacher 4:

*“...As a teacher, I have to follow the school policy, including the rules of midterm and final exams. I am not sure about the students' scores because this exam is only multiple-choice, and maybe the students were only lucky to guess the answers correctly. It reminds me that one of my students got the highest score; meanwhile, throughout her daily academic performance, she never comes to my class and never does the assessment. I think she might be asking someone else's help, or maybe she cheated. Because of that, the midterm tests and final exams should only be used for checking students' understanding and not for the main score.” (Teacher 4)*

Nevertheless, Teacher 5 stated that summative assessment in midterms or final exams in online learning situations took the same form during the usual offline situation.

*“...In our school, the midterm and final exam is the same as usual, such as offline learning using LMS. There are multiple choices and essays. I can check students' understanding of the essay because in an online situation. I try to create the essay questions with students' general opinions, such as what you think and your opinion. So that the students will answer based on their knowledge, it avoids students' cheating while answering the exam.” (Teacher 5)*

The interview results show that all teachers in Bandung were obliged to follow the school policy when conducting summative assessments, especially during midterm tests and final exams. It can then be drawn that the findings of this research were similar to that of Perera-Diltz & Moe (2014), in which they stated that summative evaluation techniques in Bandung involved the use of tests and final examination.

### **Formative Assessment**

Some teachers stated that formative assessment is more important in online learning. In formative assessment, the teacher is able to explore students' understanding. It was confirmed by Teacher 1:

*“...I try to assess students by reviewing after explaining the materials. Then, I would ask them directly.” (Teacher 1)*

Several teachers conducted formative assessment in various ways during online learning. Most of them used portfolios, but some used different tasks that might be challenging for students to complete. This was elaborated in the following statements:

*“...For the task, I will ask students to create a portfolio, and they will send it to edulogy. I will give feedback by writing commenta or praising the project.” (Teacher 1)*

*“...Portfolio is one of the tasks that I give to students for checking their understanding in the last of the materials.” (Teacher 2)*

Teachers also try to make variations for the task. The purpose is to promote enjoyable learning and to engage students to do the task using digital learning media during online learning. For instance, Teacher 3 preferred to give tasks such as videos or podcasts that allow creativity. On the contrary, Teacher 4 chose to provide students



with the task to upload contents on their social media accounts because she believed that students were familiar with them.

*“...In a Pandemic situation, the teacher should make students enjoy learning without any pressure to conduct the task. So, I try to give them easy tasks by enhancing their creativity such as making videos or podcasts.” (Teacher 3)*

*“...I used social media to instruct students’ tasks because I believe senior high school students mostly have social media accounts and will open it every day. So, every task that is given to them should involve social media. For example, for writing tasks, they are commanded to post a picture and write a caption that is related with the task given.” (Teacher 4)*

Meanwhile, Teacher 5 rarely gave tasks because she was forbidden to allocate them in her institution. The teacher was to only choose either a productive task or a project, usually two or three tasks in every semester.

*“... Because of the school regulations, I only gave productive tasks such as writing to my students, and they will submit it via LMS. I will give detailed feedback to every student with comments and suggestions. The students should revise the task until it is accepted.” (Teacher 5)*

Additional to the tasks given in formative assessment, teachers also analyze the students' attendance in the classroom through virtual meetings or asynchronous participation in the class. One of the teachers in Bandung stated that one of the most important aspects in formative assessment is students' participation in class, because it showed their willingness to learn.

*“...Online learning is different from offline situations, in which I cannot see what students are doing during the learning activity. At some points, maybe they were not ready yet to study. Most of my students are always off-camera when I explain the materials, I don't know what they do. So, for me, attendance and participation are the most important aspects for formative assessment during online learning.” (Teacher 2).*

Similarly, Teacher 3 also discovered a similar experience. He stated that student's attendance and students' presentation performance also contributed to the students getting high scores. The teacher believed that the students' presentation showed the real skills that they have rather than common tasks such as portfolios, tests, exams, etc. Students' presentations indicated how much they understood the materials.

*“...Another way to give the students a score is to analyze their performance when doing presentations. To me, presentation performance in online learning has a high score for students because only through this performance I can test the students' skills and preparation before the performance.” (Teacher 3)*

## **Teachers' Problems and Challenges when Conducting Assessments in Online Learning**

### ***Problems***

Conducting the assessment for EFL teachers is not easy because they must prepare the methods, the technique, and the possibilities that may happen in online classes (Guangul et al., 2020). Problems and challenges also

occurred to the five EFL teachers, in which they agreed that assessing during online learning is not easy.

*“...There are several problems with implementing assessment and learning activity in online learning. The first problem is trust in students. It is hard for me to trust the students because I think being honest in an online learning situation cannot be assessed. Second, most students cannot understand the instructions of the task. I don't even know if the students had read the instructions or not, or perhaps they did get the point about the instruction. So, I have to tell them slowly and clearly by giving an example of how to answer the task. The last problem is that it is time-consuming to do assessments. I will end up spending more time assessing or giving students feedback, it is different during offline learning.” (Teacher 3)*

Teacher 3 explained that he faced a problem when conducting an online assessment involving the students and also the teacher. Meanwhile, teachers 1 and 2 were troubled by the students' condition.

*“...The problem with online learning, is sometimes students have a problem with connection or internet data. Because of that I tried to offer a solution. The next one is students' motivation.” (Teacher 1)*

*“...Students' condition is one of the problems because I have to adapt the learning and assessment method with that.” (Teacher 2)*

Students' lack of motivation also becomes a problem for teachers to do the learning assessment activity. In addition, Teacher 5 had a problem in searching for the applicable students' assessment materials, as stated in the following excerpt:

*“...I try to find some materials or worksheets that make students happy and enjoy when they answer the tasks or the exam. It is hard for me to create or search for other alternatives because it will spend more time.” (Teacher 5)*

In different circumstances, for Teacher 4, the problem was caused by the school policy which forced the teachers to reduce the materials.

*“...Reducing the indicator of materials makes me confused about rearranging the method. For example, there are 7 indicators, but for this year, teachers are given only 3 indicators that should be delivered.” (Teacher 4)*

From all of the interviews, the teachers stated that various problems arose in online assessments, such as the school, students, and the teachers themselves. Every teacher has different problems depending on his/her situation. It can then be drawn from the statements elaborated by Teacher 4 that the problem came from school policy, that Teacher 5 had problems with herself, and as for Teachers 1, 2, and 3, the problems involved the students.

### **Challenges**

The pandemic was the first time the research participants had to do online learning. They encountered many obstacles when conducting the activities, including assessments. It is aligned with a study by Gaangul et al.,

(2020) in which teachers receive problems and challenges when doing online assessments due to their little knowledge on the appropriate strategy, methods, regulations, and technology they can use. Several problems and challenges that EFL teachers experienced were explained below.

*“...Absolutely, I got challenges from online learning and online assessment. The most challenging task was solving students’ problems such as their academic dishonesty, their internet problems, and their motivation to join the class”. (Teacher 1)*

Students’ background situation became a challenge for Teacher 1. This unfortunate event was also dealt with by Teachers 2 and 4. They admitted that students’ backgrounds greatly influenced the online learning activity. They declared:

*“...I don’t know if it is true or not, but for me, students’ backgrounds can influence me to implement online learning and online assessment. In my class, there were some students who always had a problem with an internet connection, so I had to change the plan of assessment from synchronous to asynchronous.” (Teacher 2)*

*“...Sometimes, I have to wait for students to submit the assessment. Many students always submit the assessment past the deadline, and they always reasoned that it was due to the internet data or internet connection.”(Teacher 4)*

In contrast, for Teachers 3 and 5, the challenges that they engaged came from the teachers themselves. They felt the need to improve their methods to conduct the assessment.

*“...I have to prepare assessment materials with more than ten options. For example, in the speaking assessment, I will use pictures for students to describe the picture. However, I should have more than ten pictures, because maybe something happens when conducting the assessment.” (Teacher 3)*

*“Many students avoid the assessment, so I have to find a way to do the assessment that is not like an assessment. It is hard for me to find another way to do the assessment.” (Teacher 5)*

Thus, it can be inferred that teachers encountered challenges from students’ conditions such as academic dishonesty, internet connection, and lack of student motivation. The challenges also came from the teachers having to be able to enhance the teaching media or learning method in order to conduct the assessment well.

## Discussion

In summative assessments, the teachers were obliged to follow the school policy which was to conduct midterm tests and final exams. This means that the grading of student academic performance was to be based solely on the examinations (Perera-Diltz & Moe, 2014). Multiple choice is one of the types of questions that the school uses for the midterm tests and final exams because most schools in Bandung use an application for assessment, or *Google Forms* to conduct the exam. Meanwhile, some teachers had doubts about the exam results. It was inferred from Teacher 4, who noticed that the student who achieved the highest score on the midterm test was

the same student who never attended any class nor completed any assignment. Furthermore, it was stated by Qu & Zhang (2013) that the multiple-choice question has disadvantages. For instance, students were able to solely guess the answer, use subjective opinions, use less knowledge, and depend on their lucky charms. Because of these issues, the teachers stated that regardless of the school policy, summative assessment should not be considered as the final decision to determine student academic performance.

Additionally, when constructing summative assessments, teachers can add other kinds of summative assessments such as a task project or daily quiz with an open book. Open resource (book) activity was recommended by Williams (2005). He stated that the teacher could not control the students to use the case studies technique to assess students' ability in online learning. According to Perera-Diltz & Moe (2014), the kinds of questions should be focused on problem-solving, decision-making skills, textual construction of students' perspectives and their engagement with the materials, as well as their experience.

When conducting a formative assessment using tasks such as portfolios, homework, project, and other assignments, feedback is needed for grading the students' scores or distributing evaluations. According to Gikandi et al. (2011), formative assessment should be assessed with authentic assessments, such as giving feedback. Feedback can support students in enhancing their skills and it contributes to the teacher mentoring activity. Gikandi et al. (2011) also stated that one of the characteristics of feedback is easy to comprehend. All of the teachers who assess their students using feedback should only give general feedback.

Based on the results of interviews, the five teachers who came from different high schools in Bandung, West Java, Indonesia, conducted formative assessments during online learning. There were many kinds of formative assessments utilized, such as portfolio, video, podcast, project, presentation, and attendance. The teachers stated that formative assessment is used for activities which are task-based, and usually influences students' scores more than summative assessments.

## **Conclusion and Recommendations**

The current research was conducted on the kinds of summative and formative assessments as well as the problems and challenges encountered by teachers during online learning assessments. In this research, the summative assessment types took place in the form of exams or tests, which were midterm tests and final exams using multiple choice. The assessments were in accordance with the school policy, but some teachers included other summative assessments, such as daily quizzes and final projects. Moreover, in formative assessments, the teachers used tasks for conducting the assessment. The kinds of formative assessments include portfolios, video tasks, podcasts, presentations, and attendance in class.

The five EFL teachers' problems when conducting online assessments were: students' background situation, teachers' low skills, and school policy. Concerning students' background situations, the assessments were often

hindered due to lack of motivation, internet connection, and dishonesty. The teachers also had minimum skills to explore the appropriate learning media for online assessment. Moreover, the school policy prohibited the teachers from using other alternatives for the assessments. Meanwhile, there are two challenges encountered by teachers when conducting online assessments. First, they had to overcome students' problems, such as academic dishonesty, poor internet connection, and lack of motivation. Furthermore, the teachers had to enhance their skills to find more methods for online assessment. The researcher suggests that future researchers examine further how to solve the teachers' challenges during online assessments.

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## Students' Perceptions of Implementing Independent Learning - Independent Campus Curriculum: Benefits and Challenges

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**Abstract:** This article aims to analyze students' perceptions of the benefits and challenges of implementing the MBKM curriculum. In this qualitative descriptive study, the data were collected from students of the Arabic Education Study Program, at Malang State University, who participated in the program with a questionnaire and interview method. The results obtained from this study are: 1) students' perceptions of the benefits of implementing the curriculum are the best practices generated from the programs such as student exchange, research program, internships (calligraphy and translation minor), and teaching practicum. The main benefits are inviting students to be creative and adaptive humans. They will be better prepared upon graduation, bringing students closer to work and industry and training students who can face social-cultural changes and rapid technological developments. 2) students' perceptions of technical and administrative challenges in implementing the program. The implementation of this program was not as smooth as expected because students faced various technical issues, such as conducting the program remotely because of the COVID-19 pandemic, and administrative issues, such as building partnerships between campus and external institutions.

**Keywords:** Students' Perceptions, MBKM Curriculum, Benefits, Challenges

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### Introduction

The world is developing rapidly along with the times. This development was in the era society 5.0, which impacts the development of all lifelines, including education, and makes it a challenge for everyone. The development of era society 5.0 in education is characterized by student-centered learning. Student-centered learning requires students who can master knowledge, face life changes, innovate in all aspects, and have high creativity in dealing with technological and information developments in human life. The Association of American Colleges and Universities (AACU) by Hou et al. (2020) defines liberal arts as a learning approach that empowers individuals and prepares them to face complexity, diversity, and change with knowledge of the wider world and in-depth study in the field of interest. In contrast, liberal arts is a multi-interdisciplinary knowledge that can be applied in everyday life (Autio et al., 2019; Bulut, 2022; Getenet, 2022; Lim, 2022;

Malcolm, 2017; Maddah, 2021; Mokhtar et al., 2021; Yurt, 2022; Zhou, Liu, & Lo, 2022; Wurianto, 2020). This learning approach is in line with the characteristics of education in the 5.0 era.

Education has become an important thing and must be in line with the times. Education could be a weapon for facing the challenges in human life. The development of this era requires various parties to make breakthroughs in thinking, drafting, and acting. On the other hand, in the face of new challenges, a new paradigm is needed in the education field (Paramitha et al., 2021). Education policy in Indonesia has transformed over time. Transformation is carried out to improve the implementation of previous education. In addition, this transformation is a form of improvement made by the government to realize better education (Mustaghfiroh, 2020). Then, various policies were implemented by the government to advance education in Indonesia. Existing policies start by equalizing education with scholarships from multiple paths, compulsory education programs, and curriculum transformation from elementary schools to college.

The implementation of quality education requires the availability of a good curriculum. The curriculum has a strategic and decisive role in the performance and educational success. In line with that, curriculum development in universities is a necessity. Curriculum development must be carried out in response to the development of science and technology, societal needs, and stakeholder needs. Nowadays, education in Indonesia is still far behind the countries in the world. Based on the Programme for International Student Assessment (PISA) results, Indonesia occupies 74th out of 79 countries worldwide. Education in Indonesia is currently being crowded in the conversation about the new policy of the "Merdeka" curriculum (Cirocki and Anam, 2021). This new policy integrated with the education aimed at Higher Education, namely the Independent Learning -Independent Campus (MBKM) Curriculum. MBKM is the latest policy in the field of education issued by the Minister of Education and Culture (Siregar, Sahirah, and Harahap, 2020). The exit of this policy is based on the idea of independence for both public and private higher education institutions (Fuadi and Aswita, 2021). This policy is considered a breakthrough and innovation for the advancement of education in Indonesia. But in fact, this policy reaps the pros and cons that color the policy's launch (Priatmoko & Dzakiyyah, 2020).

Every educational policy needs to be evaluated, including the MBKM program. Previous research was conducted by Astuti et al. (Astuti et al. 2022) about student responses to implementing MBKM (Study on FEB Students who follow International Course Asia University). The results showed a positive response from university students providing adequate facilities for international course participants. These facilities include, by bureaucracy, very varied learning media from universities. In addition, there is research on the challenges of universities in implementing MBKM. Second, the research under the title of the challenges of higher educational documentary institutions in supporting the MBKM program by Yudhawasthi & Christiani (Yudhawasthi & Christiani, 2022). The challenges that universities face include regulation and the readiness of human resources. Due to this, changes to rules and educational curricula and the introduction of new documentation of pure science are priorities in improving professional education providers in library science, archives, and museology.



This MBKM research is still limited; no one has discussed the benefits and challenges from the students' perceptions who are directly involved in the MBKM program. Therefore, this study evaluated the benefits and challenges of the MBKM policy faced by students. Although this policy has been in place for two years, the evaluation of its implementation still deserves to be implemented and discussed. It is hoped that with research on the performance of MBKM between its benefits and challenges from the students' perceptions, it is expected to be able to become an evaluation material to improve the quality of the MBKM program so that the objectives of this MBKM program can be implemented to the maximum.

### **The Concept of Independent Learning -Independent Campus**

The essence of the MBKM curriculum is the freedom and autonomy of institutions, lecturers from the bureaucracy, and undergraduate students in all Indonesian universities to choose their preferred fields and conduct off-campus learning activities to improve their competence through the Regulation of the Minister of Education and Culture Number 3 of 2020 concerning National Standards of Higher Education (Andari et al., 2021); (Fitriasari et al., 2020). The objectives to be achieved from the MBKM curriculum are interpreted as a form of granting freedom to educational institutions, lecturers, and students and independence from complicated bureaucracies to create an autonomous, non-bureaucratic culture of educational institutions and create an innovative learning system based on the interests and demands of the world. This policy provides excellent hope for universities to develop quickly and be able to create quality institutions. College autonomy is a long-held hope voiced by various universities (Ishak, 2021).

MBKM curriculum is the first step in improving Indonesia's higher education system. This MBKM Curriculum emphasizes higher education institutions that are more autonomous and flexible to create an innovative, non-restrictive learning culture following the needs of undergraduate students. The MBKM Curriculum is implemented to meet the demands of current changes and the need to prepare undergraduate students to enter the workforce. Universities must be able to design and implement a creative and innovative learning process so that undergraduate students can achieve optimal learning outcomes, including aspects of attitude, knowledge, and skills. MBKM Curriculum is believed to be an effort to free up an education system that better supports students and lecturers in realizing meaningful quality learning to deal with the disruption of the current era.

### **The Program of Independent Learning -Independent Campus**

MBKM curriculum is a continuation of the concept of the Merdeka Curriculum. The MBKM Curriculum concept is implemented in all universities with statistical data from 4593 public and private universities. Based on the statement delivered by the Acting Director General of Higher Education in Press Release Number: 020/Sipres/A6/II/2020, there are four essential policies for implementing MBKM (Lhutfi & Mardiani, 2020). These four essential policies are 1) the opening of new study programs. This policy allows public and private universities to open new study programs. However, this autonomy requires that the start of this program is given to universities with accreditation values A or B. 2) the accreditation system of universities. There is a

simplification in the accreditation of universities. Accreditation remains valid for five years and can be renewed automatically. Accreditation A will be given to universities that successfully obtain international certification; 3) making it easier for universities to become PTN-BH. This policy is expected to allow PTN BH to establish partnerships with the industry to carry out commercial projects. In addition, PTN BH can quickly make changes to financial arrangements according to what is needed most; and 4) The right to study for three semesters outside the study program. This policy of off-campus activities can be done with internships or practices in an organization. Students at MBKM can choose eight activity models (Sudaryanto et al., 2020); (Purwanti, 2021). These eight programs of MBKM are 1) student exchange; 2) Internship; 3) teaching assistance; 4) Research; 5) Humanitarian projects; 6) entrepreneurial activities; 7) Independent projects, and 8) Building a Village. The eight programs can be seen in the following figure 1.

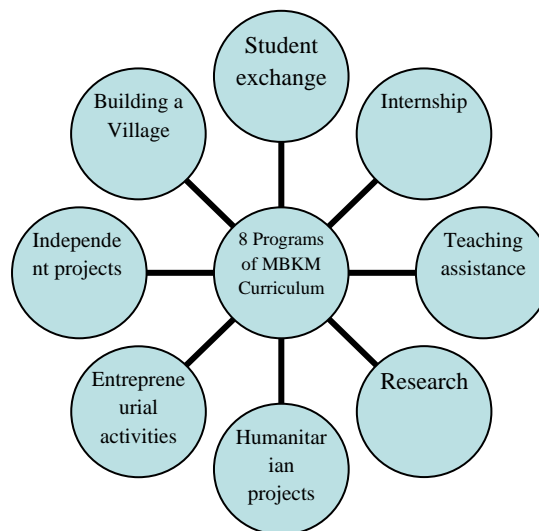


Figure 1. Off-Campus MBKM Program Model

In implementing the MBKM curriculum, the program "three semesters of study rights outside the study program", there are several general requirements that students and universities, including 1) must meet from accredited study programs, 2) elective students enrolled in PDD ikti. At the same time, the special requirements are programs that are carried out and should be agreed upon and arranged between universities and partners. MBKM Curriculum can be in the form of national programs prepared by the Ministry and programs organized by registered universities. In its implementation, universities involve external parties in formulating the curriculum so that the results of graduates can be accepted in the world of work.

## Method

This study is a qualitative descriptive approach to examine students' perceptions of implementing independent learning -independent campus curriculum between the benefits and challenges. The method used in this research

is case study research. This research was conducted at the Department of Arabic Language Education, Malang State University, which has implemented the MBKM Program. Data collection related to the benefits and challenges faced by students while participating in these activities was carried out through questions distributed using google forms. The data analysis technique used in this study is the data analysis technique, according to Matthew B. Miles and A. Michael Huberman, which consists of 4 stages: data collection, data reduction, data display, and conclusions. The data analysis technique begins with data collection. Researchers collected data on students' perceptions of implementing independent learning -independent campus curriculum between the benefits and challenges from various literary sources. The second stage is data reduction. The researcher selects and reviews the relevant literature for the research discussion. Next is the display or presentation of data. Researchers present data by identifying, classifying, and categorizing data according to the subject systematically and comprehensively. The last stage is data inference by verifying the data that has been processed based on the specified categorization. The flow of data analysis techniques can be seen in the image below:

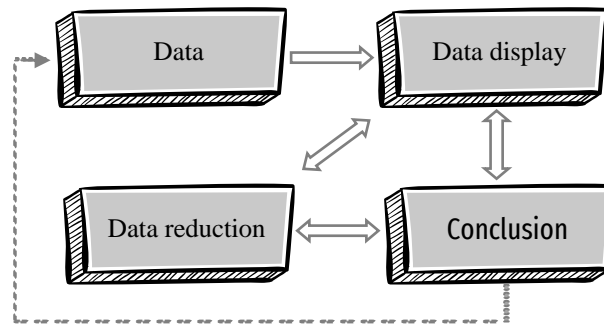


Figure 2. Miles & Huberman Data Analysis Techniques

## Results

Arabic language education students who participated in MBKM activities consisted of 95 students. Respondents were dominated by female students, with a total of 71 students (74.74%). Judging from the length of academic study, the number of students ranged from 2.10% to 50.53%, which third-year students dominated. Details of respondents by gender and length of academic study are in Table 1.

Table 1. The participants of MBKM programs

	Demographic Characteristics	Percentage
Gender	Male	24 (25,26%)
	Female	71 (74,74%)
Length of Academic Study	First-year	10 (10,53%)
	Second year	35 (36,84%)
	Third year	48 (50,53%)
	Fourth-year	2 (2.10%)

### Implementation of MBKM Curriculum

After conducting a more in-depth analysis on implementing the MBKM program in the Arabic language education department at Malang State University, 95 students participated in 5 MBKM programs out of 8 existing programs. Students who took part in village building activities were 1 student. The percentage who participated in this program was 1.05%. With this program, students can propose the village they want to develop in Malang or their hometown. Meanwhile, students who participate in the research program consist of 3 students. The percentage who participated in this program was 3.16%. This program is implemented at the University of Darussalam Gontor.

Third, students participating in the internship program consisted of 7 students. The percentage who participated in this program was 7.37%. Internships are carried out in the fields of translation and calligraphy among institutions *Lisan Arabi*, *Baitul Kilmah*, and *Fanjamil*. Meanwhile, 13 students participated in the student exchange program. The percentage who participated in this program was 13.68%. Malang State University collaborates with the State University of Semarang and Jakarta to conduct this program. And the most dominating participants are those who take teaching assistance with a total of 71 students. The percentage who participated in this program was 74.74%. Schools invited to collaborate for teaching assistance are spread in several cities; Malang, Papua, and others. You can see the data in Figure 3.

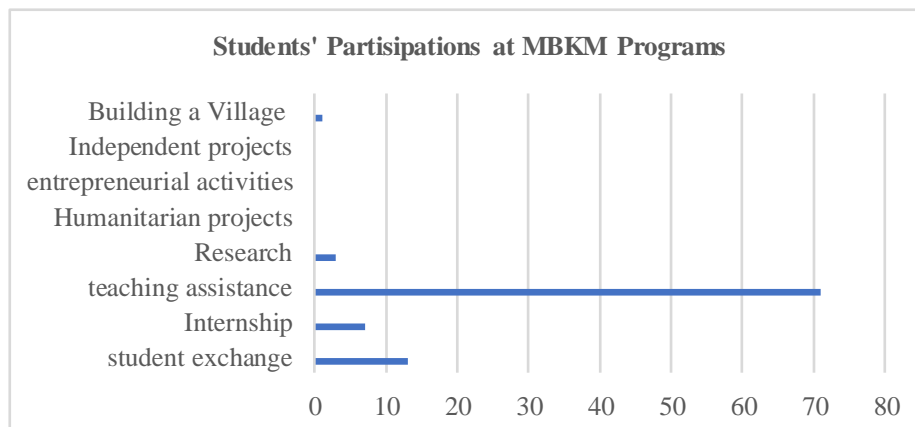


Figure 3. Participants of MBKM Programs

### Students' Perceptions of the Benefits of Implementing MBKM Curriculum

To find out the success rate of the MBKM program that has been running at this Malang State University Arabic language education study program, the researchers conducted a more in-depth study by digging up information about students' opinions regarding the benefits they get when participating in MBKM activities and the benefits after completing these activities. Most students feel that MBKM activities have an impact and benefit them. Participants from the Arabic language education study program who recently participated in this MBKM activity stated that they could meet new people, exchange ideas and discuss with students outside UM, and learn a lot from students learning outside UM. This is supported by the statements of students participating in student

exchanges. They feel the benefits of joining this program and have many relationships with various universities. More than that, the benefits of the MBKM program also train students to practice public speaking, leadership, and a helping spirit. This follows what is felt by students participating in the village building program. Students can help the community develop the village, have many relationships, learn to carry out the mandate well, practice patience and public speaking, and be confident.

Moreover, the majority of students who participated in the teaching assistant program reported that the benefit of implementing the MBKM curriculum with the teaching assistance program are 1) adding experience in fun teaching practices and knowing that being a teacher is not only teaching but being an example and role model for students; 2) Help schools improve literacy and numeracy, help develop learning media, prepare good learning tools (syllabus, porta, promissory notes, lesson plans), improve school administration, participate in helping complete school accreditation administration. 3) Gain experience adapting to the school environment and members such as teachers, staff, and students. In addition, students must adapt to rules and customs or school culture that are quite new for students, so they must learn to adapt; 4) Train self-confidence and recognize the characteristics of students; 5) Assist schools in preparing Adiwiyata schools, fostering extracurricular activities at school; 6) Able to work with teamwork in groups, new insights into the teaching profession; 7) Opportunity to attend and try to provide solutions, especially in achieving learning goals during the pandemic, and making up for the lags of many students and schools themselves who experience many obstacles in technology due to areas that are difficult to reach by the internet.

Moreover, based on the statements of students participating in the research program, the best practice they get from participating in this program is that they can, where students conduct corpus-based analysis and linguistics with the guidance of lecturers who are qualified in their fields and supportive research environment for learning Arabic. Meanwhile, students who participate in the activities of MBKM Internships, namely increasing experience in the world of internships, especially in translation, writing, and publishing, starting from book cover design, layouting, book editing, ISBN submission, and getting courses on the translation of classic books. And also have Practical experience in calligraphy.

### **Students' Perceptions of the Challenges in Implementing MBKM Curriculum**

In its implementation, this MBKM policy faces several challenges, both in general and specifically regarding available programs. The challenge, in general, as stated by most education observers, is that this policy will be difficult to do, especially for study programs that demand theoretical understanding, such as mathematics, biology, sociology, and political science. This is because the study program leads to scientific development, not job skills. Another common challenge of implementing MBKM is that universities with limited human resources, infrastructure, and remote geographical location certainly have major obstacles to establishing cooperation with large institutions and leading universities to create productive and meaningful cooperation for the development of science and student experience.

After monitoring the evaluation of MBKM activities in the Arabic Language Education Study Program, here are some of the shortcomings and obstacles encountered by students while carrying out activities; *First*, In terms of socialization of activities, students said that socialization is not in-depth, lack of debriefing, program preparation and seems forced to final students. This program is not suitable if it is intended for 7th-semester students. The solution is that this program aims at students taking semesters 5 or 6. *Second*, in terms of implementation. Students said that the information on activities is unclear and not systematic. The sudden implementation of the program was not detailed and not well organized. Then, in terms of mentoring, due to the pandemic, many lecturers are not guiding, assisting, and monitoring universities, civil servant teachers, institutions, and Field Supervisors provided by the Ministry of Education and Culture who do not come from the same area, making it difficult for us to interact directly. The solution should be carefully determined regarding the timeline for implementing the MBKM program so that students and other parties can manage time well.

In the technical issues, some challenges are faced by the student, such as funding. Students said that pocket money is not on time, so students are required to use personal costs in carrying out this activity. *Second*, coordination with partner institutions (universities and schools). Especially what happens at teaching campuses, the institution that accepts campus teaching must be informed when students enter the school from what time to what time. Third, about scheduling. These programs need to synchronize time between MBKM, especially teaching assistance with Teaching practicum, so there is no miscommunication due to the focus on one activity. And also, the actual credit exchange is not quite right because the conversion of the subject is necessary for students. So students can't learn that subject in the learning process.

## Discussion

This MBKM Curriculum is believed to be an effort to enable an education system that is more in favor of students and lecturers in achieving meaningful quality learning to deal with the disruption of the current era. Learning is expected to provide challenges and opportunities for developing creativity, capacity, personality, and student needs, as well as independence in finding and finding knowledge through reality and dynamics in the field, such as ability needs, real problems, and social interaction. Collaboration, self-management, performance demands, targets, and achievements. From this statement, it can be concluded that national education has crucial problems regarding people's education and the national purpose of education. On the one hand, he tries to focus on the soft skill aspect. On the other hand, government policies tend to underline hard skills (Krishnapatria, 2021).

MBKM Curriculum concept requires education to make a strong contribution by requiring students to study freely. Simply put, MBKM is freedom of thought. MBKM Curriculum focuses on deep learning in a more real community environment. MBKM Curriculum must meet the educational trend in the Industrial Revolution 4.0, namely the mastery of new literacy consisting of data, technological, and human literacy (Perdana et al., 2021). MBKM Curriculum is expected to be able to remove the gap between the world of education, in this case, a

college with the real world. Implementing this MBKM Curriculum is expected to support the efforts of teacher study programs in preparing undergraduate students with various skills and experiences outside the study program to answer the demands and needs of the 21st-century education world. The MBKM Curriculum provides breadth in various fields of science and learning experiences for students so that later they can find where their passion is so that they are ready and able to face the real world.

MBKM Curriculum focuses on the student's perspective. In this MBKM Curriculum, students have the right to study outside the campus. The university must facilitate students who want to take the MBKM program. The learning experience from practical work is expected to encourage students to get to know the real industrial world. On the one hand, students get to know the business world and industry directly when participating in the internship program. They also experience a new experience of academic atmosphere and competition when they choose a student exchange program. Soft and hard skills are trained in the real world. Long story short, students are presented with practical and real conditions they will face when they graduate from college.

MBKM Curriculum became a discussion both in the formal environment of universities and received many responses from both the academic community and the general public. In general, this independent campus program gives freedom to educational institutions from the existence of a convoluted bureaucratic system and gives students the freedom to have the desired study program. With this program, it is hoped that the creation of a culture of educational institutions that are independent, not bureaucratic, and the creation of a creative and innovative learning system following the demands of the modern world.

However, as a breakthrough new policy in the field of education from the Ministry of Education and Culture, the existence of such novelty makes this MBKM has the potential to cause mass and tends to be difficult to implement. This is evidenced by the number of Gross Participation Figures (APKs) only in the range of 31.5%. These results show that the implementation of the MBKM policy has not been fully evenly distributed in universities. Some of the reasons that reinforce such statements are 1) the policy objectives made are often unclear; 2) planned programs face a scarcity of resources, such as lack of information and inadequate and under-skilled staff ; 3) if the new program is inconsistent with its mission, then its implementation will tend to be inconsistent as well and carried out in ways that are already prevalent; 4) Equalization of SOP implementation of new policies with old SOPs that are not appropriate (Purike 2021).

This MBKM Curriculum received a mixed response from universities and education observers delivered on both print and online national media. This indicates that there are still pros and cons related to this MBKM policy. Although the purpose of this policy is expressly to create a culture of educational institutions that are autonomous, non-bureaucratic, and innovative learning systems based on the interests and demands of the modern world, not all universities can implement this policy. Nizam also recognizes that universities in Indonesia have special characteristics and diverse readiness to implement MBKM policies. Pro parties with this MBKM policy come from established universities. This pro party argues that the new policy is in line with the internal campus policy that has been carried out so that it is easy to integrate with this MBKM policy.

Meanwhile, the counterparty came from a small college. The counterparty stated that this policy has some difficulties because the requirements are quite heavy.

## Conclusion

The essence of MBKM's policy is the freedom and autonomy of institution education, lecturers from the bureaucracy, and undergraduate students in all Indonesian universities to choose their preferred fields and conduct off-campus learning activities to improve their competence. MbKM's policy is the first step in improving Indonesia's higher education system. The make policy concept requires education to make a strong contribution by requiring students to study freely. Simply put, MBKM is freedom of thought. There are four important policies in the implementation of MBKM, namely 1) the opening of new study programs, 2) the accreditation system of universities, and 3) making it easier for universities to become PTN-BH. and 4) freedom of learning for 3 semesters outside the study program. The four policies have a legal umbrella that overshadows them. However, as a breakthrough in the field of new policies from the Ministry of Education and Culture, the existence of such novelty gives this MBKM the potential to cause time. And tends to be difficult to implement. This is evidenced by the number of Gross Participation Figures (APKs) only in the range of 31.5%. These results show that the implementation of the MBKM policy has not been fully evenly distributed in universities. In its implementation, this MBKM policy faces several challenges, both in general and specifically regarding available programs. In its implementation, this MBKM policy drew criticism regarding 4 important programs from existing policies. Regardless of the pros, cons, challenges, and criticisms obtained from the emergence of the MBKM policy that has only been running for one year, researchers agree and support it. This program certainly has improvements in existing policies and evaluations of programs carried out during this one year. With the evaluation and input, this MBKM policy is no longer expected to be a compulsion, making its implementation a formality. On the contrary, this policy will have a positive impact on the field of education in Indonesia. It can be an alternative solution that effectively addresses educational and cultural problems in Indonesia.

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## High School Students' Attitude toward the Implementation of English Curriculum in Indonesia

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**Abstract:** The enactment of the latest English curriculum in Indonesia, namely K2013 has been implemented over six years. Thus, determining student' attitude is needed to mind map their involvement in learning English. This study aimed at investigating high school students' attitude toward the implementation of the 2013 English curriculum. The research used qualitative research, specifically survey design with a total number of the sample was 30 second grade of secondary students in one school in Palembang, South Sumatera as the participant. The open-ended questionnaire was used for collecting the data which consist of twelve questions about students' cognitive skills in learning English, preparation, and also behavior elements. All those were analyzed by using narrative analysis. The result depicted high school students demonstrating a positive attitude in cognitive skills ; they prepared, showed readiness in learning and responding to teachers, yet interactive activities were requested by them and also delivered material clearly. This research is expected to empower teachers in cultivating interactive activities as well as strengthening the learning objectives.

**Keywords:** English Education, Student' Attitude, Curriculum Implementation

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### Introduction

Admittedly, the enactment of the 2013 English curriculum has been implemented over six years. There are several adjustments in this curriculum which have restored the essence of English language learning such as the use of Communicative Language Teaching (CLT) approach to improve students' communication skills, more student-centered rather than teacher-centered. The learning objectives is also the elaboration of three domains that refer to the taxonomy of educational objectives which include attitude, knowledge, and skills. These paradigms are expected to prepare youths in facing future world challenges toward the quality of education in the 21st century. Thus, Students should be able to learn through activities; observation, inquiring, exploration, association, and communication (Nur & Madkur, 2014). Consequently, this curriculum is expected to encourage students to be more active, more critical in learning, be independent, and creative while using English. The

teacher only serves as a model of language user and language learner. Several studies found that the teacher faced several problems in the implementation of the English curriculum. Teachers in the Sulawesi Region did not fully implement the 2013 curriculum due to time constraints, challenged by the learning objectives that covered students' attitude, knowledge, and skills (Darmawan et al, 2018). Students were not accustomed to follow activities which included asking, analyzing, conveying reason, and creating ideas due to inability of students in adapting their habit from memorizing basic facts into more contextual and complex ways, therefore teachers felt difficult to develop teaching strategies to enhance higher-order thinking skills. Consequently, those problems made teachers unable to handle several mandatory regulations. Similarly, most of the students in Tegal lacked the ability in English, they were passive in the learning process, so they were not active in the learning process (Ekawati, 2018). Those cases revealed that students did not show a positive attitude in learning due to difficulties to engage with the learning process. Thus, it can be said that students were unable to think critically. Therefore, the teachers did not implement the steps of *K2013* curriculum models (i.e. inquiry-based learning, project-based learning, discovery learning, problem-based learning and task-based learning), or even scientific approach effectively. In this case, determining students' attitude is needed in order to understand how they respond or view the English lesson. Students' attitude is essential to consider whether the teaching learning process can be successful, or whether the methodologies and learning materials applied by the teacher are already suitable or not (Al-Ghasab, 2022; Alhassan & Osei, 2022; Demirbilek, Talan, & Alzouebi, 2022; Hu, 2021; Othman et al, 2015; Unsal Sakiroglu, 2020; Zulfikar, Dahliana, and Sari, 2019). In addition, Abu-Snoubar (2017) highlighted that language learning cannot significantly be implemented without students' attitude because they can be either motivated or demotivated when it shows positive or negative respectively. It can be a reflection whether the way, method or material that is used by teachers are proper with students' wants. However, most previous researchers focused on investigating teachers' perception, while the research about student' attitude is still inadequate whereas students have an active role in learning and determining whether they can achieve the learning objectives that has been set. Therefore, this present study aimed at investigating high school students' attitude toward the implementation of English learning process done by teachers at one of public senior high school in Palembang where they have implemented the 2013 ELT curriculum with a research question:

1. What is high school students' attitude toward the implementation of the 2013 English Curriculum?

## **Model of 2013 Curriculum**

Attitude reflects an expression 'point of view' and feeling that everyone has toward something. Generally, attitude refers to a hypothetical psychological construct that defines behaviors as well as explains people direction and persistence (Al-Mamun, Rahman, Rahman and Hossaim; 2012). The paradigms and adjustment of 2013 curriculum represent that students have an essential role in the teaching and learning process as they are required to be more active (Permendikbud, No. 65, 2013) in exploring knowledge. They are encouraged to think critically in identifying, understanding, solving the problem and implementing the knowledge in students' life, (Hakim, 2017), learn by themselves independently, and be creative. Students may also give opinions related to

the methodology or learning materials that are given by the teacher, whether those are suitable with their needs, wants, and condition. Consequently, by identifying students' attitude, belief, or opinion in teaching and learning process, empower teachers to track students' progress in learning, as well as to maintain their views about the activities.

In addition, Maharani and Sri (2017) highlighted that attitude covers three major components namely, cognitive, behavior, and affective aspects. These concepts are based on the paradigm of curriculum 2013. First, cognitive refers to students' reliance toward the object, here English lesson. This aspect involves knowledge and students' understanding in the language learning process they have gained. It covers four steps on how students'; connecting previous and new knowledge, discovering new knowledge, examining and applying new knowledge in many situations. Consequently, it investigates students' knowledge toward learning English. This aspect can be seen through five levels of activities namely, understanding, applying, applying, analyzing, evaluating, and creating. Second, behavior or emotional refers to a tendency to behave or act in certain ways based on the object's attitude. In learning English, students should be able to identify their ability, reflect how they behave during the learning process and adapt with behavior of the target language in the community in order to reach the learning objectives. It can be seen through activities of observing, questioning, exploring, reasoning, presenting, and creating. These behavior aspects are expected to be more meaningful skills if students do it regularly.

Last, emotional or affective aspects. It refers to personal sensibility or an emotion that an individual has toward an object they have learned. It covers student' attitude in receiving, responding, appreciating, practicing, and characterizing knowledge given by the teachers. Attitude reveals the students involved with the learning process, whether they like or dislike the methodology, procedures, or materials given by teachers. This condition can motivate and empower students in receiving learning, and solving problems related to the material so they can obtain the information and language skills taught by teachers. Thus, students' need to have a positive attitude to help teachers in organizing numerous teaching and learning activities, approaches, or methodologies that are suitable for students' conditions in learning English. It also encourages students to engage with the process, try to cope with the learning objectives deeply, and empowers them to achieve it effectively. Meanwhile, students with a negative attitude toward the teacher tend to ignore the material taught, are not accustomed with the learning rules and objectives, and at last they will find a lot of obstacles in understanding the learning material (Maharani, & Sri, 2017).

In addition to this, assessment is essentially needed. The assessment of students' attitude can be done by using several techniques such as observation, direct questions, and self-report. Direct questions are highly recommended to gather more information about each of the students. Teachers can directly ask students directly about their attitude in learning, for instance 'what is your opinion about the enactment of English policy? These open-ended questions can direct students to give a long response based on their experience in learning English. The technique can significantly uncover students' attitude toward the English lesson and help teachers in mapping their attitude and fostering the needs and conditions in learning English.

## Method

### Research Design

This study employed qualitative research with a survey design. This study aimed at investigating high school students' attitude toward the implementation of the 2013 English curriculum done by teachers at school. Creswell (2012) states that survey design is a research procedure which is used to describe the attitude, opinions, behaviors, or characteristics of a sample or entire population toward a certain issue. Moreover, the participants were 30 high school students in the second grade at one of the public schools in Palembang. The researcher took 30 students or 15% of the total population of 180 students. According to Arikunto (2010), researchers can take either 10%- 15% or 20%-25% of the population as the samples. The 30 samples have been selected by using simple random sampling. Cohen et al (2007) state that each member of the population has an equal chance of being chosen in simple random sampling technique. The reason for using simple random sampling is; the students' availability because they were in the process of the final examination in school, so not all of them want to get involved in this research.

### Instruments

The writer used an open-ended questionnaire in collecting the data. The 12 questions are divided into three categories such as 4 questions investigating students' attitude in terms of knowledge (cognitive), 4 questions about students' behavior in learning English, and 4 questions about students' emotion in learning English. The instrument had validated and checked by two English teachers who had received English curriculum 2013 training, experienced in teaching for more than eight years. Thus, all of questions are appropriate in terms of content and language to measure students' attitude toward the implementation of the 2013 English Curriculum. The questionnaire is presented in two languages, Bahasa Indonesia and English language.

### Procedures

The questionnaire was administered to 30 second grade high school students in google form and it will be administered through online. The researcher individually went to the school participants and met the English teachers. Moreover, the teacher helped to disseminate links of online questionnaires to the second grade of senior high school students. The duration of answering the question is approximately 15 minutes, and students may respond based on their own experience in learning English. Moreover, the result of the questionnaire was analyzed by using narrative analysis to ensure that the data reflect a full picture of students' attitude.

### Result

The result of the research revealed some important information on students' attitudes. The attitudes were

divided into three main categories, cognitive aspects, behavior aspects and affective aspects of English learning.

### *Students' Attitude in Cognitive Aspects*

First question:

What do you do in order to understand English lessons taught by your teacher?

It reported that all 30 students claimed that they always pay attention to the teacher's explanation while teaching. 10 out of 20 students were usually taking notes, summarizing the material given, and doing self-study and re-reading at home to deeply understand the English lesson taught by their teacher. Another two students stated that they did an analysis if they did understand the material by comparing it to other learning sources either from books or google.

Second question:

What do you do to evaluate, to what extent your ability in English?

This question explores how students' cognitive domain in evaluating their English ability. The students' response varied in these items. The result showed that 10 students practiced their English ability by comprehending and doing exercises, while 7 students did an evaluation by watching foreign movies with English subtitles and 2 of them were also playing games in English context to measure how well they understand English, one preferred reading English comics and followed singing contests respectively. Another student chose to practice their English by having conversations with friends. While the rest of the participants answered that they were only learning, understanding, and remembering.

Question 3:

If there is an English text followed by several questions related to the text. What steps

Do you take to answer those questions?

It reported that 12 students read the text several times to understand the context of the information mentioned in the English text, and afterward they read and tried to comprehend the questions. Interestingly, two students also translated the text first to understand the whole text. Afterwards they went to the questions and back to read the text carefully in order to find out the answer. Meanwhile, 9 students did the opposite, they were reading the question firstly, trying to understand the question pattern. Two of them were translating the questions first. Surprisingly the rest of the whole participants just directly answered the question given.

Questions 4:

How do you learn English?

The students' response was significantly varied. 6 students learnt and acquired English through playing games, and watching videos, movies, or dramas. 4 students asked and followed additional English course outside school in order to help them respectively, 4 students focused on building vocabulary by comprehending books, applying the vocabulary into pronunciation words, one students asked someone to help them in learning

English, and the rest of the participants were practiced the lesson school by using English application and some answered remembering and trying to understand English lesson.

### ***Students' Behavior in Learning English***

#### Question 5

(What is your preparation before learning English in class?)

The finding showed that the majority of students (13 students) prepared dictionaries, and English books to show their readiness. Other 9 students prepared by reading the learning material first, trying to understand the material that will be given on that day, and highlighting difficult material. Meanwhile the rest of the participants answered nothing in preparation.

#### Question 6

What do you do to train your English skill?

The finding reported that almost all participants practice their English particularly in speaking skill by singing English songs, having conversation with friends either in school or in an English course (20 students). Three of them explored their skill by writing stories in English. Moreover, 3 students preferred listening to English recording and also music to improve their pronunciation, and the rest just learnt the material given, memorized it and watched videos.

#### Question 7

In discussion activity, what do you do if the teacher asks you to speak in English?

Interestingly, the result reported that the majority of students were confident to speak without thinking over or refusing the chances. 6 students took the opportunity and tried to speak although they were nervous due to lack of vocabulary, inability to pronounce words correctly, or even made grammatical errors. Another two students looked for appropriate vocabulary firstly in both book and google before starting speaking. Surprisingly, 3 students refused to do that due to inability to speak in English

#### Question 8

Do you often create work in English? How do you create it?

This question revealed that the majority of students have not created an English work during the learning process in second grade of senior high school. Only 7 students regularly have made creations, simple English songs, short stories, English quotes or some dialogues regularly. Meanwhile, another 4 students did it but irregularly.

### ***Students' Emotional Aspects***

#### Question 9

What do you do when your teacher delivers an English lesson?



The response of this question revealed that 28 out of 20 participants paid attention to their teachers, they liked to respond to the teachers while teaching and learning in order to enhance their understanding about English. Meanwhile, the two students just focused and tried to concentrate on learning English.

#### Question 10

What do you do to play an active role while learning English in class?

Some students answered that they actively engaged in learning English by asking questions regularly related to the material, and or responding to the questions given (6 students), while another 6 students responded to it once if the teacher asked them directly. Surprisingly, one student tried to help their friends in learning vocabulary and tenses to show their active role in class. Moreover, 9 students just tried to listen, pay attention, understand the meaning of what the teacher has delivered and follow the learning flows. Surprisingly, two students gave responses 'confused' and 'I don't know' respectively, and another two also represented that they were quite passive in class.

#### Question 11

From 4 skills in English "speaking, listening, reading, writing" which one do you like the most?

Surprisingly, the majority of students preferred listening skills, they enjoyed listening to music and also people's conversations. Moreover, 9 students choose speaking skills because they like to interact with others. Other 8 students chose reading skills. However, only one student choose writing because it helps and trains, and other 1 students choose all those skills.

#### Question 12

What kind of English learning activities do you expect existed in class?

In terms of learning activities, 5 students agreed to have more speaking activities; dialog, conversation with friends during the learning hours in order to communicate with native speakers. 3 students answered more reading practice to enhance their pronunciation. Interestingly, the other 5 students agreed to have more practice in both reading and speaking. 4 students expected the teacher to deliver the material more clearly so students can significantly comprehend the thorough information. Other 3 students answered more enjoyable activities, English quizzes and games. Meanwhile, the rest of them answered presentation activities, watching English videos, and writing respectively'.

### **Discussion**

First, all the responses above covered students' knowledge in learning English. It illustrated that the majority of high school students showed a positive attitude while learning English. They were involved with the learning activities, did deeper understanding and analyzed the knowledge as it stated in the first question. They usually analyzed the questions, comprehend the text, and tried to detect the problems in the questions first before ending up with the answers. Consequently, they do it very carefully. In other words, they know how to solve problems

in questions and answer sessions. Therefore, not all students can analyze the material given by the teacher nor try to determine the knowledge given to other sources. This condition might happen because students' conditions in learning English vary exactly from one to another. Some of them were following additional English courses outside school, and some of them were doing self- study by watching videos, movies, or dramas, comprehending books and trying to understand English lessons by themselves.

Second, behavior aspects of attitude in questions 5 to 8. It was found that high school students showed a positive attitude before learning, they did several preparations and showed their readiness in learning by comprehending the material firstly, they were also preparing all the learning stuff. Most of them were confident to speak in front of others, but only some of them were creative in creating English work. However, they always evaluate and assess how far their understanding in English is, and validate whether they are already capable enough in English or not. Majority of students were confident to speak without thinking over or refusing the chances, although some of them were nervous but they were not afraid of making mistakes. However, the majority of students were quite passive in creating or making an English work.

Third, students showed positive reactions toward English lessons and their teachers. They were receiving and responding to the teachers by focusing on learn, paying attention. They actively participate in class by asking questions regularly related to the material, and responding to teachers' questions. They appreciated teachers by showing their eagerness to know the meaning of what the teacher speaks and showed respect and good attitudes. In addition, the majority of students prefer listening and speaking skills, while only a small number with reading and writing skills. Consequently, students hope that teachers can deliver the material clearly so students can understand it easily. They also request enjoyable and interactive learning activities such as more speaking activities, practical reading, more English quizzes and games, presentations, watching English videos, and writing activities. In other words, high school students' have a positive attitude in terms of cognitive, behavior, and emotional aspects. It supported by Zulfikar et al., (2019) stated that the attitude of cognitive aspects is influenced by students' language level. For instance, when students acquire good language skills, they tend to like English better. Thus, it encourages them to improve their English language skills and engage with the learning process effectively. In addition, the majority of high school students have positive behavior although some were passive in class and it might happen, they are not used to speaking activities. It was in line with Darmawan, Rusman, Wahyudin, Ali (2018), majority of high school graduates were not able to communicate intelligibly in English. Thus students might be preferred to dominantly use their mother tongue due to lack of opportunity to actually practice speaking English in the classroom and socialize outside the classroom (Nur and Madkur, 2014). Importantly, students are indeed interested in learning English, and they have a positive attitude toward their teachers in school. Feng and Chen (2009) highlighted that learning language is influenced by emotional factors. Students will be more engaged and better if they are taught by effective teachers. Consequently, the teachers play essential role in improving students' success in their study. Last but not least, all these interpretations indicate where 30 high school students in this are still involving themselves in the activities of receiving, responding, appreciating, practicing, remembering, understanding, analyzing, evaluating, observing, questioning, exploring, while applying, creating, characterizing, presenting are not.

## Conclusion

Based on the findings above, it can be concluded that the majority of participants have shown positive attitudes in cognitive aspects while acquiring English knowledge, preparing everything to show their readiness before learning, and respecting teachers'. However in some cases, some of them are not significantly active in class. In emotional components, they are eager in cultivating English but majority of them prefer speaking and listening, reading, while writing is the last option. They expect teachers can deliver the English material more clearly, and add more interactive learning activities. The result of this research cannot illustrate for far students have positive attitude in the implementation of English lessons done by their teacher, however it can give an overview on the variety of students' attitude during the implementation which significantly helps teachers to develop the learning process and strengthen the objectives. In addition, this research instrument can be used by teachers.

## Recommendations

Therefore, it is important for teachers to regularly track their students' attitude at least two times in one semester in order to identify whether they have problems in learning English so it affects their involvement in classroom activities. The teacher can also adapt the question above and directly ask students individually to obtain specific information about students' attitude. Moreover, teachers should also build a connection and positive attitude to make students be open with their attitude.

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## Learning through Arduino Projects: Does Gender Matter?

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**Abstract:** The focus of this paper is on using the Arduino as an educational tool and encouraging equal participation of women in the ICT field. The purpose is to contribute to the understanding of gender differences in working and learning on Arduino projects. The target population consists of first-year undergraduate students of Informatics where male students outnumber female students. Consequently, the sample consists of 44 students, 75% male and 25% female. The Arduino platform was used in an introductory course in information science. During 15 hours of computer lab lessons, students had to make five Arduino projects working in teams, supervised by a teacher and a peer-mentor. Learning through Arduino projects contributes to a better understanding of interactions between hardware, software and real-world systems, which is of fundamental importance for future ICT specialists. Based on the conducted research, statistically significant differences between gender were confirmed in student self-assessment of work on Arduino projects considering teamwork, learning and use of Arduino. Female students are more likely to be more frustrated with the work on Arduino projects, work with Arduino hardware, consider their involvement in teamwork less important, and share less of their knowledge within the team. However, through peer and active learning, working on Arduino projects supervised by the teacher, all the students acquired useful knowledge, got a deeper understanding of the course topics and improved their problem-solving skills.

**Keywords:** Arduino, STEM, ICT, Gender Gap, Gender Stereotype, Peer Learning

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### Introduction

This paper reports about using Arduino for students' projects on an introductory ICT course where self-assessment of learning through Arduino projects is researched. The aim of the research is to determine whether there are gender differences in the self-assessment of learning with Arduino. The purpose of this paper is to contribute to the understanding of gender gap in ICT.

The Arduino platform is suitable for educational usage because it is open-source hardware, adaptable, easy to use, cheap, has a user-friendly development environment, and there are many resources available for teachers and students. The Arduino helps students develop STEM knowledge, problem solving skills and acquire

competencies that will play an important role in future jobs driven by robotics, Internet of things, machine learning, artificial intelligence and other emerging technologies. A lot of effort is being put in worldwide to support girls to code and make with the Arduino platform. The goal mentioned in the Arduino User Group manifesto is to build a global network of communities that will co-design projects, exchange ideas, organize collaborative activities, and teach official Arduino courses — regardless of age, gender, language and technical ability. “Being inclusive is at the core of our mission: making technology easy to use, we want to empower everybody to be free to innovate.” (<https://www.arduino.cc/en/aug/>). Analyzing the Arduino community, gender is not a big part of its online identity in Arduino Forums, and gender was left entirely out of user profiles on the Arduino Forum (Buckley, 2017). Despite that, men created the majority of traditional Arduino projects posted on Vimeo, YouTube, Flickr and other websites (Guzzetti & Lesley, 2016: 277).

Learning about and with modern technology, as well as the adoption of that technology, should be gender neutral, but in practice this is not the case. Long-standing gender stereotypes distance female students away from STEM, making gender disparities prevalent in STEM fields (Bal, 2022; Nozava & Regt, 2020; Punzalan, 2022; Ruttenberg-Rozen, Hynes, & Mamolo, 2022). These stereotypes, and lack of digital self-confidence by women, are the biggest obstacle to gender equality in ICT (EIGE, 2017). Girls are less confident in their maths, science and IT abilities than boys, which leads to girls’ lower engagement in science and ICT (Ramos et al., 2018). According to the UNESCO research, girls lose interest in STEM subjects with age, starting with lower levels of participation at secondary school, continuing in higher education, where only 35% of STEM students are women, and only 3% of female students choosing information and communication technologies studies (Nozava & Regt, 2020). These lead to the insufficient representation of girls and women in STEM and ICT in higher education. A research conducted on more than 2000 pre-university and university students in United Kingdom shows that the gender gap in STEM begins at school where fewer and fewer girls are learning STEM subjects, and continues at work and career, as shown in Figure 1 (Andrews et al., 2017).

Girls are less likely to study STEM subjects at school and this continues through university and into their careers

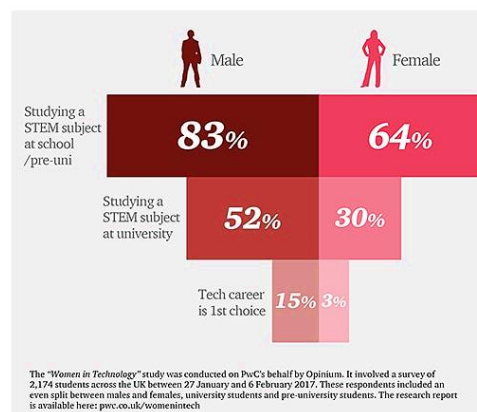


Figure 1. Male vs Female in STEM at School and Work

Source: <https://www.pwc.co.uk/who-we-are/women-in-technology/time-to-close-the-gender-gap.html>

Globally, the proportion of women who graduated in ICT related studies is approx. 25% (Ramos et al., 2018). Figure 2 shows countries according to the percentage of women who graduated in ICT related studies (West et al., 2019). A paradox has been observed which indicates that countries with low levels of gender equality (figure 2, red circle) shows the largest percentage of women graduated in ICT, and vice versa (Figure 2, blue circle).

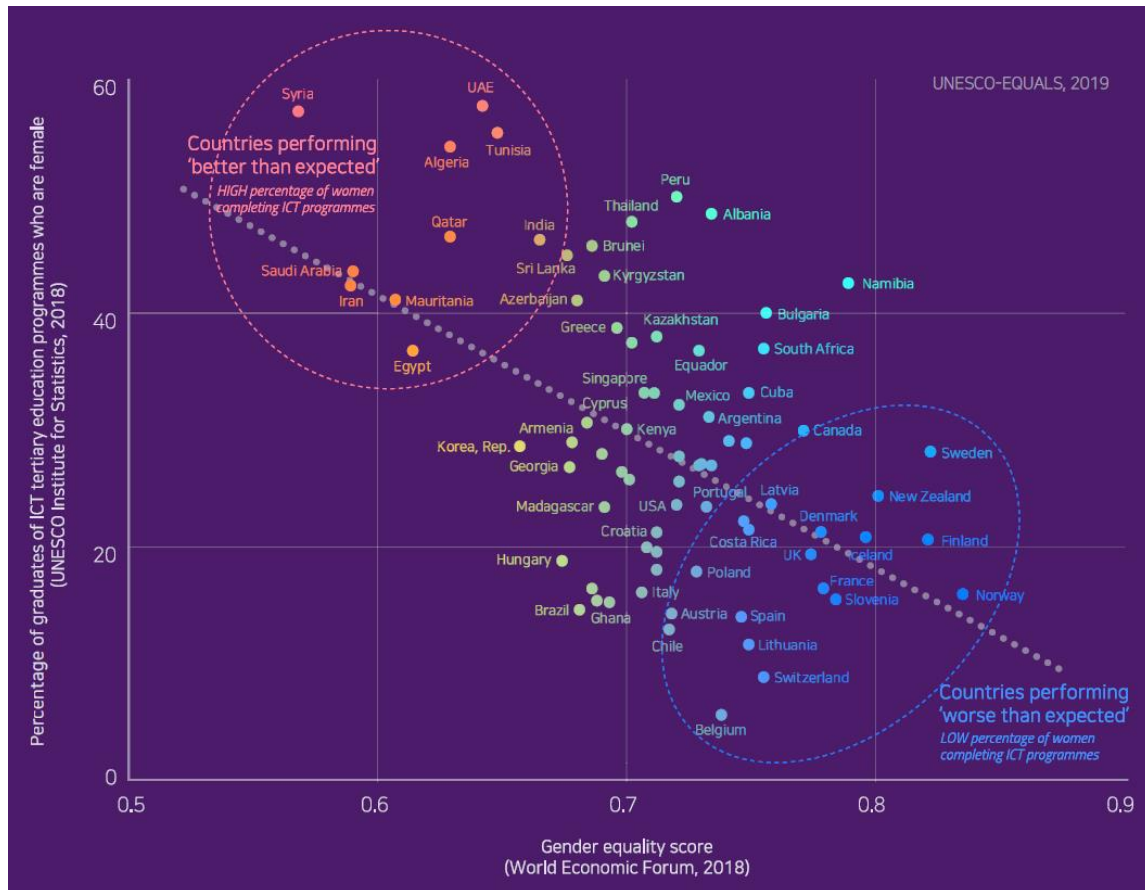


Figure 2. ICT Gender Equality Paradox

Source: <https://en.unesco.org/EQUALS/ICT-GE-paradox>

Female students usually view themselves as less competent in programming and technical skills, although research shows that gender does not affect programming performance. They find out that the lack of female role models reinforces the perception that a STEM career is not suitable for women (Andrews et al., 2017). Looking at the past, there are only a few famous women in computer science, like Ada Lovelace Byron and Grace Hopper, both the first computer programmers (Dice, 2020). It is a poorly known fact, that at the beginning of development of modern computing, programming was mostly done by women (Ramos et al., 2018).

In most countries of the European Union, share of men in the total number of employed persons with an ICT education is between 70% and 90% (Eurostat, 2021). Only 17% of women in European Union are involved in major technology jobs like programming, systems analysis, or software development, and they make only 20% of the graduates in the ICT degree programs (Sancier-Sultan & Scharf, 2022). Furthermore, the World

Economic Forum (Zahidi, 2021) reports that only 14% of women work in cloud computing, 20% in software engineering, and 32% are data and artificial intelligence professionals. Across major technology companies, female ICT employees are represented from 20% in Microsoft to 23% in Apple, Google and Facebook, while the most influential people are men, like Bill Gates, Steve Jobs, Jeff Bezos, Mark Zuckerberg, Larry Page and Elon Musk (Green, 2021).

## Methods

### Teaching Methodology

Arduino is recognized as a good educational tool, but the teaching should be pedagogically well-designed. Arduino in education entails project-based learning with a focus on student collaboration, interaction and peer-learning, encouraging problem solving skills and creative thinking. The introductory course of the first-year of the undergraduate study of Informatics used the methodology of project-based learning with Arduino during 15 hours of labs lessons. As future ICT specialists, it is important for students to be familiar with the Arduino platform and its capabilities, which professionals use to solve real-world problems. All teaching materials and other resources have been carefully selected, prepared and uploaded to Moodle. Online learning activities were used to prepare students for classes. Therefore, during the computer labs, students were focused on making an Arduino project. Students worked in teams, and there was at least one female student in each team, due to the greater possibility of peer learning within teams.

There were not only female teams. Each student had their own role in the team (connecting components, writing code, documenting, describing and presenting the project using a systems approach), and with each new project their roles rotated (Krelja Kurelovic at al., 2021). Thus, every student had the opportunity to engage in each team role. They created 5 projects using Arduino RFID kit with Arduino Uno microcontroller board. Each project had its own dynamics and deadlines, as well as evaluation criteria. For the overall success of the project, it was important that students collaborate, share knowledge and take responsibility. Students who had previous experience with Arduino (all male) became peer mentors, which enabled them to apply their knowledge.

### Research Methodology

The aim of the research is to determine whether there are gender differences in the self-assessment of the learning through Arduino projects. In order to fulfill the research objective, a questionnaire was created with 8 question items grouped in 4 categories: general (demographic data), teamwork, learning, and using Arduino. Each question item used Likert-type scale responses (5=strongly agree, 1=strongly disagree). At the end of semester, students were asked to complete an anonymous online questionnaire available on Moodle.

The research sample consists of 44 students (at the age of 18-21) who completely filled out the questionnaires, 33 male (75%) and 11 are female (25%) students. Sample represents 71% of all students enrolled in the course.



In accordance with the aim of the research, the following null hypothesis is proposed: There is no significant difference between gender in the self-assessment of learning through Arduino projects considering:

- teamwork (H1.1),
- learning (H1.2),
- use of Arduino (H1.3).

A t-test for two independent samples was used for testing the hypothesis (its three parts).

## Results and Discussion

By monitoring the number of students who enrolled in the 1st year of study of Informatics (ICT) at the Polytechnic of Rijeka, a higher proportion of male students (77% - 81%) compared to female students (19% - 23%) can be observed over years (table 1). In this case, the proportion of female students studying ICT is lower than reported by some authors (Nozava & Regt, 2020; Andrews et al., 2017), but it is higher than the European Union average of 17% (Eurostat, 2020).

Table 1. Number of Students in the 1<sup>st</sup> Year of Study of Informatics by Gender

Academic Year	Num of students	Male	Female
2021/22.	95	77 (81.05%)	18 (18.95%)
2020/21.	74	59 (79.73%)	15 (20.27%)
2019/20.	62	48 (77.42%)	14 (22.58%)
2018/19.	54	43 (79.63%)	11 (20.37%)
2017/18.	58	45 (77.58%)	13 (22.41%)

The descriptive statistics of research questions are presented in table 2. With regard to the comparison of mean values, male students have higher values on all questions than female students. A higher score indicates a greater degree of agreement with the statements. The highest score in self-assessment, male students expressed for assembling the Arduino and team contribution, while female students for a better understanding of the course topics. The biggest differences in mean values by gender were observed in assembling Arduino components and improvement of problem-solving skills, while female students expressed a much higher level of frustration with Arduino projects. By testing the hypothesis, it will be determined whether the mentioned differences are statistically significant.

The reason why there is no questionnaire item about programming is that the Informatics major has several programming courses. In this case, students were allowed to use ready-made programming codes from the Arduino community or GitHub. Therefore, they just had to adjust those codes for each project, which means that an understanding of programming was required.

Table 2. Descriptive Statistics of Responses to the Questionnaire

Self-assessment items	Male (N=33)		Female (N=11)	
	Mean	SD	Mean	SD
<i>Teamwork:</i>				
I consider my contribution in teamwork on Arduino projects important.	3.9	0.91	3.27	0.91
I shared my knowledge with teammates and encourage the team members.	3.88	0.86	3.18	0.75
<i>Learning:</i>				
I gained a better understanding of the course topics (ICT and basic of electronics).	3.61	1.04	3.27	0.65
I have improved my problem-solving skills needed to complete teaching assignments.	3.73	1.09	3.00	0.77
<i>Use of Arduino:</i>				
I felt confident while assembling the Arduino components.	3.97	1.03	3.09	1.14
Working on Arduino projects did not frustrate me.	3.64	1.10	2.91	0.94
<i>Total</i>	3.79	1.01	3.12	0.85

### Teamwork and gender

Cooperation and teamwork are necessary in many activities and today's workplaces, especially in the ICT field. Therefore, it is important to create opportunities for students to develop such skills during their education. The 33 male students ( $M=7.79$ ,  $SD=1.63$ ) compared to the 11 female students ( $M=6.45$ ,  $SD=1.51$ ) demonstrated significantly better results in the self-assessment of their engagement in teamwork on Arduino projects, as confirmed by a two-tailed t-test,  $t(43)=2.39$ ,  $p=0.02$ . With a confidence level of 95%, we can reject the null hypothesis H1.1.

### Learning and gender

Learning through Arduino projects contributes to a better understanding of interactions between hardware, software and real-world systems, develops problem-solving skills, which is important for an ICT career. In the self-assessment of learning on Arduino projects male students ( $M=7.33$ ,  $SD=1.46$ ) show better results than female students ( $M=6.27$ ,  $SD=1.10$ ), which is confirmed by a two-tailed t-test,  $t(43)=2.19$ ,  $p=0.03$ . Accordingly, we can reject the null hypothesis H1.2. with the 95% of confidence. It can be concluded that the male students benefited more from learning by doing Arduino projects. Although more detailed research would be needed to understand such a result, many authors (EIGE, 2017; Ramos et al., 2018; Nozava & Regt, 2020) believe that gender stereotypes represent a major obstacle to gender equality in ICT.

## Use of Arduino and Gender

Regarding the use of Arduino, the results of students' self-assessment show that men ( $M=7.61$ ,  $SD=1.64$ ) have better results than women ( $M=6.00$ ,  $SD=1.48$ ), and these differences are statistically significant,  $t(43)=2.88$ ,  $p=0.00$ . Consequently, the null hypothesis H1.3. is rejected, and we can conclude that male students were significantly less frustrated and had more confidence in doing Arduino projects. These findings correspond to the research results of other authors (Andrews et al., 2017; EIGE, 2017; Ramos et al., 2018).

## Conclusion

Although digital competences are becoming more important in digital age, gender disparities still exist in ICT fields, from education to employment. There are many studies, as well as educational, social, cultural, political and other activities, that try to reduce the gender gap in the digital world, but mostly the results are missing. The relatively low percentage of women's enrolment in STEM and ICT related studies and occupations suggests that women may face different barriers and stereotypes, as well as lack of self-confidence. It starts at a middle school age, when girls start to lose interest in STEM subjects. Furthermore, girls lack female role models in the world of technology because all of the famous leaders in ICT are men. All these facts indicate that education may play a key role to attracting, motivating and retaining girls in STEM and ICT field.

The Arduino with its "maker" and "do it yourself" (DIY) approach can help students acquire competencies that will play an important role in high-tech jobs. Arduino, as an educational tool, has a lot of potentials, although gender differences in self-assessment of learning with Arduino were found to be significant in this research. It would be interesting to see what results would be if Arduino was used in more courses, because then women would be more familiar with it, and probably less frustrated, with better learning effects.

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## Analysis of the Correlation between the Use of Written Algorithms and Success in Mental Calculation

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**Abstract:** This paper explores the correlation between mental calculation performance and the frequency of using written algorithms in mental calculation tasks. Mental calculation is a mathematical tool used in everyday life situations during and after our formal education. After presenting an overview of the professional literature on this topic, the paper will present calculation methods and show how represented they are in the Curriculum. For the empirical part of the research, a total of 233 Croatian students aged 10 to 22 years were tested and interviewed. The previously mentioned correlation was then analyzed. An overview of the interview results will be presented as well. It was found that school mathematics does not always contribute to the development and flexibility in using mental calculation strategies because of the student preference for acquired written algorithms. Definitely, recommendation is shifting the focus from written calculation and procedures to the mental, discussing the associated strategies and different concepts of number. In this way, formal education could contribute to what students really need later on, in both private and professional situations in which they may find themselves on a daily basis.

**Keywords:** Mental Calculation, Mental Calculation Strategies, School Mathematics, Mathematics Curriculum, Written Calculation

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### Introduction

Cambridge's Dictionary (Dictionary, 2018) defines *calculation* as the process of using information and operations of addition, subtraction, multiplication and division to estimate the number or quantity of something, while according to Collins' Dictionary (Forsyth & Mangan, 2014), *calculation* is something we think about and do mathematically; what we think about very carefully and based on which we come to conclusions taking into account all relevant factors. Calculation is involved in solving real problems that we encounter on a daily basis.

As for calculation methods, numerical calculations can be performed using three methods: mental calculation, written calculation or written algorithms (using paper and pencil) or using calculators (McIntosh et. al., 1995).

In this paper, we will give a theoretical overview of written and mental calculation and investigate the correlation between mental calculation performance and the use of written calculation.

### **Written Calculation**

As previously mentioned, one of calculation methods is written calculation, i.e. using paper and pencil. Teachers usually use the term algorithm to describe written calculation procedures of addition, subtraction, multiplication and division of numbers that are traditionally taught in schools (Stacey, 2004). “Algorithms are valuable precisely because they give a routine that works in a prescribed way for all elements of a specified domain. People can use them on any problem that fits the conditions and they can be programmed into machines” (Stacey, 2004, 94). However, Kamii and Lewis (1993) believe that algorithms are harmful because they encourage students to give up their own opinions and ideas and not to use local values in calculations, thus preventing the development of number sense. Children come to school with a huge potential for thinking, and the role of the teacher is to develop that potential instead of ‘molding’ the students and ‘putting all the cards on the table’. Students should use their constructive processes and belief in their own abilities to solve the problems presented to them.

Research on child-friendly methods showed that students were often taught classical written calculation in tasks with four basic mathematical operations where this was not necessary and when other approaches would be possible and more effective (Gravemeijer et al., 2004). At school, written algorithms are taught and automated, and students feel more confident using this method as they are sufficiently trained to use it during mathematics classes. Yet, following an inflexible set of rules is something machines are good at, not people. Furthermore, written calculation often deepens only procedural knowledge, while there is no change in conceptual knowledge. Procedural knowledge is mastery of computational skills and knowledge of procedures in identifying mathematical components, algorithms, and definitions (Lin et. al., 2013) and it often calls for automated and unconscious steps, whereas conceptual knowledge typically requires conscious thinking (Haapasalo, 2003 ). “An individual task can be performed with only limited understanding. Therefore, the fact that a student gets a calculation correct tells us little about the extent of their understanding” (Barmby et. al., 2007, 45).

Indeed, in written calculations performed in school, evaluation is done only for the correct application of the algorithm and the result, without questioning a deeper understanding of the procedure and conceptual understanding. Mathematical education should be based on understanding, building upon student’s prior knowledge and connecting their knowledge. Algorithms can be easily applied without understanding, without

even noticing, so students can experience mathematics as an area that is not built on understanding, at least not for them (Gravemeijer et al., 2004).

In fact, most of us do not even use the algorithms we learned at school to solve everyday problems in practice. Standard written ‘school’ algorithms of four operations are selected from a whole range of possible ways to solve problems (Stacey, 2004), which are often not listed in the curriculum nor in textbooks.

### **Mental Calculation**

The second calculation method to be studied here is mental calculation. Mental calculation (mental computation) is integrated into the child’s learning about numbers and refers to calculating the correct result ‘in the head’ (Sowder, 1988). Rathgeb-Schnierer and Green (2013, 553) define mental calculation as “solving arithmetic problems mentally without using paper and pencil procedures.” It is one of the best ways to develop and deepen the students’ understanding of numbers and their properties (Reys, 1984). Mental calculation can facilitate the development of the mind and provides more chances for children to learn more easily and get better academic performance (Gómez-Rosales & Mireles-Medina, 2019; Yilmaz, Akyuz, & Stephan, 2019). When manipulating numbers in the head, children look at numbers from different perspective, develop number sense and increase confidence in their own mathematical abilities. It is this confidence that will encourage them to consider mental calculation as an option when solving a task (Haylock, 2007; McIntosh et. al., 1997a).

“Mental computation is the most common form of computation used in everyday life. It is used for quick calculations and estimations” (Pourdavood et. al., 2020, 241). The research showed that 85% of calculations used on a daily basis is mental calculation, 58% of which are estimates (25% of calculations in the context of time, 23% in the context of purchase and money) (Northcote & McIntosh, 1999). Real life requires the ability to perform simple mental calculations quickly; a person must be able to quickly understand relationships and know which calculations to perform (Bruinsma, 1969). It is often enough to get approximate, rather than correct, answers to everyday complex arithmetic problems (Ganor-Stern, 2018).

McIntosh, Bana, and Farrell (1995) conducted a study to obtain information on the mental calculation knowledge of 641 students in grades 3, 5, 7, and 9 in Western Australia. Students concluded that it is important to be good at mental calculation (more than in written calculation) and that mental calculation is what they will use every day when they are adults. It is worth mentioning that written calculation is more learnt in school, while mental calculation is mostly learnt independently.

“Mental computation is an important skill [...] which can be developed by practice, to which primary school Mathematics has a decisive contribution” (Baranyai et al., 2019, 8717). Recently, flexible mental calculation has been increasingly considered an important goal in elementary math education (Selter, 2000; Verschaffel et. al, 2009). Heirdsfield (2005) studied the role of teachers in teaching mental calculation. By analyzing the teacher’s actions, she discovered two important teaching items that influenced the mindset of students when calculating.

These are carefully selected tasks which highlight connecting things and encourage strategic thinking. Furthermore, analyzing task-solving strategies gives the teacher information about the level of students' cognitive development, their individual learning style and readiness to adopt a new concept (Sharma, 2001). Certainly, mental calculation should be included as much as possible in formal mathematics education. When students use a learned formula or a procedure to make problem-solving easier, they neglect the underlying concept for deeper understanding (Bowers & Doerr, 2001; Hiebert & Carpenter, 1992; Wilson & Goldenberg, 1998). Ruiz and Balbi (2019) claim that although it is clear that the inclusion of mental calculation in school does not mean abandoning formal algorithms, schools must consider the order in which both skills are taught. Namely, prior knowledge of formal algorithms may hinder the possibility of independently discovering new mental calculation strategies, which will be discussed in more detail later. Boero et al. (1989) studied the transition from mental to written calculation and argued that it is not good to introduce written algorithms early and directly, but to start from (informal) strategies that children have built and gradually direct them towards more efficient, but always meaningful strategies. This way of teaching gives better knowledge. Hickendorff and colleagues (2010) conducted a study with 362 students in grade 6. They compared the use of mental versus written calculation. Students were free to choose their calculation strategy. A total of 20% of students solved the tasks using mental calculation, 40% chose written calculation only, and the remaining 40% applied mental calculation in easier tasks and written in more difficult tasks. It turned out that students with a lower level of mathematical knowledge were more likely to use written algorithms because they felt more confident given the good practice of using this strategy during math classes.

Therefore, the following passages will discuss mental calculation strategies.

### *Mental Calculation Strategies*

“Mental strategies are more about the application of known or quickly calculated number facts in combination with specific properties of the number system to find the solution of a calculation whose answer is not known” (Thompson, 1999, 2). Mental calculation strategies differ from written algorithms because they require more than applying an automated procedure. A key difference is the need for a deeper knowledge of how ‘numbers work’, i.e. this requires a developed number sense (Hartnett, 2007). The strategy should be chosen according to the numbers in the given problem and their properties and mutual relations, which requires a developed number sense. The chosen path to the solution depends on the observed elements, which are covered by individual calculation skills and which the individual finds easiest, considering the knowledge they feel most comfortable applying (Threlfall, 2002). Some children first notice tens and ones number partition, others round to the nearest tens, or round to the nearest numbers with which they can quickly count, etc. While children are still school beginners, the first thing that comes to their mind is the way, method, representation they were taught in class. Later on, after having developed number sense and gained experience in mathematics, they may be able to engage in other aspects. The ability to connect numbers in different ways is a very useful skill on which much of the later study of mathematics can be built (Howden, 1989).



Carpenter et al. (1997) conducted a three-year survey of 82 children in grades 1–3 who were interviewed five times each to determine and monitor students' development and understanding of multi-digit numbers and operations. The research was based on understanding the concept of number and the problems of addition and subtraction. It was shown that children are able to independently create strategies for addition and subtraction while using different conceptions of number. About 90% of students used their own strategies and it turned out that students who designed their strategies had better knowledge of numbers and flexibly expanded their methods to more complex tasks with multi-digit numbers compared to students who used recently learned standard algorithms at school. It was also found that this is the way to avoid common systematic errors. Moreover, systematic work on mental calculation promotes the development of own strategies (Carvalho & da Ponte, 2013), which makes the teacher's role very important. Heirdsfield (2011) conducted an experiment lasting 10 weeks in collaboration with two class teachers. The task of the teachers was to encourage children in developing strategic thinking skills in mathematics. Teachers worked with children encouraging them to actively participate, explain their strategies, compare them with others and reflect critically. They asked children questions such as, *How did you solve this? Who solved the task in a similar way? What makes your strategy different?* etc. In addition, they helped children establish connections between mathematical concepts paying attention to order and systematicity of their lectures. For example, the task  $46+20$  was presented before the task  $46+24$ , and  $46-29$  afterwards. During the experiment, many children developed various strategies when solving tasks using mental calculation, which was found in interviews conducted by the author before and after the experiment. The focus of this research was not only to help children develop mental calculation strategies, but also to develop higher order thinking – reflecting, criticizing and making sense of numbers and operations. Furthermore, Baranyai et al. (2019) conducted research with 239 students, future teachers in primary and preschool institutions. They studied mental calculation skills, focusing on the strategies they use. The results showed that most students do not know a variety of mental calculation strategies; more than a quarter of the respondents did not use mental calculation strategies but calculated only 'in the head' following written algorithms, and more than one-third used only one or two strategies. The results of this research highlight how necessary it is to teach mental calculation strategies to future primary school teachers, and thus to all students. Practicing procedures does not stimulate the development of mental calculation and associated strategies because little time is left for mental calculation. Therefore, Heirdsfiel et al. (1999b) recommend shifting the focus from written to mental calculation and estimation. The authors are also in favor of increasing the time spent teaching alternative calculation strategies and a more individual approach to each student encouraging them to develop their own flexible approach to learning operations and manipulating numbers when calculating.

### **Mathematics Curriculum**

In most European countries, Mathematics curriculum is an official document, which is often binding. It defines which topics need to be learned, describes education programs and their content, and determines what teaching, learning and assessment materials should be used (Kelly, 2009). The 2030 Global Agenda for Education places learning outcomes at the heart of the international framework for monitoring education. Mathematics curriculum has been revised in all European countries over the last decade, often to introduce a learning outcomes-based

approach and/or a key competencies concept. Revisions often seek to improve the way mathematics is taught in the classroom and to connect mathematics more to student's daily experiences. Formation of standards based on learning outcomes is one way of ensuring quality in education while at the same time giving autonomy to educational service providers in defining education programs that meet student needs (CEDEFOP, 2010).

In the following part, we will study the representation of written and mental calculation in the mathematics curriculum in the Republic of Croatia.

### *Written and Mental Calculations in the Croatian Curriculum*

In the Curriculum, mental calculation and written calculation are mentioned only in the part on class teaching outcomes, i.e. for students in grade 1 to 4 of primary school.

A learning outcome for the second grade of elementary school: *the student adds and subtracts in the set of natural numbers up to 100* further elaborates: *adds and subtracts in the set of numbers up to 100 using mental calculation*. Moreover, the document says that "it is desirable for students to master the mental process of adding and subtracting numbers up to 100" (Ministry of Science and Education of the Republic of Croatia, 2019, 25). An outcome for the third grade of elementary school: *adds and subtracts in the set of natural numbers up to 1000* further includes also written and mental addition and subtraction of numbers up to 1000, while the recommendations for achieving this outcome say: "In order to stimulate and develop thinking skills, the student should be continuously encouraged to evaluate the results and to check the solution and the skill of mental calculation" (Ministry of Science and Education of the Republic of Croatia, 2019, 35). In the third grade, written calculation is included in the outcome, *the student multiplies and divides natural numbers up to 1 000 with single digits* (in a long and short way). The content is expanded in the fourth grade, in line with these outcomes: *adds and subtracts in the set of natural numbers up to a million using written calculation* and *multiplies and divides in the set of natural numbers up to a million with two-digit numbers using written calculation*. In higher grades, mental calculation is mostly mentioned only in the recommendations that students should calculate mentally, when possible, without giving accurate and precise instructions, while written calculation is still often used in tasks of adding, subtracting, multiplying and dividing in various sets of numbers.

Let us also indicate which mental calculation strategies are represented in the curriculum, and thus in teaching mathematics at school:

- adding a single-digit or multi-digit number to a single-digit number is done by *making to the next tens*, and by analogy this is also valid for subtraction,
- adding and subtracting two two-digit numbers is done by *sequencing*,

- multiplying a two-digit and a one-digit number is performed by *separation from left to right*, and factorization occurs only by multiplying a number by multiples of 10 and 100, and this factor is further broken into a multiplication of a single-digit number and a ten (e.g.  $34 \cdot 200 = 34 \cdot 2 \cdot 100 = 68 \cdot 100 = 6800$ ),
- dividing a two or three-digit number by a one-digit number is done by *partition division*.

Unfortunately, school practice reveals that often the tasks that should be done mentally are not calculated in this way, but the calculation procedure is written down, and the mentioned strategies are applied accordingly, which then become written, and not mental on the one hand. On the other hand, the practice of written calculation takes up a large part of mathematics schedule intended for arithmetic. Also, it is often only written algorithm that is evaluated and assessed, and thus mental calculation loses importance and students are not motivated to learn it.

Furthermore, in the context of learning and teaching the school subject Mathematics, in the Croatian curriculum it is stated that “regular mental calculation training, determination of a simple percentage or an approximate result develops student ability to calculate ‘by heart’ and apply the skills of calculation and assessment in life situations” (Ministry of Science and Education of the Republic of Croatia, 2019, 235). Still, from the previous text we can notice that mental calculation is poorly represented. As for evaluating, the Curriculum says that the student does not have to use mental calculation to meet the lowest levels of Mathematics. Also, the benefit of mental calculation is not emphasized in terms of developing number sense and connecting different areas in mathematics. As for mental calculation strategies, they are minimally represented and explained in the Curriculum. Students are forced to independently develop and discover various strategies based on their own knowledge, insights and experience, which, as we already know, is not easy for most students. This is not even possible without the guidance of teachers and appropriate literature (textbooks, workbooks, counting collections).

## Method

### Research Design

This paper aims to examine the age-conditioned difference in respondents’ use of written calculation and the correlation between their mental calculation performance and the use of written calculation in tasks.

In accordance with the above, two hypotheses were set: *There is a statistically significant difference between the groups of respondents with respect to their age in the use of written calculation in mental calculation tasks* and *There is a statistically significant negative correlation between the use of written calculation and mental calculation performance*.

To examine the hypotheses, a test with mental computing tasks and an interview were conducted with each respondent about the mental calculation strategies they used to solve each task. In the analysis of the data obtained in the empirical part of the research, descriptive statistics were used in combination with parametric

methods that checked the existence of the differences between age groups in the number of different strategies used. The obtained data were supplemented by analyzing the student's answers from the in-depth interview. Taking into account drawing on qualitative and quantitative data collection procedures, this is mixed-methodology research. The research was conducted in the Republic of Croatia during the 2020-2021 academic year.

## Participants

*The research sample was composed of 233 students aged 10 to 22 years, i.e. the respondents were students from grade 4 of primary school to the final year of college. To exclude the impact of teacher work, students were selected from different class departments of 6 primary schools, 6 secondary schools and from 4 university departments. Students were voluntarily involved in the research. Parental consent was obtained for the participation of minors in the research. Table 1 shows the number of respondents by age.*

Table 1. Number of Respondents by Age

Age	Total
10	19
11	16
12	42
13	46
14	31
15	26
16	23
>17	30
	233

Out of the total number of respondents in grade 4 of primary school, 47% were girls, in grade 5 there were 63% girls, 53% in grade 6, 48% in grade 7 and 71% in grade 8. As for the respondents in grade 1 of secondary school, 62% were girls, while among the respondents in grade 2 of secondary school, there were 49%. Among respondents over 17 years of age, 87% were girls. The total number of female respondents was 139 and the number of male respondents was 94.

## Instrument

Two research instruments were applied: a mental calculation test and an interview. The former instrument consisted of 20 mental arithmetic tasks, 5 tasks for each of the four basic arithmetic operations. Assignments were created so as to ensure that the selected numbers in the assignments were appropriate for students of a

certain level of education according to the Croatian curriculum. Accordingly, the test was made for three levels: students 10-12 years old attending upper elementary and lower middle school (grades 4-6); students 13-14 years old attending upper middle school (grades 7-8) and students 15-22 years old attending high school or university. Figure 1 shows the number of respondents by groups with regard to the level of mental calculation test.

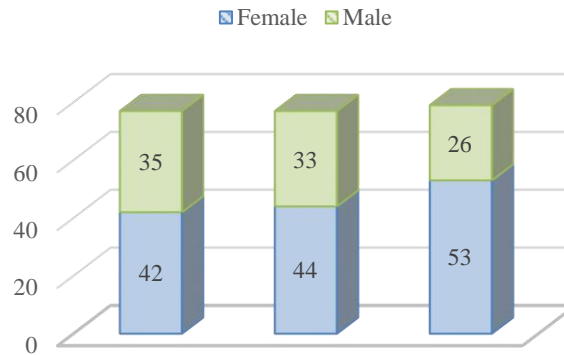


Figure 1. Number of Respondents with Regard to the Level of Mental Calculation Test

Furthermore, the tasks were chosen in such a way as to allow a different mental calculation strategy as the most effective way of solving. After hearing a voice recording of each task (which was used to avoid written calculations), students were given 20 seconds per task to solve it. After the test, an interview was conducted with each of the students. Those who solved the task correctly were asked the question: “What strategy did you use? Describe the calculation procedure in words”. Students who did not calculate correctly were asked to try to recalculate the result and to describe the procedure. It should be stressed this part of the research certainly requires an interview, not a questionnaire with multiple-choice questions or open-ended questions. Namely, the skilled examiner will better explain to the respondent what he/she is asking for and will understand what the respondent wants to say and describe because the students were not taught most of the strategies and did not hear their names in school. In contrast, multiple-choice questions would suggest the strategy to be used. On the other hand, open-ended questions may produce many unanswered questions because the respondent does not know how to express, write, describe the strategy he/she has applied. The interview revealed a number of different mental calculation strategies used for each individual arithmetic operation. The prevalence of written calculation was determined, i.e. in how many mental calculation tasks written algorithm was used. Namely, although the students were asked to solve tasks using mental calculation, some still applied written algorithms imagining them in their heads. A pilot study with 17 students aged 12 and 14 students aged 21 was carried out before creating the final version of the test. Based on the results of the pilot study, the number of mental calculation tasks was reduced from 28 to 20.

### Data Collection

Testing and interviewing lasted for two months during the 2020/2021 academic year. The entire procedure was independently carried out by the author of the paper because this enables the most credible results of the examination, especially in the interview. The respondents in each grade were clearly presented with the plan;

first, mental calculation test and then the interview. Mental calculation tasks were reproduced using a mobile phone and a wireless speaker, thus enabling all respondents the same test conditions such as volume, duration of the task, number of readings, time for calculation. In this way, the tasks were presented orally, not visually, in order to avoid written algorithms, as mentioned before. The test was anonymous, so each respondent had to come up with their own code and, later on, their test and questionnaire were linked to the strategies examined by the interview. The interview lasted approximately 10 minutes per respondent.

### Data Analysis Techniques

The Kolmogorov-Smirnov test verified the normality of the data, and the homogeneity of variance was confirmed using Levene's test for equality of variances. When showing the data for each hypothesis, the parameters of descriptive statistics (arithmetic mean  $\pm$  standard deviation, median, minimum, maximum) were first presented, followed by test results. All results were calculated using the Statistica 13.5 software.

In the context of the hypothesis *There is a statistically significant difference between age groups in the use of written calculation in mental calculation tasks*, a single-factor analysis of variance (ANOVA) was used. Here, the statistical significance of the main effect was calculated, and Bonferroni's post hoc correction examined the existence of significant differences between individual subgroups of respondents. As a measure of the magnitude of the effect, a partial eta square ( $\eta^2$ ) was used, and the F-value and associated degrees of freedom were calculated.

In the context of the hypothesis *There is a statistically significant negative correlation between the use of written calculation and mental calculation performance*, we calculated Pearson's correlation coefficient ( $r$ ), the coefficient of determination ( $r^2$ ) and the linear regression model ( $y=b_0+b_1x$ ) of the correlation of variables and the associated statistical significance for each age group.

## Results and Discussion

### Analysis of Differences between Age Groups in the Use of Written Calculation

In the following part, we will analyze differences between age groups in the use of written calculation. During the interview, the respondents admitted to using written calculation by giving these answers: "*It's like in school... on the board, so I imagine writing*", "*I imagine paper and write one below the other*", "*I imagine it in my head one below the other and subtract*", "*I divide just like in school on the board*" etc. Students who used 12 or less mental calculation strategies, out of a total of 20, resorted to imagining written algorithms in their head. On the other hand, students who used 13, 14, or 15 mental calculation strategies used written algorithms only sporadically by imagining the procedures in their heads. This can be seen in all age groups.

Table 2 includes descriptive statistical indicators related to the hypothesis *There is a statistically significant difference between age groups in the use of written calculation in mental calculation tasks.*

Table 2. Descriptive Statistics on the Representation of Written Calculation

Variable	Age	AM ± SD	MED	MIN	MAX
use of written calculation	10	4.84±3.50	5	0	10
	11	6.25±3.13	7	1	10
	12	4.43±3.93	4	0	15
	13	5.07±3.93	4	0	15
	14	2.81±2.87	2	0	8
	15	3.50±3.44	2	0	13
	16	3.44±3.38	3	0	12
	>17	5.30±3.25	6	0	11

From Table 2, we can read the average number of tasks in which the respondent used written calculation, which means they did not use one of the mental calculation strategies when solving the task but imagined in their head that calculation was written on paper or a board. It is interesting to note that respondents over 17 years of age are just below the students aged 11 in the use of written calculation. In 11-year-olds, there is even a minimum of 1, which means that each respondent used written calculation in at least one task. In all respondents, except 14-year-olds, a maximum of 10 to 15 was reached. Thus, out of 20 tasks, some respondents used written calculation in a minimum of half of them. As we have seen in the passage on the Croatian curriculum, written calculation is taught in formal education in grades 2, 3 and 4 of primary school, so we can be surprised by the fact that respondents who are high schools students and older used written calculation even in 13, 12 and 11 tasks regardless of the fact that in higher grades of primary school this strategy is used less and new knowledge that contributes to mental calculation (and not written) is taught. In order to examine the statistical significance of differences in arithmetic means of the variable *use of written calculation* among the observed age groups, a one-way analysis of variance for independent samples (ANOVA) was used. The results will be presented in Table 3.

Table 3. Variance Analysis Results

	F	p	$\eta^2$
age	2.592	0.013	0.074

According to the results shown in Table 3, it can be observed that the main effect is statistically significant ( $0.013 < 0.05$ ). This confirmed the hypothesis, i.e. there is a difference in the use of the written calculation strategy in different age groups in mental calculation tasks, and the results of the Bonferroni post hoc test show us in more detail where the differences are (Table 4).

Table 4. Bonferroni Post Hoc Test Results

	11	12	13	14	15	16	>17
10	0.24	0.67	0.81	<u>(0.04)</u>	0.21	0.19	0.66
11		0.08	0.25	<u>0.01</u>	<u>0.02</u>	<u>0.02</u>	0.38
12			0.39	0.05	-0.29	0.28	00:30
13				<u>0.01</u>	0.07	0.07	0.78
14					0.46	0.52	<u>0.01</u>
15						0.95	0.06
16							0.06

Differences between age groups are present in 21% of couples. Fourth graders (age 10) and fifth graders (age 11) certainly use written calculation more than older students, which is expected because formal education mostly focuses on written calculation. However, what is interesting to note is that in respondents aged 12 and older ones, only two differences were observed, one in those aged 12 and 14, with younger students using written calculation more, and in respondents aged over 17 and 14-year-olds, showing that older students use written calculation twice as much. Thus, although there are differences, they are not present among older respondents, starting from grade 6 (age 12) and are not always in favour of older respondents, i.e. we have shown that in some cases older respondents use written calculation more in mental calculation tasks. Indeed, it has been shown that students prefer the paper and pencil method in calculation tasks, i.e. written calculation involving accurate and exact results, but this does not help them in acquiring the competence of assessment and developing number sense (McIntosh et. al.,1997c). Also, in the research on mental calculation and conceptual understanding, it was shown that inflexible students mostly use the automated procedure, i.e. written calculation. This was partly explained by “blind faith” in the written algorithms taught by the teacher, and partly by reduced knowledge that could not support more effective mental strategies. These students even managed to solve the tasks of mental calculation in part, but they did not show a developed number sense (Blöte et al., 2000). Teachers should focus on encouraging students’ thinking, rather than teaching them written procedures that do not support thinking, they should stimulate the development of number sense and expect students to use their self-developed strategies. In this way, students would apply their own strategies, instead of resorting to the ‘teacher’s’ actions without thinking about the given numbers or the context of the task (Heirdsfield & Cooper, 2004).

#### Analysis of the Correlation between Use of Written Calculation and Mental Calculation Performance

This passage will analyze the correlation between the use of written calculation and mental calculation performance. Table 5 shows descriptive statistical indicators related to the hypothesis *There is a statistically significant negative correlation between the use of written calculation and mental calculation performance.*



Table 5. Descriptive Statistics Indicators

variable	AS ± SD	MED	MIN	MAX
mental calculation performance	14.59±4.21	15	1	20
use of written calculation	4.41±3.60	4	0	17

According to the results in Table 5, we can see that in 50% of respondents, written calculation is represented in as many as 4 tasks with a maximum of 17, although 20 mental calculation tasks were given in the questionnaire. Thus, a part of the respondents cannot solve some of the tasks with one of the mental calculation strategies, but they must resort to imagining a written algorithm. Furthermore, the results of the correlation analysis used to verify the correlation between the variable *use of written calculation* and the variable *mental calculation performance* will be presented in Table 6, followed by a scatter diagram and a direction of regression (Figure 2).

Table 6. Correlation of mental Calculation Performance and Use of Written Calculation

	r	r <sup>2</sup>	t	p
mental calculation performance				
use of written calculation	-0.466	0.217	-8,011	<0.001

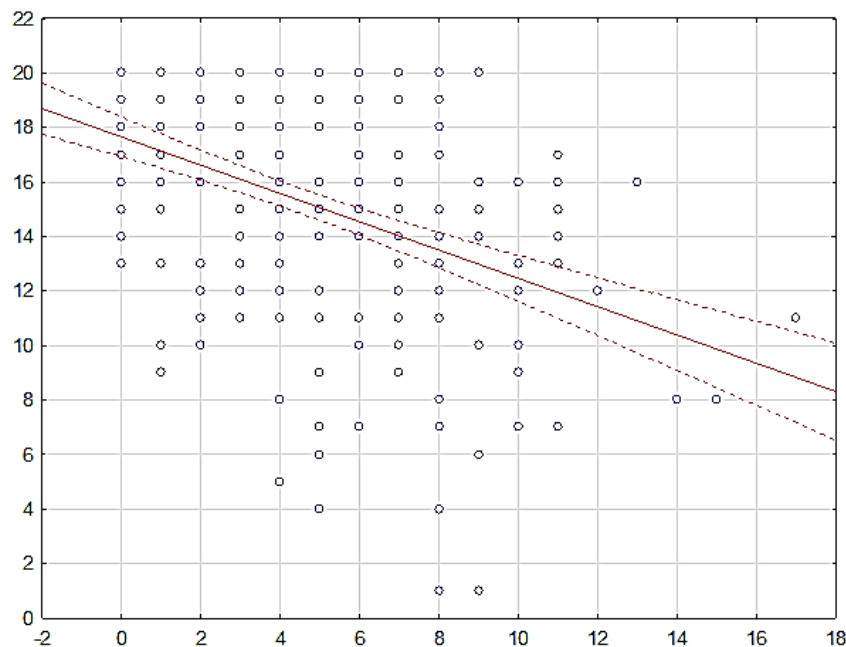


Figure 2. Scatter Diagram and the Direction of Regression of the Set

Pearson's correlation coefficient ( $r=-0.466$ ) shows a moderately to good negative statistically significant correlation ( $p<0.001$ ) of the variables *use of written calculation* and *mental calculation performance*. It can be observed that 21.7% of the variability of the criterion variable is explained by the predictor. The results point to

the fact that mental calculation performance is correlated with the use of written calculation. Therefore, we confirmed the hypothesis, and we can say that respondents who use written calculation less are more successful in mental calculation. Consequently, the recommendation is that during formal mathematics education there should be less insistence on written calculation and more on mental calculation strategies to make students more successful in mental calculation. We can also say that students with better knowledge of mental calculation will benefit less from written calculation, which for most of the time is not useful in everyday life of adults.

## Conclusion and Recommendations

Allowing today's youth to be able to respond to the demands of society in the future requires a constant change of the education system. Globalisation, the rapid advancement of technology and the wealth of information we receive every day set us new goals, challenges and problems that we have to cope with. All of the above is easier for us to handle and successfully solve if applying logical thinking, correlation, careful and meaningful organization. Mathematical literacy is recognized as one of the most important prerequisites for the development of individual life skills, the application of mathematical knowledge, lifelong learning, openness to the use of new technologies and the realization of one's own potential. Learning and teaching the subject of Mathematics encourages creativity, precision, systematicity, abstract thinking and critical thinking that helps in identifying and solving problems from everyday life and social environment. The task of school and formal education is to train the individual to become a participant in society and successfully cope with everyday life problems. Mental calculation is a tool that has helped us to develop number sense, cognitive skills and abilities since our childhood. Relying on professional literature and experience, it was found that mental calculation is the best way of brain training as it improves concentration, memory, visualization, logical reasoning, focus, that is, everything we need in everyday life. An analysis of classes of Mathematics in Croatia and the Curriculum reveals that written calculation is more used than mental. Unfortunately, school math is mostly written math. The above prompted us to examine the impact of the use of written calculation on mental calculation performance.

We have statistically confirmed that written calculation has a negative effect on mental calculation, and this is the scientific contribution of this paper. Namely, overtraining and automation of algorithms and procedures make students resort to written algorithms even when not necessary and this does not contribute to the development of mental calculation. What is more, students do not use mental calculation at all.

Regarding the practice itself, i.e. the professional contribution, this paper should help both class and subject teachers to formulate and plan the teaching of mental calculation and to transfer the focus from written to mental calculation. Teachers cannot be guided rigidly only by a curriculum and a textbook, but they should be informed and taught daily so that in class practice, they can respond adequately, answer students' questions and teach in a quality way.

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## On The Contributions of Competitive Exhibitions to Art Education

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**Abstract:** Continuing art activities in art try to undertake a different mission. It is very valuable and important for individuals who receive Art Education to be able to say I am in art activities. Because of the spread of art and the understanding that it is a value on its own, the exhibitions provide a lot of benefits to the field in terms of accepting that it is an original method of expression. The importance of those who are enthusiastic to see many good works together, the pride and determination have given to them if they have been exhibited, raising the standards of aesthetic perception with the psychology of competition and increasing their interest in the field are important situations.

In the field of deep-rooted competitive exhibitions, the links of the chain can be seen year by year and a social memory of art can be created. The fact that it is not possible to collect artistically qualified works that have achieved certain standards from a historical perspective is important. In addition, if the historical development and perspective of social memory from an artistic point of view are to be mentioned, it will be better understood why similar activities are important.

**Keywords:** Exhibition, Art, Art Education, Achievement

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### Introduction

Today's people make extensive use of the visual blessings offered by the technology that has developed over time and witness the artistic activities taking place around them. Among these art activities, competitive exhibitions are undoubtedly one of the simplest and most practical solutions for educating people's visual worlds, as they can reach large masses.

The contributions of state and private institutions that organized art organizations to art and culture have always been considered important for the widespread education of the field of art. As an art practice, these practices

have had a great impact on the progress, artistic and cultural development of individuals and societies.

### **Competitive Exhibition Culture**

Throughout history, art has existed wherever there have been people. Every society that has lived on earth has had its own unique art. Wherever there is a human community, art has manifested itself as an effect of material life, intuition, subconsciousness, instinctuality, which has become a necessity of life (Artut, 2009:13).

Art is like a treasure left over from the past and waiting to be transferred to the future for human beings, it is an accumulation kneaded from the experiences of societies in the past. These accumulations are of great importance in ensuring interaction between generations. This transfer process is realized through different artistic presentation methods between art producers and consumers. Artistic exhibitions, which are the activities that most clearly demonstrate the communication and educational functions of art, are activities that play an important role in raising individuals who are aware of themselves, life and their environment, and who can observe their surroundings from different perspectives. Exhibitions also enable the development of individuals who have developed the ability to think abstractly, who can express these thoughts in their own individual language in accordance with the requirements of contemporary life, and who can combine their thoughts with their own interiority.

"... art exhibitions have the duty of protecting cultural values, enabling the development of these values, responding to people's artistic expectations, and bringing artistic value to society. They also have artistic, cultural, educational and scientific purposes. These activities ensure that the student is actively involved in the art programs in plastic arts education, as well as making the society love art by making it popular with the works of art exhibited and developing the art consciousness of the society by making use of the power of art to influence people." (Erbay, 2001: 29).

Throughout history, many regimes have resorted to a wide variety of tools to establish and strengthen their power. One of these tools has been art. The use of art as a tool for the establishment of ideologies started in the last century. This policy is based on three main ideas: creating national art, ensuring that national art is modern, and reorienting fine arts education in the creation of national contemporary art. These studies in the field of Plastic Arts originated from social dynamics and were programmed by intellectuals in line with the policies of the state (Yasa Yaman, 1994:161).

In the following years, with the increase in art galleries due to liberal economic openings and socio-political approaches, the increase in art competitions, in which the private sector was more predominant, and the state was more indifferent, was an important sign of development and change. Art competitions, which carry very important functions in terms of providing financial support to artists and revealing plastic sensibilities prone to creativity, have continued to increase to the present day.

### Competitive Exhibitions in the Context of Contribution to Art Education

The economic and social development of a country is proportional to its cultural and artistic initiatives. A country striving for economic development will not be able to accomplish this important task without nationwide cultural planning.

The ability of young people, who receive their first knowledge of art education in schools at the formal education level, to mature and develop concepts that are not based on a certain foundation in their minds depends on the prevalence of cultural and artistic opportunities where they can find concrete equivalents to these concepts in the environments where they live. This can only be realized by providing equal services in the fields of culture and art to the majority of the people throughout the country, by making them benefit from these services, and by providing opportunities for artistic creation. In addition to state institutions, the contributions of private organizations to arts and culture are important in terms of non-formal education in this field.

In developing countries and some developed countries, as in other areas, the state's duties of determining options in art and culture and creating the necessary conditions for as wide a segment of the population as possible to share in art and culture are shared by semi-official and private organizations. The main objective here is to enable large segments of society to benefit from art's comprehensiveness, informative and pleasure-creating function, and thus to expand the service possibilities of private organizations, regardless of the field they are oriented towards (Özsezgin, 1997:15).

Exhibitions are undoubtedly one of the simplest and most practical solutions for educating people's worlds through plastic arts, as they can bring artworks to large masses in this development process.

Competitive exhibitions offer young art students the opportunity and space to show their presence. In addition, it is possible to look at the perception styles, expression preferences, and popular techniques of a period through the panorama offered by exhibitions. In this respect alone, these competitive exhibitions are important.

Aydın Ayan said in an interview: *"Competitions and exhibitions contribute to art in the following way. You write stories, poems, or novels. You have ten novels. Publishers and magazines don't publish them. You don't have that opportunity; you can't reach people. You are by yourself. One of the most important functions of art is communication. Tolstoy was asked what art is. He couldn't answer. He sat down and wrote a book on what art is and then said that the most important function of art is communication. Yes, we don't make art just for ourselves. It is a necessity of ours, we cannot do without art without production. But the pleasure of sharing it and communicating with others through art is different. The satisfaction and pleasure it gives to people are different."*(Öztürk, 2014).

Misman also commented on the contribution of activities to art education: *"... students have the opportunity to work at school, they have a workshop, they have materials. With the posters of the institution, the awards given,*



*and the encouragement of their teachers, students are eager to enter such a competition. I remember there would be an effort on the part of the students just to enter the art competition. In the past, students entered competitions, and some of them were successful. Their teachers were proud that their students entered the exhibition. Competitions are an important thing. Of course, there are some students who continue this in the future. These cannot be denied. In fact, they are valuable activities for both students and teachers."* (Öztürk,2014).

As can be understood, the remarkable development of art depends on activities, exhibitions, competitions, catalogs and books, and awards. When there is no expected effort in terms of exhibition opportunities, meeting with society, and being appreciated and attracted by society, there can be no development in this field. In art education, the importance of these processes for students and educators becomes more prominent.

## Conclusion


The impact of competitive exhibitions on young artist candidates is undeniable. In this sense, art competitions today are similarly recognized as platforms that play an important role in the emergence of young talents and the production of new works for the art world. Although art competitions organized by both state and private institutions do not show their former social effectiveness, they are seen as an important representation area for artists, academics, amateurs and art lovers, especially young artist candidates. In this respect, it can be said that it is important for students who are active in similar exhibitions to continue their artwork production activities in their post-school lives and to carry this into their careers. Similar indirect effects can be seen in the reflection of competitive exhibition activities on human life. It is a fact that awards and achievements are seen as a reason for preference in the selection of a person while moving up the career ladder. In addition, these competitive exhibition events are important areas where young candidates who will fill the seats in the academies in the future can see the stirrings of talent beforehand.

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# The Digitalization of Higher Education in Morocco, Limits, Challenges and Perspectives: Case Study of the Faculty of Letters and Human Sciences University of Ibn Zohr Agadir

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**Abstract:** This article's interest is to approach the impact and changes occurred by integrating digital pedagogical practices in the Moroccan higher educational system. The paper emphasizes the use of digital technology in the university curriculum, and how the latter shaped students' behavior as well as learning development. Our research methodology is based on observation sessions in which we measured and accessed students' knowledge acquisition, and how the use this digital learning in their research and study process. We also worked on focus groups with students of French department in the faculty of letters and human sciences of Agadir to measure how the digital learning process could increase student's creativity and critical thinking. This methodology is adopted in order to present an overview or the educational context and the appearing challenges in order to propose innovative work perspectives and to design a model of digital learning strategy enhancing student's analysis and interpretation competencies. The main concern of our paper is how can we integrate an innovative impactful digital strategy in the process of learning and teaching in higher education, knowing that this system remains somehow resilient?

**Keywords:** Digitalization, Pedagogical Practices, Resilience, Educational System, Learning Development

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## Introduction

The COVID-19 pandemic has seriously shaped our habits and practices in all life aspects including the Moroccan educational and training system. Higher education is ipso facto the driving force behind this so-called 4.0 revolution. In fact, this sector has for some years been anticipating ICTs as an innovative science capable of articulating the aim of education and training with the demand of the labor market. Coronavirus played the role of a driving factor that contributes to the virtual management of the rapid transformations undergone in a context of contradictions and constraints, generating both frustrations and enthusiasm. How can we describe the relationship between society and the pandemic on the one hand and that of ICT higher education on the other

hand?

The main merit of the digital resources, whether rediscovered or reinvented, is that today it is not only revolutionizing the educational system but also societal practices and the socio-economic and cultural contexts. Can we consider then that the digitalization is a desire for computing or a tool for demarcation and differentiation? Scientific use and learning are now the results of a clear and structured emergence and instrumentalization of these digital tools. Opening up higher education to the new principle of digital intelligence and modernizing its research structures and training practices will make it possible to gradually apprehend the risks of a galloping globalization requiring adequate training, but before that, should we not reconcile the higher education system with itself?

The Moroccan university, although any innovative revolution encounters resistance especially in times of crisis, the flexibility, the exchange, the continuity and the digital intelligence system will be accepted and appropriate by the users. It is not because they have a proven track record in the areas of management, extended business management, and many others that they will be appropriate. Users will adopt these tools differently and perceive them as a fact of resilience able to avoid chaos through recovery, reaction and appropriation. Of course, this is a process that still needs to be adapted to a multitude of challenges that must be faced: the massive number of students, university loss, lack of resources, the involvement of own or external actors, synergies, university designs. In short, the social context must involve a revolution in the systems of educational strategies with a view to the empowerment of governance, scientific profitability and openness to a labor market characterized regionally and horizontally. What practices have been adopted to make the digitalization of teaching more effective and, above all, more human in order to provide more appropriate access to an inclusive learning and training framework with regard to opportunities? How to make the digital tool at the service of education and not a segregating element acting as an expelling factor?

### **Contextual Development: Society and ICT**

Acting in a globalized society, shaped according to the needs, temporality and practices of today, does not mean that it is a levelled society. The substantial general interest gives way every day to the procedural general interest which is interested in how to do, behind a computer, more than result (Acher F., 2010). That's what Bourdieu calls theory of habitus that has often led society from a context of commitment to science to that of science to commitment (Bourdieu, 2008). This orientation appears very clearly when Bourdieu evokes the theory of the most particular distinction as regards his social criticism of the judgment between taste and cultural practices. This is to say that a new society is emerging. The theme of the GEF, held in Davos, Switzerland in January 2019, was "Globalization 4.0: Designing a New Global Architecture in the Age of the Fourth Industrial Revolution". Globalization 4.0 is now a key concept. This is a new era characterized by a change in the geopolitical landscape, the regular appearance of new technologies and the emergence of major ecological challenges. The Executive Chairman of the GEF, believes that we are golden and already in a new

phase of globalization «4.0». It is not an abstract conflict of Web generation, but in a real technological revolution in the broadest sense of the term with its hours and its misfortunes. Two current parallel worlds and the one advocated for the future are jostling. On either side, the changes that do not cross are rapid and do not result only from a cultural revolution of its own. It is often the CEOs of the multinationals who really govern the world and chart its future. It is in this context that Moroccan society, higher education and ICTs evolve between appropriation, acceptance, termination or refusal. The contemporary individual, is the product of a new way of making society, related to the assertion of self and his own social practices. It turns out that in the ICT boom, the extension and even the trivialization of the internet use, the multiplication of «benign and clever» social networks, the individual finds himself sharing or even disorienting. The COVID-19 pandemic has awakened the collective awareness ICT's use of in everyday life, as much as it has disoriented public opinion through the condensation and sharing of true and false information. What is the relationship between higher education and the use of ICTs, the ethics of information and communication techniques and the credibility of information and communication media?

### **When the Pandemic awakens the Collective Consciousness for Change**

Moroccan society is no longer a clan society as it used to be. The transition from rural to urban, the projected urbanization rate for 2030 exceeds the 70% mark in the strategic research of the metropolitan city as a pivot of economic and social development. These facts are important, it is being accompanied by profound changes. The Moroccan individual living the «second modernity» now continues his own process of identity building independently of his clan, soon if he is not already independent of his family, or even of his spouse (Singly and Chaland, 2001). Obviously, each individual learns to live this duplication of private life which, even if it has a psychological cost, offers the possibility of preserving a certain freedom of action, of pursuing his own construction of identity. The use of the mobile phone to establish an authority remotely or in contrast to strengthen autonomy and personal independence in relation to the family, the spouse or to stay in contact with work, to acquire goods or services, further strengthens the search for a personal territory more than it needs a space of physical connection. The COVID-19 pandemic is timely to hit hard at the growth drivers of the 2030 strategy that are no other than metropolitan cities (Ben Attou, 2021). It is precisely individual behavior in the margins and pockets of peri-central poverty and vulnerability that constitute risk factors for the spread of the virus in Casablanca-Settat, Tangier-Tetouan, Rabat-Salé-Kenitra, Fez and Marrakech. Individualism thus takes precedence in metropolitan cities which are also tourist centers that follow the pandemic worldwide through the mobile phone, the interpretation of social networks. As a result, they will adopt an attitude in terms of protection and social distancing, not voluntarily according to official security measures, but rather according to their own individual second-hand interpretation. It is in this context of pressure, lack of individual visibility, lack of material resources and generalized computer culture that higher education programs, teachers and research structures and students will have to face. What reaction will they develop? Can they react in a context of pressure and instability of university reforms? It is more than a challenge of know-how or mastery of the use of virtual communication, it is a fundamental structural challenge related to beliefs and values. The pandemic has taught us a lot. The higher education system is just one sector. Thus, what is valid for the professionals is valid

for academics in terms of administrative decisions, and human resources management. A small survey conducted by the HCP “Higher Commissariat of Planification : The Office of the High Commissioner for Planning is responsible for the production, analysis and publication of official statistics in Morocco.” in the midst of a pandemic on telework is a good example of what has happened in all jurisdictions and academic institutions. Thus, despite the enviable effort made by Moroccan decision-makers in a key time, the survey that targeted the productivity of public servants through telework makes it possible to situate fairly accurately, the relationship between society and pandemic ICT. According to the survey, 56% had a positive reaction in terms of working time, reduced travel and flexibility. Admittedly, but there are others, a large proportion saying that they have encountered functional difficulties in teleworking. Of these, 43% experience some genes performing tasks outside the office; 18% have difficulty following additional confidentiality and data security requirements due to lack of adequate resources and equipment. They also find it difficult to reconcile telework and household tasks (43%) when non-compliance with work schedules is felt (39%) “ *Survey on the coronavirus impact April 2020 HCP*” In any case, for both of them, the reaction regarding the return to work at the office is mixed, even if their hierarchy has taken all the necessary measures for their safety. 58% believe they are concerned about the health risk with the return to work in person. 24% are also concerned about child care provisions (HCP, 2020). From the results of this survey, we can already sketch the fact that society in the face of adversity is no longer «society as a system». Rather, it is in «the theory of communicational action» in a differentiated society (Habermas, 1985) subject to a few aspects.

### **Higher Education is also a Differentiated Target Area in a Context of Pandemic**

The context of COVID-19, which is going through individual and differentiated society, has led to the need to open up to a different model of teaching and pedagogy that we know. Here again, we are not given enough to make the right choice unanimously. Each educational institution, while remaining consistent with the official slogan about safe absenteeism and safe face-to-face, manages its crisis as much as possible. Some schools, institutions and training bodies have had to manage with agility a continuity of activity while trying to guarantee the promise of value of their education and training. But this is not the case for all institutions. Between ensuring a unanimous transition to the internet, the initiation of digitization processes and improvisation, a slope remains to be overcome. A forced shift towards digital is it really able to boost the digitalization of higher education, although it seems uniform, is deeply in transhumance from one reform to another. If we consider the ability of students to make use of digitalization other than zapping on the mobile phone or the teaching staff under an intergenerational dimension, its transnational or national training, its computer skills and its reference scientific curriculum, we realize the diversity of the profiles, the complexity of the educational field. Switching to digitalization is not a vertical decision, nor a change in behavior and use of tools, but a process of evolution that is being prepared in a context of societal and cultural revolution. Higher education under the pandemic is a mirror on which the image of a differentiated individual society is reflected, hesitant about the perception of the future. Whatever innovative, resilient or passive pedagogy, the result is almost the same as long as the pandemic remains, as long as the blur is established. The evaluation of pedagogical innovation and of the transition even partially to digitalization, is seen and perceived by the whole

of society (teachers, students, parents of students, civil society, media...) on social networks as being insufficient, unable to replace the face-to-face or provide good training.

### *Unfinished Reforms in Higher Education*

Many voices are raised and agree that the policy pursued in the higher education sector has led to a deadlock that will result in binding emergency reforms by the end of the 1990s (Nabil, 2015). This is a fact, the Human Development Index ranks between 1995 and 2005 at 26 and 177th places because of illiteracy, regional disparities, and social inequalities in access to education and education (UNDP, 2007). Much has changed since then, but the proliferation of urgent reforms has made the field of higher education resistant to any profound change in the system, not only from the point of view of education, but education in its entirety.

#### *Insufficient Reform in 1997*

The 1997 reform is a timely conclusion to the classic reform cycle that began in 1992. It establishes training in UFR and organization in DESA and DESS. However, until 2000, the twinning between higher education and research was only superficially carried out. This reform, although it tried to structure scientific research into UFR, clusters of competence and thematic national networks, its objective was to promote the research-enterprise link. The failure of this reform is due, among other things, to its inadequacy and its financial requirements and the resistance of the opposition to the privatization of education (Nabil, 2015).

#### *The 2003 Reform: A Forced Reform and an Urgent Course*

This reform may be attributed to an LMD system at first sight seemed to be a complete and comprehensive vision of the educational system pivotal around improving the conditions of research and researchers. However, the fact that the organization of Master's and Doctorate's degrees has remained optional, and the fact that their opening is strictly speaking granted to research units still in gestation and under-equipped, changes the situation. A certain degree of discrimination divides forever the teaching staff qualified as structured for research teams and unstructured for teachers not adhering to one of the research structures. As a result, the Bachelor's thesis was set up as an exhibition and access to the Master's in pedagogical terms. Both cannot promote basic research or the professionalizing option. The 2003 reform made accreditation of research channels compulsory. However, the re-accreditation for four years at the level of the Masters and Doctorate cycles while the registration is done annually is, in a way, only a form of contractualization. A doctoral training cycle in reality exceeds an interval of 4 years. Hence improvisation, management on sight and the risk of dropping out of school. In short, the contribution of the reform remains unsuited to the lived experience. Another no less important problem is the introduction of teacher assessment-research through the promotion grid. Other than that; it poses a credibility problem that will further divide the evaluator- faculty within a research structure. Other than the problem of neutrality and scientific objectivity, the grid adopts a progression that is made at three

speeds (exceptional, fast and normal) respectively over 6, 7 and 8 years. The search for promotion by all means ends up making the teaching staff fibril and induces research in decline.

*The 2003 Reform: A Forced Reform and an Urgent Course*

The role of the internet in popularizing scientific knowledge and opening up innovative perspective (virtual classes, videoconferences, digital platforms: the MOOC model, the Moodle- open- source learning platform, canvas, Ms Teams, google classroom, flipgird ...) is a real fact, however, two things need to be clarified. One is that cutting-edge research remains high-paying and inaccessible to students and even isolated researchers without sufficient resources. The other is that the digital tools deployed have varied greatly depending on the institutions' digital maturity. But beyond the technological aspect, the experience clearly shows that it is not enough to connect a webcam to ensure pedagogical continuity.

We have analyzed the context of higher education, so while the tools have enabled the rapid transition to digitalization, they are only the apparent part of the iceberg. Once again, this is not a teaching problem, it is an educational and educational challenge. The whole system has to adapt to this new learning environment. The investigations conducted on the subject, tend to show that the timing did not always allow an optimal adaptation. This is an important focus for the future. Of course, the opening up of ICT research is not entirely new. Since 2005, a number of initiatives including the creation of the Marwan computer network (8 megabits), the Moroccan Virtual Campus, the MacGrid project, the launch of the Engineering Program.

However, the withdrawal of the State from teaching and research to the private sector has not helped to support the initiative of digitalization in higher education. Results remained limited, especially in provincial universities and peripheral university nuclei. If we add to this the digital bill still inaccessible because of the lack of infrastructure and equipment for both learners and teachers, the scale of the problem can be seen in being able to establish a university level of both quality and use of ICT. Another difference is that metropolitan universities have benefited from cooperation projects in the field of ICT. Is it fair to say that more than 30 years of research on online education would not have been enough to convince universities to take the digital shift seriously and to anticipate the arrival of such environmental uncertainty (Tamir, 2019).

In addition, it is commonly accepted that the digitalization of universities requires a radical transformation of premises and equipment adapted to digital developments for each university (Clardy, 1994 and 2009, Harasim, 2000, Mason, 2000, Taylor, 2001). Instead, the bottom-up privatization of the university and the collaborating with laboratories and research teams will give the teacher-researcher a status of employee as promulgated in law 01.00. The revision of the 2014-215 reform, has only accelerated the process of privatization the least one can say complicated: 13 public universities, one with public-private management, 5 privates. The merger further complicated the university field. The establishment of the university centers provided for by Law 01.00 will become a reality. These clusters will integrate engineering schools and businesses from other departments.

### *Change by Computer Shock: Two Centrifugal Speeds*

As a result of the pandemic, Morocco has been inspired by the dominant international models to address the COVIDe-19 pandemic in an urgent manner. As a result, the transition to a competitive digital university was not a global project on the scale of all university wirelines. The brand image, the race for differentiation and individualism in university management that has become plural will make digitization, even partial, a political slogan, a media image and a positioning of the institution. Thus, we move at once, from a 0 digitization to a use (and non-development) of the most recent digital. MOOCs and SPOC are emerging as the latest generation of academic digital.

### *ICT: Use and Resistance*

With a continuing pandemic and the increasingly advanced involvement of foreign institutions in behavioral changes and ICT integration, some Moroccan universities have found themselves in the movement of foreign partners. The MOOCs rather similar to traditional university courses will be assimilated as a method of distance education and as a platform for exchange, learning and dissemination. As a result, the use of ICTs begins to expand with the individual involvement of the teacher and the institution. It is true that many schools have realized the financial and educational value of the development of education and training technologies as a driving force for educational strategies which can solve the problem of distance education and the institution of the necessary equipment and the layout of the ICT rooms adapted to the educational need, security measures and the image of institutions, particularly those with open polarization. However, the experience and philosophical and epistemological debate on the desire for computing in the American and European academic milieu is an old debate of more than three decades already about the use of ICT as a desire for a tool (Mooc) capable of transforming and to disrupt the methods of education (Blin & Munro, 2008). This view is not shared by others who assimilate different technologies and educational media as mere vehicles through education without influencing the performance of users (Clark, 1983). When we consider another parameter in the education system: the student “*We made a survey for 1500 student at the French department of the faculty of letters and human sciences of Agadir , asking them about their experience of digital learning during the pandemic, we concluded to the results*” and his ability to finance the use of ICT in a plural university context, put into streams, public and private, and contractual, we easily understand the resistance developed. Resistance can come from the teacher himself on another register. Already energized and weakened as a contract (reforms) then as an employee (Law 01.00), the teacher finds himself compressing as and when the use of ICT (good or bad, whatever) expands, he is dispossessed of the appropriation of knowledge, supposed to be now, the property of all. Simply click on the cursor to replace it or to provoke it, to adapt and comply with the requirements of the apprentice and the agenda of the management platforms of the education system. In short, he is no longer an authority, notoriety or scientific guarantee. ICTs play an important role in improving the university’s brand image in its competitive process without academics and in an environment of crisis communication. Is this the basic problem of higher education?



*ICT between University Use and the University's Overall Strategy*

ICT is a central tool in improving the quality of education and training. Nevertheless, this can be done in a project of society, skills enhancement and university regulation by evolutionary process where the trilogy University, Teacher, Student is the basis of the learning and training system. Urgency, competitiveness, the search for distinction, equipment acquisition strategies, scientific marketing are not able to reconcile pandemic quality and sustainability. There is a big difference between appropriating ICT as a fashion, dominance tool and marketing product and adopting it as a way of life, organization and development. The pandemic has taught us the need to change our behavior towards the use of space we have, the way we think, the mechanisms of expanded consumption (supply, lifestyle, travel...). Higher education is only one important link in a global, listed and identified whole. ICTs are a way of life, a way of consumption and a way of learning. It is the whole of society, in its being, that is concerned and that must adapt to the globalized risk environment. ICTs are therefore not just tools for individual motivation to seek to combine the richness and interactivity of other ICTs in real or virtual ways. The whole of Europe in the middle of a pandemic crisis has begun to think of the absurdity of globalized economic models. It is in the face of adversity that we must show the qualities of inhabitants-users-citizens unsuspected in the face of the crisis. This is to say that we must first react containing content. That is to say, to start by establishing a process of regulation of the education system in order to reduce the gap of the malfunctions analyzed above. ICT is a social project in response to the pandemic. Then find the link between the university as a locomotive for equitable change and the simplified popularization of the use of ICT in all aspects of daily life. This is how ICT can be used to achieve the desired results. Good results evoke the availability of ICT. At the moment, under the pandemic, it is not a question of treating one's self-determination as a hypothetical degree of freedom perceived by an individual in the choice and execution of one's actions. It is the return to the integration of the power of the plural society as an open system on ICTs and evolutionary (Dortier, 2013), around social action, norms and values, but also as an actor where the human being can seize himself-and to build oneself at the same time as a singular individual and as a social actor inseparable from the historicity and social relations in which it is inscribed (Lebel, 2013).

***The Bachelor: An Adaptive Digital Reform***

Still in a direction towards the digitalization of higher education, the pandemic comes at the right time to activate the ICT implementation process of the Moroccan university. The need for this is significant and the impact of the coronavirus on the learning process, the university assessment and the triogical university-teacher-student relationship are considered insufficient, the aim of the project is to provide the Moroccan University with emergency solutions to a fundamental problem affecting its most elementary functioning. Despite efforts to save in-extremist the year 2020 and to prepare even more against a pandemic in which the virus is rampant and even becomes mutant (use of ICT platforms, educational TV, YouTube, Creation of Kolliya TV Channel at the FLSH, Ibn Zohr University of Agadir), the assessment of results struggles to come out in the image of the efforts made. This should not be attributed, automatically and exclusively, to the only problem of the pandemic or the way in which it is dealt with. It is the environment of pressure and succession of quasi-vertical reforms

that makes the university field contracted and rather tense. It is in this environment that the Bachelor arrives as a school at the same time fundamental, of engineers and computer science. Its designers estimate IT security... information technologies under the domain close to IT and network management and architecture.

Adapting training to the labor market requires, it is the result of a training in three years of study, but it remains open on parallel admissions (diploma Bac+2) in a single year. Its curriculum takes place in fundamental and alternating (Web and software development, network architecture, computer languages, programming, robotics, project management, the Bachelor is assimilated, in times of pandemic, as a digital medium that has already revolutionized the world and that will further impact the transformations and the daily lives of people. Virtually and through de facto transposition and model importation, the Bachelor already sees himself, according to the Vaud perception (Swiss industrial groups), propelled in the world of HEIG-VD, which is distinguished by a unique ecosystem with the direct proximity of the Y-Parc innovation park and the density of links with Vaud and national companies, which gives a professionalizing dimension to the training, with lessons close to industrial needs and willing to operate within the a tri-national curriculum (France-Germany-Switzerland), to cushion the impact in other words, it is a curriculum designed for a constantly evolving field, the Informatics and Communication Systems (ISC) stream trains engineers specialized in software computing, data engineering and development of embedded computer systems.

On the one hand, excessive privatization, the importation of advanced ICT models and high-tech channels responding to the specific needs of industrial societies, the pandemic; on the other, a university environment under pressure, a succession of vertical reforms, a system of education and training in gestation. Is all-out privatization with all that it entails as a societal issue the most suitable solution? This, knowing the real limits of society's access to ICT in its entirety. Are we not in a context of contradictions when the new model of development recently undertaken by a Morocco that wants to be strong, competitive and strongly attached to its identity base through public school?

## **Method**

Our research method aims to cross the perceptions toward the challenges, difficulties, resistance regarding the management of the educational system in a new era either by students, professors or administration. We also worked on a developmental research strategy focusing on educational innovation techniques. For this purpose, we adopted two methodological approaches:

### **Empirical Field Work**

To approach the cleavage between the reality of the educational system and the digitalization philosophy imposed vertically and to understand the mechanisms of the system, to figure out where and how to deal with the anomaly of digitalization.

## Experimental Groups

Two experimental groups with 150 students each with two different strategies. To see how the *creactical* “combination of creative and critical proposed by Jason Ohler - *Reinventing Education*” approach can lead to educational innovation, in order to propose new digital pedagogical philosophy with concrete results. Our application methods for the experimental groups were different. Figures bellow explain the different strategies:

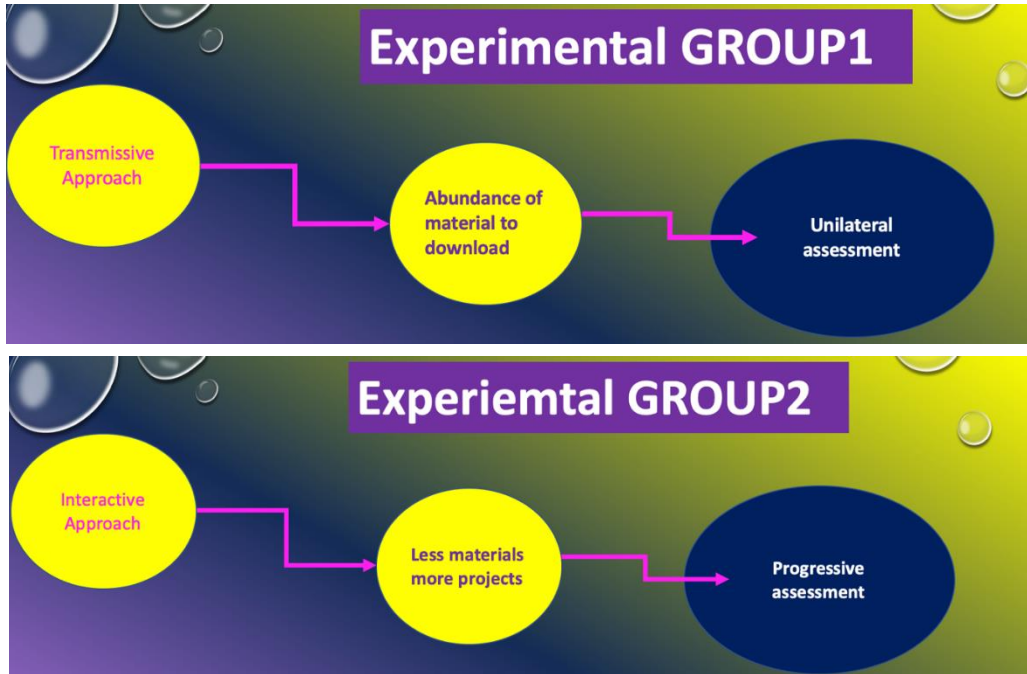


Figure.1. Transmissive Approach For 150 Students

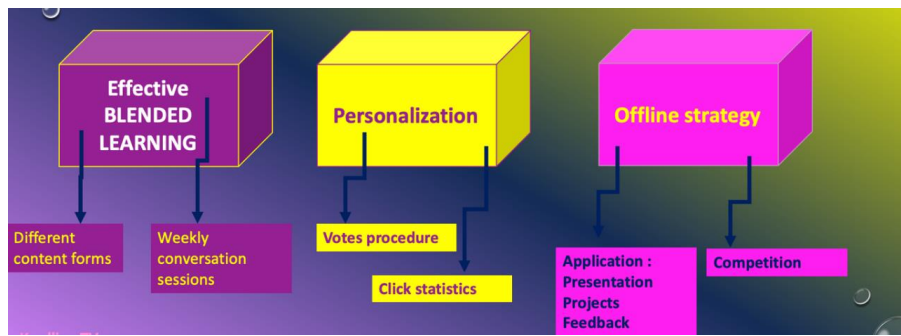
## Results

As a result, to the experimental groups strategies we came to the following results:

- a- For first group in which we implemented transmissive strategy: students’ assessment has shown random answers, lack of reflection and critical thinking and most importantly the resistance against this digitalization process.
- b- For the second group in which we based our teaching on interactive approach: Students’ manifested engagement, expressed ambition and they also have been active in the course conception.

## Discussion

The culminate point of this experience is that we came out with an innovative hybrid educational pedagogy we called “Edu-Lab-classes”, based on collaborative perspective the following diagram explains our new educational strategy:



Our main concern was to provide adapted content for the different students' profile , based on the personalization technique as well as the effective blended learning.

## Conclusion

The digitalization of higher education is certainly, a project of society to modernize, to face the pandemic contexts that will still arise in a globalized world that manufactures its skills, its crises and its remedies. Throughout this article, we have tried to demonstrate the parameters of a profound crisis in higher education. A crisis that is mainly related to the gradual withdrawal of the State from the educational question not only for higher education, but for the whole educational sector. This withdrawal is not new. It is the result of a balance of power often decided on external proposals in favor of privatization and international partnership. These power relationships take many forms. Sometimes it's structural adjustment, often it's the privatization process, if not the voluntary departure.... The question of the use of ICTs in the modernization of society, of education, of virtual accompaniment of globalized lifestyles is inevitable. Just like mobile phone use, everyone automatically aligns themselves with technological innovation, but each one has its own speed, resources and know-how. Once again, the crisis in higher education is not to be decided on the basis of computer usage. It is more profound and is part of a real national debate about the future of a country as a whole.

The instrumentalization of the pandemic, the modernization of the university field is not only a question of access to ICTs, imported models, privatization in all directions, must not jeopardize our identity and civilizational achievements, on our ability to adapt, to contain adversities. We have lived through our history, pandemics and not a pandemic and naked have come out each time more powerful and enterprising. Today, the winners of the public school are true entrepreneurs around the world. Whether in the business, in finance, in the medical field, in IT ... This does not mean that ICT innovation and development opportunities should be ignored. However, a balance is needed. The State must continue to support public education in general and not only higher education, because it is a system of education from preschool to PhD. It is up to the Moroccan university to adapt to ICT, to the environment of digitalization on a more secure basis, with more social justice, more means and more autonomy of management, less reforms at each turn. Privatization policy as it is designed for higher education, with the many logics and strategies behind it, cannot pay off. The ICT issue is not a question of controlled use, but a question of the development of a differentiated society.

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## Pareto Analysis on the Academic Service as an Effort to Improve Total Quality Management at Higher Education

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**Abstract:** The concept of TQM is really needed by educational institutions, considering the needs and user satisfaction are the main goals of services in an educational institution. The synergy of student expectations and campus interests will be achieved if academic services are carried out by prioritizing aspects of quality, adequate facilities, and professional management. Therefore, service provided to the students must be improved in terms of its quality. This study used descriptive quantitative method to find out which aspect(s) of higher education academic service that most likely needs an improvement. Although numerous studies on students' satisfaction with academic service have been conducted, a study involving the Pareto analysis method has not been clear yet. Based on the results of the study, the academic service quality that is highly expected from higher education is a domain related to information on service procedures, information on service requirements, and the responsiveness of service officers in responding to complaints.

**Keywords:** Pareto Analysis, Academic Service, Total Quality Management

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### Introduction

Higher education as educational institutions will not operate in isolation from global competition. As a result, improving the quality of education is the major objective in order to be successful in the global era. TQM (Total Quality Management) is a management concept that emphasizes integrated quality improvement and is relatively new in the field of education. The concept of TQM is very much needed by educational institutions, considering the needs and user satisfaction are the main goals of services in an educational institution.

There is no question that TQM has enormous promise in education, although it should not be assumed that there

are no difficulties or hurdles in applying TQM in education. Higher education and other academic institutions are substantially diverse, with distinct ethos and qualities that make implementing the TQM concept handed down from industry difficult (Brinbaum, 2000; Massy, 2003; Moore, 2021; Oustous et al., 2021). Otherwise, in the education field, TQM is a method that can be used to improve the quality of education and achieve goals most effectively. The education improvement should also pay attention to the quality of service. Educational activities are focused not only on the outcome of the educational process but also on good proof of accountability, such as quality assurance and quality improvement (Peraturan Badan Akreditasi Nasional Perguruan Tinggi Nomor 5 Tahun 2019 Tentang Instrumen Akreditasi Program Studi, 2019).

Quality issues in education are not only related to inputs, processes, and outputs, but also outcomes. The involvement and synergy of the entire academic community, including employees, lecturers, students, alumni, and the private sector, is very important for higher education success. Today's interest and attention to factors of educational service quality may be attributed to the recent decade. The success of educational services is judged by delivering quality services to those who utilize them (students and the community). Students are one of the main players influencing the operation of institutions in the administration of higher education. Academic services that prioritize quality, proper facilities, and competent administration will establish a synergy of student expectations and campus interests. Therefore, service to the students must be improved in terms of its quality.

The degree of service quality cannot be measured from the perspective of the firm but must be considered from the perspective of the client (Nugraha et al., 2016). Customer satisfaction is positive if it satisfies their expectations; alternatively, the service is seen as poor if it does not satisfy their expectation (Kotler, 2000). The satisfaction level is a function of the difference between perceived performance and expectations. Likewise with students who are customers of higher education. To achieve a high level of satisfaction, it is necessary to have an understanding of what consumers want, by developing a commitment that everyone in the institution strives to meet consumer needs (Cravens & Piercy, 2009; Saritaş, Börekci, & Demirel, 2022).

Since the aim of this study is to find out aspect(s) of higher education academic service that most likely needs an improvement, the researcher refers to the study conducted by Marthalina, (2018) under the title "Analisis Kualitas Pelayanan Akademik dan Kepuasan Mahasiswa di IPDN Kampus Jakarta." According to this study, the academic services of the S-1 Human Resource Management Study Program have been going very well. However, it also needs to identify several weaknesses that exist in the academic service process of the S-1 Human Resource Management Study Program, especially on the dimensions of reliability and responsiveness. Similar findings were also revealed by Miati & Setiawan, (2022) who indicated that E-service quality had an impact on students' satisfaction levels. It emphasized that service quality, indeed, is important to improve institutions' quality especially when it comes to customer satisfaction.

Linking service quality and customer satisfaction have been widely discussed by several studies. Nevertheless, there is a limited study that shows aspects of academic services that require more improvement. This current study is seen to be noteworthy since the findings should be advantageous to the institution in improving the

quality of their academic service. In addition, although numerous studies on students' satisfaction with academic service have been conducted, a study involving the Pareto analysis method has not been clear yet. According to the previous studies referred by the researcher, those studies only revealed students' satisfaction levels according to the survey. Therefore, this current study helps to identify the top aspect(s) that need to be addressed to improve the implementation of TQM in academic services. Moreover, the researcher used various levels of higher education students as respondents who were thought to be capable of understanding something more sophisticated.

### **Total Quality Management**

TQM is planning and controlling the quality of products and services within a company explicitly and systematically (Prasojo, 2016) TQM is implemented as a tool to improve quality by taking into account the needs and satisfaction of customers or stakeholders. When adopting TQM in educational institutions, there are five factors that must be considered as follows: internal and external customer focus, entire engagement, quality standards, commitment, and continual quality improvement (Huriyah, 2016). According to Goetsch & Davis, (2016), the total quality approach is distinguished by the following characteristics: strategic focus, employee involvement and empowerment, obsession with quality, scientific approach, customer focus, long-term commitment, teamwork, bottom-up education and training, freedom through control, continuous process improvement, unity of purpose, and peak performance.

TQM requires that everyone and everything in the organization participate in the enterprise of continuous improvement (Sallis, 2002). Furthermore, Hardjosoedarmo, (2014) stated that TQM is the use of quantitative methodologies and human understanding to enhance materials and services, all organizational processes, and attempts to fulfill the demands of current and future product and service consumers.

In education, quality management can lead to a successful learning process that is fun and provides enjoyment. The implementation of TQM in education needs to consider the existence of continuous improvement, quality standards as the basis for quality development, cultural and organizational changes, and the effort of maintaining good relationships with customers (Haudi, 2020).

### **Academic Service Quality**

Quality is the characteristics of a good or service, which demonstrates its ability to satisfy specified or implied needs. According to Sallis, (2002), educational institutions must build quality systems to demonstrate to the public that they can deliver quality services. Types of services to higher education, according to Kotler & Fox, (1995) are divided into six main dimensions namely: academic advising, extracurricular activity, resources, quality of instruction, library, opportunities to talk with faculty members job, placement services. Service quality is the extent to which the company's services meet the requirements and expectations of customers, or how large the gap between reality and consumer expectations of the services they receive (Juhana & Mulyawan,



2015; Sallis, 2002). The quality of services is centered on efforts to meet the needs and desires of the user community and the accuracy of its delivery to compensate for what the user community expects (Susanto, 2012). Quality of services depends on the ability of service providers to meet the expectations of the user community consistently and end up in the perception of the user community.

Academic services are university-related educational services that comprise syllabus, curriculum, lecture quality design, material presentation, serving material units, practicum, guidance, and evaluation (Anastasia & Tjiptono, 2001). Academic service quality is a measure of how good the overall service level provided by the higher education institution is so that it can meet customer needs or desires (main external and internal).

In the assessment of public service performance of the minister of the utilization of the state apparatus number: Kep/25/M.PAN/2/2004, community satisfaction index requires that the minimum service must meet these aspects of service which include: service procedures, service requirements, service officers' clarity, discipline, responsibility, ability, speed of service, service equity, courtesy and sociability of officers, realistic and the certainty of service costs, the certainty of service schedules, and the convenience of the service environment.

### **Pareto Analysis**

Pareto diagrams are used as a proposal for improvement to see the order of repair variables that are top priorities (Arifianto & Dwiyanto, 2013). Furthermore, this analysis led to the statement that 80 percent of problems stem from 20 percent of processes (Sallis, 2002). The Pareto Rule, sometimes known as the 80/20 Rule, is an important concept. The Pareto diagram is useful for identifying some vital issues by applying the 80:20 comparison rule, meaning that an 80% increase can be achieved by solving 20% of the most important problems faced (Yamit, 2010).

If at least 80% of the issue areas can be identified, they should be prioritized in any quality improvement initiative. Initiative strategies should focus on the areas that provide the most issues. Pareto charts are basically specialized vertical bar charts that help with quality concerns. Pareto charts direct attention to the most pressing issues affecting a group or institution.

### **Method**

This study is conducted by using a descriptive quantitative method to investigate academic service in higher education to improve the implementation of total quality management. This study took data from students and alumni from higher education in Indonesia that were selected by using a random sampling method.

Since the purpose of this study was to explore academic services in higher education, so the appropriate tool was a questionnaire. The questionnaire used was adapted from (*Laporan Survey Indeks Kepuasan Masyarakat*

*Bidang Pelayanan Umum Kelurahan Di Surabaya Timur*, 2019). The adaptation process produced a new questionnaire that consisted of four sections questioning respondents' demographic data, respondents' perceptions of their expectations and satisfaction with academic services at higher education, and related suggestions for improving academic services.

The researcher used an indirect questionnaire which means the respondents only answer the question about the characteristics. This questionnaire used Likert response scales ranging from Very Unimportant and Very Dissatisfied (*STP*) to Very Important and Very Satisfied (*SP*). Each has its numerical value for the sake of the statistical computation needed among others, *STP* had the lowest score (1) while the *SP* has the highest one (5). By using this questionnaire, the researcher gained data from the respondents regarding service requirements, service procedures, service time duration, officers' competencies, officers' behavior, supporting facility and infrastructure, handling and complaint, and service result.

Table 1. Blueprint of the Questionnaire

Domain	Indicators	Section
	Respondents' name, Respondents' alma mater,	1
Demographic Data	Respondents' student status, Higher education level	
Service requirements	Information availability, clarity, and convenience regarding service requirements	2, 3
Service procedures	Information existence, clarity, and convenience regarding service procedures	2, 3
Service time duration and costs	Accuracy and speed of service time duration, accuracy and affordability of service costs	2, 3
Officers' competencies	Officers' skills, experience, knowledge, and understanding of their work	2, 3
Officers' behaviors	Officers' attitude, attention, and professionalism	2, 3
Supporting facility and infrastructure	Availability, feasibility, and utilization of supporting facilities	2, 3
Handling and complaint	Availability of complaint facilities and follow-up on complaints	2,3
Service result	Suitability of service result	2, 3
Suggestion	Respondents' suggestions of academic service in higher education	4

The features of the questionnaire were analyzed by using the Customer Index Satisfaction method (CSI). The results of the CSI calculation then will be categorized into satisfaction level criteria as shown in Table 2.

Table 2. Criteria Scale of CSI

CSI Score	Criteria
$X > 0.81$	Very Satisfied
0.66 – 0.8	Satisfied
0.51 – 0.65	Sufficiently Satisfied
0.35 – 0.5	Not Satisfied
0.00 – 0.34	Very Dissatisfied

After the calculation result was revealed, Pareto analysis was applied to identify which academic service domain needs more improvement. To assure the study's validity and avoid bias, the researcher reviewed the questionnaire data and identified supportive ideas from past research and experts.

$$CSI = \frac{\sum_{i=1}^p WSi}{5} \times 100\%$$

$p$  = number of importance's attributes  
5 = scale total

Figure 1. CSI Formula

## Results

### Customer Index Satisfaction

To know customer index satisfaction, the researcher distributed the questionnaire by using Google Form to the students and alumni of higher education in Indonesia. The questionnaire was shared in March, 21st 2022 through social media and WhatsApp groups. The questionnaire used Likert Scale with five range which are Very Important/Very Satisfied, Important/Satisfied, Moderately Important/Sufficiently Satisfied, Not Important/Not Satisfied, Very Unimportant/Very Dissatisfied.

Each statement had its numerical value for the statistical computation which applied the highest score (5) to Very Important/Very Satisfied as the lowest score (1) to Very Unimportant/Very Dissatisfied. The result of the questionnaire was determined by calculating the respondents' answers and then analyzing and scoring them. There is a total of 21 questions for each important and satisfaction section regarding the service requirements, service procedures, service time duration, officers' competencies, officers' behavior, supporting facility and infrastructure, handling and complaint, and service result.

The maximum score of the questionnaire was 210 and the result of the questionnaire calculation is shown in Table 3.

Table 3. Result of the Questionnaire

No	Indicators	Mean Important Score	Mean Satisfaction Score	Gap
1	The existence of information about the requirements for obtaining services	4.51	4.17	0.34
2	Clarity of information about the requirements for obtaining services	4.51	4.21	0.3
3	Ease of requirements to get services	4.43	4.17	0.26
4	The existence of information about service systems/mechanisms/procedures	4.40	4.13	0.27
5	Clarity of information about service systems/mechanisms/procedures	4.51	4.24	0.27
6	Ease of information about service systems/mechanisms/procedures	4.47	4.14	0.33
7	Speed of service processes	4.56	4.29	0.27
8	Accuracy of service process	4.47	4.31	0.16
9	Accuracy and affordability of service costs	4.53	4.41	0.12
10	Officers' competence in carrying out their duties	4.54	4.30	0.24
11	Officers' knowledge and understanding of the duties and their responsibilities	4.56	4.36	0.2
12	Officer's ability to provide solutions to students/alumni	4.50	4.36	0.14
13	Friendly attitude and officers' attention to students/alumni	4.53	4.23	0.3
14	The professionalism of officers in carrying out duties	4.56	4.40	0.16
15	The ministry does not discriminate.	4.56	4.43	0.13
16	Feasibility and comfort of the service building	4.39	4.27	0.12
17	The availability of services supporting infrastructure	4.46	4.30	0.16
18	Implementation of the use of IT / Information Technology systems for service processes	4.47	4.33	0.14
19	Availability of complaint box	4.33	4.07	0.26
20	Follow-up on student/alumni complaints	4.40	4.17	0.23
21	Conformity of output/quality of service results obtained	4.51	4.30	0.21
Total Mean Score		98.66	93.81	4.85
Customer Index Satisfaction			85.30	

Based on the result of the questionnaire, the mean satisfaction score of each statement is below the important score. The indicator "follow-up on student/alumni complaints" achieved the lowest mean satisfaction score which is 4.07. Meanwhile, the highest mean satisfaction score was achieved by indicators of "officers'

knowledge and understanding of the duties and their responsibilities” and “officers’ ability to provide solutions to student/alumni” with a figure of 4.36. The highest gap is on the indicator “the existence of information about the requirements for obtaining services” with a figure of 0.34, while the lowest gap is on the indicator “accuracy and affordability of service costs” and “feasibility and comfort of the service building”.

Furthermore, the table also revealed that the total mean importance score is 98.66, while the total mean satisfaction is 93.81. It meant that respondents most likely had a positive impression of academic service in higher education. However, a gap of 4.85 between the important and satisfaction score indicates that service performance was still below customer expectations.

On the other hand, the table shows that the customer index satisfaction of academic service in higher education obtained a score of 85.30. It means that most of the users are very satisfied with the academic service, (see Table 2).

### Pareto Analysis

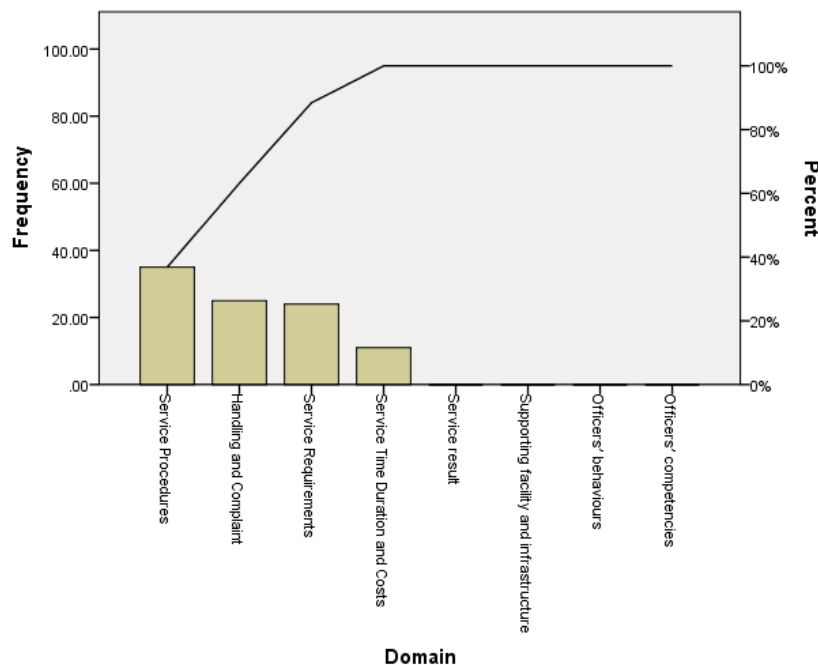


Figure 2. Pareto Chart

Based on the Pareto Chart, showed that dominant problems occur related to the service procedures then followed by the domain of handling and complaint, service requirements, and service time duration. According to the Pareto principle, if the three most dominant domains are handled, 80% of the problems will be resolved since the three types of domains are the priority that must be addressed first. These three domains are things that must be considered so that the service quality can be improved, and customer satisfaction can increase.

## Discussion

The results of this study also support the findings of the study conducted by Azam, (2018) who states that students' views of service quality are connected to their satisfaction with such services. Other research results that are also relevant to this research are research conducted by Kurbani, (2017). The results of the analysis confirm the existence of a favorable and substantial relationship between academic service quality and student satisfaction with sig values 0.046. It is emphasized by Shah & Nair, (2010) who stated that student evaluations of education are based on more than just what happens in a typical classroom; they consider the entire student experience, including course design, instructor quality, relevant support services, learning infrastructure, information technology, assisted learning, and campus life.

Quality academic services are supposed to enhance student satisfaction with academic services provided by any educational institution. The quality of academic services behavior is supported by student enthusiasm to utilize them. It is similar to the result of the previous study explaining that officers' dependability in providing academic services, accuracy in information delivery, responsiveness to student complaints and requests, and harmonization of service relationships between officers and students all contribute to the quality of educational achievements desired by students in higher education institutions (Kuswanto & Anderson, 2021).

Students will engage in positive consuming behavior if they feel that the academic services they use will help them to complete their academic affairs and there are enticing offers from higher education institutions. It is in line with Malik et al., (2010), who stated that the quality of service has a significant impact on student satisfaction in a variety of ways. The basis of student satisfaction is dependent on the institution's teaching and learning environment, as well as the demand for well-qualified students, learning, and faculty experience for their academic and professional growth. Besides, Zhang et al., (2008) pointed out that since college reputation has a direct impact on student expectations, universities should first improve their educational services to enhance student satisfaction.

Student satisfaction will provide benefits for the college. Students who are satisfied with the college's services will continue their education at the same institution. Furthermore, they will advertise the college's excellent service to other potential students. This is in line with (Kotler, 2000) that many benefits will be obtained by the company with the achievement of a high level of satisfaction.

## Conclusion

Based on the results of the study, the academic service quality that is highly expected from higher education is a domain related to information on service procedures, information on service requirements, and the responsiveness of service officers in responding to complaints. Indirectly, these expectations are helpful to the institutions in improving their performance, especially in academic service. This current study leads the

institution to know what aspects most likely need to be improved to implement Total Quality Management in education. It can be seen that most respondents feel less satisfied compared to their expectations.

## Recommendations

The researcher made several recommendations for the academic service officers based on this study. As a service assistant, the officer should pay attention to the customers' needs. The officer should note that different customers should have different needs and characteristics. However, the researcher assumed that this study will serve as a useful reference for other researchers doing more studies on Total Quality Management in educational institutions. Since the analysis method used in the present study is Pareto Analysis Method, future researchers might analyze similar themes from another method like Root Cause Problem Analysis or else. Future researchers can explore comparable subjects and expand the scope of the study by conducting various issues, resulting in better and more valid results.

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## Students' Errors in Solving Sequences and Series Word Problems Based on Problem-Solving Steps of Polya

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**Abstract:** Problem-solving is one of the 21st-century skills. However, students still have difficulty solving sequences and series word problems. The purpose of this research is to analyze students' errors in solving sequences and series word problems based on problem-solving steps of Polya. The research method is descriptive qualitative. The research subjects were six students of XI-B SMA Plus Ar-Rahmat Bojonegoro who were given written tests and interviews. The written test consists of two sequences and series word problems. The results show that the percentage of students who made mistakes in the step of understanding the problem is the smallest and in the step of looking back is the largest. The research findings show that there are four types of student errors; misunderstanding the meaning of the keywords, incorrectly relating what is known and asked to the previous knowledge, incorrectly distinguishing concepts and strategies for solving real-world context problems due to positive interference, and miscalculation due to pseudo-covariational reasoning from "wrong" answers.

**Keywords:** Students' Errors, Word Problems, Sequences and Series, Problem-Solving, Polya's Steps

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### Introduction

Many organizations and educators argue that to cope with the rapidly evolving world because of globalization, students must develop 21st-century skills that include creativity, critical thinking, problem-solving, communication and collaboration, and technological fluency (Bray & Tangney, 2016; Voogt & Roblin, 2012). Mathematics education is the right domain to develop 21st-century skills by preparing students to be able to apply mathematics in real-world problem-solving (Gravemeijer et al., 2017). Problems are tasks that cannot be solved by direct effort and will require some creative insight to solve (Liljedahl, 2015; Mason et al., 2010; Polya, 1965).

Problem-solving in mathematics means that students apply their knowledge and frequently develop new

mathematical understandings to find solutions to problems for which there was previously no known solution (NCTM, 2000). Problem-solving ability, according to Polya (2004), is identified as the ability to (1) understanding the problem, (2) devising plan, (3) carrying out the plan, and (4) looking back. According to In'am (2014), understanding the problem is a necessary step before beginning problem-solving activities, devising plan was to make a direction for developing appropriate strategies to solve the problem, carrying out the plan was to carry out the problem-solving following the selected approach, strategy, and model, and looking back was an effort that needed to be made during problem-solving to assess the results.

PISA is an international-level assessment study, which measures students' problem-solving abilities. A scenario-based approach was used in the assessment of problem-solving at PISA in 2012, the assessment of collaborative problem-solving at PISA in 2015, and the assessment of mathematical literacy which includes problem-solving abilities at PISA in 2018 (OECD, 2019a). The results of the PISA study from 2000 to 2018 in the mathematics section show that Indonesian students always perform very poorly. The average score of 15-year-old Indonesian students in the 2012 PISA study was second to last out of 64 countries (OECD, 2014). In PISA 2015 (OECD, 2016), the average score was better but still far below the average score. In PISA 2018 (OECD, 2019b), the average value fell again and was ranked 72nd out of 77 countries.

To develop problem-solving skills and provide practical application in real-world situations, teachers can give word problems to students (Verschaffel et al., 1999). Word problems are a combination of numbers and words in which students apply mathematics instruction in a problem-solving context (Pfannenstiel et al., 2015; Wyndhamn & Säljö, 1997). However, research shows that word problems are the most difficult type of problem faced by students (Verschaffel et al., 2020).

One of the mathematics problems that is considered difficult is the problem of patterns, for example, problems that require the ability to determine sequence patterns to calculate series (Kurniati et al., 2015). The results of observations at SMA Plus Ar-Rahmat Bojonegoro showed that some students still had difficulties in solving the word problems of sequences and series. This is evident from the fact that 52% of students received scores below average on the previous sequences and series test that included word problems.

Based on the background of the problem above, this study aims to analyze students' errors in solving the word problems of sequences and series based on problem-solving steps of Polya.

## Method

The method used in this study is a qualitative method with a qualitative descriptive approach. The study was conducted on February 24, 2022. Of the 21 students of class XI-B SMA Plus Ar-Rahmat Bojonegoro who were given a written test, six students were chosen as research subjects using purposive sampling. It is intended that

the subjects are chosen based on their information's relevance to the research's goals or specifically by those who are knowledgeable and have effective communication skills (Creswell, 2012).

The identification process is carried out by categorizing the written test results based on the errors made by students in the problem-solving steps of Polya. Data collection techniques in this study were tests and interviews. The test instrument used consisted of two word problems. Problem number (1) is an arithmetic series problem, while number (2) is a geometric series problem as shown in Figure 1.

1. The sum of paper produced by a factory follows the rules of an arithmetic series and is expressed as  $P = \frac{5}{2}h^2 + \frac{3}{2}h$ , where  $P$  is the sum of production (in tons) and  $h$  is the number of days. The number of papers produced by the factory on the 10th day is...
2. A child plays on a swing with his father in the park. The father swung his son back, then let go and let the swing stop on its own. If the length of the first arc formed is 2 meters and in each subsequent swing the length of the arc becomes  $\frac{3}{4}$  of the previous arc, then the length of the swing path until it stops is ...

Figure 1. Test Instrument

Data were analyzed using the triangulation method. Triangulation is the process of strengthening data from various types of sources (Creswell, 2012). The study's supporting evidence is strengthened by examining the accuracy of the findings and interpreting the data from the same source with different ways, specifically through student work and interviews. Data reduction, data presentation, and conclusion drawing were all steps in the triangulation process (Miles & Huberman, 1984).

Based on the purpose of this study, students' errors in solving the word problems of sequences and series were analyzed based on problem-solving steps of Polya with indicators presented in Table 1.

Table 1. Error Indicators Based on Problem-Solving Steps of Polya

Solving Steps	Error Indicators
Understanding the problem	<ol style="list-style-type: none"> <li>1. The student misreads the problem given.</li> <li>2. The student misinterprets math words or sentences in the problem.</li> <li>3. The student is wrong in determining information about what is known and asked in the problem.</li> </ol>
Devising plan	<ol style="list-style-type: none"> <li>1. The student is wrong in remembering the formula or concept he has received to devise a plan.</li> <li>2. The student is wrong in associating what is known and asked in the problem with the knowledge that they mastered.</li> </ol>

Solving Steps	Error Indicators
Carrying out the plan	1. The student is wrong in carrying out the completion plan he has made. 2. The student is wrong in doing calculations.
Looking back	The student is wrong in re-checking the truth of the answer.

## Results

Of the 21 students who were given the test, the percentage of students who made errors in solving the word problems of sequences and series based on problem-solving steps of Polya is shown in Table 2.

Table 2. Percentage of Students Who Made Errors in Problem-solving Steps of Polya

Problem-solving Steps of Polya	Percentage of Students Who Made Errors		Average
	Problem I	Problem II	
Understanding the problem	38%	24%	31%
Devising plan	62%	52%	57%
Carrying out the plan	76%	52%	64%
Looking back	76%	52%	64%

Then six students who represent errors in each step of problem-solving steps of Polya are selected shown in Table 3.

Table 3. Subjects' Errors

Problem-solving Steps of Polya	Subject					
	AHA	MRAH	SAF	ASW	SMHW	RAF
Understanding the problem	√	√	–	–	–	–
Devising plan	√	√	√	√	√	–
Carrying out the plan	√	√	√	√	√	√
Looking back	√	√	√	√	√	√

Description:

(√) The subject made an error in that step

(–) The subject did not make a mistake in that step

### Error in the Step of Understanding Problem

Figure 2 shows student AHA misinterpreted the math word or sentence in problem number (1). Student AHA

did not understand the difference between “the number of” and “the sum of”. What is known in the problem is “the sum of production” which is denoted by P. Meanwhile, what is asked in the problem is “the number of productions”. However, the student wrote that what is asked is also P.

<p><u>Diketahui</u>  <math>P = \frac{5}{2}h^2 + \frac{3}{2}h</math>  <math>h = 10</math>  <math>P = \text{jumlah produksi}</math>  <math>h = \text{hari}</math></p>	<p><u>Ditanya</u>  <math>P = \text{saat } h = 10</math></p>	<p><b>Translation:</b>          Known:  <math>P = \frac{5}{2}h^2 + \frac{3}{2}h</math>  <math>h = 10</math>  <math>P = \text{the sum of production}</math>  <math>h = \text{days}</math>          Asked:  <math>P \text{ when } h = 10</math></p>
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Figure 2. Error in Understanding Problem Number (1)

To ensure this, the researcher conducted interviews with student AHA as follows.

- Researcher : what is asked in the problem?  
 Student : the number of paper production, Ustaz.  
 Researcher : what do you write here?  
 Student : P when  $h = 10$ .  
 Researcher : what is P?  
 Student : the sum of paper production.  
 Researcher : what is the difference between “the number of” and “the sum of”?  
 Student : they are the same, Ustaz.

Figure 3 shows that student MRAH misinterpreted the math word or sentence in problem number (2). Student MRAH misunderstood the sentence “in each subsequent swing the length of the arc becomes  $\frac{3}{4}$  of the previous arc”. The sentence should mean a multiplication operation, but the student performed a subtraction operation.

<p>diket . - Panjang busur I = 2 m          - setiap ayunan = <math>(2 - \frac{3}{4}m)</math> dan seterusnya</p>	<p><b>Translation:</b>          Known:          Length of first arc = 2 m          Each swing = <math>(2 - \frac{3}{4}m)</math> and so on</p>
--	---

Figure 3. Error in Understanding Problem Number (2)

### Error in the Step of Devising Plan

Figure 4 shows student SAF was wrong in relating what the known and the asked in problem number (1) with the knowledge he mastered. Student SAF can write down what the known and the asked correctly but used the formula P to find the Un.

<p>diketahui <math>\Rightarrow P = \frac{5}{2} h^2 + \frac{3}{2} h</math>  <math>P</math>: jumlah produksi dalam ton  <math>h</math>: banyaknya hari</p> <p>Ditanya: banyaknya produksi kertas pada hari ke-10</p> <p>Jawab: <math>\frac{5}{2} (10)^2 + \frac{3}{2} \cdot 10</math>  <math>= \frac{5}{2} \cdot 100 + \frac{3}{2} \cdot 10</math>  <math>= 5 \cdot 50 + 3 \cdot 5</math>  <math>= 250 + 15</math>  <math>= 265 \text{ ton}</math></p>	<p><b>Translation:</b></p> <p>Known:  <math>P = \frac{5}{2} h^2 + \frac{3}{2} h</math>  <math>P</math>: the sum of production in tons  <math>h</math>: the number of days</p> <p>Asked:  The number of paper production on the 10th day</p> <p>Answer:  <math>\frac{5}{2} (10)^2 + \frac{3}{2} \cdot 10 = \frac{5}{2} \cdot 100 + \frac{3}{2} \cdot 10</math>  <math>= 5 \cdot 50 + 3 \cdot 5</math>  <math>= 250 + 15</math>  <math>= 265 \text{ ton}</math></p>
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Figure 4. Error in Devising Plans Problem Number (1)

Figure 5 shows that student ASW was wrong in relating what the known and the asked in problem number (2) with the knowledge he mastered. Student ASW did not know that the problem in the problem should be solved using the formula for an infinite geometric series.

<p>Dijawab: <math>u_1</math>    <math>u_2</math>    <math>u_3</math>    <math>u_4</math>  2 meter    <math>\frac{3}{2} m</math>    <math>\frac{9}{8} m</math>    <math>\frac{27}{32} m</math></p> <p>Jadi panjang lintasan ayunan sampai berhenti adalah <math>\frac{27}{32} m</math></p>	<p><b>Translation:</b></p> <p>Answer:  <math>U_1</math>    <math>U_2</math>    <math>U_3</math>    <math>U_4</math>  2 meters    <math>\frac{3}{2} m</math>    <math>\frac{9}{8} m</math>    <math>\frac{27}{32} m</math></p> <p>So the length of the swing path until it stops is <math>\frac{27}{32} m</math></p>
---	---

Figure 5. Error in Devising Plans Problem Number (2) Student ASW

While Figure 6 shows student SMHW was wrong in remembering the formulas or concepts that he has received to make plans for solving problem number (2). Student SMHW already knew that the problem can be solved using the formula for an infinite geometric series. However, when calculating the trajectory, student SMHW multiplied an infinite geometric series by 2, then subtracted it by the first term.

<p>Penyelesaian :</p> <p>Menggunakan rumus deret geometri tak hingga</p> $S_{\infty} = \left( \frac{a}{1-r} \right)$ <p>Panjang lintasan : <math>2 \cdot S_{\infty} - a</math></p> $= 2 \cdot \left( \frac{a}{1-r} \right) - 2$ $= 2 \cdot \left( \frac{2}{1-3/4} \right) - 2$ $= 2 \cdot (8) - 2$ $= 16 - 2 = 14 "$	<p><b>Translation:</b></p> <p>Using the formula for an infinite geometric series</p> $S_{\infty} = \left( \frac{a}{1-r} \right)$ <p>Length of the path:</p> $2 \cdot S_{\infty} - a = 2 \cdot \left( \frac{a}{1-r} \right) - 2$ $= 2 \cdot \left( \frac{2}{1-3/4} \right) - 2$ $= 2 \cdot (8) - 2$ $= 16 - 2$ $= 14$
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Figure 6. Error in Devising Plans Problem Number (2) Student SMHW

To find out the reason, the researcher conducted interviews with student SMHW as follows.

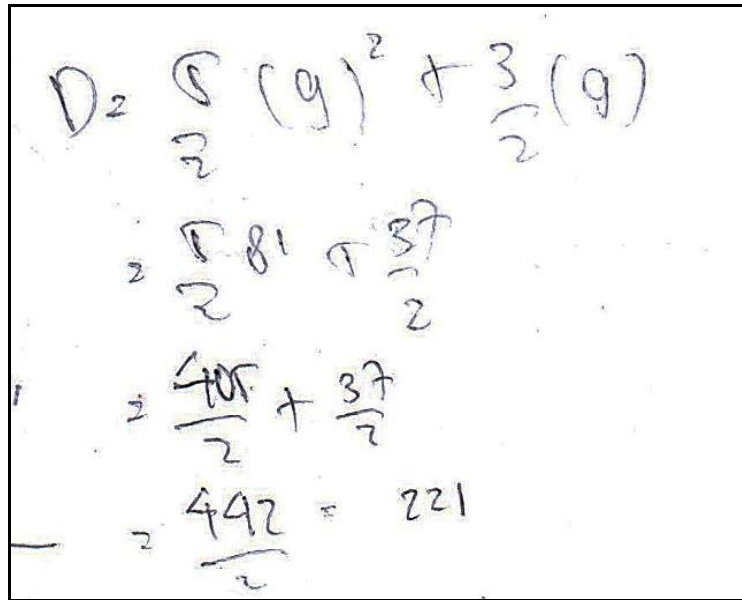
- Researcher : why did you multiply S with 2?  
 Student : because the path is back and forth, Ustaz.  
 Researcher : then why did you subtract it with a?  
 Student : because the first one is only counted once.  
 Researcher : have you ever worked on a similar problem?  
 Student : I have.  
 Researcher : what about?  
 Students : find the length of the path of the bouncing ball.

From the interview results, it is known that student SMHW thought that the strategy for solving the swing problem is the same as the strategy for solving the bouncing ball problem which both use an infinite geometric series.

### Errors in the Step of Carrying Out the Plan

Figure 7 shows the student RAF was wrong in calculating problem number (1). The student RAF miscalculated  $3 \times 9 = 37$ , it should be  $3 \times 9 = 27$ .





$$D_2 = \frac{9}{2} (9)^2 + \frac{3}{2} (9)$$

$$= \frac{9}{2} \cdot 81 + \frac{3}{2} \cdot 9$$

$$= \frac{405}{2} + \frac{37}{2}$$

$$= \frac{442}{2} = 221$$

Figure 7. Error in Carrying Out the Plan Problem Number (1)

To find out the reason, the researcher conducted interviews with student RAF as follows.

Researcher : how much is  $\frac{3}{2} \times 9$ ?

Student : (recounting)  $\frac{27}{2}$ , Ustaz.

Researcher : Then why do you write  $\frac{37}{2}$  here?

Student : At that time, I counted it in the air.

From the results of the interviews, it is known that student RAF made a mistake in doing calculations because he did not write down the process on paper and only counted in the air. However, when re-confirmed the student RAF was able to give the correct answer.

## Discussion

According to Table 2, the proportion of students who made errors in the understanding of the problem was the smallest, and the proportion who made errors in the step of looking back was the biggest. This is consistent with earlier research by Son et al. (2019), which found that the bigger the percentage of student errors, the further the step in problem-solving steps of Polya.

Students who made mistakes in understanding the problem are wrong in interpreting words or mathematical sentences in the problem. This is in accordance with previous research conducted by Boonen et al. (2014) that one of the sources of students' difficulties in solving word problems is understanding the readings and the meaning of the keywords used. Mathematical vocabulary is the main factor that helps students in understanding math word problems (Powell et al., 2017).

Students who made mistakes in the step of devising plan are wrong in remembering the formula or concept that

they have received to devise a plan and are wrong in relating what is known and asked in the problem with the knowledge that they mastered. Students who were wrong in remembering the formulas or concepts that they have received to devise a plan cannot distinguish problem-solving strategies using infinite geometric series. According to Makovski & Jiang (2008), this is called proactive interference. Proactive interference is old information that interferes with recalling new information (Sternberg & Sternberg, 2017).

Students who made mistakes in carrying out the plan are wrong in doing calculations. However, when confirmed again, the student can correct the answer. This according to Subanji (2011) is called pseudo covariational reasoning from “wrong” answers, namely students give wrong answers, but after reflection, they can fix them so that they become correct answers.

Students who made mistakes in looking back are wrong in re-checking the truth of their answers. In fact, according to Pratikno & Retnowati (2018) writing a conclusion sentence is one of the indicators to see if someone checks the results of their work. In addition, the conclusion sentence also shows a person’s understanding of a problem (Saygılı, 2017). Students who are wrong in the step of looking back in this study are the same students who are wrong in the step of carrying out the plan. This is in accordance with previous research conducted by Sukoriyanto et al. (2016) that students who make mistakes in the step of understanding the problem also make mistakes in the steps of devising plan, carrying out the plan, and looking back.

## **Conclusion**

Based on the results and discussion above, it can be concluded that in the problem-solving steps of Polya, there are four types of errors made by students, namely misunderstanding the meaning of the keywords, incorrectly relating what is known and asked to the previous knowledge, incorrectly distinguishing concepts and strategies for solving real-world context problems due to positive interference, and miscalculation due to pseudo-covariational reasoning from “wrong” answers.

## **Recommendations**

For further researchers, it is recommended to conduct further research regarding the four types of errors.

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## Review of Gifted Students' Perceptions towards Receiving Homework


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**Abstract:** In this study, the aim is to examine the perceptions of special talented students towards the homework given in mathematics courses with various variables. The research was conducted with 149 gifted students studying at the science and art center in the southern region of Turkey. This study is a descriptive study in screening model. In the collection of the data, “Mathematics Course Student Homework Perception Scale” developed by Uçar (2018) was used. The data was analyzed by t-test, Anova test, Kruskall Wallis and Mann Whitney U-tests on SPSS package program. As a result of the research, it was concluded that the perceptions of the students about the homework given in mathematics courses were positive. In addition, while there was no significant difference in the perception of the homework given in mathematics courses in variables such as gender and education status, it was seen that there was a significant difference in some sub-factors in terms of grade level and group variables.

**Keywords:** Homework, Homework Perception, Special Talent

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### Introduction

Educational activities are carried out in a planned and programmed manner in schools. Since the learning speed and learning style of each individual are not the same, the learning activity has to continue outside of school. Teachers often support the learning activity outside of school with the homework they have given. Homework is a learning activity that teachers give to students to be done outside of school, sometimes reading-writing and sometimes a problem to be solved or a television program to be watched, with the help of the student's family or individually or in groups with friends (Türkoğlu, İflazoğlu and Karakuş, 2014). Since the time students spend in school is short, school alone is not enough to achieve educational goals. Education needs to be carried out of

school with homework. Since the time that a teacher can spare for students during school is also limited, it should be ensured that learning continues outside the school. Homework, one of the teaching techniques, is one of the most effective methods of acquiring knowledge, making knowledge permanent and repeating knowledge, considering the time spent in school. Homework are considered to be beneficial to students in many ways (MEB, 2011).

Homework has many positive effects on learning Şen and Gülcan (2012) indicated that the preparation, repetition, work or activities carried out by the students with the guidance of the teachers outside the class time support learning, thinking and individual development of the students. Homework centering on the student during the education and training process and making the student active in the learning process exhibit an approach that frees the student from the rote system. With the homework given to the students, teachers save the students from the preparation and direct them to become individuals who investigate and question (Uçar, 2018).

In summary, it can be said that homework are indispensable parts of education that continues outside of school. In addition, there are discussions about whether homework are necessary within the scope of educational activities. In the studies on homework in the field literature, it was found that homework at the secondary and higher education level had a positive effect on academic success. Some researchers have also found that there is a negative relationship between the amount of homework and attitude (İflazoğlu and Arslanhan, 2015). This situation reveals the importance of the quality and amount of the homework given.

Whether homework is necessary, how much and in what quality homework will be given if given, and the effects of homework on children's academic and social development have always been the subject of debate. Although there are not enough scientific studies on this subject in Turkey, there are studies or publications that discuss homework in a wide variety of dimensions, especially in the United States (Uçar, 2018). Information about the historical development process of home homework is limited to international publications (Atlı, 2012). The effectiveness of the homework given to the students to do was evaluated as a problem that should be emphasized on the positive and negative reflections of the students (Öcal, 2009).

In order for students to have positive situations related to homework, care should be taken to give the homework taking into account the interests and abilities of the students, to explain the purpose of the homework and to share the evaluation results with the students and to give feedback to the students (Dinçer and Ulutaş, 2003). When homework that do not appeal to the interests and abilities of students are given, it creates a feeling of boredom in children and is usually brought back without being done (Uçar, 2018). Such homework given to students will cause reluctance in students over time. To prevent these, it is concluded that students should be given homework that are appropriate to their interests and abilities, enable them to access information in their own way, activate their thinking skills and develop a sense of responsibility (Özer and Öcal, 2013).

Not every individual is the same in the classroom, and there are students who differ individually. Students with special talents are among the students who differ individually. Students with special talents need special

education both in the process of learning outside and inside the classroom because they have extraordinary potential in terms of intelligence, creativity, social and mental aspects compared to other students (Ngiamsunthorn, 2020). Teachers are the most important supporters who can understand the needs of these children with special abilities in the educational environment and provide education in this direction.

There have been many studies on homework that address the opinions of teachers, students and students from different grade levels (Benli and Sarıkaya, 2013; Keskin and Özer, 2016; Deveci, Önder and Çepni, 2013; Duru and Çöğmen, 2017; Ekici and Akdeniz, 2018; Gedik and Orhan; 2013; Özer and Öcal, 2013; Şeref and Varioğlu, 2015). In addition, there were no studies (Cımbız and Köksal, 2019) in which Science and Art Center students' metaphorical perceptions about the concept of homework were determined. In the literature, there were no studies in which a scale of the concept of homework and the perceptions of specially-talented individuals regarding the homework given in mathematics courses were determined. Therefore, it is thought that the results of this research will contribute to the relationship between the field literature and the homework given for mathematics courses.

In this context, in this research, it is aimed to examine the perceptions of special talented students towards homework. In line with this basic objective, the answer to following questions were sought:

- What are the perceptions of special talented students towards math homework?
- Do the perceptions of students with special talents towards the homework given in mathematics lessons differ significantly according to gender, grade level, group and education level?

## Method

This study is quantitative descriptive research structured according to the screening model. The purpose of screening models is to reveal experiences, what is already existing, what is happening by qualitatively and quantitatively.

## Study Group

The study group of this study consists of gifted students studying at the Science and Art Center (SAC) in Adana in the Southern region of Turkey. The research data was obtained from 149 students studying at the same school in the 2nd semester of the 2021-2022 academic year. Individuals who are diagnosed with special talents with standardized tests performed in Turkey receive education in science and art centers as well as their formal education.

In SACs, project-based, interdisciplinary and differentiated education programs are applied according to the abilities of the students. These programs are carried out within the scope of adaptation, support, recognition of individual talents (RIT), special talent development (STD) and project production programs respectively.



Students first participate in the integration program and continue until the last year of high school with the project production program. The personal information of the students is shown in Table 1.

Table 1. Percentage and Frequency Distribution of Students

Variables		Study group	
		N	%
<b>Gender</b>	Female	56	37,6
	Male	93	62,4
<b>Grade Level</b>	4th	29	19,5
	5th	65	43,6
	6th	55	36,9
<b>Group</b>	Support	21	14,1
	RIT	101	67,8
	STD	27	18,1
<b>Education Level</b>	Primary School	29	19,5
	Secondary School	120	80,5
	Total	149	100,0

When Table 1 is examined, 37.6% of the students in the study group participating in the study are girls and 62.4% are boys. 19.5% of the students are studying at 4th grade level; 43.6% of them are studying at 5th grade level; and 36.9% of them are studying at 6th grade level. In addition, 14.1% of the students participating in the study are studying in the Support group, 67.8% of them in RIT group, and 18.1% of them in the STD groups. In addition, 19.5% of the students are primary school students, and 80.5% of them are secondary school students.

### Data Collection Tool

In the study, to measure the perceptions of special talented students about the homework given in mathematics lessons, mathematics course student homework perception scale was used; the information about the data collection tool used in the study is briefly explained below.

#### *Mathematics Course Student Homework Perception Scale*

Mathematics Course Student Homework Perception Scale (MCSAPS) developed by Uçar (2018) was used to determine the homework perception scores of the students related to the mathematics course. The scale, which consists of twenty-three questions, has three sub-factors. The names of these factors were determined as factor 1: Mathematics Homework Strategies (MAS) sub-factor, factor 2: Mathematics Homework Control (MAC), and factor 3: Mathematics Homework Postponement Dimension (MAPD) (Uçar, 2018). In this study, the internal consistency coefficients for the sub-factors are shown in Table 2.

Table 2. Cronbach Alpha Values of the Total Score of the Mathematics Course Student Homework Perception Scale and the Scores of Sub-Factors

Sub-factors	Cronbach Alpha
MAS	,883
MAC	,663
MAPD	,880
Overall Score	,788

When the Cronbach Alpha internal consistency coefficients for the scale are examined, they were calculated as .883 in the MAS sub-factor; they were found as .663 in MAC sub-factor; they were found as .880 in MAPD sub-factor. The internal consistency value for the entire scale is .788. These reliability coefficients for the current application show that the scores on the scale and sub-dimensions are sufficiently reliable and can be used for research purposes (Tavşancıl, 2002).

### Data Analysis

SPSS 26.0 statistical package program was used for data analysis. The scale used in the study has a five-item Likert-type rating of “I Completely Disagree (1) to “I Completely Agree” (5). Scoring in the responses to the negative items in the SPSS program after data entry was converted in the form of “1-5; 2-4; 3-3; 4-2; 5-1”. In accordance with the five-item Likert options, the evaluation intervals were calculated to rationalize the arithmetic averages. Accordingly; the range 1.00 – 1.80 corresponds to “I Completely Disagree”, the range 1.81 – 2.60 corresponds to “I Disagree”, the range 2.61 – 3.40 corresponds to “I Neither Agree nor Disagree”, the range 3.41 to 4.20 corresponds to “I Agree”, and the range 4.21 to 5.00 corresponds to “I Completely Agree”. The points that can be obtained from the five-item Likert-type scale vary between 23 and 115 points ( $23 \times 5 = 115$ ). To facilitate the interpretation of the scale, the total score or scores from sub-factors can be divided by the total number of items.

Independent groups t-test and one-way analysis of variance (ANOVA) were used to examine the scores of the students according to gender, grade level, education status and group variables. The homogeneity of the variances was checked before the analyzes, and Kruskal Wallis and Mann Whitney U tests were performed in cases where the precondition of homogeneity of the variances was not met. In order to check whether the normality condition is met, Kurtosis and Skewness values were examined and it was seen that it provided normal distribution. In the process of comparing the groups, LSD test was performed.

### Findings

#### Findings on the Perceptions of Special Talented Students towards Math Homework

The arithmetic mean and standard deviation values related to the MCSAPS student sub-factors and total scores

of the students with special talents in mathematics course are given in Table 3.

Table 3. Standard Deviation and Arithmetic Mean Values for Students' MCSAPS Sub-Factors and Total Scores

<i>Sub-Factors of MCSAPS</i>	<b>N</b>	$\bar{X}$	<b>SS</b>
MAS	149	57,55	9,09
MAC	149	19,68	3,83
MAPD	149	15,28	4,71
Total	149	92,53	13,72

When Table 3 is examined, students stated that the factor of “Mathematics Homework Making Strategies” ( $\bar{X} = 57.55$ ) is generally suitable for mathematics lessons. However, students stated that “Math Homework Procrastination” sub-factor was the least suitable for the mathematics course. When the total score of the MCSAPS is examined, the arithmetic mean is 92.53. When Table 3 is evaluated in general, we can say that students' perceptions of their math homework ( $92.53/23=4.02$ ) are at the level of “I Agree” in a positive way.

#### Findings on the Perceptions of Students towards Homework according to Gender

The standard deviation, arithmetic mean and independent groups t-test results of the MSCSAP sub-factors and total scores of the students according to their gender are given in Table 4.

Table 4. Arithmetic Mean According to the Gender of Students for MSCSAP Sub-Factors and Total Scores, Standard Deviation, t and p Values

<b>Sub-factors of the scale.</b>	<b>Gender</b>	<b>N</b>	$\bar{X}$	<b>Ss</b>	<b>Sd</b>	<b>T</b>	<b>P</b>
MAS	Female	56	59,12	7,87	147	1,642	,103
	Male	93	56,61	9,67			
MAC	Female	56	20,19	3,22	147	1,266	,208
	Male	93	19,37	4,15			
MAPD	Female	56	15,98	4,64	147	1,397	,164
	Male	93	14,87	4,73			
Overall Score	Female	56	95,30	11,85	147	1,932	,055
	Male	93	90,86	14,53			

According to Table 4, there was no significant difference in the MSCSAP sub-factors and total scores of the students according to gender. According to these findings, it can be said that the perceptions of female and male students are similar in terms of math homework strategies, math homework control and math homework postponement. In addition, it can be said that the perceptions of both female and male students towards the homework given in mathematics course are positive.

### Findings on the Perceptions of Students towards Homework according to Grade Level

One-way variance analysis was performed to determine whether the students' MCSAPS, sub-factors and total scores indicated a significant difference according to their grade level. However, before this analysis, the Levene Test was applied and the variance homogeneity was tested. It was seen that the distribution variances of the groups were equal only in "Mathematics Homework Making Strategies" factor of the mathematics course student homework perception scale (MCSAPS), and the findings of the one-way variance analysis are shown in Table 5.

Table 5. Standard Deviation, Arithmetic Mean, F and p Values of MCSAPS Scores of Students according to Grade Levels

Sub-factors of the scale.	Grade Level	N	$\bar{x}$	Ss	Sd	F	p	Significant difference
MAS	4th	29	57,55	9,03	2	5,057	0,008	5>6
	5th	65	59,92	7,32				
	6th	55	54,76	10,29				

As can be seen in Table 5, there is a significant difference between students' perceptions of homework and statistical ratios of "Math Homework Strategies" factor according to grade levels ( $F[2-5.057]$ ,  $p<0.01$ ). When the results of the LSD test to determine the direction of the difference were examined, it was seen that there was a significant difference in favor of the 6th grades of the 5th grade in "Math Homework Strategies" sub-factor. Since the results of the Levene test determined that the distribution variances of the groups in "Math Homework Control", "Math Homework Procrastination Dimension" factors and the total score were not equal, Kruskal Wallis test was performed on these data, and the results are shown in Table 6.

Table 6. Kruskal Wallis Test Results for MAC, MAPD Factor Scores and Total Score According to Students' Grade Levels

Sub-factors of the scale.	Grade Level	N	Order Avg.	sd	$X^2$	p
MAC	4th	29	61,64	2	3,964	,138
	5th	65	80,72			
	6th	55	75,28			
MAPD	4th	29	76,36	2	,408	,815
	5th	65	76,85			
	6th	55	72,10			
Total	4th	29	71,72	2	5,039	,081
	5th	65	83,75			
	6th	55	66,38			

As seen in Table 6, there is no significant difference between “Math Homework Control” “Math Homework Postponement Dimension” factors of the MCSAPS and the total score and the level of the classes.

### Findings on the Perceptions of Students towards Homework according to Groups

One-way variance analysis was performed to determine whether the students’ MCSAPS, sub-factors and total scores indicated a significant difference according to their groups. However, before this analysis, the Levene Test was applied and the variance homogeneity was tested. It was seen that the distribution variances of the groups in all factors and total scores of the mathematics course student homework perception scale (MCSAPS) were not equal, and Kruskal Wallis test was performed.

Findings belonging to the analysis made are presented in Table 7.

Table 7. Kruskal Wallis Test Results for MAPD Sub-Factor and Total Scores according to Students’ group

Sub-factors of the scale.	Group	N	Order Avg.	Sd	X <sup>2</sup>	p	Significant difference (Mann Whitney U)
MAS	Support	21	66,24	2	12,502	,002	STD<RIT
	RIT	101	83,11				
	STD	27	51,46				
MAC	Support	21	53,38	2	9,797	,007	Support<RIT
	RIT	101	82,27				
	STD	27	64,61				
MAPD	Support	21	77,19	2	1,596	,450	-
	RIT	101	77,04				
	STD	27	65,65				
Total	Support	21	64,19	2	10,536	,005	STD and Support <RIT
	RIT	101	82,69				
	STD	27	54,65				

As seen in Table 7, there was no significant difference between the “Math Homework Making Strategies”, “Math Homework Control” factors of the MCSAPS and “Math Homework Postponement” sub-factor, where there was a significant difference between the groups and the total score. Mann Whitney U test was performed on the binary combinations of the groups to determine which groups favored the difference observed between the groups. As a result of these tests, it was seen that the significant difference was in favor of the students in RIT.

### Findings on the Perceptions of Students towards Homework according to Education Status

Independent groups t-test was performed to examine whether there was a differentiation in the MCSAPS sub-factors and total scores of the students according to their education status. However, before this analysis, the Levene Test was applied and the variance homogeneity was tested. As a result of the homogeneity test, independent groups t test was performed for “Math Homework Doing Strategies”, “Math Homework Procrastination Dimension” factors and total score.

The arithmetic mean, standard deviation and independent groups t-test results of the MSCSAP’s “Math Homework Doing Strategies” “Math Homework Procrastination Dimension” and total scores of the students according to their education status are given in Table 8.

Table 8. Arithmetic Mean According to the Education Status of Students for MSCSAP Sub-Factors and Total Scores, Standard Deviation, t and p Values

Sub-factors of the scale.	Gender	N	$\bar{X}$	Ss	Sd	T	p
Factor 1	Primary School	29	57,55	9,03	147	,004	,997
	Secondary School	120	57,55	9,14			
Factor 3	Primary School	29	15,58	4,59	147	,690	,706
	Secondary School	120	15,21	4,76			
Overall Score	Primary School	29	91,34	14,89	147	,327	,606
	Secondary School	120	92,81	13,47			

According to Table 8, there was no significant difference in the MSCSAP sub-factors and total scores of the students according to education status. According to these findings, it can be said that the perceptions of primary and secondary school students are similar in “Mathematics Homework Doing Strategies”, “Mathematics Homework Postponement Dimension” factors and total score.

Since the results of the Levene test determined that the distribution variances of the groups in “Math Homework Control” factor were not equal, Kruskal Wallis test was performed on these data, and the results are shown in Table 9.

Table 9. Mann Whitney U Test Results of MAC Factor Scores according to Students’ Education Levels

Sub-factors of the scale.	Grade Level	N	Order Avg.	Total Order	U	p
MAC	Primary School	29	61,64	1787,50	1352,500	,062
	Secondary School	120	78,23	9387,50		

According to Table 9, it is seen that there is no significant difference between “Math Homework Control”

dimension of the MCSAPS and the level of education.

## Discussion, Conclusions, and Recommendations

This study, which was conducted to determine whether the perceptions of special talented students about the homework given in mathematics courses differed in terms of various variables (gender, grade level, group, education status), is based on data obtained from 149 gifted students.

In this research, in line with the first research question, the perceptions of special talented students towards the homework given in mathematics courses were examined. In order to find an answer to this question, the scores of the participants regarding the mathematical homework strategies on the scale (MCSAPS), math homework control and math assignment procrastination dimension sub-factors and the total score were analyzed. In this respect, when the scores obtained from the scale are examined, it is seen that the average of the perceptions of the students with special talents towards the mathematics homework is 4.02 and the perceptions of the students about the assignment are positive. Uçar (2018), in a study conducted to determine the perceptions of secondary school students towards the homework given in mathematics courses, concluded that the perceptions of the students towards the homework were positive. Similarly, Öcal (2009) stated in his research that students' attitudes towards homework were positive. In his study, Aydın (2011) stated that the students did the homework lovingly and willingly, and that they expressed that the homework was necessary. From here, it can be said that the findings obtained in this research are in line with the findings of the literature. In their study, Cımbız and Köksal (2019) stated that gifted students see homework as a tool of mental development. The reason why students' perceptions of the assignments given in mathematics lessons are positive is that their homework is useful for them (Aydın, 2011; Özer and Öcal, 2013).

In this study, in line with the second research question, it was concluded that the perceptions of the students about the assignments given in the mathematics course did not differ according to gender. In addition, it is observed that the perceptions of both female and male students towards the homework given in mathematics course are positive. Kayacık (2013), in a study, indicated that students' homework styles, motivations to do homework and study habits differed according to the schools they studied, their grade level and gender. Şentürk (2013), in the light of the observations made during his research, found that female students did their homework more carefully, complete and error-free compared to male students, and that the writings of preschool students were more legible and smoother than students who did not receive preschool education. İflazoğlu and Hong (2010) found that there was no significant difference between gender, homework motivation and preference. In this context, it can be said that this research finding is partially similar to the field literature.

In line with the third research question, it was observed that the perceptions of the students about homework given in mathematics course had a significant difference in favor of the 5th grades only in "Mathematics Homework Doing Strategies" factor according to the grade level. In his study, Öcal (2009) stated that there was

no significant difference between the grade levels and attitudes of the students regarding homework. Xu and Corno (2006) stated in their study that there was no significant difference in the grade level in relation to homework perception. From here, it can be said that this research finding is similar to the field literature.

In line with the fourth research question, it was observed that the perceptions of the students about homework given in mathematics course were significant in favor of the students in the RIT group by the scores of “Mathematics Homework Doing Strategies”, “Math Homework Control” factors according to the groups. In line with the fifth research question, it was concluded that the perceptions of the students about homework given in mathematics course did not differ according to education level.

In the mathematics lesson homework scale, it can be said that the answers given to the items in mathematics lesson homework strategies factor bring together the information obtained from different sources while the students are doing homework, that the students are responsible for establishing connections between the information, and that they question the information. In addition, it is understood that students have a positive opinion that the mistakes they have made in their homework related to homework control are emphasized, the mistakes made are corrected and evaluated in a short time. It can also be said that students do not look favorably on postponing doing their homework. In Uçar’s (2018) study, there are similar situations in the opinions of secondary school students about the homework given in mathematics lessons. From here, it can be said that this research finding is in line with the field literature.

It is thought that the findings obtained as a result of the research will give a perspective on the concept of “homework” by considering the design stages of the teaching processes in the preparation of mathematics curriculum. It may be recommended to conduct detailed qualitative studies in which the perceptions of the students regarding the assignments given in mathematics courses are discussed. It is recommended to conduct detailed research that reveals the homework needs of individuals with special abilities. In addition, it may be recommended that teachers be given in-service training to identify the need for out-of-school learning of individuals with special abilities.

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## The Female Body and Grotesque in the Context of Classism

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**Abstract:** While the dominant thought in the progression of art up to the renaissance had been the necessity for art to be a representation of superhuman beauty, with the renaissance and especially romanticism, this thought evolved into a more natural art attitude that could adopt people as they were, with all faults and flaws. The representation of flawless, majestic and epic bodies, which aimed to fascinate people with all their majesty in the classical aesthetic notion, gave the audience the impression that the figures with these bodies were free from all human limitations. The figures carved in the classical period not only reflected perfect human forms but also gave a perfect impression in terms of being away from the earthly needs of all living things in nature, such as eating and drinking, excretion, illness and reproduction. Bodies that were anatomically exalted with their muscles, joints and bones, with their undamaged and silky skin, led the audience to the feeling that they had no interaction with the environment, atmosphere, time and nature. Some current sources state that the female body is an affectable and passive subject even though it has no faults regarding its fertile, reproductive, and nurturing functions due to its existence and structure, and therefore it cannot be perceived as perfect as the male body in the classical aesthetic understanding. The concept, of 'grotesque', which incorporates concepts such as the art of imperfections and the aesthetics of ugliness, reflects reproduction, fertility, and the passivity of organic forms against nature; hence the female body is considered as a grotesque structure despite classical attitudes. In this study, the differences between the perceptions of male and female bodies in classical aesthetics have been identified based on the context of the concepts of perfectness and grotesque.

**Keywords:** Art, Grotesque, Woman, Classicism, Aesthetic

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### Introduction

The depiction of a female form has varied considerably among cultures throughout history. This may have been realized due to distinctive social structures or simply artistic preferences based on how a woman was supposed

to look or appear. For thousands of years, artists have depicted a nude female form in a wide variety of styles and compositions. This has likely to have been attributed to the changing societal norms regarding an "ideal woman" depiction as well as an artist's own vision and radiant personality. The history of the depiction of a female form seems to be full of inconsistencies. However, despite such inconsistencies, there are also artworks of a female body being depicted in a purely sexual way. One of the most famous philosophical and artistic questions about the female figure is: "What is her ideal form?" Ancient Greek artists aimed to find answers to this question, which led to the emergence of different figures throughout history, with the changes they made in their artistic styles.

Whereas the dominant notion in the progression of art up to the renaissance was the necessity for art to be a representation of superhuman beauty, with the renaissance and especially romanticism, this perspective evolved into a more natural artistic attitude that could adopt people as they appeared with all their faults and flaws. Aiming to fascinate people with all their majesty in the classical aesthetic perception, the representation of majestic, sumptuous and epic bodies enabled the audience the feeling that the figures with these bodies were free from all human limitations. The figures carved in the classical period not only reflected perfect human forms, but also gave a flawless impression in terms of being away from the earthly needs of all living things in nature, such as eating and drinking, excretion, illness and reproduction. Bodies that were anatomically exalted with their muscles, joints and bones, with their undamaged and silky skin, suggested the audience that they had no interaction with the environment, atmosphere, time and nature. Reproductive organs were ignored, and these bodies, which did not seem to possess any disability or disease, aimed to seek the better, the one that was free from constant defects in art.

### **Concept of Classical and Classical Period**

The word "classic" has a rather cold taste for us. We feel it drags us away from the bright, vibrant world, into stuffy rooms where only shadows live; not hot, red-blooded people. "Classical Art" is regarded as eternally dead, eternally old... A perception of the world that seems to be fruitful by academies, the result of learning, not life itself... (Wölfflin, 1953, p. 13). We can point out that the word "classic" represents a certain set of standards originating from the past as a concept. The classical notion refers to the works of art that emerged in line with certain criteria or teachings.

In the history of art, the concept of classical has found a distinctive coverage for itself periodically. It represents a certain period and distinguishes the works produced in this period with this concept. Hakman (2019) states that the Greek Classical period covers the 5th and 4th centuries BC in general. The sculptures, obelisks or architectural reliefs of this period exhibited a structure that went beyond its period in terms of subject and iconography. The clumsiness and inactivity of the archaic period yielded its place to more realistic, elegant, and moving sculptures (Hakman, 2019). Ancient Greek history is divided into different parts within itself. Accordingly, the classical period represents the era after the Archaic period and before the Hellenistic period. In addition to the rise of Athens in the social, political, and economic fields, there were developments in the

military and cultural dimensions of Sparta, and this period ended as failure due to the Persian forces that came for the invasion. Thanks to the union of Athens and Sparta, which provided this success, the period was also called as the "Golden Age". It appeared as a very productive period in which basic universal values and ideas such as democracy, Olympic games and theater were initiated respectively. The ideas, thoughts, and artistic productions, put forward in this period, are still appreciated today.

Maintained to be the most perfect among the creatures created, a human being has always aimed to reach the image of "beautiful" throughout his/her life and has pursued to grasp the aesthetic one. Although the word "beauty" has a relative matter of opinion as a concept, the term has been interpreted as beautiful in a mathematical context by Greek philosophers and sculpture artists, especially during the period called as the Classical Period in ancient Greek art as well the era between 490 and 330 BC. To bring this word to life, the sculptors tried to achieve this goal with the form of naked human body. Başaran and Kasapoğlu reported in their studies that the concept of "canonical measure" in art begins with the expression "canon", which means the law, measure and rule covered by this mathematical understanding of beauty, and in this context, it expresses the ultimate point reached via perfection (Başaran & Kasapoğlu, 2018).

Classicism, also known as the 1660 school, has been an artistic and literary movement that respects the ideas, art style, and aesthetic understanding of the classical period and adopts it as the only and most fundamental human value. This movement tried to reach the accurate and ideal with measures and proportions in line with the classical period and shaped its works based on the notion of glory.

Although classicism and the classical period reflect a historical period, they both have been used to depict a certain style, orientation and influence in every field of human history and have existed in every period. We can claim that the effect of classicism decreased with the emergence of the romantic movement. Wölfflin (1953) considers the concepts of Classical and romantic as broad terms. That is, they can be applied as critical terms to the art of any age. One can say that Giorgione was a romantic painter or Mondrian a classical painter. In this way, these concepts help define the characteristics of the artists (Kenneth, 1973, p. 19). The necessity of magnificence, grandeur and sublimity, which reflected a dominant understanding in the classical period, gave its place to more humane purposes in the romantic art movement. Figures are more humane, more vulnerable, and more natural. Ideal ratio & proportion and perfect beauty in the classical period began to lose its reputation. The corrosive effect of time and the destructive power of nature were more tangible and realistically reflected on the figures.

### **Image of Women in Art**

Women have made many contributions to human civilization, one of which is in the visual arts. Women who imitate the magnificence of nature, influence and inspire others by using various materials and methods, have also been embodied in art as an image. The origins of the female form in art history can be traced back to ancient Greece, where women had been represented as goddesses. The transition from mythological sculptures

to symbolic sculptures has led to a more realistic depiction of women in art and their recognition as human subjects rather than symbols.

The earliest known female statues were said to have been created in the late Stone Age and depicted as full-figured women with large hips and thighs, large breasts, and stomachs, as well as large heads. Archaeological findings have revealed that the oldest known female sculptures predate realistic female body depictions dating back to the middle stone age. These figures resembled drawings of female bodies in early human history rather than realistic sculptures of modern female bodies. Evolutionary factors have brought about a preference for more feminine features, narrower waists, larger breasts and stomachs. The representation of the female figure launched as naive and idealized; and in time it turned into a more realistic depiction with the Venus symbol representing the Roman goddess of love. This new scope inspired artists to explore more of the female figure. The history of the female figure can be traced back to ancient Greek sculptures in which nude women were depicted as beautiful and frequently exaggerated goddesses. Greek sculptors began to create human figures using clay materials and developed a more realistic style around 600 BC. This approach has made it possible for artists to depict emotion in their pieces of art as well as describing the humanistic flaws of a subject.

The female body has been transformed into to a different position with the phenomenon of nudity in the history of humanity. It is impossible to see nude mother goddess figures or similar female figures dating back to the Middle Ages. The balance that had been initially available in the nude representation of male and female figures was disrupted by the adoption and spread of Christianity. While the images of ancient Greek gods and goddesses were mostly presented naked, in the Middle Ages, Jesus figures were usually depicted without clothes except for their private parts; nevertheless, Mary was never ever considered without clothes (Kocadoru, 2020). When we observe the pre-medieval artifacts in the light of archaeological remains, we can easily recognize that there is no restriction or taboo regarding the nudity of the figures. In addition to masculine figures whose reproductive organs are engraved in exaggerated sizes, there are also feminine figures that are reflected in an exaggerated manner and naked including the chest and hips.

On the other hand, there are studies on the male-dominated perceptions in Ancient Greek society. Yılmazcan states that in the Ancient Greek society, which had a male-dominated mentality, women were regarded as evil, dark, unreasonable, curious, the source of all disasters, pains and sorrows from the very beginning of creation. Therefore, women are creatures to be avoided in the relevant culture. A woman without a name and identity in social life is just a body, no different from an animal; an object for sexual satisfaction and a tool used for reproduction. This tool, which cannot manage herself, must be under the control of a master individual, that is, the man, who has placed himself in the most intelligent, superior and master position, thus must be managed by the man (Yılmazcan, 2020). Within the scope of a similar study, Başar points out that Athenian women did not have a legally independent existence. Women were governed by a kind of male guardian called Kyrios in Oikos. Women used to live under the protection of their fathers or their closest male relatives until they got married; and once they got married, their husbands took over the kyrios. When a woman was divorced or widowed or did not have a son as a heir, she had to return to her original guardian (Basar, 2021). Unfortunately, one could

recognize that the problems related to the equality of men and women, examples of which we still see today, also existed in Ancient Greek civilizations. Although they took steps beyond their times in many fields such as art, literature, theater and democracy, there are findings related to the fact that the society lagged behind in terms of gender equality in the civilization.

There have been many studies on the daily life and the role of women in ancient times. In plastic works, in the art of painting, in the descriptions on various works, women are not realized doing jobs that require skill and talent, nonetheless they are usually busy with housework. Ancient sources, epigraphic finds, philosophical thoughts, and literary products provide information about the place of women in the ancient Greek world. Based on data investigated one can come up with the fact that the Greeks had a patriarchal society structure. Despite this fact, there were also strong female Greek goddesses as well as male gods in religious beliefs. Although the society's perception of men and women and the belief in god-goddess in religious beliefs seemed like a great irony, the gender roles of the gods were also reflected in their representation.

Contrary to the duties assigned to Greek women, some female deities such as Athena and Artemis in the Greek Pantheon were identified with masculine jobs. Except for Aphrodite, there are no nude depicted figures of other goddesses. Nudity is a characteristic seen only in Aphrodite depictions in order to better reflect the feelings of love and lust among the goddesses. Goddesses are dressed like local Greek women and have beauty concerns like other mortal women (Marangoz, 2019).

In art education, from the Renaissance period to the 19th century, working on figures and portraits by fashioning out of the nude model has been one of the mainly adopted principles. Being very skilled in nude model fashioning has been a must-have qualification in order to produce monumental works. Antmen, advocating the traditional understanding of painting in the 19th century, art authorities stated that the figures had to be represented naked in monumental works on the grounds that they prevented a classical idealization principle and the idea of being a universal value beyond their age. The basis of the art education offered in the art academies established in the late 16th and early 17th centuries consisted of working on nude male models. On the other hand, working and teaching via a female model was prohibited in state art schools until 1850. This prohibition continued in some institutions in the following years (Antmen, 2021, p. 137).

Alexopoulos and Power critically analyze gender perception through the concept "grotesque". Considering the social construction of sex and gender, the 'female' body is described as grotesque if it deviates from the common norm or is regarded as destructive. Just as horror movies use the grotesque in the form of non-human monsters or extreme violence, violations of gender canon can be expressed as grotesque. (Alexopoulos & Power, 2018). Criticizing the marketing economy in this direction, Alp reports that the female body has been transformed into a fetish object in different forms by the market economy and has turned it into a commodity that can be watched, traded and therefore controlled by others. In the critique, Alp states that the market economy has used the image of woman in the most efficient ways to gain profit, and that it also represents the female body in the most appropriate way for its purpose. In this context, a female body becomes an object exploited by the

marketing economy (Alp, 2014). Thus, we may say that this situation also exists in the fields of art.

### **Anatomy Distortion and Grotesque**

Grotesque art is a style of art in which a tension between desire and fear is expressed by depicting figures with exaggerated limbs or monstrous-like shapes. The use of vibrant colors, crooked shapes and fracture lines creates an unsettling atmosphere often associated with the grotesque. An anatomically deformed person has given rise to hybrid forms such as an animal head or an overgrown insect on the body, as well as figures that have revealed pathological disorders.

Grotesque art, or grotesque realism, grants the privileges of an image of the human form in which it is made difficult or impossible to manifest realistic factors by altering or exaggerating physical properties and proportions. The anomaly is the most extreme version of the grotesque, in which a part of the body has a mutated form. The term refers to malformed or mutated parts of an abnormal body, such as a single eye or a tail. It is also used as a medical term for a non-functioning or underdeveloped organ or a body part, such as an extra finger or an animal's tail.

It would be more accurate to complement the concept of grotesque with the statement of Mihael Bakhtin, who first theorized this phenomenon. According to him, grotesque images reflect the phenomenon of transformation as a defective metamorphosis of birth and death, growth and existence. The relationship with time is one of the defining features of grotesque images. Another feature is its uncertainty. Because in this picture, we can easily recognize the old and the new, the dying and giving birth, the beginning and the end of the metamorphosis as the poles of the transformation (Bakhtin, 2005, p. 52). The style of grotesque art can be an anatomical deformity, for example, there are works in art history that aim to depict the brutality image of human suffering.

The anatomical deformations of the human body have also been used as a starting point for artists in the history of art. They are often associated with grotesque art forms based on pathology and other factors. Anatomical deformation is a significant separation of the body from its original position and proportions. This can be caused by deformity of the body, diseases, or other factors. The finalized art form is called grotesque art. It has taken its place in art history as a method of representing the strangeness, eccentricity, or disfigurement of the human body. Transforming anatomical deformations into a realistic image has been a stylistic technique used in some types of art as well.

It is not possible to attribute the grotesque expression to a specific period. It has been handled and reflected by various artists in different forms as well as the forms in different centuries from the ancient period on, especially from the Middle Ages to the present. Artists such as Leonardo da Vinci, Hieronymus Bosch Hi, Francisco de Goya, Mehmet Siyah Kalem, Pablo Picasso, Salvador Dali and Giuseppe Arcimboldo have become important names in grotesque appearances. To give an example, the grotesque caricature-style portraits of Leonardo da Vinci draw attention in this regard (Özdemir, 2018).



## Method

In this study, we have used the literature review method, in which historical sources are discussed respectively. In this direction, we have made a review on sources related to field terms such as grotesque, art, art history and aesthetics, and the findings obtained as a result of the synthesis have been noted respectively.

## Results

As a figure depicted in art, the female body is often associated with the notion of grotesque. The first work of human beauty is considered to be the Venus statue of the Stone Age. However, in these figures, the female body is processed and distorted in a way that is far from normal proportion, which is because the parts of the female body associated with the secondary sex characteristics have been exaggerated. This is directly related to the functions of perpetuation and reproduction, and the transition to patriarchy, the existence of ethical and religious ideas, and the aesthetic image of people have also changed. Bakhtin defined the classical body canon as a new canon that emerged accordingly from time to time in the historical process after the bodily freedom environment was achieved in ancient times. Every protrusion, bud, every hole in the body, attempting to create a new body and push its limits, is intentionally ignored, closed, withered, or softened. In this respect, the body is attributed to a finite, insurmountable mass. What goes on inside the body is an individual matter, and what goes on inside the body only means death eventually. Death never coincides with birth. But in the grotesque body, death is intertwined with birth, that is, it has no end. The oral norms of this canon tend to prohibit everything related to the natural processes of the female body: fertility, pregnancy, and childbirth. Extremism and exaggeration are completely odd to the new canon. Organs are perceived in a way that they cannot be separated from the body or exist independently of each other. Unbreakable bodily integrity is essential.

The theory of grotesque, which is completely opposite to the classical criteria of beauty and ideal image, has highly focused on the female body through the phenomena of reproduction and fertility. In this context, one sees the female body as two living things and argues that this understanding has violated her insurmountable boundaries. The magnificent indestructibility of the classical figure thus descends to the mundane level.

## Conclusion

Grotesque images were often observed from prehistoric times to the period when our understanding of modern art began to take shape. The human body is one of the most discussed and used shapes in the visual arts and other fields. Changes in philosophical ideas and religious dogmas, developments in technology and science, and social needs have changed the understanding of beauty, the fashion of the period and ultimately the body of the work of art based on this understanding, making it possible for everyone. Although the history of the body is between both men and women, it is clear that the female body is represented more frequently than the male body in most works of art that have survived for ages. We may witness how the body, which lost its importance

in the Middle Ages and was seen as the cage of the soul, lost its shape, darkened, crushed under religious and social pressures, and the ugly body phenomenon emerged and turned into the forms of art. During the Renaissance, the proportions of the human form were determined by ideal canons, and its well condition and integrity gained importance again. Thus, it became an inspirational tool for anatomical studies. It can be said that the nude pictures of beautiful models originating from mythological tales also started the erotic image of a female body. The carnival atmosphere and grotesque depictions created by Bosch and Brueghel were important examples of their era as an anti-aesthetic form that shattered the classical understanding of beauty and influenced the stylistic characters of successor artists respectively. Artists such as Quentin Messisve and Agnolo Bronzino mainly focused on distorted and unusual appearances and created a trend that initiated a compassionate approach to ugliness. In addition to the phenomenon of beauty, which was transformed by challenged forms of classicism and social denial in the Baroque period, one can encounter ugly human depictions as grotesque figures in Spanish painting.

According to patriarchal definitions, no single body is true, classical, pure, virgin, clean. Paradoxically, every female body is grotesque (Damgaard, 2019, p. 197). The significance of grotesque female bodies, then, lies in their capacity to incite sexuality and perversion and also to be a means of controlling it. According to Russo, these bodies function in a carnivalesque social world, a destructive materiality, as well as a transformative and anti-productive one, circulating on the brink of chaos and order. The possibilities that the grotesque female body opens up to create new social categories between actor and spectator and beyond gained particularly importance for feminism reenactments (McWilliam, 2003).

Today, gender equality has increased, and women are portrayed as strong and independent creations. This reflects the level of community values widely adopted in our society today.

## Recommendations

Having theorized the phenomenon of grotesque, Bakhtin has opened up a new world that is quite suitable for the art world. All the details about women and femininity, which have been subjected to negative discrimination throughout history, have also been affected by the grotesque theory. Passiveness, disesteem, powerlessness, fertility, being grafted, the female subject with its limbs extending out of the body has taken place under the masculine thought. Even in the classical period aesthetics, the phenomenon of fertility and passivity continues somehow. In this context, one can claim that the female body was handled with a grotesque understanding in the classical period as well. Bringing the female subject to the point she deserves and evaluating her under the same equal conditions as masculine subjects are possible with the works and studies of artists and theorists. Making academic contributions by making different studies in this field in order to weaken the indestructible bond between the female subject and the grotesque expression and to stop seeing the female body as only a functional entity with a feminist approach will bring about egalitarian and civilized steps to be taken in our modern world.

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## Students' Difficulties in Solving Mathematical Literacy Problem Level 3, Level 4 and Level 5

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**Abstract:** This study aims at describing students' difficulties in solving mathematical literacy problem level 3, level 4 and level 5. Qualitative research was used in this study. Participants of the research were 10 tenth-grade students randomly selected from a senior high school. The research was conducted at Senior High School 1 North Bengkulu. Data collected through mathematical literacy skill test, questionnaire, and interview. Data analysis revealed that in level 3 student had difficulties in calculating the arithmetic operation and interpreting the problem which make them solve the problem without understanding the question well. In level 4 students have difficulties in interpreting the problem, calculating the arithmetic operation, making mathematical models, communicating explanation and arguments, solving the problem due to forget the prior knowledge and not knowing how to apply the formula. In level 5 students also have difficulties in interpreting the problem, calculating the arithmetic operation, devising the strategy to solve the problem, making mathematical models, and using the formula. In this level students also have difficulty in communicating their interpretation and reasoning and have difficulty in using well-developed thinking and reasoning skills.

**Keywords:** Mathematical Literacy, Solving Mathematical Problem, Students Difficulties

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### Introduction

Mathematics becomes one of the subjects that usually gets avoided by students at school. In reality, each student views mathematics differently depending on their knowledge towards mathematics. Mathematical knowledge of each person will be diverse from one another since a person's cognitive structure influence someone's activity in learning mathematics (Umbara & Suryadi, 2019). Students' action toward mathematics somehow also affects their learning outcomes at school. Students' mathematical ability could be seen from the PISA (Programme for

International Student Assessment) result in 2018. It was stated students' mathematics scores in PISA were ranked 72 out of 78 countries with an average score of 379 (OECD, 2019). This lower score affected by some factors such as difficulty in communicating questions' information, creating mathematical form based on real problem, representing answers, designing strategies in solving problems, deciding arithmetic operations to be executed in solving problems, students also had struggle in reasoning and conveying arguments (Prahmana, 2022). Those datas and explanations showed that Indonesian students still had lower mathematics ability compare to the other students from another country.

One of the factors affecting students' mathematics ability is Mathematical literacy. The focus in mathematical literacy situated in the way indivisual uses conceptual mathematical knowledge and abilities in a variety of social contexts (Umbara & Suryadi, 2019). It includes reasoning mathematically and using mathematical concepts, procedures, facts and tools to describe, explain and predict phenomena (OECD, 2017). Mathematical literacy is seen as mastering the use of reasoning, concepts, facts and mathematical tools in solving everyday problems (Suciati et al., 2020). Mathematical literacy involves more than executing procedures, the competence and the self-reliance in applying the base knowledge are required in the practical world which means mathematical literacy is not only about executing procedures (Ojose, 2011).

The use of real-life data is needed in modeling mathematical literacy problems (Kula et al., 2018) where each problem in mathematical literacy has a different proficiency to be accomplished. There are 6 levels of Proficiency in mathematical literacy according to PISA (OECD, 2019). These proficiencies distinguish students in each level of mathematical literacy. The use of informations in the students' resource system that contributes to connect mathematical knowledge with real life situation can distinguish the mathematical literacy levels of two students with huge mathematics accomplishment (Ada et al., 2021). Each proficiency should be mastered by students to be able solving mathematical problem correctly, but from the PISA results it can be said students rarely reach the ability of higher level of mathematical literacy.

Most of the students find some difficulties in solving higher level of mathematical literacy, 65.3% and 73.68% of students made error in solving mathematical literacy level 3 and level 4 respectively (Setiawan et al., 2020) and students are in a low category of mathematical literacy (Sari & Wijaya, 2017; Wijaya, 2016). It happens because students do not have good literacy skills (Hayati & Kamid, 2019). The factor contributing on students' low mathematical literacy is their ability in solving the problems. From the prior research, it was found that students struggle to formulate situations mathematically and evaluate the reasonableness of a mathematical solution in the context of a practical issue (Ratnasari & Abadi, 2018; Edo et al., 2013).

Students were able to interpret the problem correctly and knew the right formula but they were unable to apply the formula to solve the problem and made mistakes in reasoning the questions (Masfufah& Afriansyah, 2021). The procedures carried out by students were fully incorrect so that the final conclusions obtained were incorrect and students didn't not carry out the completion process and strategy (Ratnasari & Abadi, 2018; Lukman & Zanthly, 2019). In addition, students are unable to select and integrate different representations (Nurhanurawati

et al., 2022). Besides that, the most frequently observed while solving the problem is students' error in doing arithmetic (Setiawati, 2017) whereas this ability is important as a high level of mathematical literacy may be influenced by the high level of skills in the four mathematical operations (Yilmazer & Masal, 2014). Those attitudes become the reason why they fail to solve the problem correctly and fail to gain a better mathematical experience.

It is important to explain the students' problems with tackling literacy problems in depth so that they can follow up and come up with solutions. (Retnawati & Wulandari, 2019). Besides, the information about students' difficulties supports teachers to select suitable teaching strategies and organize the learning material (Lestari & Juniati, 2019). In addition, Haara et al. (2017) claimed that to teach mathematical literacy teacher can not stick out to the traditional mathematics teaching, teacher needs something more than that.

To encourage students' knowledge of problems and solution-finding, teachers should consider students' backgrounds and select problems that are connected to their backgrounds. (Sumirattana et al., 2017). Because of that reason, teacher need to know which part in each level of mathematical literacy proficiency that makes students have the struggle to solving the mathematical literacy problem. By doing this, teacher can manage to develop students' mathematical literacy ability by giving the suitable contextual problem.

Based on the data described above, it is an important issue to find out the students' error in solving mathematical literacy problem. This issue needs more concern due to a purpose of knowing the deeper reason why students experience poor mathematical literacy so the teachers can overcome this matter by applying relevant strategy and approach. The problem level 3, level 4, and level 5 will be given to the students in higher school as students in Indonesia got a lower mathematical literacy score in those level and they rarely get those problems at school. Therefore, the research of this study will focus on the students' difficulties in solving mathematical literacy problem level 3, level 4 and level 5.

## Method

This type of research was descriptive qualitative research. The subjects of this study were 10 students in X IPA 2 of senior high school 1 in North Bengkulu which were selected randomly. To collect data research, data collection techniques were carried out as follows:

1. Individual written test which consists of 3 questions about the linear equation. The instrument was designed based on the proficiency of mathematical literacy level 3, level 4, and level 5.
2. Questionnaire were given to the students to analysis their difficulties in solving mathematical literacy problem.
3. Interviews were conducted to the students to strengthen the analysis of students' difficulties in solving mathematical literacy problem which has been known from written test and questionnaire.

## Results

The first question given to the students was “When you go to a mall in Bengkulu, you bring Rp. 500,000.00 with you. One of your friends bought 2 audio cassettes and 3 video cassettes for IDR 425,000.00. Your other friend bought 3 audio cassettes and 2 video cassettes for IDR 350,000.00. If you are also interested in buying cassettes, do you have enough money to buy 4 audio cassettes and 3 video cassettes? Explain and make its mathematical modeling”. Three out of ten students made mistakes in calculation that led them to the incorrect answer. Five out of ten students solved the problem without answering the question “does he have enough money to buy 4 audio cassettes and 3 video cassettes?” and two out of ten students answer the question correctly.

The second question given to the students was “Thomas has IDR 6,000,000.00 invested between a checking account, a savings account, and a bond account. The checking account has 2% annual interest, savings account has 5% annual interest, and bond has 7% annual interest. Thomas earns a total of Rp355,000.00 in annual interest. If has Rp2,300,000.00 less invested in his savings account than his bond account, how much does he invest in each account?”. Nine out of ten student only write what was known and one student answered using mathematical model but she made miscalculation.

The third question given to the students was:

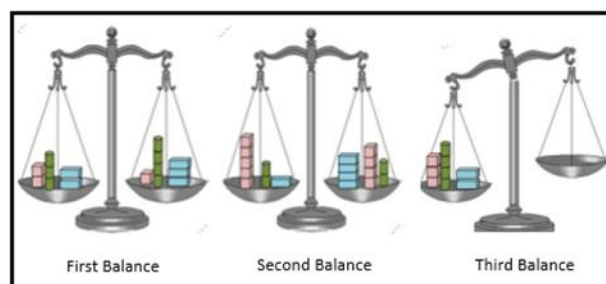


Figure 1. Balance for Problem Number Three

If Cuboids has 3 kg in weight. How many cubes, cuboids, cylinders that may be added at the right side of third balance such that the weights are in balance? (Edo et. al, 2013). Seven out of ten students left the answer blank, one student answered the question using her logic falsely and two students answered correctly but made mistakes in mathematical procedure.

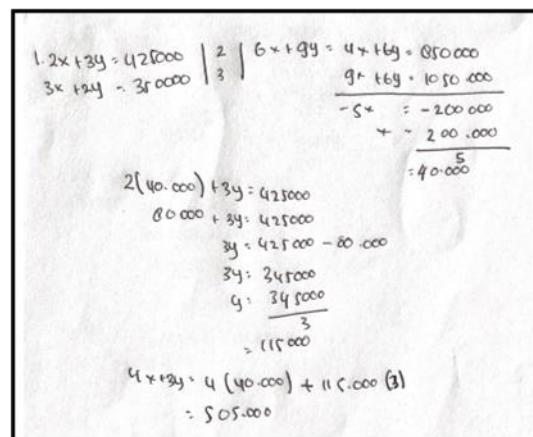
## Discussion

### Analyzing the first question

Question number one is the question that contains mathematical proficiency level 3 including using

representations based on different information sources and reason directly from them, showing some ability to handle percentages, fractions and decimal numbers, and working with proportional relationships (OECD, 2019). From students' answer, it can be said that most of them still don't understand the question in number 1. Five out of ten students solved the problem without answering the question "does he have enough money to buy 4 audio cassettes and 3 video cassettes?". Instead, they giving answer how much money they need to pay for buying 4 audio cassettes and 3 video cassettes. Student A's answer for number one can be seen in Figure 1 below.

From the Figure 1 it can be seen that student A correctly made the mathematical models and could find the value of  $x$  and  $y$  correctly. What made student A incomplete in solving problem number one was she neither gave the answer the question "is the money enough to buy cassettes" nor gave explanations to answer the question. From the questionnaire, it can be seen that student A confidently said she could solve the problem correctly without any difficulties. To clarify their answer, the interview was conducted to student A to talk about her strategies, difficulties, and understanding in mathematics. Here is the result of the conversation in the interview process.



$$\begin{array}{l} 1. 2x + 3y = 425000 \\ 3x + 2y = 350000 \end{array} \quad \left| \begin{array}{l} 2 \\ 3 \end{array} \right| \quad \begin{array}{l} 6x + 9y = 4 + 16y = 850000 \\ 9x + 6y = 1050000 \\ -5x = -200000 \\ + = 200000 \\ \hline = 40000 \end{array}$$

$$\begin{array}{l} 2(40000) + 3y = 425000 \\ 80000 + 3y = 425000 \\ 3y = 425000 - 80000 \\ 3y = 345000 \\ y = \frac{345000}{3} \\ = 115000 \end{array}$$

$$4x + 3y = 4(40000) + 115000(3) = 505000$$

Figure 2. Student Misinterpreting the First Question

R: Do you understand this problem well?

A: Yes

R: Do you think your answer was correct.

A: I think yes

R: Look at the question, what was the question again?

A: Is his money enough to buy 4 audio cassettes and 3 video cassettes?

R: You didn't answer that question. Why?

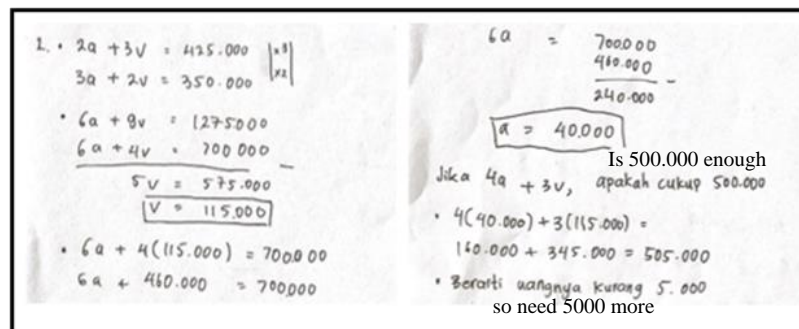
A: I didn't read carefully the question. I thought it was enough to write how much money he needs to buy 4 audio cassettes and 3 video cassettes because usually the question was like that.

From the interview it can be said that student A met the comprehension error. Misunderstanding the instruction, misinterpreting the keyword, and poor information selection are the three signs of a student's comprehension



problem. (Ahyan et al., 2019). She correctly solved the problem, correctly applied the formula, but incorrectly answer the question due to misunderstanding the instruction. Students need to understand the problem and the question to correctly answer the question. Correct steps will guide students to the correct answer but never guarantee them to give the correct answer. Hence, this kind of student didn't meet all criteria of the proficiency in level 3 because she still found difficulty in understanding the question. While the other students fail to answer the question accurately, the two other students (Student B and C) can interpret and represent the question well. They made the mathematical modeling and giving the reason why they need more money to buy 4 audio cassettes and 3 video cassettes. Student B's answer can be seen in Figure 2.

From the Figure 2, it can be seen that student B gave the clear mathematical modeling to find the price of each cassette. She knew the steps to solve the problem and understands the process to answer the question. This attitude shows that this student didn't have any difficulties in solving the problem number one. This statement can be clarified by seeing student B's answer in the questionnaires. She stated that question number one was easy, she didn't have any difficult to solve the problem, and she often gets this kind of question. Thus, student B already have a good mathematical literacy in level 3 since she could use representation and solve the problem without misinterpreting it.



Handwritten mathematical solution for a system of linear equations:

$$\begin{aligned} 1. & \quad 2a + 3v = 425.000 \quad | \times 2 \\ & \quad 3a + 2v = 350.000 \quad | \times 2 \\ & \quad \cdot 6a + 9v = 1275.000 \\ & \quad 6a + 4v = 700.000 \\ & \quad \hline & \quad 5v = 575.000 \\ & \quad v = 115.000 \end{aligned}$$

$$\begin{aligned} & \cdot 6a + 4(115.000) = 700.000 \\ & 6a + 460.000 = 700.000 \end{aligned}$$

$$\begin{aligned} 6a & = 700.000 \\ & 460.000 \\ & \hline & 240.000 \end{aligned}$$

$$a = 40.000$$

Is 500.000 enough  
Jika  $4a + 3v$ , apakah cukup 500.000

$$\begin{aligned} & \cdot 4(40.000) + 3(115.000) = \\ & 160.000 + 345.000 = 505.000 \\ & \cdot \text{Berarti uangnya kurang 5.000} \\ & \quad \text{so need 5000 more} \end{aligned}$$

Figure 3. Student's Correct Answer for Question Number One

### Analyzing the Second Question

Question number two is the question containing mathematical proficiency level 4 including being able to select and integrate different representations, including symbolic, linking them directly to aspects of real-world situations, being able to utilise their limited range of skills and can reason with some insight, being able to construct and communicate explanations and arguments based on their interpretations, arguments and actions (OECD, 2017). For the problem number 2, all of the students failed to give the correct answer. Nine of them only wrote what was known. An interview was conducted to know deeper reason why student failed to answer this question. Here is the conversation with student E.

R: Did you understand the problem?

E: No, it was so difficult. I had no idea what I should do to solve the problem.

R: Why did you think it was difficult?

E: It talked about bank interest. I already forgot the formula. I also got confused with what was known in the problem, so I just wrote what I understand.

R: Do you know the concept of bank interest in real life?

E: I know.

R: Can you tell me what you know about it?

E: Our saving gains some amount of money each month or year in accordance with how much our money is.

R: Why do not you try to use that concept? That is similar to the case in the problem.

E: I do not know how to write them mathematically.

From the interview, it can be said that student E still have lower ability in interpreting the problem and did not know how to write the information mathematically even though she knew the concept of bank interest in real life. Many students found it difficult and do not understand in applying their mathematical knowledge to solve problems that exist in everyday life (Afni & Hartono, 2020). Some students faced complexity to write the information in the form of mathematical model so she could not find any steps to solve the problem (Suciati & Subagyo, 2018). Additionally, student E had difficulties to link the informations from the question directly to the aspects of real-world situations, she struggled to construct and articulate the justifications and reasons that would have supported her interpretation. All of those behaviors indicate that student E did not understand the problem. Students' error in understanding the problem also affect their ability in solving the problem (Mahmudah, 2018). Students whose problem-solving ability in the low category often make fundamental and causal errors (Son et. al, 2019). Hence, they find the hardship in developing the solution of the problem.

From the questionnaire, they stated that this problem was so difficult that they didn't know what strategy they should use to solve the problem. They also stated that they rarely found this kind of problem before. Students who rarely met non-routine contextual problem would be confused in developing mathematical reasoning and interpretation. The poorly considered selection of problems can hinder rather than encourage the development of principled-conceptual knowledge (Kolar & Hoknik, 2020). Besides that, the prior understanding also has a big role on solving this problem. Because of those difficulties, students fail to made mathematical model, devising strategy, communicating explanations and arguments based on their interpretations and actions and solving the problem. Thus, these students didn't have a good mathematical literacy in level 4 due to unable to fulfill the criteria of proficiency in level 4.

Out of ten students, one student gave the answer using mathematical model. Unfortunately, she gave an incorrect answer. The student who answered the question incorrectly was student C. this student's answer can be seen on the Figure 3 below.

From the Figure 3 above, it can be seen that this student made mistakes in subtracting the number, she calculated  $35.500.000 - 18.600.000$  and got the value  $18.900.000$ . It should have been  $16.900.000$ . Another

mistake she made was the addition  $5z + 3z = 2z$ , that should have been  $8z$ . These mistakes led this student to incorrect value of  $x, y$ , and  $z$ . Therefore, she failed to give the correct answer. She stated that she thought this problem was difficult because the number was big. It was reasonable because this students made errors in calculating. She also stated that she rarely get this kind of problem before. An interview was conducted to know the further information about student's difficulties in solving this problem.

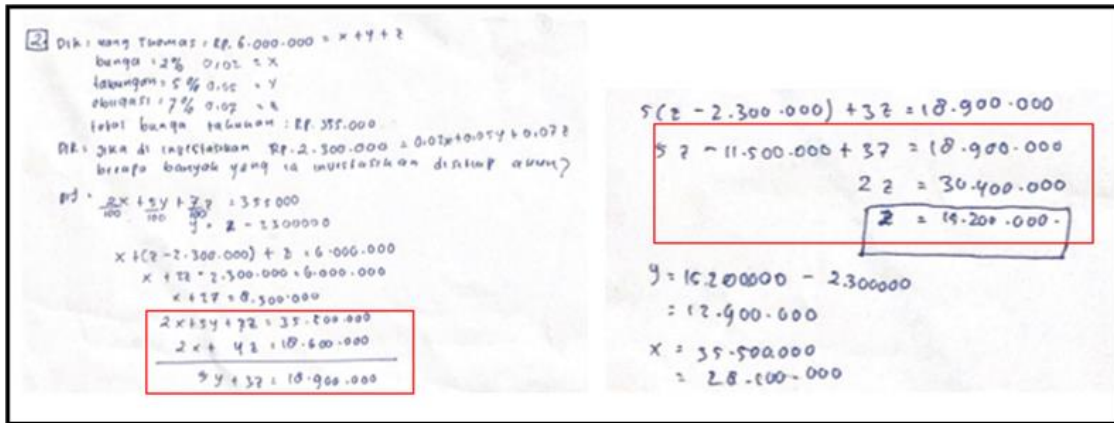


Figure 4. Student Incorrect Answer for Number Two

R: Did you understand this problem?

C: Yes

R: You made some calculation errors, did you notice it before?

C: No, I thought I already worked carefully on it. I didn't recheck my answer

From the interview it can be said that this student understand the problem and can solve the problem. What she missed was looking back process whereas looking back is one of the steps which is important in solving the problem (Huang, 2012). Students' error in process skill error and notation also play a role on the properly creating the solution (Mahmudah, 2018). It also showed that student had a difficulty so solve the problem level 5 (Wulandari, 2015). Therefore, this student already had a good mathematical literacy in level 4 but faced the difficulty in calculation the arithmetic operation due to skip the looking back step in solving the problem.

### Analyzing the Third Question

Question number three is the question containing mathematical proficiency level 5 including developing and working with models for complex situations, selecting, comparing and evaluating appropriate problem-solving strategies for dealing with complex problems related to these models. They can use well-developed thinking and reasoning skills, formulate and communicate their interpretations and reasoning (OECD, 2017). Unfortunately, most of the student failed to answer that question, 7 out of 10 students left the answer blank. From their questionnaire answers, it can be known that students didn't understand the question, they thought this question was difficult, they didn't know the strategy to solve it and was never given the similar question before.

On the other hand, there was a student (Student D) who answered the question using her logic, she could give the number of cube, cuboid, and cylinder. However, her answer was incorrect. Student D's answer can be seen in Figure 5 below.

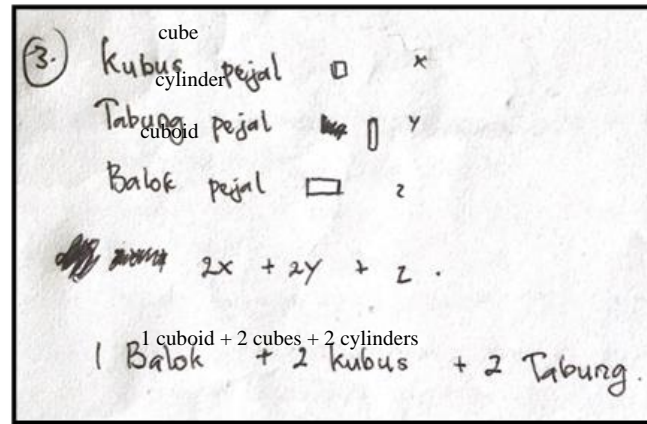


Figure 5. Student's Incorrect Answer for Number Three

From the Figure 5 it can be seen that student D answer the question without making any mathematical model. She also didn't write any explanation why she gave such answer. From her questionnaire, she stated that this problem was kind of difficult, she was not sure with her answer, she subtracted the wight of the balance on the left side using her logic, she also stated that she forgot the formula and she rarely got this type of question.

However, her logic to subtract the wight of the balance on the left side was incorrect. From this attitude, it can be said this student failed to use not only well-developed thinking and reasoning skills but also failed to formulate and communicate her interpretations and reasoning. Students need to know the weight of each solid figure to determine the number of cube, cuboid, and cylinder. To deepen the reason why they fail to answer this question, an interview was carried on with student D. Here is the conversation about student D's difficulties in solving problem level 5.

R: Did you solve this problem well?

A: Actually, I am not sure with my answer.

R: Can you tell me your reason?

A: I knew the direction of the question, but I didn't understand how to complete the task. I also got confused which formula I should use. That was why I used my logic.

R: Did you notice this question was about three variables linear equation?

A: Yes, but I didn't know what should I do to find the value of x and z. I never solve this kind of problem before.

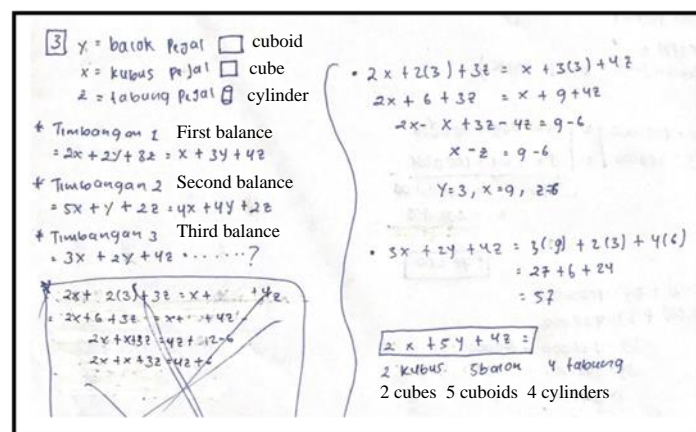
From the interview session it can be said that student D had difficulty in working with models and didn't know how make the appropriate strategy to solve the problem. She also stated that she never has a chance to solve

similar problem before because questions asked to students in the exams held in schools primarily measure mathematical operation skills (Fatih & Bekdemir, 2017) as it was opposite with the statement that students can improve their mathematical literacy by engaging in various types of tasks from procedural tasks, word problems, to pure and applied mathematics reasoning tasks (Hwang & Ham, 2021).

The same situation also followed the students who left the answer blank. Both students who left the answer blank and using incorrect logic mean they failed to fulfill the criteria of mathematical literacy which requires students to perform arithmetic operations and recognize mathematical problems in the context of real life, and express them mathematically (Satici in Ada et al., 2021). They also can't fulfil the proficiency in level 5 problem. Thus, they have difficulty in solving mathematical literacy problem level 5 (Wulandari et al., 2015) as mathematical literacy is related to the ability in solving problems and using mathematical knowledge (Kurniawati & Mahmudi, 2019). Students had difficulties in interpreting the problem, making mathematical model, communicating their interpretation and mathematical reasoning, using well-developed thinking and reasoning skills. They also lack in employ mathematical concepts, facts, procedures and reasoning.

In contrast, 2 out of 10 students can solve this problem correctly. They use mathematical model to find the weight of cube and cylinder to give the exact number of cube, cuboid, and cylinder to be added on the right side of the third balance. However, one of the students (student C) made mistakes in determining the weight of cube and cylinder. This student's answer can be seen in the Figure 6 below.

From the Figure 6 above, it can be said that student C falsely made the conclusion that the value of  $x$  is 9 and the value of  $z$  is 6. Even though the answer was correct, the mathematical process was broken. The operation of  $x - z = 9 - 6 = 3$  can be formed using the other expression such as  $x - z = 9 - 6 = 8 - 5 = 3$ . This expression shows that the value of  $x$  and  $z$  can have many values which makes the process was incorrect. It shows that this student already understood the meaning of the problem and knew what she should do. Unfortunately, she made error in calculating and lacked in employ mathematical procedures.



3.  $y =$  balok pejal  cuboid  
 $x =$  kubus pejal  cube  
 $z =$  tabung pejal  cylinder

\* Timbangan 1 First balance  
 $= 2x + 2y + 3z = x + 3y + 4z$

\* Timbangan 2 Second balance  
 $= 5x + y + 2z = 4x + 4y + 2z$

\* Timbangan 3 Third balance  
 $= 3x + 2y + 4z = \dots ?$

$2x + 2(3) + 3z = x + 3(3) + 4z$   
 $= 2x + 6 + 3z = x + 9 + 4z$   
 $2x + 3z - 4z = 4z - 3z$   
 $2x + x + 3z = 4z + z$

$2x + 2(3) + 3z = x + 3(3) + 4z$   
 $2x + 6 + 3z = x + 9 + 4z$   
 $2x - x + 3z - 4z = 9 - 6$   
 $x - z = 9 - 6$   
 $x - z = 3$   
 $y = 3, x = 9, z = 6$

$3x + 2y + 4z = 3(9) + 2(3) + 4(6)$   
 $= 27 + 6 + 24$   
 $= 57$

$2x + 5y + 4z =$   
 $2 \text{ kubus } 5 \text{ balok } 4 \text{ tabung}$   
 $2 \text{ cubes } 5 \text{ cuboids } 4 \text{ cylinders}$

Figure 6. Student's Correct Answer for Number Three

## Conclusion

Data analysis revealed that in level 3 student had difficulty in calculating the arithmetic operation which support them to make an incorrect answer. Students also have difficulty in interpreting the problem which make them solve the problem without understanding the question well. In level 4 students have difficulties in interpreting the problem, calculating the arithmetic operation, making mathematical models, communicating explanations and arguments, solving the problem due to forget the prior knowledge and not knowing how to apply the formula and deciding a strategy to solve mathematical literacy problem. In level 5 students also have difficulties in interpreting the problem, calculating the arithmetic operation, devising the strategy to solve the problem, making mathematical models, and using the formula. They lack in employ mathematical concepts, facts, procedures and reasoning. In this level students also have difficulty in communicating their interpretation and reasoning and have difficulty in using well-developed thinking and reasoning skills. For some cases in level 4 and level 5, students left the answer blank due to the unknown steps they should choose to solve the problem which shows that they have lower mathematical literacy.

## Recommendations

Based on these results, researcher suggest that students should be given non routine problem to develop their understanding in interpreting the problem. The learning process in the class should be focused on the concept instead of the formula so that student still can use their prior knowledge even though they forgot the formula.

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## Factors Affecting Effective Communication in the COVID-19 Pandemic: A Neural-Network Based Study

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**Abstract:** Working with students effectively in schools is a challenge. The aim of this study was to investigate the factors affecting the effective communication from the perspective of secondary school teachers in the COVID-19 pandemic period. To achieve this goal, artificial neural network has been used as a new approach to determine and predict important variables involved in effective communication. In order to prepare a questionnaire, high school teachers were interviewed in two stages. In the first stage, the interview questions were identified with the help of the focus group. In the next stage, semi-structured interviews were conducted with 14 secondary teachers. Findings from this step were classified using Colaizzi method. The output of this stage was 74 open code and twelve categories which was the basis of a 74-item questionnaire. The validity of the questionnaire was confirmed by four education and psychometrics experts. Then a questionnaire was administered to 104 secondary teachers for a pilot study. Based on the data obtained from this step, some weak questions were removed and the questionnaire was modified. The reliability of the questionnaire was calculated using Cronbach's alpha, which was a number between 0.79 and 0.92 for the subscales. Then the electronic version of questionnaire was sent to all secondary teachers in the North Khorasan province, which finally received 469 complete questionnaires. Data were analyzed using artificial neural network method. The coronavirus epidemic has affected various aspects of human life, perhaps arguably its most important effect on communication. The outbreak of the virus has changed the communication between teachers and students, the most important factor that can predict the effective communication between teacher and student is attention to the affective domain. This was followed by Control on teacher activities, Interference between home and instructional activities, Technology barriers, Student 'academic procrastination, Technology acceptance, Inefficiency of face-to-face instruction methods in Online Environment, Traditional assessment inefficiency, Content development, Perceived teaching quality and Teacher authority.

**Keywords:** COVID-19, communication, teaching experiences, high schools, neural-network

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## Introduction

Perhaps the most important effect of COVID-19 pandemic on human societies has been the widespread change in their communication style. Due to the spread of this virus, people were forced to distance themselves from each other. This distance disrupted the natural communication of people. Throughout history, people have been accustomed to face-to-face interaction, and although he designed tools for telecommunications, he used them when necessary. But COVID-19 pandemic forced humans to use Internet communication tools extensively. But most people, including teachers, were not prepared enough to use from these tools in their careers. The online learning environment has its own requirements, teachers must learn the skills and competencies required for this learning environment, in order to be able to communicate effectively with their students. In this study, we sought to answer the question of what factors have influenced the effective relationship between teachers and students in the COVID-19 era from the perspective of teachers. The answer to this question helps teachers and educational policymakers to identify the important factors influencing effective communication in e-learning environments during the COVID-19 pandemic. The results of the present study could provide some opportunities for teachers to promote students' learning and academic achievement. Here are some studies on how the COVID-19 pandemic affects different aspects of education.

A review of the literature shows that communication and effective relationships between teachers and students have an impact on students' performance (Alawamleh et al., 2020; Hassell & Cotton, 2017; Khan et al., 2017). As such, all practitioners in the education system are together responsible for providing high-quality learning environments. In this regard, throughout the learning process, it is vital to ensure communication occurs effectively. Effective communication has been defined as the “*process of exchanging ideas, thoughts, knowledge and information in the best possible way* (Alawamleh et al., 2020)”. Based on the above notion, the purpose of communication is to exchange information. Research shows that having good and effective communication has made students' learning experience more meaningful (Khasawneh, 2021; Kyaw et al., 2019).

The COVID-19 pandemic has significant impacts on all aspects of teaching and learning such as an abrupt shift in delivery format, low participation of students in-class activities, network un-stability, teacher unpreparedness, low control of learning process, and low level of interaction and communication between teachers and students (Bai et al., 2020; Habibi et al., 2021; Jain et al., 2021; Khanna & Prasad, 2020). Effective communication in an online learning environment requires more planning in comparison with traditional communication. In this regard, teacher preparedness is one of the main contributors to effective online

communication. One reason may be due to the incomplete integration of ICT with the curriculum and teaching-learning activities. International research before the COVID-19 outbreak points out that digital technologies have not yet been fully integrated into teaching and learning (Addimando et al., 2021). If this integration had been done well before the start of the COVID-19 pandemic crisis, the damage from this period would undoubtedly have been much less. Although about three years have passed since distance and online teaching, online teaching and online assessment are still not sufficiently integrated with ICT (König et al., 2020); Because face-to-face teaching methods are not be suitable for online situations(Bai et al., 2020; Mikušková & Verešová, 2020; Pokhrel & Chhetri, 2021; Xiao & Li, 2020).

Effective communication in the educational environment has psychological and educational dimensions. The COVID-19 epidemic has affected various dimensions, including: well-being ,(Ávalos et al., 2021; Kim et al., 2021), reported high levels of anxiety, stress, (Adedoyin & Soykan, 2020; Ávalos et al., 2021; Miller & Harris, 2020; Truzoli et al., 2021), negative impact on students' emotional health and frustration among students, (Mikušková & Verešová, 2020; Miller & Harris, 2020; Mseleku, 2020; Ziebell et al., 2020), increasing inequality (Adedoyin & Soykan, 2020; Bank, 2020; Brief, 2020; Di Pietro et al., 2020; Jain et al., 2021; Jaramillo, 2020; Portillo et al., 2020; Zhao & Watterston, 2021; Ziebell et al., 2020), decreased learning, increase academic failure, (Adedoyin & Soykan, 2020; Andrabi et al., 2021; Cachón-Zagalaz et al., 2020; Di Pietro et al., 2020; Thamtanajit, 2020). Environment is one of the effective factors in effective communication. Home is where people live. The house design and equipment for daily life. In order to deliver human knowledge, it is necessary to install blackboards, tribunes, tables, chairs, multimedia equipment and other teaching aids.

The obvious consequence of changing the place of teaching and learning in online education is that there is more pressure on parents and students. Parents have to buy more equipment and more learning materials to turn the home environment into a classroom, and this puts more mental and financial strain on families (Bai et al., 2020; Di Pietro et al., 2020). However, low-income parents are likely to spend less time reading and playing with their children (Crew, 2020). The ability to use ICT to communicate effectively in this environment is essential. Contrary to expectations, it has been found that newly recruit teachers - in the last two years - who, according to Mar, (2001) are digital natives, do not necessarily have sophisticated digital skills. As a result, there should be an increasing emphasis on teacher skills and competencies in the use of ICT (König et al., 2020; Noor et al., 2020).

Authentic assessments and instant feedback are two essential components of learning that influence effective communication(Amoah et al., 2019). One of the vital parts of distance and online learning is that it enables useful cumulative assessments and instant feedback for online learners (Doucet et al., 2020); Assessment has become more complex and difficult during the COVID-19 pandemic and it is in the trial-and-error stage(Adedoyin & Soykan, 2020). These assessments are unreliable and ambiguous for students, teachers, and parents. Apart from the discussions that will take place in the future, some scholars consider the experiences and lessons learned during the COVID-19 pandemic to be valuable and helpful for the future (Addimando et al.,

2021; Bertling et al., 2020; Pokhrel & Chhetri, 2021) and others see the COVID-19 pandemic as an opportunity to rethink about educational processes (Ziebell et al., 2020) and some see it as an opportunity for research and study and a platform for innovation (Adedoyin & Soykan, 2020; Brooks et al., 2021; Sá & Serpa, 2020). Some believe that the COVID-19 pandemic provided an opportunity for reflection on the teaching profession and had a positive impact on students (Miller & Harris, 2020).

A group of researchers consider it an exceptional opportunity and for the first time to move away from traditional education and use digital approaches, tools, and media (Ratten, 2020) and believe that the current situation has led to more innovative ideas and solutions in education systems. Emerge (Bryson & Andres, 2020). The education system must make three major changes in the post-COVID-19 pandemic period: the curriculum must be developmental, personalized, and evolutionary; Education should be student-centred, research-based, authentic, and purposeful; Provide training that should simultaneously emphasize and use the strengths of synchronous and asynchronous learning (Zhao & Watterston, 2021).

There is no doubt that in the future there will be discussions about educational justice, testing new ideas and models for school and school year lengths, flexible weekly schedules, technology infrastructure, and more. What can and should not be taught online, and what new teaching skills new teachers may need (Adedoyin & Soykan, 2020). Despite numerous studies, we need more research on developing countries, pedagogy, and platforms suitable for different grades from elementary to middle school (Pokhrel & Chhetri, 2021). Based on the above notion, this study aims to explore factors affecting effective online communication from the perspective of secondary teachers in a developing country.

## **Method**

### **Design and Sample**

This study employed a cross-sectional, analytic approach as method of the study. A total of 469 secondary teachers in North Khorasan Province, Iran participated in this research through Convenience sampling. 65.2 (%) of the participants were female and 34.8 (%) were male teacher.

### **Instruments**

Researchers first identified appropriate interview questions using an unstructured interview method. These questions formed the basis of interviews with teachers about factors affecting effective communication during the COVID-19 pandemic. Semi-structured interviews were conducted with 14 secondary level (cycle one and two) school teachers. The findings were classified using the (Colaizzi, 1978) method. The data obtained from this step became the basis for constructing a researcher-made questionnaire. The validity of the questionnaire was confirmed by experts. In order to validate the survey 4 experts from education and psychometrics were asked to review the surveys.

Table 1. The Reliability of a Researcher-made Questionnaire using Cronbach's Alpha Method

	Subscales	Number of items	Cronbach's alpha coefficient
1	Technology Barriers	1 to 5	0.79
2	Technology Acceptance	6 to 14	0.85
3	Content Development	15 to 20	0.92
4	Perceived Teaching Quality	21 to 26	0.89
5	Traditional Assessment Inefficiency	27 to 31	0.79
6	Student' Academic Procrastination	32 to 37	0.85
7	Control on Teacher Activities	38 to 42	0.92
8	Interference between Home and Instructional Activities	43 to 48	0.79
9	Effective Communication	49 to 56	0.85
10	<i>Lack of attention to the affective domain</i>	57 to 61	0.92
11	Inefficiency of face-to-face instruction methods in Online Environment	62 to 69	0.79
12	Teacher Authority	70 to 74	0.79

All of them were Professors in Educational Sciences under the department of Education. All the experts confirm that the survey and items are valid and it covers the concepts and factors that it seeks to measure. The average CVI score for the questionnaire was 0.85 Obtained. The reliability of this questionnaire after the initial implementation on 104 people and the removal of 8 items and the correction of some items are shown in Table 1 The numbers in this table indicate the high reliability of this questionnaire. The questionnaire consists of 12 components as follows:

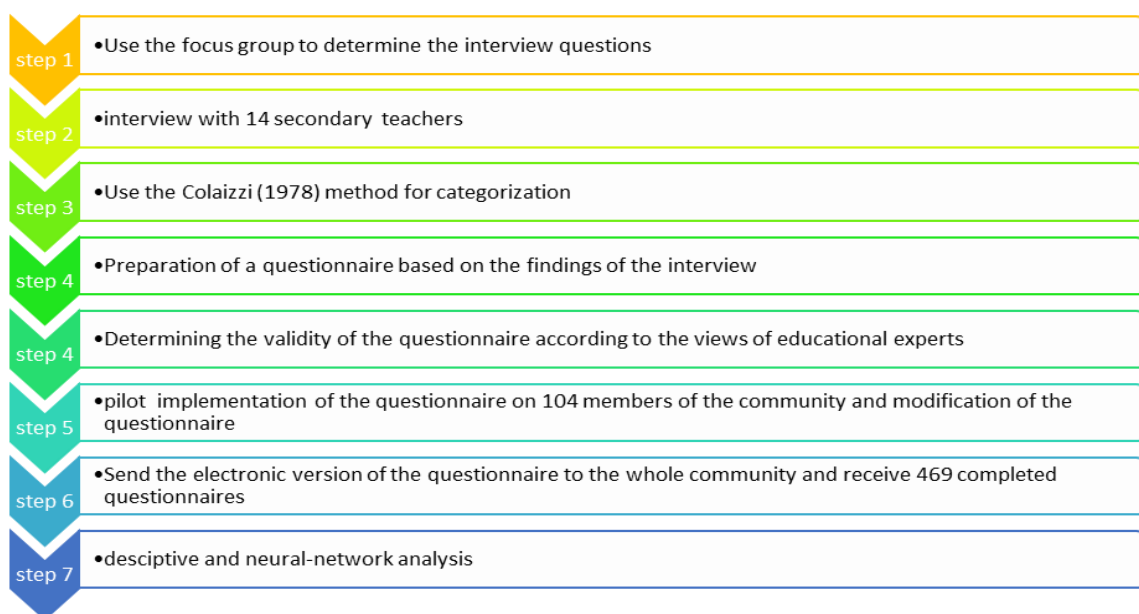


Figure 3. Steps of Conducting Research

Items were answered on a 5-point Likert scale with corresponding (5) *strongly agree*; (4) *agree*; (3) *undecided*; (2) *disagree*; and (1) *strongly disagree*.

### Data Collection

Data were gathered over two months (November to December 2021) using the self-administered questionnaire. The electronic version of questionnaire distributed between the whole community during the break time. Finally, 469 complete questionnaires were received.

### Data Analysis

The Statistical Package for the Social Sciences (SPSS, version 26) was used. Descriptive statistics such as frequency, percentage, mean and standard deviation were used to describe the demographic characteristics of participants and their responses on survey items. In predicting factors to effective communication, the neural network analysis (ANN) was used. The ANN is a commonly used data analysis method to ascertain the linear relationship of data using a perceptron.

The main aim of the ANN is to elicit the connection pattern and network topology of data that mimic the action of a biological neuron. Further, LeCun, Benigno, and Hinton (2015) suggest that ANN analysis employs solving that are nonlinear as well as complex, and that the analysis used simple mathematical processes such as addition and multiplication. The mathematical structure of ANN can predict the relationship among a set of input and output variables using an iterative learning process.

### Results

The majority of participants in this study were female (n=306, 65.2%), bachelor (n=265, 54.2%), Many reported graduated from human sciences (n=283, 60.3%). Scholastic records showed that most were Cycle 2 (n=281, 59.9%), and living currently in urban area (n=342, 72.9%). According to Table 1, the majority of teachers who participated in this study have more than 21 years' experience (n= 202, 43.1%). The NNA was performed in considering the significant factors affecting effective communication. In this study the NNA model was made up on one dependent variable (effective communication) and 11 inputs (independent variable). Results showed that three variables were most important: Lack of attention to the affective domain (100%), Control on Teacher Activities (55.5%), and Interference between Home and Instructional Activities (54.5%). In addition to these three variables, the Technology Barriers (42.5%), which may be influence on effective communication, was identified as the other significant variable. Based on the predictive power of the model, while Student' Academic Procrastination (40.1%), Technology Acceptance (32.8%), Inefficiency of face-to-face instruction methods in Online Environment (29.2%), Traditional Assessment Inefficiency (28.4%), Content Development (21.1%), Perceived Teaching Quality (18.2%) and Teacher Authority (14.0%) were recognized as the least

significant of the independent variables (Table 3).

Table 2. Descriptive Statistics of Participants

Characteristics (N=469)	n (%)
<b>Gender</b>	
Male	163 (34.8%)
Female	306 (65.2%)
<b>Level</b>	
Bachelor	265 (54.2%)
Master	204 (43.5%)
Ph.D.	11 (2.3%)
<b>Cycle</b>	
First	188 (40.1%)
Second	281 (59.9%)
<b>Living area</b>	
Urban	342 (72.9%)
Rural	127 (27.1%)
<b>Experience</b>	
1-5	63 (13.4%)
6-10	35 (7.5%)
11-15	68 (14.5%)
16-20	101 (21.5%)
21-	202 (43.1%)
<b>Field of study</b>	
Human Science	283 (60.3%)
Science	136 (29.1%)
Engineering	34 (7.2%)
Other	16 (3.4%)

Figure 2 illustrates the two-layer neural network model of the association of factors with independent variables. The partitioning of input data included 71.4% on training (batch) and 28.6% testing. The input layer had 10 units excluding the bias unit. The percentages of incorrect prediction factors obtained for multilayer perceptron training, and testing were 17.3%, and 13.4%, respectively. The low percentage of incorrect predictions or the cross-entropy error is indicative of the power of the model to predict affecting factors.

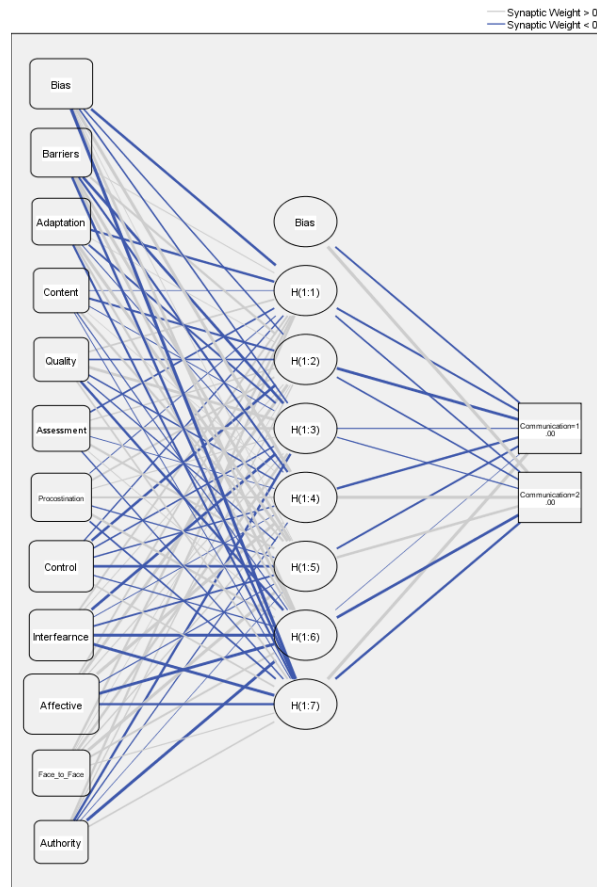


Figure 4. Two-layer Neural Network Model Diagram

Table 3. Independent Variable Importance to Examination Determinants Score in a Two-layer Neural Networks (perceptron/regression) Model

Full variable name	Abbreviation	Importance	Normalized Importance
Lack of attention to the affective domain	Affective	0.229	100.0%
Control on Teacher Activities	Control	0.127	55.5%
Interference between Home and Instructional Activities	Interference	0.125	54.5%
Technology Barriers	Barriers	0.097	42.5%
Student' Academic Procrastination	Procrastination	0.092	40.1%
Technology Acceptance	Adaptation	0.075	32.8%
Inefficiency of face-to-face instruction methods in Online Environment	Face-to-face	0.067	29.2%
Traditional Assessment Inefficiency	Assessment	0.065	28.4%
Content Development	Content	0.048	21.1%
Perceived Teaching Quality	Quality	0.042	18.2%
Teacher Authority	Authority	0.032	14.0%



## Discussion

The present study sought to determine the variables affecting effective communication during the COVID-19 pandemic. To achieve this goal, artificial neural network analysis was used. Findings revealed that attention to the affective domain is the most important predictor of successful communication. And consequently, these variables (include: control of teacher activities, interference between home and instructional activities, technology barriers, student 'academic procrastination, technology acceptance, the inefficiency of face-to-face instruction methods in an online environment, traditional assessment inefficiency, content development, perceived teaching quality, and teacher authority) are important. In the following, we will discuss each of them.

Martin & Reigeluth, (1999) have developed a six-fold taxonomy (including, emotional, motivational, moral, social, spiritual, and aesthetic) for the affective domain. Teachers who answered the interview questions and the questionnaire may not have paid attention to all aspects of this domain, but they realized that in the COVID-19 era this field had received little attention. One of the most important findings of this study is that attention to the affective domain can be the most important predictor of effective communication in the educational environment. As Kaufmann et al., (2021) say, effective communication affects motivation, effort, persistence, resilience, learning goals, assignments, projects, and academic success. During the COVID-19 era, the affective domain did not receive enough attention for a variety of reasons, including the inherent limitations of e-learning environments. As a result, the affective domain is one of the most important issues that those involved in educational systems should pay attention to. The second important factor influencing effective communication during the COVID-19 pandemic was controlling the behavior of teachers' activities. Excessive control deprives teachers of their freedom. One of the most important human concerns is freedom. Freedom is essential for human growth. Schwartzman, (2020) states that the education system, based on their neoliberal views, does not act responsibly, but imposes strict controls on teachers and their activities. Monitoring and providing effective feedback should replace unnecessary controls.

The environment is one of the factors affecting effective communication. An inappropriate environment disrupts effective communication (Gudmundsdottir & Hathaway, 2020; Whalen, 2020). The home environment is not designed for school activities and the factors present in it can interfere with the effective communication process (Bai et al., 2020; Crew, 2020; Di Pietro et al., 2020). If educational systems want to improve the quality of education and learning, they must find a suitable solution for this issue. Technology Barriers are the fourth-factor influencing effective communication. Access to smartphones, computers, high-speed Internet, content production, and instructional software is critical to effective communication in e-learning environments. Various researchers have highlighted these barriers (including Network and technology instability; Lack of familiarity of teachers with technology, hardware, and internet connection; financial barriers, Internet infrastructure, hardware and software, digital literacy) to technology (Bai et al., 2020; Brooks et al., 2021; Habibi et al., 2021; Jain et al., 2021; Khanna & Prasad, 2020). Without removing these barriers, effective communication is not possible.

Effective communication at its highest level is a transactional process. This means that both the student and the teacher are actively involved in the process. During the COVID-19 era, students were not serious enough about learning activities for a variety of reasons. This has reduced the quality of communication. In the present study, this factor has been called Student Academic Procrastination. Many researchers report that many students do not do their homework on time, and most homework is done by parents. On the other hand, many students do not actively participate in class activities (Miller & Harris, 2020; Phillips et al., 2021; Xiao & Li, 2020; Ziebell et al., 2020). At the beginning of the COVID-19 outbreak, most teachers were unfamiliar with using Internet tools to conduct online classes. This lack of familiarity with new communication technologies was a serious obstacle to effective communication, and teachers became familiar with these tools over time. Teachers' gradual mastery of Internet communication tools has enabled them to communicate effectively. It can be said that resistance to technology is one of the serious obstacles to effective communication, and acceptance of technology can provide the basis for effective communication in the e-learning environment. Many researchers (Addimando et al., 2021; Bai et al., 2020; König et al., 2020; Mikušková & Verešová, 2020; Pokhrel & Chhetri, 2021; Xiao & Li, 2020) believe that educational systems and consequently teachers did not try to integrate information and communication technology with the process of teaching and learning as well as evaluation. They tried to use traditional methods in the online environment. But due to the mismatch between the traditional environment and the online environment, these efforts failed.

From teachers' point of view, the Inefficiency of face-to-face instruction methods in Online Environment and assessment methods are other factors that affect effective communication. This finding is consistent with the view of this researcher (Addimando et al., 2021; Adedoyin & Soykan, 2020; Bai et al., 2020; Gudmundsdottir & Hathaway, 2020; König et al., 2020; Mikušková & Verešová, 2020; Pokhrel & Chhetri, 2021; Xiao & Li, 2020). Different environments require different communication techniques. Teachers were accustomed to the communication techniques of traditional learning environments and were unaware that they could not be used in an online learning environment. This disproportion has prevented effective communication. The assessment method has a great impact on students' learning activities (Doucet et al., 2020). Choosing the right assessment method can have a great impact on teaching and the quality of learning. Teachers tried to use traditional assessment methods such as multiple choice and descriptive questions to assess students learning while these assessment methods are not suitable for e-learning environments. These evaluation methods increase the possibility of student fraud and negatively affect the relationship between teachers and students.

Creating electronic content required skills that teachers did not have at the beginning of the COVID-19 outbreak. But over time, they mastered these skills, which improved the quality of their communication. Stewart et al., (2021) also emphasize the difficulty of providing content by teachers during this period. Some teachers have created Facebook groups and so on to overcome this problem. Teachers are concerned that their content may not be accepted by students. That's why they tried to provide quality content. E-learning made it possible for teachers to observe and review their teaching after it was completed. On the other hand, their teaching file was inadvertently shared with others and this caused them to be more careful in their teaching. They felt that the quality of their teaching had improved. However, because their teaching method was not appropriate for the e-

learning environment, it did not have much effect on promoting students' learning and, consequently, on improving their communication with students.

Irrational exponential power destroys communication that was also obtained in this study. But if power is combined with freedom and justice, it will improve the relationship. The type of message that the teacher sends to the students has a different effect on the communication between them. As Kaufmann et al., (2021) State, the type of message a teacher sends affects the student's perception of the teacher (including respect, care, communication, and value) and gratitude to the teacher. This part of the research findings shows that teachers have not been able to gain students' respect by sending effective communication messages, or students have been reluctant to receive such a message and have not had much respect for the teacher.

## Conclusion

The purpose of the current research was to investigate the factors affecting effective communication in the e-learning environment during the corona virus epidemic from the perspective of secondary school teachers. The present study showed that the most important effective factor in effective communication according to secondary school teachers of North Khorasan province is affective domain. Besides that Control on teacher activities, Interference between home and instructional activities, Technology barriers, Student 'academic procrastination, Technology acceptance, Inefficiency of face-to-face instruction methods in Online Environment, Traditional assessment inefficiency, Content development, Perceived teaching quality and Teacher authority are important. The present study identified eleven factors affecting effective communication in the era of Corona pandemic, paying attention to these factors can improve effective communication in e-learning environments. In the present study, the factors affecting effective communication were examined only from the teachers' point of view, it is suggested that these factors should be considered from the students' point of view as well. The current research was carried out in a non-interventional way, it is suggested to study each of the eleven factors obtained in the current research alone or in combination with each other experimentally in order to determine the role of each of them in effective communication.

## Recommendations

- Attention to the affective domain to improve effective communication in e-learning environments.
- Giving freedom of action to teachers in various matters related to education.
- ICT-related competencies and instructional design of lessons for e-learning environments should be taught to teachers.

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## Learning *Bipa* through Folktales: Need Analysis of Foreign Students in Indonesia

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**Abstract:** The existence of the Indonesian language is currently improving. It can be seen from many foreigners interested in learning the Indonesian language for foreigners or *BIPA*. Besides, the Indonesian Ministry of Education and Culture also sent the teachers of *BIPA* to go abroad, making more foreigners know the Indonesian language, especially students. This study aimed to determine foreign learners' needs in learning the Indonesian language. The present research employed a qualitative approach. The data were obtained through distributing offline questionnaire, online questionnaire, and doing interviews. The findings indicated that foreign people hoped they could use the Indonesian language dominantly in the *BIPA* learning, find variations of methods and resources, access innovative media engaging various folktales, and meet many new classmates from different countries. Some informants also assumed that the Indonesian language was unique and easy to learn by using folktales. They were interested in learning through folktales. The implication of this study was that *BIPA* teachers could use folktales as lesson materials for their students.

**Keywords:** *BIPA*, Need Analysis, Foreign Students, Folktales

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## Introduction

The Indonesian language has a vital role and function in country development, especially in unifying various ethnic groups with social, cultural, regional language, and religious diversities. With the Indonesian language, communication between individuals with different backgrounds can also be done effectively. In addition, besides the benefits for native speakers, it is now starting to be learned in the international community. According to data from the Language Center in Jakarta, the *BIPA* teaching program has been organized in 46 countries worldwide (Azizah et al., 2012, p. 1). Their interest is evident by the provision of a learning program known as the Indonesian language for foreigners (*BIPA*) both in Indonesia and abroad. They learn it for business, education, or a new insight into the Indonesian language and culture. *BIPA* program has a role in the internationalization effort of Indonesian universities, from which the growing number of enthusiasts can be benefitted (Ningrum et al., 2017). This program is starting to develop well as many governmental and private institutions begin to apply it. For example, South Korea actively conducts *BIPA* teaching, in which three universities have introduced majors related to Malay-Indonesian. Moreover, private institutions also teach the Indonesian language to Koreans, especially in Seoul, as the three universities cannot thoroughly meet people's needs in learning (Jae Hyun, 2015). Therefore, a capable and skilled instructor is undoubtedly needed for the sustainability of the *BIPA* program. A *BIPA* instructor is also expected to be competent and experienced, so it will be easier for them to teach the Indonesian language to foreigners. Besides the conceptual understanding, creativity, breadth of knowledge, and insight will be very helpful for the instructor in carrying out learning activities. However, in reality, *BIPA* learners are expected to master all Indonesian language skills. It can be achieved by doing a need analysis so that instructors can develop ideal learning based on learners' needs, such as various supporting facilities covering adequate learning media, excellent teaching materials, syllabus, and learning references or resources. Therefore, this research focused on need analysis of foreigners in studying *BIPA* and How their interest in studying through folktales. It was expected to provide more precise and comprehensive information about the needs of *BIPA* learners.

## Method

This study employed a qualitative method, a type of scientific research. In general terms, scientific research consists of an investigation that systematically seeks answers to a question, uses a predefined set of procedures, collects evidence, and produces findings that are not determined in advance yet applicable beyond the immediate boundaries of the study (Mack, 2005). In this research, there were some ways which were used to get the information. Those ways were online and offline strategy. Firstly, researchers meet some foreigners who were *BIPA* students to know the needs of learning *BIPA* in Surakarta, especially at Universitas Sebelas Maret (UNS). In order to get valid results, secondly, researchers carried out several interviews to gather

information on international students' (*BIPA* students) needs. Thirdly, researchers also distributed online questionnaire to some foreigners to investigate their interest in learning *BIPA* through folktales. All informants in this study were foreigners from various countries: Tajikistan, Egypt, Timor-Leste, Turkmenistan, Nigeria, Uzbekistan, Vietnam, Singapore, the United States, India, Laos, Malaysia, Thailand, and Vietnam.

## Results and Discussion

### Indonesian as a Foreign Language

According to Saddahono (2012), the international office of UNS (Universitas Sebelas Maret) in 2012 showed that 113 people from 28 countries followed student exchange programs, and 63 people from 26 countries studied at UNS. Understanding the characteristics of international students is necessary, especially in the effort to select and develop *BIPA* learning materials (Suyitno, 2007, p. 64). Saddahono (2012) states that international students studying the Indonesian language at UNS have a peculiar communication. Daily conversation is still heavily influenced by English as a mediating language for foreign students and lecturers.

Besides oral communication, international students must also be able to communicate in writing, especially in completing assignments, a thesis, and a dissertation (Anjarsari et al., 2007). The Indonesian language exists internationally as several Asian and European universities teach it as one of the compulsory courses. Many efforts have been made to introduce the Indonesian language to the international scene, one of them being the teaching of *BIPA* (Ningrum et al., 2017). The use of the Indonesian language in education in Indonesia has been stipulated in Law No. 24 of 2009, especially article 29, paragraph (1). It applies to *BIPA* teaching programs in Indonesia. Therefore, international students who study and work in this country should be able to use the Indonesian language to communicate. Hence, they can speak Indonesian daily through the *BIPA* program (Ningrum et al., 2017). Nowadays, the Indonesian language has become one of the most popular in the world. Thus, efforts to conduct a good learning process for foreign speakers are crucial (Saddhono, 2015). *BIPA* plays a prominent role in developing students' communication skills at Vietnam National University. It served as the barometer in the Indonesian Studies major that required an effective learning model (Oktriono et al., 2017).

The *BIPA* program is growing because foreigners' interest in learning Indonesian is high. They learn Indonesian for various purposes, such as business, education, and work in Indonesia. *Listening skill* is essential to learn other language skills (Loren, 2017). Verbal and non-verbal communication strategies supported *BIPA* students in understanding the ongoing event. Moreover, they could bridge the gap between the students and the teachers (Purwiyanti et al., 2017). Junaidi et al. (2017) state that the existence of *BIPA* learning is strengthening internationally. It is evidenced by the increased number of foreign learners coming to Indonesia. In addition, even in some well-known universities in Indonesia, many foreign learners continue to study the Indonesian language even for their Master's degree. It confirms their passion for mastering the Indonesian language for various interests.

### **The Needs of International Students in Learning *BIPA***

The available teaching materials poorly supported foreign learners' interest in learning the Indonesian language. Consequently, the lesson materials had to balance their passion. In this regard, the sociocultural sphere was considered essential in representing Indonesian wealth of identity, character, and culture. Nevertheless, interactive course books of *BIPA* had not been developed optimally in Indonesia. One of the obstacles was the less interactive media development technology mastered by the teachers and stakeholders (Ulumuddin & Wismanto, 2014).

Based on the information from some foreigners in Universitas Sebelas Maret, the following are the goals of foreign students in learning the Indonesian language:

#### *To study and conduct research in Indonesia*

The informant stating this purpose was an international student who got the opportunity to learn Indonesian from the Indonesian government. In their study progress, the Indonesian language was necessary for them to attend the lectures. After completing their Indonesian language studies, they lived in Indonesia to study in college.

#### *To learn different languages, including Indonesian*

Some *BIPA* learners were interested in learning Indonesian because of their hobbies or love to learn foreign languages. They generally could speak many other languages besides Indonesian.

#### *The Indonesian language is easy to understand*

Some informants thought the Indonesian language was easy to understand, making them interested in learning it. In this case, they would understand the language for a short time. They said it was easy because they had learned other languages considered more complex than Indonesian.

#### *To work in Indonesia*

Informants chose this purpose because they wanted to work and stay for a long time in Indonesia. They would start their careers by working in foreign companies or others.

#### *Interest in Indonesian culture and people*

Informants who stated this were those who wanted to have more insight into Indonesia. They also felt that Indonesian culture was fascinating, and the people were friendly that they were happy to learn the language and culture.

#### *To stay in Indonesia*

This group of people would usually start a career in Indonesia because they had been interested in living in this country for a long time.

*To teach the Indonesian language in their country*

Some of the informants had a different purpose than others. They planned to return to their own country and teach the Indonesian language there. They came to Indonesia to acquire knowledge and understanding of *BIPA* and Indonesian culture as a provision to teach in the future. Nowadays, the Indonesian language is taught in many countries, promoting its internationalization effort. Thus, it might become an international language that the global community loves.

Furthermore, their significant challenge in learning the Indonesian language was in the aspects of speaking and writing, while the most effortless language skill for them was reading. Some informants also agreed that listening was the hardest. It made them practice frequently by listening to music and chatting with friends. These circumstances made them want *BIPA* teachers to speak using the Indonesian language fully to improve their listening and communication skills.

Generally, *BIPA* learners had ideal needs for the learning process. They wanted contextual learning to engage Indonesian culture's elements, such as introducing traditional clothes, visiting tourist destinations, getting to know Indonesian food, and prioritizing the improvement of language competencies, knowledge, and culture. The following table illustrates the needs of *BIPA* learners in learning the Indonesian language based on the offline questionnaire, interview and online questionnaire.

Needs of *BIPA* Learners

Time	45 - 90 minutes
Sources	Book, newspaper, internet, music, field trip, folktales
Media	Audio, audio-visual, field trip, and traditional clothes
Classmate criteria	Different countries, different gender, and similar level
Method	Individual, peer-teaching, and group
Expectation	Using various methods, using pictures, interacting with students, creating innovative media, and using the Indonesian language entirely in teaching

Based on the table above, *BIPA* learners requested the learning process to be taken place for 45 to 90 minutes in a single meeting. They also preferred learning resources from books, the internet, music, newspaper, field trip, and folktales. Some also asked for traditional clothes as learning media to make them more excited about learning.

Furthermore, they had some expectations regarding class conditions. They favored a heterogeneous class, so they had many friends from different countries and genders. Likewise, all informants disliked having classmates from the same country and gender. For learning methods, they expected to learn in groups or pairs. The learning process was also anticipated not to be monotonous and instead have many variations of innovative methods in each meeting. Excessive use of English also made them less interested in learning. They preferred teachers who

speak Indonesian the most, interact actively, and assign tasks to students.

### Using Folktales in *BIPA* Learning

Many foreigners are interested to learn *BIPA*, not only for the benefit of a tourist but also for long time purposes such as research, study, consult, work, or a career in Asian countries (Ningsih et al., 2019). One of the biggest obstacles in *BIPA* learning was learners' motivation. Many reasons made them less motivated, including the boring class atmosphere. One way to increase their motivation is by providing something extraordinary, especially for teens and early adulthood learners. Comics can efficiently boost their learning motivation, in which the impact is the same as using a game in *BIPA* learning (Ramliyana, 2016). Furthermore, folktales could be used as learning materials to improve the Indonesian language skills of international students. The story's plot, local wisdom, and cultural values could attract learners to read. Students would undoubtedly gain insight and knowledge about the Indonesian language and culture. In this regard, some of them expressed their interest in learning Indonesian using folktales.

By reading folktales, international students might be easier to know Indonesian language and culture. They could get a variety of new vocabularies, an understanding of cultures, and insight into various regions in Indonesia. Moreover, they enjoyed reading Indonesian folktales as the stories were interesting. There were also *BIPA* learners attracted to participating in storytelling competitions. The folktale was a suitable learning material for them to improve their speaking skill. Based on the result of the online questionnaire, there were 20 responses that consisted of 15% of informants at basic level, 50% at intermediate level, and 35% at advanced level. In addition, 80% of informants liked to read books about Indonesian folktales, while 20% disliked it. 90% of informants liked to learn the Indonesian language through folktales and 10% disliked to do it. Moreover, 75% of informants liked to learn Indonesian using folktales for the reason that they wanted to quickly master the Indonesian language and wanted to get to know Indonesian cultures, the other 20% just liked to read the stories, and 5% were not interested in reading storybooks.

### Conclusion

Based on the research discussions, the Indonesian language has now been taught to international communities. This condition would undoubtedly strengthen its existence internationally as it would become more recognizable to foreigners. Hence, optimizing *BIPA* teaching became a crucial thing to do, one of which was by determining their needs in learning the Indonesian language. Anchored on the research findings, *BIPA* learners had a variety of objectives and reasons to learn Indonesian, such as for studying, working, doing research, staying in Indonesia, and for being *BIPA* teachers in their country. They also generally expected culture-based learning, innovative methods, ideal time, varied learning resources, innovative media, and educational interaction during the learning process. Also, many foreigners love learning *BIPA* through folktales because they not only want to learn Indonesian language, but also to understand Indonesian culture.

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## Utilization of Videos Based on Local Wisdom of Surakarta as Learning Media for BIPA Students

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**Abstract:** The Indonesian language learning program for foreign speakers (BIPA) is currently the government's focus in its efforts to internationalize Indonesian as the language of international communication. BIPA students will learn four language skills: listening, speaking, reading, and writing. The selection of attractive learning media will ease them in learning Indonesian. This study aimed to engage local wisdom as a medium of learning for BIPA students in Surakarta. In this context, Surakarta's local wisdom included tourist attractions, historical places, cuisine, and the local community's culture. This research employed a qualitative design involving a case study approach. The data were obtained from document analysis, observation, and interviews with BIPA students in Surakarta. The data validity was achieved by administering the triangulation of technique and source. The findings indicated that videos, as learning media containing Surakarta local wisdom, could increase BIPA students' enthusiasm to learn Indonesian and local culture. Aside from being a part of Indonesian language learning, local wisdom could also be a medium to promote Surakarta tourism to foreign tourists. BIPA students acquired vocabulary commonly used by the local community. In addition, they also comprehended the culture of the Surakarta people; *hastalaku* (eight Javanese behaviors). It helped them adapt to the social life of the community.

**Keywords:** Utilization of Local Wisdom, Teaching Materials, BIPA, Surakarta

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## Introduction

Indonesian is the world's tenth most widely spoken language after English, Mandarin, Hindi, Spanish, French, Arabic, Bangali, Russian, and Portugese (Ethnologue, 2020). The Indonesian language learning program for foreign speakers (*BIPA*) is currently the government's focus on internationalizing Indonesian as the language of international communication (Tiawati, 2022). *BIPA* learning is currently experiencing very rapid development. In the 2019 academic year, the Darmasiswa Program accepted 638 international students from 90 countries (Kemendikbud, 2018), implying that the Indonesian language is in great demand. It is also reflected in the *BIPA* program at several Indonesian universities, one of which is in Surakarta. Three universities carry out the *BIPA* program in Surakarta City: Sebelas Maret University, Raden Mas Said University, and Muhammadiyah University of Surakarta (Saddhono & Erwinsyah, 2018). In learning *BIPA*, it is necessary to consider the planning, process, and evaluation. In addition, it is essential to pay attention to the teaching materials, media, and methods. In this regard, the use of appropriate and attractive materials can affect the success of foreign speakers in achieving goals in learning Indonesian, which is consistent with the previous studies (Mardasari et al., 2022).

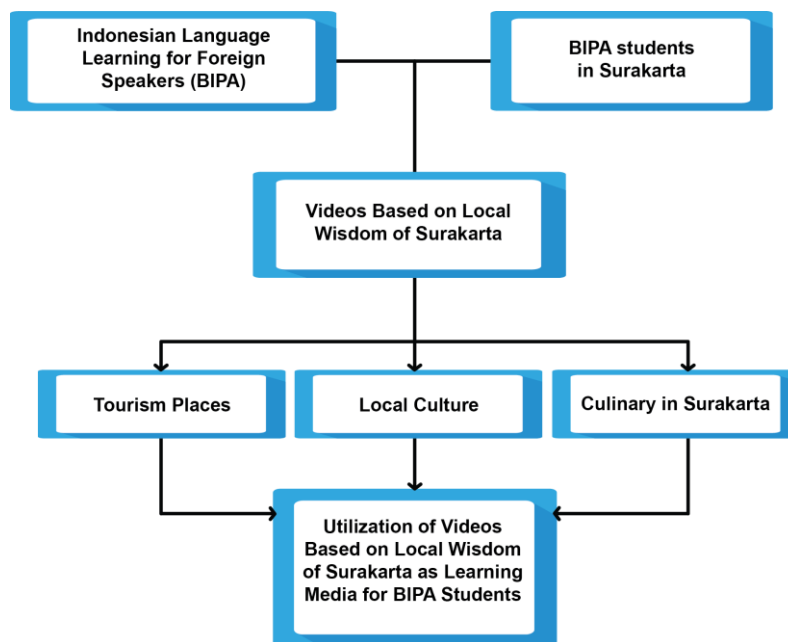
Foreign speakers' interest in learning Indonesian is currently not accompanied by the media following their needs (Jessica, 2022). It can be seen from the scarcity of *BIPA* learning media in the form of textbooks and non-textbooks containing local wisdom. Therefore, it is required to have standardized media in response to foreign speakers' interests (Bulan, 2019). A limited amount of *BIPA* learning media presents sociocultural aspects of Indonesian society (Sari & Ansari, 2021), as there are just 56%, 24 out of 43, textbooks containing materials regarding sociocultural elements. Likewise, Subektiningsih analyzed a *BIPA* textbook entitled "*Lentera Indonesia*" and concluded that the exercises poorly improved foreign speakers' communication skills because the integration of speaking and listening proficiency was limited to comprehension tasks (Yunus & Anwari, 2021). The need to learn Indonesian for foreign speakers is progressing rapidly, but no standardized curriculum and learning media have been available. In addition, the existing *BIPA* learning media is significantly disconnected from the introduction of culture (Rahmawati, 2019). Moreover, students who visit tourist attractions or other historical places are likely to encounter obstacles as they do not understand the tour guides because of their lack of vocabulary and cultural knowledge (Maulana, 2021).

The present study's novelty was associated with integrating the local wisdom of Surakarta in a video-based *BIPA* learning media involving a scientific-thematic approach. Previous related research was conducted by Jannah (2021) on learning Indonesian for foreign speakers (*BIPA*) based on local wisdom teaching materials. A similar investigation was carried out by Alfayanti et al. (2017) regarding the use of audiovisual media containing Indonesian national culture in studying literary works for *BIPA* students. The aspect that distinguished this research was the utilization of more specific local wisdom, namely the culture of Surakarta. Researchers also developed videos containing local wisdom in three categories: tourism, cuisine, and local culture. It was accomplished because *BIPA* students studied the Indonesian language in Surakarta City.

This study intended to develop video-based learning media containing local wisdom for foreign students. It was considered critical to improving the competitiveness of the Indonesian nation in the international world. The BIPA program is a form of Indonesia's soft diplomacy. Hence, learning media in the form of videos to bring foreigners closer to the culture of Surakarta City and its surroundings was required to be developed. The results of this research were expected to contribute to the development of BIPA learning and affect the tourism sector. In the development of culture, this investigation could serve as a milestone in preserving Indonesian culture

**Method**

This research employed a qualitative method involving a case study approach. Researchers described the results of the application of videos containing local wisdom for *BIPA* students in Surakarta. The present study was conducted at the *BIPA* organizing institutions in Surakarta, consisting of Sebelas Maret University, Muhammadiyah University of Surakarta, and Raden Mas Said University. The data were gathered by administering document analysis, observation, and interviews with *BIPA* learners in Surakarta. Data collection techniques included (a) In-depth interviews with lecturers and students of *BIPA* in Surakarta, (b) Passive classroom observation to investigate the use of videos containing local wisdom of Surakarta in *BIPA* learning, and (c) Questionnaires regarding perceptions of *BIPA* lecturers and students of learning media in the form of videos containing local wisdom of Surakarta. The data validity was accomplished through the triangulation of methods and data sources. The data analysis technique used was an interactive analysis model (Milles & Huberman, 2005). The procedures consisted of (1) data collection (focusing on collecting the necessary data); (2) data reduction (analysis during data collection, within-site analysis, and cross-site analysis); (3) data display (matrix displaying some general suggestions); and (4) drawing and verifying conclusions.



**Figure 1.** Frame of Mind

## Results

### Integrating Local Wisdom of Surakarta and Its Surrounding in Learning Videos

Local wisdom becomes the identity of a particular community. Saputra et al. (2022) explains it as a habit firmly embedded over generations and consisting of elements of high cultural values. Correspondingly, society uses local wisdom to survive in an environment. It is integrated with belief systems, norms, and culture because it is expressed in long-lasting traditions and myths. According to Kurniawan (2022), local wisdom is part of the community following the strict environmental conditions, needs, and beliefs that are difficult to eliminate.

Local wisdom is essential for every region as it can reflect and symbolize a specific area to others. It affects many elements, including local culture, tourism, and cuisine, making local and foreign tourists curious and paying a visit—one example of the region in question is the Residency of Surakarta, Central Java.

The Ex-residency of Surakarta (Javanese) was an area during the Dutch colonial period which included the Kasunanan Palace of Surakarta and Praja Mangkunegaran. The Surakarta Residency consists of the following areas: (1) the Municipality of Surakarta; (2) Karanganyar Regency; (3) Sragen Regency; (4) Wonogiri Regency; (5) Sukoharjo Regency; (6) Klaten Regency; (7) Boyolali Regency. Residents of the ex-residency of Surakarta are proud to call themselves “*Wong Solo*” (*Orang Solo*), which means the natives born in Surakarta and its surroundings (Harloff, 1920; Indriawati, 2022).



**Figure 2.** The Process of Developing Videos Containing Local Wisdom

Link: [uns.id/VideoBIPA](https://uns.id/VideoBIPA)

Local wisdom integrated as learning videos in this research covered tourist attractions, cuisine, and local culture. Surakarta Residency has unique natural and cultural tourism. The first video was entitled "The Enchantment of the Ex-Residency of Surakarta". It showed the beauty of natural and cultural tourism in the ex-residency of Surakarta. The tourist attractions displayed in the video were (1) Balekambang Park, Surakarta; (2) Grojogan Sewu Waterfall, Tawangmangu, Karanganyar; (3) Kemuning Tea Plantation, Karanganyar; (4) Cetho Temple, Karanganyar; (5) Nampu Beach, Wonogiri; (6) Gajah Mungkur Reservoir, Wonogiri; (7) Kedung Ombo Reservoir, Sragen; and (8) Umbul Ponggok, Klaten.

Videos from various tourist attractions were compiled into learning videos based on local wisdom of tourism in the Surakarta area and its surroundings. Meanwhile, the historical place integrated into this research was the Sangiran Early Man Site, Sragen, designated as a World Cultural Heritage by UNESCO, by registration number 593 in 1996 under "The Sangiran Early Man Site" (Kemendikbud.go.id). This circumstance eventually led researchers to involve it in a *BIPA* learning video regarding the local wisdom of historical places.

The second learning video was entitled "Culinary in the City of Solo". It displayed various kinds of cuisines in Solo City, such as: *soto, timlo, cabuk rambak, tahok, serabi, selat, tengkleng, es dawet, es kapal, sate buntel, nasi liwet, and angkringan*. The traditional cuisines of Surakarta were compiled into a learning video introducing local wisdom. The third learning video was named "The Culture of Shopping in Traditional Markets by the People in Surakarta". The city of Solo witnessed people maintaining local wisdom amid a pandemic and rapid technological advancement. It could be seen from their shopping habits. There were 38 traditional markets in Solo City, such as *Pasar Gede, Pasar Gading, Pasar Legi, Pasar Klewer, Pasar Triwindu*, and others. In these places, local wisdom was reflected in the familiarity of buyers and sellers who seemed to know each other, apparently representing traditional markets' vibes. Moreover, sellers often noticed having a spirit of cooperation and mutual assistance. In addition, there was mutual trust between merchants and their customers. Buyers were given discounts and were sometimes allowed to go into debt. Nonetheless, modern markets, which were somehow cleaner and more comfortable, began to be developed in Solo City, along with the technological advancements allowing people to shop online. Regardless of those changes, people in Solo did not neglect their culture and local wisdom by continuing to buy goods at traditional markets.

Surakarta has a variety of natural beauty, culture, and unique cuisine. This city, with the third largest population in the southern part of Java Island after Bandung and Malang, is known to be a delicious culinary paradise. In this context, the cuisine was inseparable from the daily life of *BIPA* students in Surakarta. Therefore, researchers created a learning video focused on traditional cuisine to be a reference for *BIPA* learners in Surakarta.

### **Utilization of Video-Based Learning Media Containing Local Wisdom of Surakarta for *BIPA* Students**

The videos containing local wisdom were utilized during the *BIPA* learning process at Sebelas Maret University (*UNS*), Muhammadiyah University of Surakarta (*UMS*), and Raden Mas Said University of Surakarta. There were 46 *BIPA* students in Surakarta in 2022. They came from various countries, such as Thailand, Tanzania,

Japanese, Sudan, Uganda, Bangladesh, Egypt, Afghanistan, Madagascar, Germany, Yaman, Turkey, and Zimbabwe. They have studied Indonesian for more than six months, indicating that they were supposed to be at the intermediate level. Before using video-based learning media containing local wisdom, *BIPA* teachers prepared a lesson plan. They utilized the videos for various listening, speaking, reading, and writing materials according to the competencies to be taught.



Figure 3. *BIPA* Learning Process

## Discussion

In this study, *BIPA* teachers in Surakarta used videos as learning media containing local wisdom for teaching listening and speaking skills. They utilized the videos by involving various learning methods, models, and techniques, making the process more enjoyable. Based on the results of observations, *BIPA* students watched the learning videos intently. They seemed enthusiastic about the explanations and questions regarding local wisdom in Surakarta provided by the teachers. Dadela et al. (2021) and Wisudawati (2022) also found that video or audio-visual media could increase *BIPA* students' learning motivation. They were also asked to retell the stories they watched in videos containing local wisdom. Additionally, the teachers gave assignments to the learners to observe one of the tourist and culinary attractions, as shown in the videos. Based on the assignment results, *BIPA* students comprehended tourist attractions and tasted the traditional cuisine of Surakarta. They admitted that they had never visited local tourist attractions during their six months living in Surakarta. Some of them also revealed that they had never tasted the traditional cuisine of Surakarta and only ate food around campus due to transportation constraints and lack of time to walk. With assignments given by *BIPA* teachers, they were responsible for learning to use public transportation to reach their intended locations.

From the observation assignments, *BIPA* students acquired vocabulary in the Javanese language that local people commonly used, such as *kulonuwun* (excuse me), *monggo* (please), *matur nuwun* (thank you), etc. They also knew the taste of Surakarta cuisines, which were spicy and sweet. They also noticed the local community

habit of "whatever the food is, drink it with iced tea". In addition, *BIPA* learners also understood the culture of Surakarta known as *hastalaku* (eight Javanese behaviors), namely: *gotong royong* (cooperation), *grapyak semanak* (friendly), *guyub rukun* (harmony), *lembah manah* (humble), *ewuh pekewuh* (mutual respect), *pangerten* (considerate), *andhap asor* (virtuous), and *tepa slira* (tolerance). These findings were consistent with Nuryani et al. (2022). They discovered that local wisdom in the form of *wayang* stories could introduce culture to international students and be the Indonesian language diplomacy efforts. In addition, research conducted by Rahaya and Sahidillah (2022) confirmed that media containing local wisdom helped *BIPA* students adapt to the social life of the local community.

The use of videos as learning media containing local wisdom should be prepared with an *RPP* (Lesson Plan) according to the competencies to be taught. It could affect the success rate of the media implementation to improve the Indonesian language proficiency of *BIPA* students. The videos were developed to ease *BIPA* students in learning the Indonesian language and comprehending the local culture better.

## Conclusion

*BIPA* learning requires innovative and attractive learning media to facilitate students to learn the Indonesian language and culture. Therefore, the teachers should develop various innovative media, one of which is by engaging local wisdom designed in the form of videos. Using videos as learning media containing Surakarta's local wisdom could increase the enthusiasm of *BIPA* students in Surakarta to learn the Indonesian language and local culture. Video-based learning was interesting and not boring for the learners because it displayed images, motion, and sound. Local wisdom could also be a medium to promote Surakarta tourism to foreign tourists. *BIPA* students acquired vocabulary commonly used by the local community. In addition, they understood the culture of people in Surakarta, supporting them in adapting to the environment.

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## The Invisible Catalysts Unit in the Educational Hierarchy System in Kuwait: A Need to Improve Supervisory Unit

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**Abstract:** This study was carried out to determine the current status of the supervision unit in the Kuwaiti education system from the perspective of its staff. To gather the pertinent data, the supervisors at the Ministry of Education (MoE) were interviewed and invited to join focus groups in order to discuss the obstacles and challenges they face, and obtain their suggestions for improvement. Subsequent data analysis revealed important issues related to the complexity of their job description, duties, and responsibilities, making it challenging to address the needs in the educational field. Their main recommendations pertained to a better breakdown of their job responsibilities to enhance their performance. Therefore, this study sheds light on the current situation in the supervisory unit with regards to the institutional, individual, and legal enabling environments for education in Kuwait, indicating that the complex administrative hierarchy hinders supervisors from fully supporting the system.

**Keywords:** Supervisor, Education leadership, Reform

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### Introduction

The Ministry of Education (MoE) is the leading governmental body supervising the education system in Kuwait. Its current responsibilities involve supervising, developing the educational services, and enhancing the quality of learning in schools (National Report of Kuwait, 2019). Kuwait's education system is highly centralized, as the MoE has complete power over all resources and decisions (Alsaleh, 2019). The MoE manages and regulates every aspect of the educational process, including training, curriculum, assessment, districts, and their schools. The MoE management structure consists of the minister, undersecretary of education, and seven sector directors. Each sector has a sub-department that facilitates certain tasks and duties, as shown in Figure 1. Thus, if any of the system's hubs cease operations for any reason, the entire system and its outlying components are severely affected (Alsaleh, 2019). Because one central agency carries out all the required tasks, all processes are obviously much slower than would be in a decentralized system (Male & Alhouthi, 2015).

As this centralized structure of MoE relies heavily on supervisors, they inevitably need to fulfill too many roles and duties in different Ministry sectors (Alsaleh et al., 2017). For instance, the job description of senior supervisors indicates that they are in charge of teacher performance, curriculum, and assessment. Their duties also involve developing plans for the implementation, supervising, and working on curriculum development, updating teachers' performance assessment methods, mentoring and guiding teachers in their academic development, and approving tests and assessment tools. The job description of the head of supervisors in the district is similarly comprehensive and includes participating in the proposed general policy of education, planning to improve the educational process, providing expertise to the department heads in each academic educational field at schools, determining the professional development and training needs of teachers, providing guidance for curriculum development, analyzing exam results, and preparing relevant reports (Oliva & Pawlas, 2004). However, many supervisory unit roles involve overlapping duties. According to Alsaleh et al. (2017), this often results in the same tasks being performed by several individuals, while other aspects are overlooked, such as aligning teacher training with teachers' needs. Therefore, as a part of this study, the perspectives of supervisors related to their position and profession in the current MoE settings are examined in order to answer the following questions:

- What is the current role of supervisor at the MoE?
- What are obstacles and challenges supervisors face and which changes they deem beneficial?

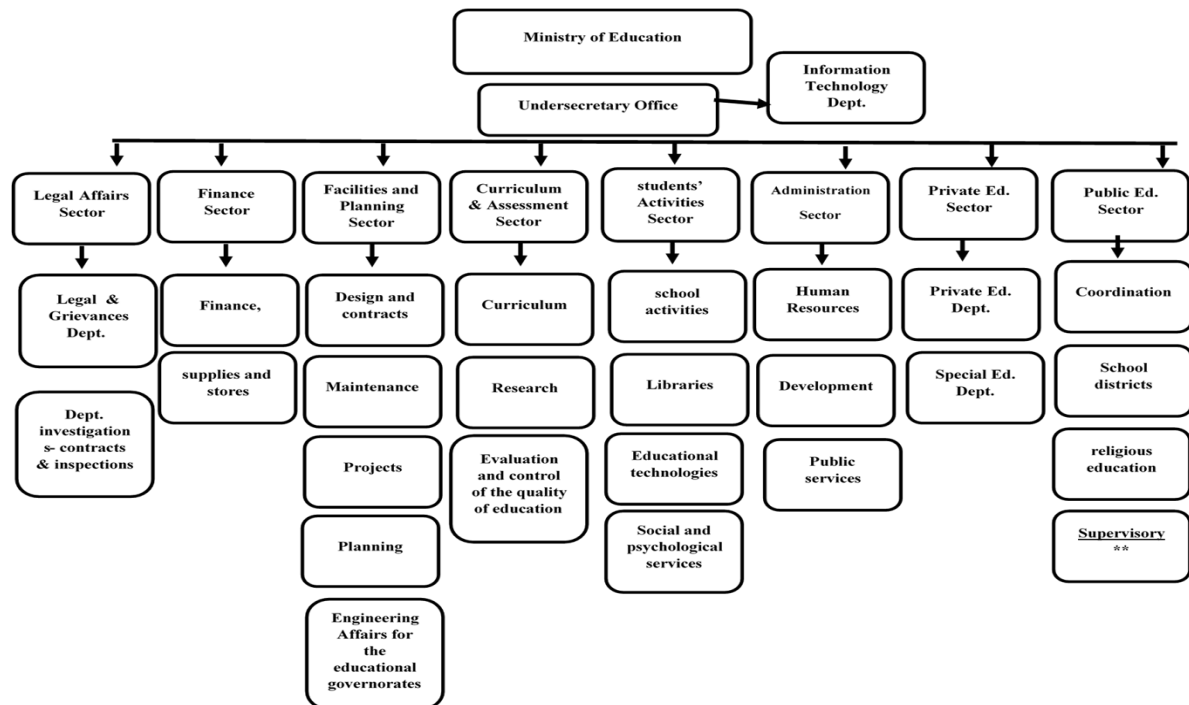
## Literature Review

In order to situate the present study in an appropriate context, a literature review was conducted focusing on the decentralized and centralized education systems adopted in other countries. Traditionally, supervisors conducted school inspections and monitored the quality of teachers (Kayıkçıl et al., 2017), but their role later expanded to include guidance and mentoring (Cogan, 1973; Goldhammer, 1969). In clinical settings, such supervision was found to enrich the learning and teaching processes (Kayıkçıl et al., 2017), as peer coaching is an effective teaching strategy (James & Massiah, 2019). In the U.S., educational supervisors often have multiple responsibilities, but primarily focus on curriculum and teacher development (Abiogu, 2014). Therefore, they are responsible for making sure that the content of teacher education programs prepares them for their future profession. In addition to overseeing the work of beginner teachers, supervisors also support the subject-matter supervision conducted by a school department chair. Other professional personnel involved in supervisory roles include cluster coordinators, lead teachers, mentors, peer coaches and peer supervisors, curriculum specialists, project directors, trainers, program evaluators, and district office administrators. Unfortunately, these professionals often carry out their supervisory work without having any professional preparation for it, finding what seems to work for them by trial and error (Rustiad, 2015). With the involvement of state departments of education in monitoring school improvement efforts, supervisory responsibilities are increasingly covering the tasks at the higher end of this list. Consequently, these responsibilities put supervisors in much more complex, collaborative, and developmental relationships with teachers, as their role is no longer restricted to strictly inspectorial responsibilities of a model based on different educational goals of building educational

infrastructure and basic accessibility to education.

In Singapore, the management of schools is highly centralized. Within the Ministry of Education, there are three Deputy Director-Generals each heading departments responsible for curriculum, schools, and professional development. The Curriculum Department handles the following aspects: Syllabus Design & Review, Teaching Approaches and Assessment Modes, Special Programs, Resources and Training for the implementation of the above, Library Services, Language Centers, and lastly, Consultancy Services to provide specialist advice to schools, other Divisions, Ministries and private publishers on matters related to the curriculum (Ng et al., 2015).

The schools are grouped into districts and each is managed by a Superintendent. The Superintendents are responsible for guiding and supervising the school leadership teams to ensure that schools are effectively run. This includes networking, sharing and collaboration among the district schools to improve the knowledge and skills of the leadership teams and the performance of each school. Superintendents also play a key role in personnel and financial management by supporting staff with training and identifying those for career advancement, and managing the allocation of funds based on the districts' particular needs to reach national goals (Ng et al., 2015)



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Although the management structure and distribution of decision-making power of the education system in Singapore differs from that adopted in other high-performing nations, the commonality is found in the characterization of the approach.

Figure 1. MoE Approved Hierarchy (2020).

Retrieved from <https://moe.edu.kw/about/Pages/Ministry%20Hierarchy/ges.aspx>

The goals, reform projects, and vision are based on qualitative student outcomes rather than the quantitative findings of school inspections model (Ng et al., 2015). In the two systems introduced above, supervisors are defined and embedded in the body of their own structure and hierarchy. Therefore, supervisory unit is crucial in every education system and has an authority or rank when dealing with teachers.

## Method

A qualitative research design was adopted in this study, as its aim was to understand the challenges facing the supervisors in the education system in Kuwait. Specifically, to gain broad and in-depth insights into the specific issues that need to be addressed in order to improve learning outcomes and enhance the educational system's overall performance, individual interviews and focus group discussions were held. In addition, when conducting the needs assessment, sources providing both objective (decrees, plans, and job description) and subjective (the expressed needs of individuals) information were consulted, along with the normative needs as defined by experts (specialty boards, accrediting and professional organizations). These findings were segregated into individual needs (those that relate to the supervisory role) and organizational needs (those that are tied to organizational goals and requirements).

Focus groups were held to gather qualitative data required for developing a needs assessment strategy. In total, they were attended by 67 supervisors for 18 academic subjects, 40 supervisors, 23 first supervisors, and four senior supervisors, who met in small groups. All participants were involved in structured and informal discussions on the major issues related to their job duties, the obstacles and challenges they face, and the changes they would like to see in the supervisory unit structure at the MoE. Personal interviews were also conducted to explore the vision of each of the interviewees and compare their perspectives, explore the ways to ensure that this vision is executable, assess the discrepancy between the status quo and the vision, as well as identify current strengths, weaknesses, opportunities, and threats.

The gathered qualitative data was subjected to scheme-based analysis, utilizing an open coding procedure based on the grounded theory research design. This approach involved several stages of analysis, resulting in overarching themes and categories reflecting the nature of the challenges and facilitating evidence-based interpretations of the findings. The aforementioned approach was complemented by the discourse analysis of major ministerial decrees, reports, and official documents.

## Results

The findings yielded by analyzing interview and focus group data revealed that, in Kuwait, the supervisor plays a vital role in the process of achieving the national educational goals. The supervisors monitor the quality of the educational system, as well as the performance of the educators, the effectiveness of the curriculum (including contents, and teaching methods and techniques). Further, the supervisors provide the vision and development

plan for employees at the school level.

As previously noted, senior supervisors are also required to develop plans for the implementation, supervision, and work on curriculum development, monitor teachers' performance, mentor teachers in different academic fields, guide teachers in their daily work, review teacher reports, and study their recommendations. Similarly, heads of supervisors for specific districts are required to participate in the development of general policy for different fields of study in order to improve the educational process, provide expertise to the department heads in each academic educational field at schools, conduct professional development for teachers and assess their training needs, provide development for the curriculum, and analyze and report on the exam results (Alhashem, et al. ,2022).

In general, the perquisites and requirements for managers and supervisors are the same, as shown in Figure 2. From the information gathered as a part of this investigation, neither role requires completion of specific training or attendance of professional development seminars. In practice, most managers and supervisors in the MoE work their way up through the system to become a department head in their particular area of study and then continue on to apply for administrative or technical positions. This can include becoming an assistant principal or school principal based upon the system of upgrading credentials set forth by the MoE in Kuwait. For each position upgrade or promotion, there are certain requirements that must be met, such as years of experience, evidence of successfully passing requisite examinations, good performance on a personal interview, and completion of recommended MoE workshops and trainings. Because the structure of the education system is centralized, the supervisors' job description includes too many roles and duties.

In Kuwait, supervisor plays a vital role in the educational process on the basis of the set educational goals, and is thus responsible for monitoring the quality the educational system, which includes the performance of educators, and the effectiveness of the curriculum (including contents, and teaching methods and techniques). Further, supervisor provides a vision and a plan towards the development for teachers in the school. The senior supervisors usually cover three main domains: teacher performance, curriculum, and assessment. Their technical role also requires them to develop plans for the implementation, supervise and work on curriculum development, update teachers' performance methods, mentor and guide teachers in their academic field, and approve tests and assessment tools. Pre-service training is provided in coordination with the faculties of teacher preparation according to an established plan. Candidates are accepted in the practical education program that is shared between the university and the Ministry of Education, and cooperation is underway with the private universities in Kuwait for the academic accreditation of learning courses so that students can graduate from these universities.

Supervisors also work with the Development Department of the MoE which conducts specialized training courses in cooperation with technical guidance and other bodies. Formal responsibility for the provision of Continuous Professional Development (CPD) for teachers in Kuwait rests with the technical/subject supervisors. There are 18 general supervisors each of whom is responsible for one of the 18 subjects comprising the national

curriculum. Hence, each year, they produce 18 plans for teacher training, which is delivered either through one-week courses in one of the training centers or through one-day workshops in district centers or in schools.

### Challenges

As can be deduced from their job descriptions noted above, supervisors in Kuwait require urgent job transformation which extends beyond revision of their job descriptions by the Human Resources Department at the Ministry and the CSC. Given that supervisors play a fundamental role in equipping the education sector with the knowledge, skills, and training teachers require to function efficiently in schools, they need to be better supported in fulfilling these duties, as noted by one of the study participants:

*The bureaucratic administrative system lacks vision, and requires improvements in planning and communication, as well as daily administration, individualized planning, and information sharing. As supervisors, we improvise and try to solve issues that are not related to our unclear job description. I wish one day the Civil Service Commission will solve our issues.*

Lack of clarity on the extent to which the current educational enhancement projects are responsive to the future vision of the state was also repeatedly mentioned, as noted by one of the participants: “As a supervisor, I am responsible for writing up curriculum via committees but I lack the sustainability because I work in the general education sector but I also have to help in writing up tests in assessment department, write up curriculum at the curriculum department, and train teachers, this is too much.”

Some participants reported that, due to the scarcity of qualified cadre with educational background, many administrators are not aware of educational leaders’ duties. Others stated that some supervisors are incapable of managing educational projects due to the lack of training during the promotion period. However, they also struggle to keep abreast with the global developments in education because of the amount of work they have to complete. Several participants also pointed to the need to develop creative thinking skills as well as digital literacy.

On the other hand, some supervisors were of view that the main issue arises from the combination of automatic promotion based on years of service and the inability of the public sector to dismiss civil service employees for poor performance, as this strategy has created weak incentives for teachers even though salaries are high. The system apparently also suffers from political interference in teacher promotions and transfers, which is a common problem in countries that have not put in place explicit meritocratic policies and institutional processes for their implementation, as shown in Figure 2. As a result, the system is characterized by a large excess of teachers with low skill levels and few incentives to work hard, pursue in-service teacher development programs, and improve their performance.

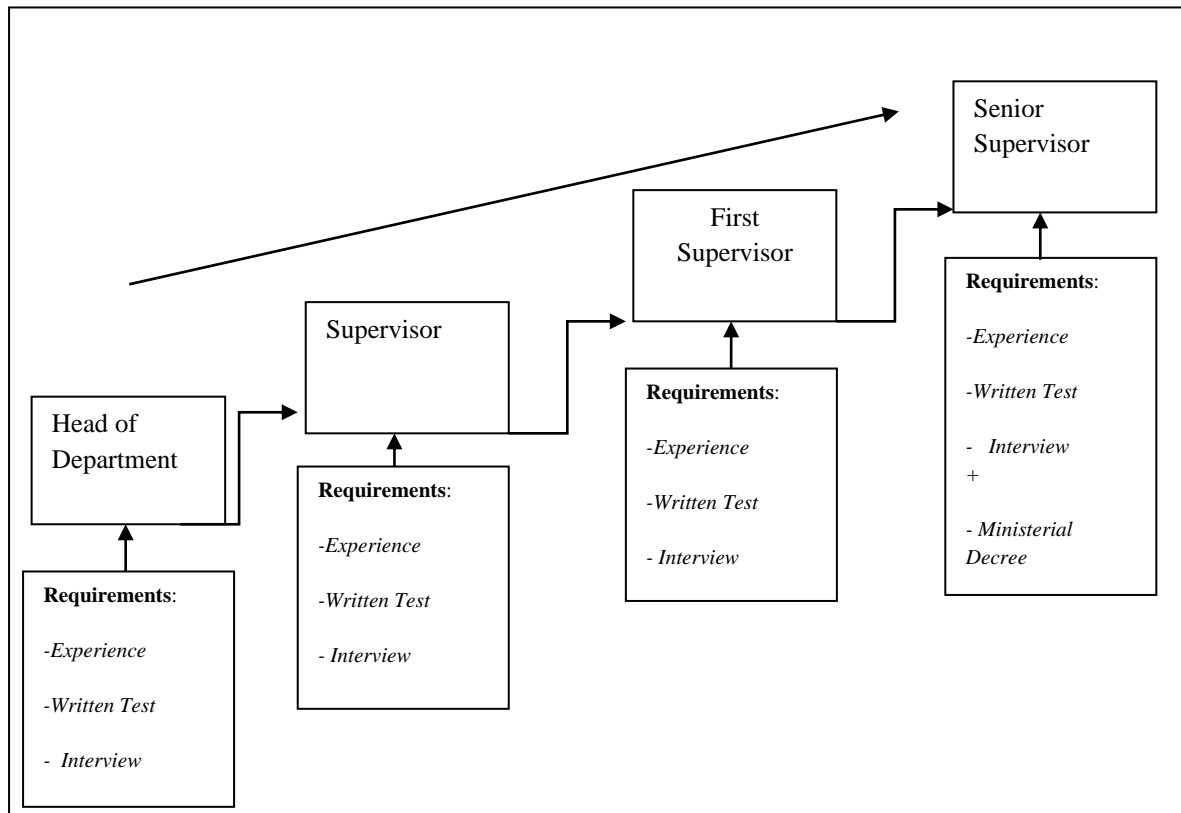


Figure 2. The Supervisory Promotion Model

## Discussion

Establishing a well-functioning school system and raising the overall level of education requires perseverance and hard work, and often involves political contests as well. The system can never be completely finalized, of course, but will continue to take new forms and adapt to the rapidly changing societal needs. As the supervisory unit is crucial in this process, it cannot be left behind. Thus, supervisors' job descriptions and the breakdown their duties need to be revised in order to allow them to achieve their maximum potential. It is hoped that this study will pave the way for addressing the current situation of the supervisory unit in the Kuwaiti education system with regards to the institutional, individual, and legal enabling environments. The supervisory unit contains three main elements—support and training, supervision and inspection, and delivery of educational services (Rustiad, 2015).

However, in Kuwait, supervisors have too many responsibilities and cannot effectively mentor teachers due to their large number. Moreover, supervisors would benefit from training in leadership and mentoring, as well as communication skills. However, their collaboration with other MoE departments (Curriculum and Assessment, and Development departments in particular) should also improve. Therefore, Civil Service Commission and the MOE must redesign the supervisory unit, aiming to divert some of the work into subunits within each department. One of the essential characteristics common to the most progressive education systems with the

world is that the educational policy planning and management rejects its centralist and highly hierarchical structure in order to connect all education system arms in a horizontal structure that facilitates participatory strategic planning, communication, and sharing of information. For example, a school principal or supervisor is more likely to become an effective decision-maker if they adopt planning criteria and tools that consider their abilities, plans, and the diversity of contexts and students.

In sum, this study has highlighted the need to develop models in the field of supervision in education, concerning the future of supervision and development. As the analyses have shown, the Kuwaiti supervision system has many overlaps, and too many duties are assigned to individual supervisors. More research, however, needs to be done in the area of the conceptual approach to management. If we can state that the current system is described as an inspection-based model, then we can safely state that this model has achieved its goals of building the educational infrastructure in Kuwait. Perhaps now it is time to consider using a different model in order to more effectively reach Kuwait's national goals for education. In addition, supervisors need to understand that teachers need more support rather than to be judged for their performance. Similarly, supervisors are involved in teacher training, which tends to be subject-related, and its content is determined by the relevant supervisor with little or no consultation with teachers. Therefore, greater teacher involvement is needed, given that even mode of delivery tends to be formal and lecture-oriented, with limited opportunities for teacher participation.

## Recommendations

- Based on the findings reported here, it is recommended that educational stakeholders, policy makers, and practitioners develop a participatory plan to translate customized educational philosophies and theories to practice, as no nation can fulfill its national development goals without best-fit educational theories (Abiogu, 2014). All stakeholders should be also be aware that positive ideas can make the nation stronger and more prosperous, while negative ideas can destroy its legacies which have been built over many generations. Nothing deters the development of a nation more than mistaken beliefs and citizens cannot attain success without hard work (Rustiad, 2015). To this end, educational stakeholders and policy makers require tools, means, and forum to develop a proactive educational vision and strategic plans, to realize nation's aspirations, and to convince the citizens of the state that human development can only be achieved by expanding knowledge, skills, and productivity. At present, the rigid Civil Service Commission (CSC) regulations and structures do not support this new paradigm.
- Decentralizing the supervision sector may not result in better performance; however, restructuring the sector based on more in-depth studies that reflect the needs of the Kuwaiti culture, society, and school system is urgently needed. The communication and integration with other departments will result in less duplication in duties, roles, and responsibilities for supervisors.



- There is no doubt that, in the vital efforts to develop the role of supervisors, the Ministry should form several committees to conduct studies and field research for better improvement and development.

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## MOOCs in India: An Investigation about Reasons, Motivations and Valued MOOCs for Indian Students

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**Abstract:** Massive Open Online Courses (MOOCs) have become a prominent alternative source of learning for engineering and science students. This rising proclivity for MOOCs among students is based on multiple factors. Several studies have focused on factors that affect MOOCs usage, and most of them have used the Motivation theory. These studies have primarily focused on intrinsic motivations and tangible benefits of MOOCs. However, they have rarely examined why students spend on MOOCs. This paper examines why students are paying only for a certain courses on MOOCs. Our analysis uses the theory of consumption value (TCV) to explain this phenomenon. This study uses a survey method to investigate the students' pursuit of various courses on different MOOC platforms. The survey questionnaire elicited students to share information about MOOCs they have pursued, either free or paid. Our analysis reveals that personal motivations, negative classroom experiences and different learning reasons influence Indian students to pursue MOOCs. The expenditure analysis of students on MOOCs shows that students find Computer Science and Engineering (CSE) courses are more valuable than courses from any other discipline. Finally, we discuss the findings and interpret its implications with respect to future of learning in higher education.

**Keywords:** Massive Open Online Courses (Moocs), Theory of Consumption Value, Motivation and Reason, Expenditure on Mooc, India

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### Introduction

The education technology (Ed-Tech) sector has proliferated in the last decade and Massive Open Online Courses (MOOC) providers have been its significant players worldwide. The rise of private MOOC platforms (e.g. Coursera, Udemy, edX etc.) is attributed to the type of content and courses they provide from the world's

prestigious and elite colleges. Irrespective of time and space, the other advantages of MOOCs such as ease of access and flexibility to learn, make them an attractive alternative source of learning (UNESCO, 2016).

The perceived benefits of MOOCs have resulted in an exponential increase in the number of MOOC learners. By the end of 2021, more than two hundred million people across the world have used MOOCs for learning (Shah, 2021). The phenomenon of MOOC-based learning is on the rise in India, too. Various global MOOC platforms are well known and common among Indian learners (Kundu & Bej, 2020). Besides the global MOOC platforms, India has its own government-funded MOOC platform called SWAYAM. The SWAYAM MOOC platform includes NPTEL Online Certification (NOC), which is also an Indian MOOC specifically meant for engineering and science disciplines.

The growing number of learners along with the variety of MOOC courses dished out by different MOOC platforms draws the inquisition to understand which MOOCs are popular. It also motivates our research to find out the reason for college students paying for MOOCs and the courses for which this has been done. Hence, this study attempts to discover answers to such questions. The study strives to answer the following research questions:

- What are the different motivating factors and reasons which influence the use of MOOCs among Indian engineering and science students?
- What factors affect the selection of MOOCs and MOOC platforms?
- Which discipline of MOOCs have high perceived value and why?
  - Which MOOC platforms are popular for pursuing paid MOOCs?

This study offers new insights into the use of MOOCs in the Indian context and the following contributes to existing research: (i) highlights the specific factors that influence the selection of MOOC courses and MOOC platforms. (ii) Provides insight into popular MOOC courses which students perceive as having a high value. Thus, motivating them to spend money on such MOOC courses.

## Literature Review

### Motivation and Reasons to use MOOCs

The study of motivations in educational practices has had a long research history. From intrinsic and extrinsic motivations to Self-Determination Theory (Deci & Ryan, 1985; Ryan & Deci, 2000), these frameworks have commonly been referred to for analysis in education. More recently, they have also been used to examine the impact of educational technologies.

Using several motivation theories, MOOCs have been analysed for its effectiveness in learning since its meteoric rise in 2012 (Alshammari, 2022; Bertiz & Hebebe, 2021; Pappano, 2012). Intrinsic motivation, which

is based on 'free-will' and 'self-interest' (Ryan & Deci, 2000) has been used in several researches to study the use of MOOCs. One such study, where the theory of intrinsic motivation (which is linked to deterministic goals) was used, has shown to affect the learning process in MOOCs (Littlejohn et al., 2016). Barak, Watted and Haick studied the learner engagement pattern of MOOCs using intrinsic motivation and self-determination (Barak et al., 2016).

Extrinsic motivation pertains to the instrumentalities leading to meaningful outcomes of an activity (Deci & Ryan, 1985; Ryan & Deci, 2000). In the study on MOOCs, the extrinsic motivation construct has been very useful in assessing the impact on the learning process. Extrinsic motivation to establish a correlation between completion rate and obtaining MOOC certification has been used in some studies (Huang & Hew, 2017; Semenova, 2022). Another study explained the use of MOOCs based on three extrinsic motivating factors viz. career benefits, personal benefits and educational benefits (Watted & Barak, 2018).

Most of the above studies have consistently used several forms of motivation. However, motivation is not the only factor which persuades learners to use MOOC. Sometimes external factors may also encourage students toward MOOCs or online learning. Though certain studies have mentioned factors such as bad classroom experience or lack of infrastructure (Shapiro et al., 2017) as a learning challenge, they do not explain the reasons leading to the rise of such perceptions among learners. Therefore, our study not only ascertains the motivations (intrinsic and extrinsic) of Indian students but also strives to examine the aspects of the classroom learning ecosystem which drive students towards MOOCs and other online learning platforms.

### **The Valued Choice Framework**

One of the theoretical frameworks is the theory of consumption value (TCV) which expounds the consumer behaviour to select and either to purchase or not to purchase a product. Sheth et al. developed TCV with the inspiration to explain the influence over selection of the product purchase and is based on five values viz. functional, conditional, social, emotional and epistemic (Sheth et al., 1991).

The economic and utilitarian benefits experienced from the consumption of a service are the Functional value of TCV. This primarily reflects the economic philosophy of a "rational economic man". Emotional value concerns with a service's ability to '*arouse feelings*' or elicit emotional feelings upon its consumption (Sheth et al., 1991). An alternative (or a service) acquires Social value through its perceived positive or negative stereotyping by social groups. Epistemic value concerns with satiating one's need to acquire knowledge from an alternative or service. When the consumer's choice is contingent on specific conditions or circumstances, it is perceived as Conditional value. For example, the consumer selects or purchases a product because of its seasonal value (Lai et al., 2012; LeBlanc & Nguyen, 1999; Sheth et al., 1991).

There are several studies which have used TCV in higher education research. A study on Chinese students showed functional value as the paramount factor to pursue higher education (Lai et al., 2012). The functional

value was primarily driven by the perceived value of higher education programs having greater employability. The research extended the 'economic rationality' and 'utility' argument to the necessity of learning and pursuing future-ready career programs (Lai et al., 2012; Stigler, 1950). Another study by Stafford examined the selection of elective courses in marketing education. This study shows that epistemic and conditional values mainly influence the choice of electives. It was the humdrum situations such as the desire for variety and the hindrance of the schedule of other courses which decided the consumption of elective courses. The finding was startling as it revealed more about the students' perception than what the educators believed (Stafford, 1994).

## Method

### Data Collection

The data about MOOCs usage among Indian students was gathered using the survey method. The target population for the survey in this study were engineering and science students. Using Stratified Random Sampling, the states and cities of the colleges were identified and selected for the in-person survey. The number of colleges selection for the survey was based on the number of colleges present in the State. Use of MOOCs for learning was the prerequisite for the students to participate in the survey. The data shared by the students is based on their experience of using MOOCs.

Table 1 shows the demographic details of 537 students who participated in our survey. The Goodness of Fit test is significant for all the demographic factors. The student's caste is also included to address the representation of the social status of the students. However, the disclosure of such personal details was purely discretionary. Based on the number of samples and Cochran's sample formula, the survey results provide a 95% confidence level with +/- 5% margin of error (Bartlett II et al., 2001).

Table 4. Demographic Details of the Student Samples

Demographic Details	Level	Count	Proportion (%)
Gender	Male	374	70
	Female	159	30
Caste	General	385	73
	OBC	113	21
	SC/ST	30	6
Type of College	Public	207	39
	Private	330	61

### Analytical Methods

Quantitative analytical methods are used to analyse the data collated from the survey. We have used descriptive statistics to analyse the responses to the closed-ended multiple-choice questions and cost analysis of the MOOC

courses paid by the students. The non-parametric Mann-Whitney tests were used for analysing the effect of independent variables on the responses as the responses of the survey and the independent variables are nominal. The tests were conducted using SPSS statistical software, while Tableau was used for descriptive and visual analytics.

## Analysis

### Factors Contributing to the use of MOOCs among Students

While conducting our survey, it was found that no single factor influences the use of MOOCs. Instead, a confluence of reasons dictates the use of MOOCs among science and engineering students. This section will present reasons and motivations of Indian students to pursue MOOCs revealed in our data analysis.

#### Reasons

The students had provided many reasons to learn the courses using MOOCs. The survey consisted of multi-choice questions requiring the students to share their reasons for pursuing MOOCs as part of their learning. Figure 1 shows the key reasons reported by the students (number of samples (N) = 537) for pursuing MOOCs. The interaction with the students during the survey emphasized the lack of clarification of doubts in the classrooms and thus is a significant reason to pursue MOOCs. For students, pursuing online learning is a recourse to clarify their doubts and ameliorate their concepts.

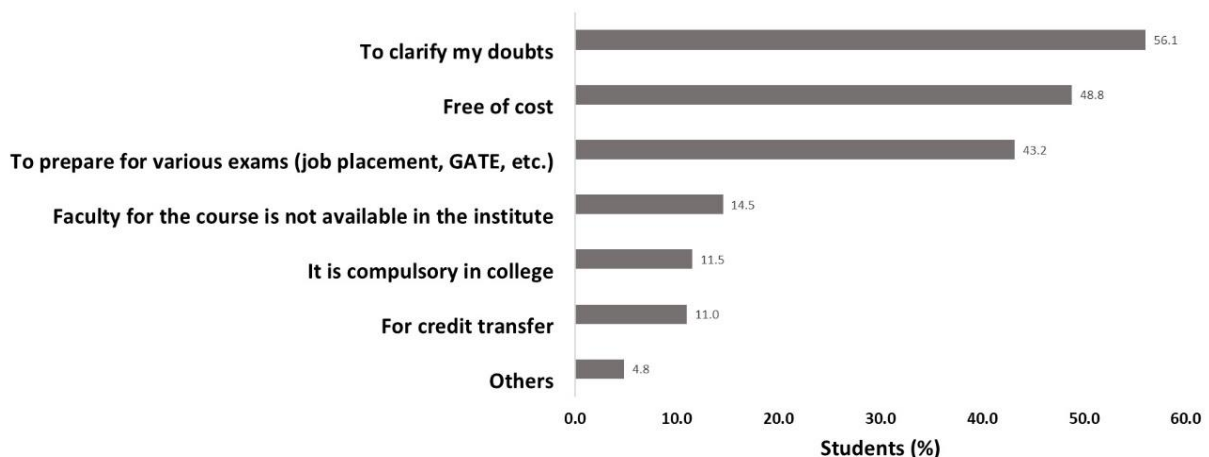


Figure 1. Students' Reasons to pursue MOOCs (N=537)

The cost of MOOCs is an important reason for students to pursue MOOCs. Almost half of the students pursued MOOCs because it is freely available and need not spend extra for learning. An approximately similar percentage of students use MOOCs, either free or paid, to prepare for various examinations. These examinations can be following but no limited to: post-graduate entrance examinations, job placements, their regular degree course examinations, etc.. Faculty not being available in the institute for a particular course also contributes to

the reasons for some students to pursue a course on MOOCs.

When we analysed the data against two independent variables, i.e. college/institutes and gender as independent variables, we found certain factors dominating the two variables. In the case of the type of college/institute, students of public institutions (N=207, 64.3%) are more likely to pursue MOOCs to '*clarify*' their doubts as compared to students of private institutions (N=330, ~51%) and this difference is statistically significant (N=537,  $\chi^2 = 7.941$ , d.f. = 1, p = 0.005). The students of public institutes/colleges (N=207, 14%) are more likely to pursue MOOCs for '*credit transfer*' than students of private institutes/colleges (N=330, 9%) though not statistically significant. Students of private colleges (N=330, 13.3%) are more likely to pursue MOOCs due to their institute making it '*compulsory in college*' than public colleges (N=207, 8.7%).

Considering the gender variable, the analysis does not reveal much difference between them, but for two reasons. The analysis shows that male students (N=373, 16.4%) are more likely to pursue MOOCs because of the unavailability of the faculty for a particular course than female students (N=159, 10.7%). Female students (N=159, ~59.7%) are more likely to pursue MOOCs to '*clarify*' their doubts than male students (N=373, ~53.6%). However, both the observations are not statistically significant.

### Motivations

Motivation, by definition, is driven by an internal desire to achieve actualisation. Figure 2 shows different motivations of the students to use MOOCs for their learning. The data reflects the rising aspirations of students to enhance existing knowledge and also learn newer subjects of different subject matter. Apart from the desire to increase knowledge, the students also recognise the need to gain and learn new skills, which will make them employable.

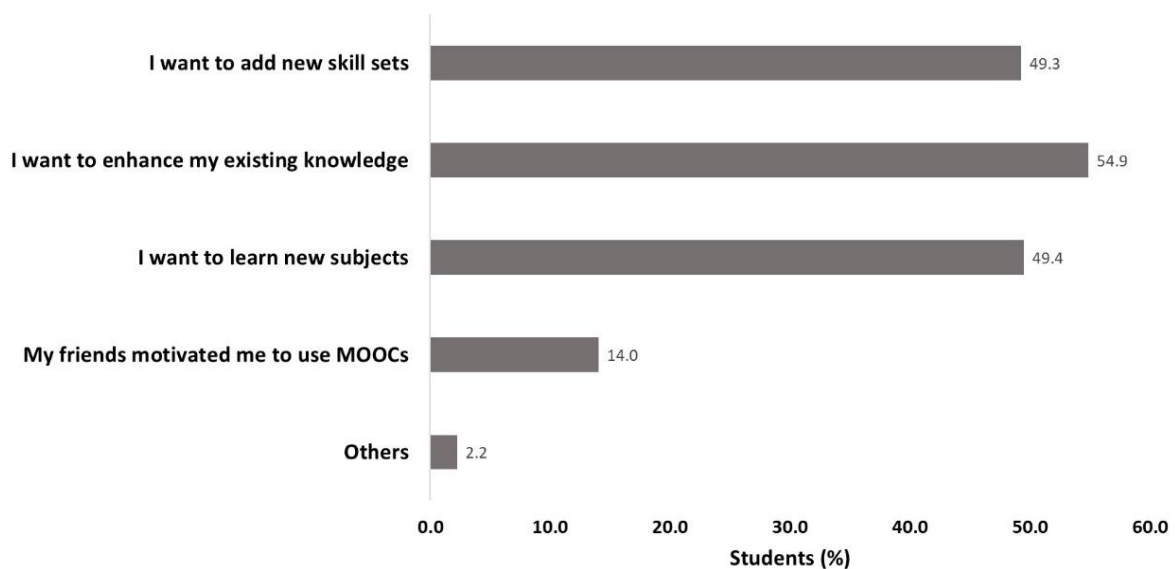


Figure 2. Different Motivations to Pursue MOOCs (N=534)

The statistical test of the responses for different independent variables did not show any significant results, but for one. A Kruskal-Wallis test on responses for the caste variable showed statistically significant results for the response 'I want to add new skill test' ( $\chi^2 = 6.506$ ,  $df = 2$ ,  $p = 0.039$ ). The test results reflect that the acceptance of the importance of building new skills is less among the students of SC/ST (38%) and OBC (40%) category as compared to General category students (52%).

### Negative Classroom Experience

Students' internal motivations and reasons are not the only factors driving them to opt for MOOCs for learning. Our survey also examined whether students' classroom learning experience affects their decision to refer to online learning content. Figure 3 illustrates various negative classroom learning experiences of the students, which may have contributed to their online content pursuit. Almost half of the students responding to the question felt that the content taught to them in the classroom was insufficient. There can be several reasons for feeling discontent about content which could be

- (i) an incomplete syllabus,
- (ii) instructors rushing up the lectures and skipping the necessary content and
- (iii) the syllabus being outdated or inadequate to meet the job requirements available in the market.

The figure highlights an important reason which can explain the growing reliance on learning through MOOCs. The data shows that one out of the three students believes 'Teacher is not a good instructor.' However, we believe this data is conservative as many students shared their opinion verbally but were reluctant to mark them on the survey form.

The students' response raises questions about the capability of the faculty and their specific teaching and pedagogical skills. Inadvertently, it highlights an alarming shortage of quality faculty in institutes across the country. The analysis implies that even though the institutes and colleges have the physical infrastructure, they do not have adequate quality human resources for teaching.

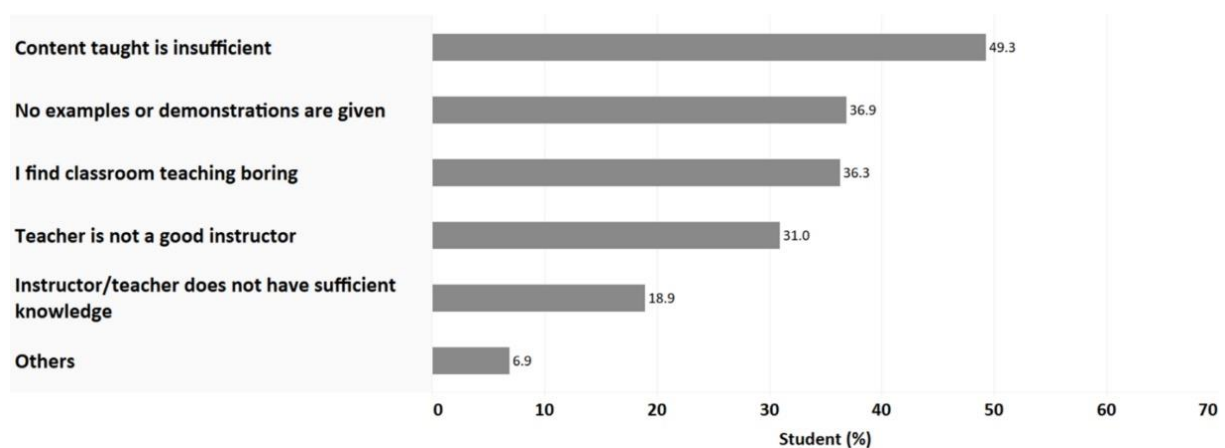


Figure 3. Negative Classroom Experiences of Students leading to the use of MOOCs (N=507)



Table 5. Negative Classroom Experience Response Distribution based on Gender and Type of College

Classroom Learning Experience	Gender		Type of Institute	
	Female (N=152)	Male (N=352)	Private (N=306)	Public (N=201)
Content taught is insufficient	59.6	45.2	48.4	50.7
No examples or demonstrations are given	37.1	36.6	35.9	38.3
I find classroom teaching boring	29.8	38.9	41.5	28.4
Teacher is not a good instructor	31.1	31.0	33.0	27.9
Instructor/teacher does not have sufficient knowledge	23.2	16.8	20.6	16.4
Others	6.0	7.4	4.9	10

The students also highlighted the lack of examples or live demonstrations in the classroom. The data indicates that students pursued online courses or MOOCs to understand the subject with more clarity as they provide better and enhanced illustrative concepts with animations and simulations, which otherwise is absent in classroom teaching. An almost similar percentage of students also felt that classroom teaching is boring. Though there is no correlation between the former and latter reasons, it can be implied from the data that students think classroom teaching is tedious due to a lack of practical concepts or demonstrations.

A Mann-Whitney test indicated female students are more likely to feel the '*Content taught is insufficient*' compared to male students ( $U = 22740.5$ ,  $p = 0.003$ ,  $Z = -2.964$ ,  $r = -0.13$ ). Also, the perception among female students as per the analysis highlights that the instructors or teachers are not having 'sufficient knowledge' as against male students, though the difference is not statistically significant (refer to Table 2). As far as students of private colleges are concerned, they are more likely to feel bored with classroom teaching than students of public colleges ( $U = 26710.5$ ,  $p = 0.003$ ,  $Z = -3.008$ ,  $r = -0.133$ ). There is almost consensus among private and public college students for a negative class learning experience for the rest of the responses.

Table 3. Correlation Matrix of Factors leading to Negative Classroom Experiences

Classroom Learning Experience	Coefficient	Teacher is not a good instructor	I find classroom teaching boring	Content taught is insufficient	No examples or demonstrations are given	Instructor/teacher does not have sufficient knowledge
Teacher is not a good instructor	Spearman's rho	1	0.009	-0.004	.151**	.395**
	p-value	.	0.839	0.936	0.001	0
I find classroom teaching boring	Spearman's rho	0.009	1	-.186**	-0.05	0.033
	p-value	0.839	.	0	0.262	0.457
Content taught is insufficient	Spearman's rho	-0.004	-.186**	1	-0.002	.107*

Classroom Learning Experience	Coefficient	Teacher is not a good instructor	I find classroom teaching boring	Content taught is insufficient	No examples or demonstrations are given	Instructor/teacher does not have sufficient knowledge
is insufficient	p-value	0.936	0	.	0.969	0.016
No examples or demonstrations are given	Spearman's rho	.151**	-0.05	-0.002	1	.152**
	p-value	0.001	0.262	0.969	.	0.001
Instructor/teacher does not have sufficient knowledge	Spearman's rho	.395**	0.033	.107*	.152**	1
	p-value	0	0.457	0.016	0.001	.

Table 3 shows the correlation matrix for the factors which lead to negative classroom experiences among students. Evidently, students perceive a teacher as not a good instructor either if he/she does not provide demonstrations to explain the problem at hand, or does not have sufficient knowledge or both. There is also a significant correlation between content taught is insufficient and teacher does not have sufficient knowledge. The relation is expected because of obvious reason. Similar inference is also valid for the correlation observed between content taught is insufficient and absence of examples or demonstrations.

### Students' Perceived Value of MOOCs

*What is there in paid MOOCs?*

In our sample of over 500 students, around 425 students shared information about the MOOCs/Online courses they pursued or were pursuing then. 175 (41.2%) out of 425 students had paid for the MOOCs courses they pursued. The data shows that at least one out of the three students pursuing MOOCs is likely to pay for a MOOC. Among the 175 students, 54.3% of students paid for only one MOOC, 24% of students paid for two MOOCs and 21.7% of students paid for at least three MOOCs. The data shows that if a student is paying for two MOOC courses, they will likely be motivated to pursue further paid MOOCs.

Table 4. Popular Paid MOOC Platforms used by Indian Students

Paid MOOCs Platforms	Students using MOOCs
NPTEL	67.40%
Udemy	20.00%
Coursera	6.30%
SWAYAM	6.30%

Paid MOOCs Platforms	Students using MOOCs
Internshala	4.60%
edX	3.40%
Udacity	1.10%
Mycaptain	0.60%
Autodesk	0.60%
Bharat Acharya	0.60%
Coding Blocks	0.60%
MauriSilicon	0.60%
NIIT	0.60%
Oracle	0.60%
Paathshala.com	0.60%
Unacademy	0.60%

As students are spending money to pursue MOOCs apart from their expenditure on regular classroom degree programs, it becomes pertinent to ascertain those MOOC courses for which the students are paying. Thus, the survey focused on eliciting information on MOOC courses and the platforms for which the students paid and pursued their learning. Table 4 shows the list of paid MOOCs platforms selected by the students. The data reflects the popularity of MOOCs platforms among students. However, the data of students pursuing paid MOOCs and the list of MOOCs are mutually inclusive (i.e. a student may have pursued different MOOCs of the same course from different MOOC platforms). NPTEL is the most popular MOOCs platform among for students pursuing paid MOOCs. Udemy and Coursera are private MOOCs platforms which are popular for pursuing paid courses. NPTEL and SWAYAM were different public MOOC platforms at the time of the survey; however, since 2021, the former has been subsumed by the latter. The distribution of various disciplines of paid MOOC courses pursued by the students is shown in Table 5. The data elucidates that most paid courses pertain to Computer Science and Engineering (CSE ~60%) while ~20% of the paid courses are Professional Communication courses. Humanities and Social Sciences, Mechanical Engineering and Electronics Engineering courses each constitute approximately 5% of the paid MOOCs. The remaining percentage distribution of other disciplines is shown in Table 5. Most engineering students pay for CSE courses on MOOCs platforms irrespective of their pursued discipline in undergraduate/post-graduate programs. The data also showed that approximately 50% of CSE paid courses were programming courses: Python and C Programming being the majority of them. Machine learning and Artificial Intelligence courses constituted 10% of the paid CSE MOOCs. With the evidence showing a majority of paid MOOCs being from CSE and Professional Communication courses, it becomes equally important to ascertain the kind of money students spend on these paid MOOCs. Figure 4 shows the box plot of students' cumulative spending on MOOCs for the five disciplines. The data on students' spending is most scattered for CSE MOOCs with a higher percentage of students spending beyond the median expenditure of Rs.1200 (~\$15) as compared to all other MOOC disciplines. It further provides evidence that students value CSE MOOCs more than any other discipline and they are willing to spend

more on these courses. Electronics Engineering and Mechanical Engineering, too, have students spending beyond the median of Rs.1100 (~\$14), albeit lesser in magnitude than CSE. This emphasises that the perception of students to acquire core knowledge of their discipline is as per their needs.

Table 5. Percentage Distribution of Different Discipline of Paid MOOCs used by Students

Discipline of Paid MOOCs	Paid Courses (%)
Computer Science Engineering	60.10%
Professional Communication	19.20%
Mechanical Engineering	5.40%
Humanities and Social Sciences	5.10%
Electronics Engineering	4.50%
Zoology	1.60%
Electrical Engineering	1.30%
Management	1.00%
Biotechnology	0.60%
Design	0.30%
Electronics and Telecommunication Engineering	0.30%
Metallurgy Engineering	0.30%
Physics	0.30%

With the data highlighting the CSE MOOCs as popular discipline for students, it motivated us to find which courses of CSE are contributing to high spending. Figure 5 shows the expenditure distribution of students for different CSE courses. Evidently, most of the students are spending on programming courses followed by Artificial Intelligence and Machine Learning (AI &ML). Programming has the highest average spending mean compared to other CSE MOOCs. The data highlights the value of programming courses for the students and the importance to build programming skills.

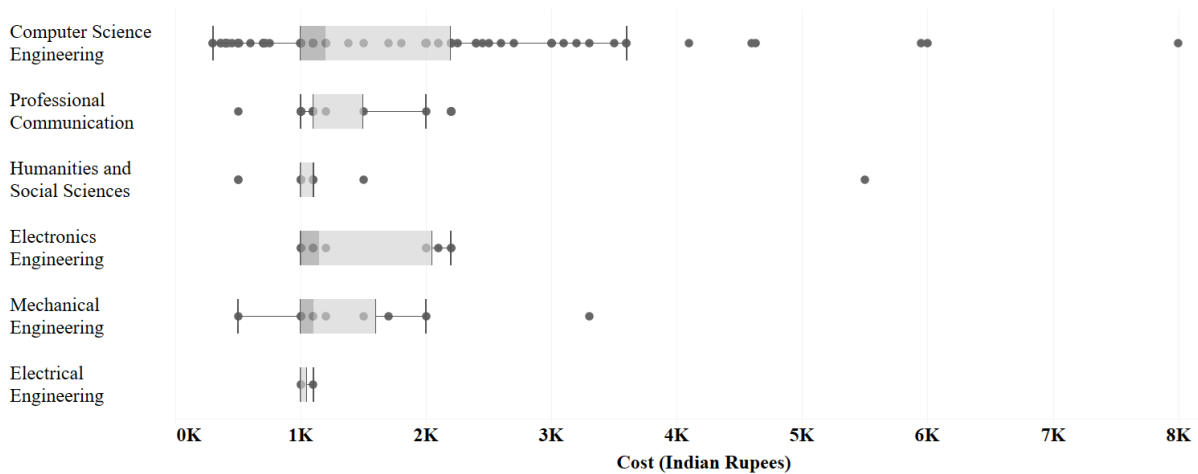


Figure 4: Expenditure of Students for Different MOOC Disciplines

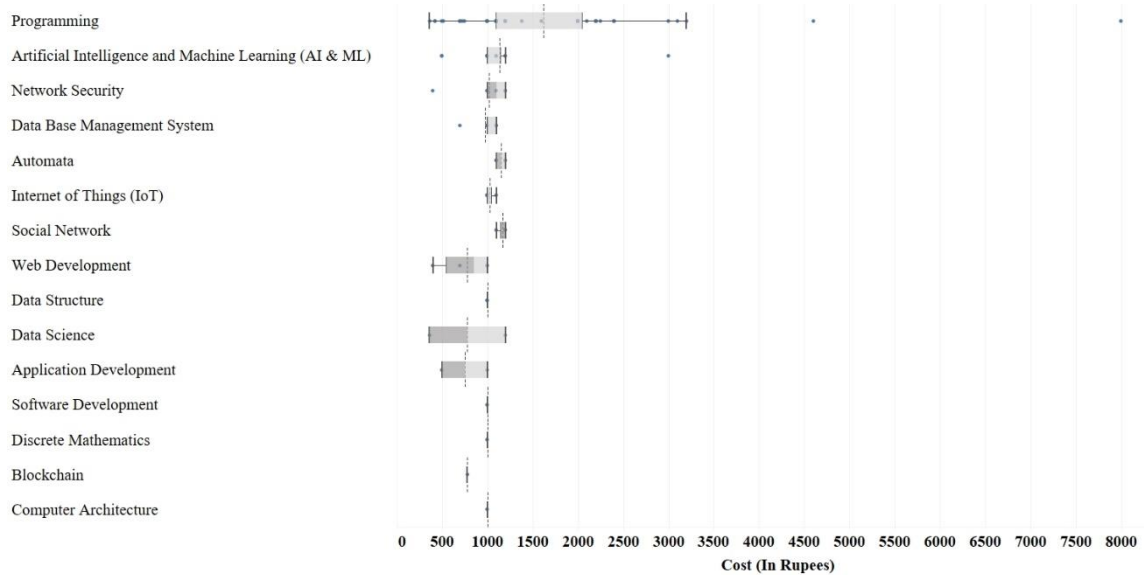


Figure 5. Expenditure of Students on Different Types of CSE MOOCs

*Factors influencing the selection of MOOCs*

Motivation and reasons are integral aspects for the use of MOOCs among students. But equally important are the factors which influence the selection of MOOCs amongst a plethora of MOOCs provided by different MOOC platforms. This section will elucidate different factors which influence the selection of MOOCs among Indian students. Figure 6 shows the major influencing factors in the selection of MOOCs. Among Indian engineering and science students, developing 'skills' is the most crucial factor in selecting a course on a MOOC platform and possibly paying for it. Cost is a vital factor which influences the selection of MOOCs among students. In our survey, the choice of the instructor of a MOOC is another factor which got reflected as one out of the three students check about the instructor before pursuing a MOOC. The role of faculty is also crucial, as approximately one out of three students listen to their faculty's recommendations when selecting MOOCs.

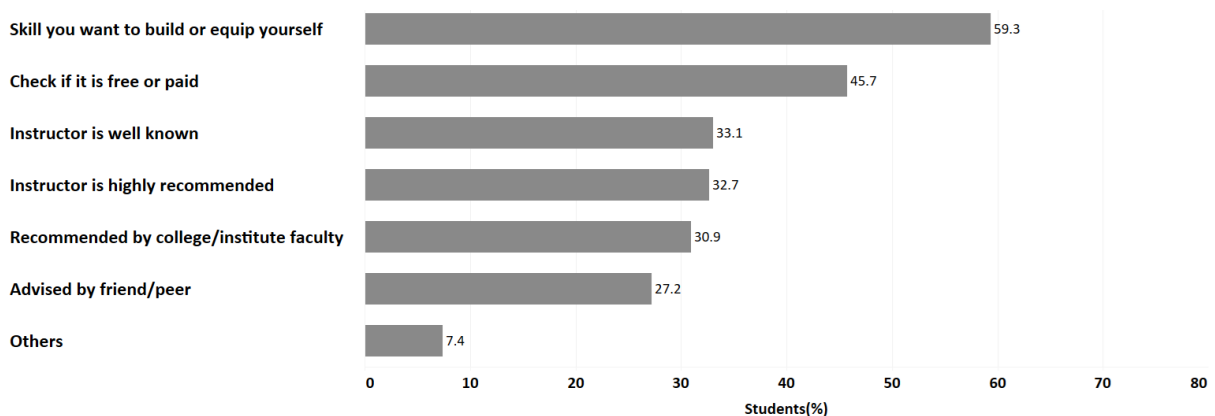


Figure 6. Factors Influencing the Selection of MOOCs (N=514)

*Factors that Influence the Choice of Paid MOOCs*

Examination of the data on popular MOOC courses and MOOC platforms raises question on the factors influencing the selection of a MOOC platform or a MOOC course. The analysis provided in the previous section revealed that almost 80% of paid MOOCs are from Computer Science and Engineering (CSE) and Professional Communication courses. This section delves in finding the factors that influence MOOC courses' selection from the two disciplines of MOOCs.

Table 6 shows the list of factors that influence the selection of MOOC courses or MOOC platforms for CSE and Professional Communication courses. Skilling or building digital and information technology (IT) based skills is paramount for students when selecting MOOCs for CSE and Professional Communication courses but is more dominant in CSE MOOCs. It also reflects that irrespective of the discipline the students pursue in undergraduate or post-graduate studies, they realise the importance of having IT and CSE skills, mainly computer programming skills. The importance of the instructor teaching the course on MOOCs is another critical factor.

As far as Professional Communication MOOCs are concerned, apart from skill development, the role of colleges and institutes too influences the selection of MOOCs (as shown in Table 6). The increase of 20% in the factor '*Recommended by college/institute faculty*' for Professional Communication MOOCs compared with CSE MOOCs can be due to the policies of All India Council for Technical Education (AICTE) and State Technical Education board. Many state technical and private universities/colleges have mandated completion of Professional Communication courses via NPTEL/SWAYAM. This has also been reflected in our data, where all the paid Professional Communication courses pursued by the students are from NPTEL/SWAYAM.

Table 6. Factors Influencing the Selection of Paid CSE and Professional Communication MOOCs

Factors Influencing selection of MOOCs	Computer Science and Engineering (CSE)	Professional Communication
Skill you want to build or equip yourself	77.1	66.0
Instructor is highly recommended	40.4	14.9
Check if it is free or paid	34.9	19.1
Instructor is well known	30.3	19.1
Recommended by college/institute faculty	29.4	48.9
Advised by friend/peer	23.9	14.9
Others	7.3	6.4

**Discussion**

**Motivations, Reasons and Previous Classroom Learning Experience Influencing use of MOOCs**

Among Indian learners, the adoption of MOOCs is dependent on various factors, as has been described in the

analysis section. Hence, the findings warrant a discussion which can explicate the analysis in the context of the literature available on motivations to use MOOCs. Our study explains the reasoning for the use of MOOCs among Indian science and engineering students and shows two contexts, i.e. intrinsic motivation and external factors.

The impetus of intrinsic motivation among students is based on two factors. The first factor reflects the motivation to build skills which can enhance their employability and the second factor focuses on the students need of fulfilling their aim of enhancing knowledge. At the same time, these students are also striving to explore new domains of knowledge using MOOCs. Our findings are consistent with the previous findings on intrinsic motivations to pursue MOOCs (DeBoer et al., 2013; Dillahunt et al., 2016; Watted & Barak, 2018).

Most of the MOOCs without certificates are free of cost. It makes the MOOC platforms an ideal learning resource and a possible alternative to classroom learning. Nearly half of the students mentioned 'Free of cost' as an essential feature of MOOCs to pursue its courses. It also underlines the importance of access to quality education which most of the Indian students need.

The ineptitude of the institutes to provide quality higher education was also reflected in our analysis. There are several observations which support the former argument. Over 40% of students stated the necessity to prepare for various examinations as the reason to use MOOCs or other online learning resources. These examinations include job placements, GATE examinations, semester examinations, etc. The analysis further highlights the exasperating problem of quality learning and skill development in professional courses. The students pursue online courses as they are not acquiring skills that would get them jobs or the manner in which the courses are taught cannot help them qualify for the relevant examinations. The data inadvertently also emphasises the need to upgrade the human resource to the new age courses and train the faculty.

The other extrinsic reason (or factor) which our survey elicited focus on the role of the classroom learning experience. Even though Shapiro et al. highlighted the lousy experience in learning as a reason to pursue MOOCs (Shapiro et al., 2017), it fails to elaborate the causes of a bad experience. Our finding highlights multiple reasons leading to negative classroom learning experiences which influence Indian students to pursue MOOCs. The analysis helps in explicating the learning environment of classrooms across Indian colleges and universities. The students perceive lack of practical demonstrations, lack of updated knowledge among faculty and inefficient teaching as critical factors which lead to negative classroom experiences. These factors are also correlated with each other as shown in our analysis. The negative experiences are perceived more among female students than male students. MOOCs, for such students, have become a convenient alternative to accomplish their learning goals.

### **Valued MOOCs**

A key objective of this study was to find out which MOOCs students value more. Based on our findings, the

perceived value of MOOCs underlies two different aspects i.e. the student's willingness to pay for MOOCs and the reasons for selecting such MOOCs. Based on these two key factors, we understand that that three TCV factors play a major role in the use of MOOCs viz. Functional, Conditional and Epistemic values.

In India, job opportunities are increasing exponentially in the sector of digital technologies. As per Nasscom, the demand for digital talent jobs is expected to rise by twenty times the current demand (Nasscom, 2020). Therefore, the industry demand for students having digital skills, such as Artificial Intelligence, Data Science, Data Analyst and Software Engineering is swelling (Coursera, 2022).

Our analysis reflects the recognition among students to equip themselves with desired digital technology skills for better employability. Therefore, most students are paying more for CSE MOOCs irrespective of their undergraduate/graduate discipline in degree programs. Thus, MOOCs on CSE courses reflect students' perceived function value and also reflected within CSE MOOCs especially in programming and AI & ML courses as more students are spending on these courses.

Considering that most Indians are from middle and lower income (Chancel et al., 2022), spending money beyond regular college tuition fees is a significant investment. Our analysis shows that students are judicious when spending money on MOOCs. The selection of paid MOOCs and its platform is predominantly decided by the skills (digital / communication skill) the student intends to develop. On the other hand, students shelling out extra money for MOOCs exposes the chasm between the syllabus of the technical courses taught and the necessary skills required for modern jobs. The implication of the data underscores the need to restructure higher education and the syllabus taught. Contemporary professional and technical education should be able to cater to the market's needs.

The students also pursue paid MOOCs because of its conditional value. Many Indian higher education institutions are implementing the government's MOOC policy in their degree programs AICTE (Credit Framework for online learning course through SWAYAM) Regulations 2016, 2016). Several colleges and universities have mandated the use of NPTEL and SWAYAM MOOCs as part of degree programs (AKTU, 2018; MAKAUT, 2018; SVUCE, 2020). The MOOCs on professional communication courses are an example which reflects the conditional value of MOOCs. These courses as now mandated by the colleges to be completed through MOOCs.

The students attach Epistemic value to MOOCs for self-learning. This observation is based on reasons given by the students for using MOOCs in our survey. The evidence from the analysis shows that Indian students are mostly using MOOCs to clarify their doubts, prepare for various entrance examinations and to enhance their knowledge. In addition, the negative classroom learning experiences resulting from the lack of relevant content taught in classrooms and practical learning are compelling students to use MOOCs. Thus, underscoring the Epistemic value of MOOCs as an alternative source of learning.



## Conclusion

MOOCs many studies have examined the motivations and reasons for learners to pursue in the literature. However, those studies have not focused on external factors of students which drive them towards MOOCs. This paper found two critical factors of MOOC-based learning prevalent among Indian students. One of the factors is what persuades them to pursue MOOCs and the MOOCs which the students find valuable enough to spend money. Our analysis showed that internal motivations lead by the need to build employable skills are important factors for selecting MOOCs. Another factor which influences students to pursue MOOCs is their experience of classroom learning. Negative classroom learning experiences, such as lack of practical learning and teachers' lackadaisical pedagogy, turn students towards MOOC-based learning.

Second part of the analysis presented an assessment of the spending pattern of the students for different MOOCs. This analysis used the theory of consumption value to examine the perceptual reasons for the spending pattern. The students' spending on MOOCs is based on its functional, conditional and epistemic value. They mostly pay for CSE MOOCs because it has a perceived functional and epistemic value. The expenditure of students on MOOCs is also driven because they have a conditional value as well (to fulfil degree requirements).

The findings presented in the paper are based on the survey of Indian students of science and engineering disciplines. Their beliefs about MOOCs and need to use them are driven by the factors which apply in the Indian context. Therefore, the findings cannot be generalised to students of other disciplines/degree programs or to students across the world. However, this paper can help provide inputs to analyse the impact of MOOCs and find out the value of MOOC-based online courses from the learners' point of view.

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## The Self-Improvement School Project: A Case Study of Choafa (Princess) Ubonratana School

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**Abstract:** The Self-Improvement School Project was funded by The Equitable Education Fund (EEF), Thailand. The purpose program was to improve the quality of 636 schools. Choafa Ubonratana School is one of the project schools for this case study. The research used mixed method research. Key informants were 30 school stakeholders and 3 school coaches. Data collection included quantitative data and qualitative data collection from field studies. The content analysis is used as well as the statistics used. It found that Choafa Ubonrat School is a charitable private school located in Chiang Mai Province, Northern Thailand. They provide educational services to people of 28 villages from kindergarten level to secondary level with 28 teachers and 332 students. All are from various hill tribes along the borderline. Their parents are poor. They have trouble speaking and writing in Thai. Communication with teachers requires an interpreter. The development has caused all 13 hill tribe students to be able to read and write in Thai. Students has developed skills in the 21<sup>st</sup> century especially on a better and improved living and professional skills to raise additional income for their families. They have a better quality of life. All of these occurred from the determination and quadrilateral focus on the work and sacrifice of the teachers, academic leadership, and change of school administrators. As a result, the school has been developed all of administrator, teachers, students as well as parents especially core learning outcomes of students with knowledge, skills, attitude and values at the National Educational Average.

**Keywords:** Self-Improvement School, School Development, Choafa Ubonrat School, Equitable Education Fund, School Management

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### Introduction

Education is an important mechanism for the development of people, the nation and the ability to compete at their own

society, nation and international level. Each country aims to develop people for the development of the country such as knowledge, skills, attitudes and behaviors to improve throughout life in various ways (Siridhrungsri, 2019). The last 20 years, globalization and economic, social, cultural, political prosperity have been limited. Influence context affecting the development such as governance, science and technology pushed each country to be more competitive (Education Council, 2016). Therefore, the countries have evolved both materially and the nation, as long-handed only have winners to live in world society. Therefore, countries are grouped in the form of developed, developing and underdeveloped countries. The mechanism to keep those countries is to get people's education, reduce inequality as a base for development, especially in the wake of a new pandemic, such as the COVID-19 pandemic that is spreading violently affecting human life throughout the world. There's no sign of calming down yet. The plague challenges human intelligence to find ways to manage, each country needs to protect its peoples, and the circumstances become a post-globalization situation that, in addition to competing for survival, must be done for themselves and their own countries more important than to take into internationalism helping each other. Education and knowledge can only save all peoples or people from crises. That needs to be supported and developed for schools are the main institutions to manage education, accessibility, quality, equity with effectively (UNESCO, 2000) and sustainable development. (United Nation, 2017)

However, inequality in student-driven education continues to appear in the Thai education system, despite the efforts of the authorities responsible for the management of education both public, private and local governments, as well as other institutions that support education (Sueksathikarn Foundation, 2020), especially the Equitable Education Fund (EEF), Thailand, which has been making efforts to reduce inequality and support student education through the process of developing teachers and schools to continuously improve the quality of education program (Equitable Education Fund, 2020). Equitable Education Fund (EEF) Thailand, it plays a role and mission focused on helping those in need, funding, reducing educational inequality, enhancing, and improving teacher quality and performance to strengthen and improve the quality and efficiency of teachers to be able to provide teaching and learning. It can develop juveniles based on different fundamentals and potentials. To encourage, support and assist schools so that they can teach and develop according to their aptitude and potential, as well as conduct or provide education, research or research on how to develop teachers in the spirit of teacher hood. Virtue, ethical, knowledgeable and capable of providing teaching and developing learners to reduce inequality in education with appropriate motivation. As well as encouraging or encouraging the establishment of model institutions in teacher production and development (Government Gazette a, 2018).

Schools are the most important unit in the education system because they provide access to basic education services over 7.3 million students. (Education Council, 2021). It is also a learning management unit that will develop potential students. The skills and competence required in the 21<sup>st</sup> century; quality citizens of the country and good citizens of the world. Whole school approach is an important break-in point both in terms of ensuring equality in access to children and youth education and improving the quality of learning in both academic, important skills and attributes of children and young people, which will be in line with the Thailand 20-year national strategy (2018-2037) to develop human resources as an important force for national development (Government Gazette b, 2018). This depends on how effectively the school performs its role. Self – improvement School Project is one of the programs to enhance the school student quality funded by EEF

between 2019 and 2022.

Research on the Self -Improvement Schools Project was funded by EEF between 2020 and 2022. Princess Ubonratana School is one of the project schools for this case study.

## Research Objective

Objectives of the research was to study the development result of self-improvement Choafa Ubonrattana School, administrator, teachers and students to improve the quality of education

## Research Methodology

Method used was the Mixed Method Research, both qualitative and quantitative. Research tools for the quantitative research included surveys, questionnaires, while tools for the qualitative research comprised interviews, group discussion, observation and document synthesis in keeping with the objectives and research conceptual framework in terms of environment, factors, process, outputs, outcomes, impacts, problems and obstacles, strengths, limitations, efficiency, effectiveness, factors and conditions for success. Informants consisted of coaches in the development project, school administrators, teachers responsible for the project implementation, students' representatives, parents' representatives as well as communities' representatives. For data collection; quantitative data collection used the Google form system and sending questionnaires directly to the participating schools (together with other schools of the project), while qualitative data collection used manually conducted from field studies, focus - group discussions, operational observation and document synthesis. The analysis of quantitative data was analyzed by package software and qualitative data analysis using content analysis; data were analyzed by using percentage, PD (percentage difference) and the Relative Gain's Score. Data presentation is in essay type associated with photos. Research duration was between August, 2020 and September, 2022.

## Related Literature

### Self-Improvement School Project

(Education Equitable Fund, 2020, pp. 1-10) ): Self-Improvement School Project is a project in 2020-22 , 1-34) set up following the development of teachers and schools to continuously improve the quality of education during June 2020 – July 2022, in 40 provinces, 636 schools were received with development grants to develop teachers and schools through 11 educational institutions: 1) Khon Kaen University 2) Prince of Songkla University 3), Future Skills Foundation) 4) Lamplimat Pattana Foundation 5) Naresuan University 6) Kanchanaburi Rajabhat University 7) Phuket Rajabhat University 8) Siam Kammachon Foundation 9) Yuvapat

Center Statesman Foundation, General Prem Tinsulanont, 10) Surin Primary Educational Service Area Office 2, and 11) Starfish Country Home School Foundation with the following concepts, goals and objectives:

**A. Operating Framework:** The key conceptual framework of the Self-Improvement School Project will guide the school to improve the quality on its own in the entire school system according to the school's needs. By reinforcing the support of network parties in various measures to create a framework for executives progressing to lead the transformation of the organization and empower teachers to proactively manage teaching and learning management. In order to develop the 21<sup>st</sup> century performance to learners and have desirable attributes, the measures that schools should take to drive development such as clearly having school goals. Using information as a targeting base, monitoring students' school visits, including student support teachers will encourage teachers to have knowledge in the subjects they teach, and the active learning management process evaluates students' progress. Able to take care of students individually. Have a good relationship with students and improving teacher performance focuses on the process of self-improvement. Teachers in schools create learning communities to improve teachers' professions in schools and expand the learning community between schools. This may also enhance the skills of teaching and learning according to the needs of teachers.

The Self-Improvement School Project is an ongoing project from teacher and school development projects to continuously improve the quality of education in the third year in the target school. The original operation of the project, both 1st and 2nd generations, 636 schools through the joint network supporting the development of all 11 educational institutes and maintaining the principles of voluntary operation and requirements of the school. The measures of the development of the entire school system are 6 measures and increased support measures to support the care system for disadvantaged and special needs students.

To increase educational equality and create a better quality of learning for disadvantaged children, the project continues to focus on the school developing the school management system and developing the class management system itself, which will be carried out in two main ways: expanding the school's performance to develop self-quality to sustainable outcomes and communicating knowledge to the wider society, as well as communicating with parties, including affiliated agencies and related organizations, for broader expansion or positive impact. Supported by 8 supplementary processes, including (1) Project Series Management (2) Research, Monitoring and Evaluation of Projects (3) Supporting quality communication systems for school management (info) (4) Using evaluation guidelines for the development of learning students (5) Self-assessment with process development evaluation or developmental evaluation (6) Research, development, measurement and evaluation of active learning outcomes developed Executive Function (7) Transcription of Project Operations and (8) Social Communication (Public Advocacy) operations in two parallel characteristics. It will help the school to develop itself in quality, leading to desirable outcomes for the learner. In other words, students have the 21<sup>st</sup> century performance and desirable attributes. Happy and well-being, reduce the rate of drop-off from the education system, reduce regressive learning situations and increase access to a quality education system. Finally, parents and communities can be strong as well.

**B. Target:** The school has the ability to continuously improve itself. To continuously enhance the quality of education. As a result, students in the target schools of the project have developed quality in terms of performance in the 21st century, have higher desirable characteristics and academic achievements, as well as receive full care, assistance and development, potential and safety, to create educational opportunities, reduce inequality and reduce the rate of drop-off from the education system.

**C. Objectives:** 1) To promote the quality development of the school itself in whole school approach and schools. Have the potential to continue to develop themselves, 2) to improve the performance of students in the 21th century, leading to higher academic achievements according to the potential of the learner. It focuses on caring for disadvantaged students in both quantitative and quality. 3) To develop the skills of administrators in school management and the skills needed for teachers to provide teaching and learning that can develop students to compete in the 21st century. 4) To create a network for improving the quality of schools in Active Learning Management. 5) To develop information systems (Q-info) and the use of databases for school management and student support. 6. To study, monitor and evaluate and take lessons from operations and expand development to network schools to achieve appropriate and contextual quality improvement. Lead social communication and policy drive with relevant agencies

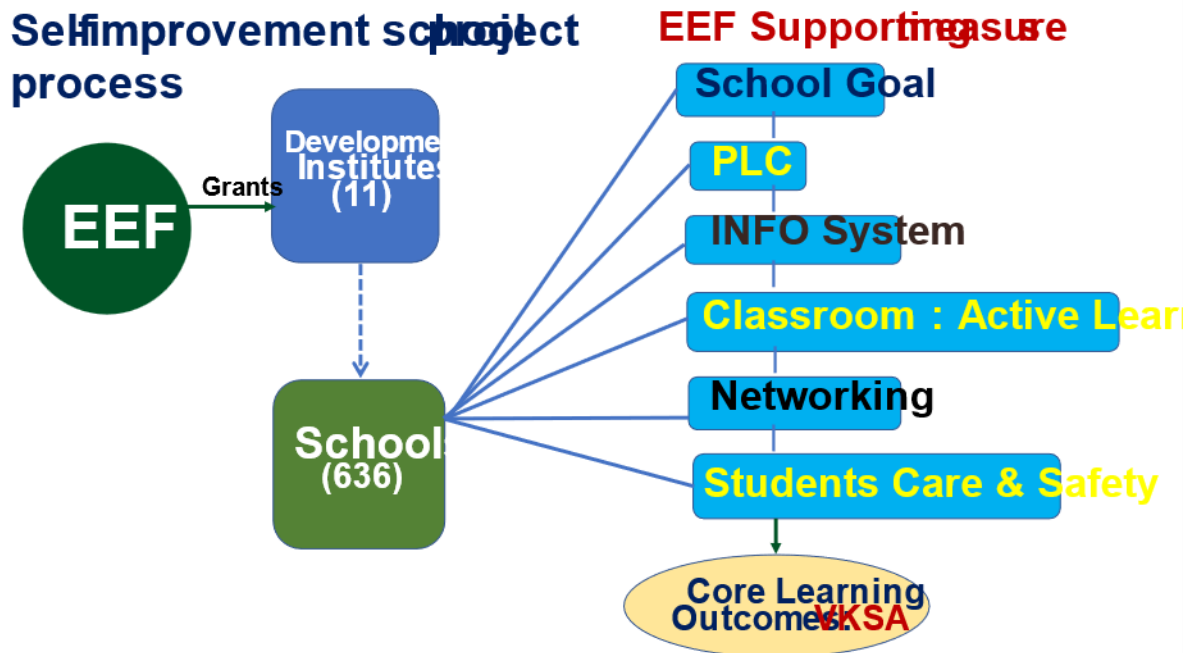


Figure 1. Modified Model of Self-Improvement School Project Process Adapted From “Self-Improvement Model,” By P. Siridhrungsri and W. Witsarutapa, 2022. *Report Research and Evaluation of The Self-Improvement School Project*, P.17.

Source: Siridhrungsri and Witsarutapa (2022, P. 17).

**EEF supporting measures** (Education Equitable Fund, 2020) : In this project, EEF sets the supporting measures for the school development with 6 measures, those are 1) setting quality goal (School Goal), 2) developing teachers and



administrators through professional learning community process, 3) management of effective information system, 4) development of quality instruction in classroom to be the active learning with various techniques, 5) creation of collaborative networks together, and 6) intense students care and safety system, with the four key processes inclusive flexible learning management, care of students thoroughly and equitably, developing teachers to be motivated by pursuit of knowledge and be a professional teacher, plus building faith in community participation, shown as figure 1 as follow:

**STEAM Design process:** It is established model using innovative development of instruction with STEAM Design Process developed by Starfish Country Home School Foundation from the results of research, development, and experiment then results expanded and well accepted at last. It has been used for developing the school in the self - improvement project under Starfish Country Home School Foundation consist of Ask, Imagine, Plan, Create, and Reflect and redesign, shown as figure 2 as follow:

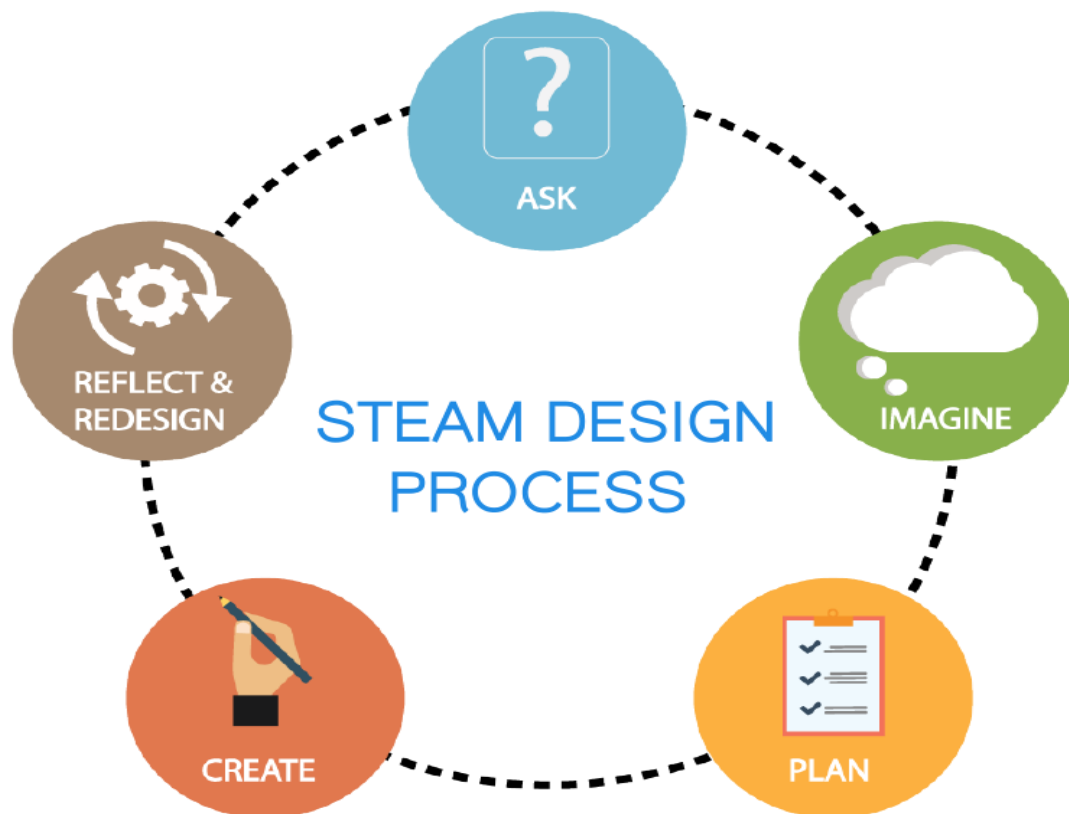


Figure 2. STEAM Design Process. From Starfish Country Home School Foundation, 2019.

Source: Starfish Country Home School Foundation, 2019. Retrieved December 3, 2019 from <https://bre.is/ZmacurUf>

**Core Learning Outcomes:** EEF set the result of the projects that the learning outcomes of the projects to be made to students at the National Education Average (NEA), both knowledge, skills and morality as follows:

No.	Learning Outcomes	Indicators
1	<b>knowledge</b> Knowledge of learning and participation in project activities	Students can 1) capture and draw important conclusions from readable stories 2) choose a writing style to communicate to others, suitable for the situation and potential of themselves. 3) describe the relationship between knowledge gained and their daily livelihood, families, societies, countries, and world societies. 4) identify problems and solutions for families, communities and societies where they can become members 5) tell themselves how to apply the knowledge gained from the project in everyday life.
2	<b>Skills</b> 1.1 Critical Thinking and Critical Thinking Skills	Students can 1) think critically, sort out the situations that happen to lead to decisions and connect to real life. 2) choose a smart and rational solution.
	1.2 Creative skills	Students can 1) think flexible and varied 2) innovate new methods until they are accepted.
	1.3 Communication skills	Students can 1) speech, writing or body language can be used to communicate to others correctly, clearly, easily. 2) choose the right technology or tactics to communicate.
	1.4 Professional skills	Students can 1) choose to practice the profession they are interested in. 2) apply basic professional knowledge to further development as a career.
	1.5 Life skills	Students can 1) think progressively and optimistically 2) have the ability to adapt, be ready for change and work with others.
2	<b>Morality (Desirable Attributes)</b> 2.1 Discipline means a feature that represents the adherence to the Agreement family rules and regulations, communities and society	Students can 1) comply with family agreements and rules Schools, society and non-infringements on the rights of others 2) punctual to learn and perform activities.

No.	Learning Outcomes	Indicators
	2.2 Be honest means a feature that expresses adherence to accuracy, behave according to the truth to oneself and others.	Students can 1) behave in the right way for yourself and others. 2) behave and advise others to follow the rules of society and culture.
	2.3 Have a public spirit means a feature that expresses participation in activities or situations that benefit others, community and society willingly enthusiastic without hope of return.	Students can 1) share and help others willingly and satisfied with no hope of return. 2) participate in activities that benefit the family. Schools, communities and society, with enthusiasm and unsteadiness to the situation.

## Research Findings

It was found that education provision in the midst of difficulties on the basis of ethnic, religious, cultural, economic, social and national security is viewed quite challenging education for the administrators and teachers of Princess Ubonratana School.

**School context:** Choafa (means Princess) Ubonratana School is a private charitable school under the supervision of Slurs de Saint-Paul de Chartres, Princess Ubonratana School situate at 167 Mu 8, Chiang Dao Sub-district, Chiang Dao District, Chiangmai Province. The school is affiliated to the Office of the Private Education Commission under control of Chiangmai Provincial Education Office, and support from Princess Ubolratana Foundation. Purpose of the school is to improve the quality of life and education of poor students, those infected with HIV and the students whose parents are prosecuted for drug related crimes and other lawsuits.

The school provides education for students from 28 villages in Chiang Dao District, offering from Kindergarten 1 to Mathayom 3, with 28 administrators/teachers, 332 students; 200 of them residing in the school under care of the teachers and administrators throughout the entire 24 hours of the day. Students included the children from 13 ethnic tribes such as Pgakayor. Akha, Hmong, Lisu, Lahu, Dara AngKachin, Yao, Lawa, Thai Yai and Thai students in the north along the border stitch. Their poor parents engaged in agriculture. Mostly are Christians and Buddhists. Students in each tribe cannot speak and write Thai. Thus, an interpreter is required

for communication with the teachers. Due to different society circumstances, culture and tradition in each tribe, the school therefore has found it hard to provide education for them.

#### **School's Measures for further development** included

**1. Determining quality school goals,** Princess Ubonratana School by school administrators, teachers, representatives of the school committees and parents' representatives are committed to share determining the goals of school. Problems encountered by the students are determined, i.e. students cannot read Thai, no social life with others, but will associate with friends from the same tribe, students speak their tribal language, the teacher does not understand the language of the students. The elders in each tribe of the school must interpret for the teachers. The administrators, teachers, parents, and committees wish the students can use Thai as the medium of communication with student fellows from all 13 tribes in the school. By employing the process of Development Evaluation (DE ) trained by the EEF and the Starfish Country Home School Foundation, vision and goals of school are defined as follows:

**Vision :** To build learners with the 21<sup>st</sup> century skills, enabling them to read, write, and transfer knowledge through vocational skills activities.

**Goals:** Learners can read, write and communicate, emphasizing upon vocational skills.

In the past year, the school's goals highlighted on reading and writing, but this year to focus on idioms, proverbs, rhythm of prose (recitation). It can be seen that the goals set by school conforming to the students' problems. The identified goals are consistent with the vision, are short, concise, language used is simply to understand and can be fruitfully implemented within one academic year.

From the school's self-assessment, it was found that before participating in the project, the determining school's goals was at **high level**, but after participating in the project at the **highest level**. Participants in determining the school's goals comprised the administrators and school committees. The goal setting method employed knowledge sharing using the PLC process, SWOT analysis and Development Evaluation ( DE ). The school's current goals are “ Smart, Good, Happy ” . To achieve the determined goals, the school has prepared a plan to improving quality of student life and a project on quality building school.

**2. Managing quality information system:** Last year, Princess Ubonratana School applied the information system specified by the EEF to some programs, such as checking students' names, assisting and caring the students in conjunction with the old school information system. Recently, the school's original affiliation (Office of the Private Education Commission: OPEC) required all private schools to use its information system called Regis. If not, that school will not receive a subsidy from the OPEC. The school thus solved the problem by using both of the existing information system and the one required by the OPEC concurrently.

From the school's self-assessment, it was found that before participating in the project, the school's information system management was at **moderate level**, after participating in the project at **low level** because the school

must use the information system of the original affiliation. For this reason, it is not possible to fully implement the information system specified by the EEF. The school's use of the EEF's information system was at the beginner level. In the meantime, the school encountered the system of the EEF was unstable and not comprehensive. The school therefore uses both the information system suggested by the original affiliation and the one developed by the school on its own.

### **3. Developing teachers and administrators through the Professional Learning Community Process (PLC)**

– The school administrators have the teachers organize knowledge sharing activities using the PLC Process by dividing the teachers into subgroups according to individual learning area, sharing knowledge once a week and knowledge sharing meeting of the teachers once a month for the whole school. The issues raised in the exchange of knowledge forum included problems that each teacher has encountered. In the meeting, problems will be solved together, permitting the teachers to reflect problems or behaviors of individual students. Then all teachers will come up with solutions to the problems. Or they will share and learn what the teachers have noticed any positive performance from the students. Every teacher must record the results of knowledge sharing. In addition, the administrators and teachers share knowledge with administrators and teachers from other schools under the network of the Starfish Country Home School Foundation. Once a month, knowledge sharing activity is held through conducting the PLC Leader, PLC Teacher, and PLC Happy Hour Life. Moreover, the school participates in exchanging knowledge with private schools in Chiangmai Province to improve the quality of education together and with other schools in the Roman Catholic network.

From the school's self-assessment, it was found that before participating in the school project, the development of the teachers and administrators through the Professional Learning Community process ( PLC ) was at *high level*, after participating in the project at the *highest level*.

**4. Building collaborative networks**, Princess Ubonratana School joined working network with parents, students, and schools attached to the Starfish Country Home School Foundation network, including other foundations and agencies as follows:

- The school is networked with schools belong to the same Roman Catholic network to develop academic and administrative works.
- The teachers are networked with all of students' parents. They work together to support, looking after, and monitor students.
- The teachers are networked with schools participating in the project launched by the Starfish Country Home School Foundation in order to share knowledge concerning instruction and evaluation.
- The school is networked with alumni to serve as local wisdom teachers and help the school where possible.
- The school is networked with the Forest in Our Hearts Foundation of Thai Beverage Company to give the students guidance how to maintain and take care of trees.
- The school is networked with the PTT Green World Project.

- The school is networked with the Love Chiang Dao Club.
  - The school is networked with Learn Anywhere by using the program for online study.
  - The school is networked with the Rotary Club of Chiangmai that donated water purifiers and school supplies.
  - The school is networked with the Khun Phao Sarasin Foundation.
  - The school is networked with Phor Luang Wat Dong Chai Thawee ( to learn the history of Chiang Dao ).
  - The school is networked with Chiangmai University for academic support in preparing a course.
  - The school is networked with the Foundation for the Underprivileged of Maejo Agricultural College.

Over the past year, the school's self-assessment achieved at **good level**. But this year (2022), the school has substantially made more progress, resulting in the following outcomes.

#### Effects on students

1. **Learning achievement:** From group discussions with the administrators and teachers, it was found the students at each level attained the following achievements.

- **Reading test (RT) results, Primary 1:** For academic year 2020, the students had higher reading test results than in academic year 2019 (compared to school level), but had lower test results than the national and provincial averages.
- **National Test (NT) results, Primary 3:** The students had Language and computation lower test results lower than the national and provincial averages.
- **Ordinary National Educational Test (O - Net) test results, Primary 6 and Secondary 3:** The students had learning area of Thai language higher test results than the national and provincial averages. For learning area of mathematics, science and English, however still lower than the national and provincial averages but higher test results at school level than academic year 2019.

From self-assessment of the school after the project implementation, it was found that students' learning achievement was at **high level**.

2. **Learning outcomes as determined by the Equitable Education Fund (EEF):** According to group discussions with the students who experienced learning through the STEAM Design Process for almost 2 years, they achieved the following learning outcomes as prescribed by the EEF.

**Equality of students was discovered that;** Equality of the students who have been cared, supported, and developed to their full potential both before and after participating in the project. It is obvious that the students are equally cared at the **highest level**.

**Quality of student** can be classified into each aspect as follows:

1) **Knowledge:** From conversation with the students, it was found that the students successfully created different works through learning from the 5-step STEAM Design Process. They gained knowledge about working

together as a team, taking the knowledge gained from learning to build upon which finally turning out a career. For example, a student revealed, “ *I made mulberry paper from a banana tree, then colored the paper to make bags, boxes, book covers, gift wrapping paper and sold them in the market or online. Moreover, we also learned about raising chickens, fish, and crickets obtaining knowledge of animal sanitation.*” A secondary 2 student mentioned, “*I learned about embroidery and weaving, which came to the idea of designing fabric patterns which are made embroidery later by my parents for sale as a career.*” The students said, “*We learned reading and writing Thai for communication use as foundation of study diverse learning areas and we can teach the children better in villages.*”

From the school's self-assessment on knowledge, it was found the overall that before participating in the project, the students obtained knowledge of four indicators at the **highest level**, except for one indicator, namely the description of the relationship between the knowledge gained and leading their daily lives was found at high level. After participating in the project, the students acquired knowledge of all indicators at the **highest level**.

## 2) Skills Included;

**2.1) Analytical thinking skills, problem solving skills, and critical thinking skills with consideration**, it was found according to a student that “*I know how to think critically in choosing materials such as banana trees to make mulberry paper and think of colors that will be used to dye the paper beautifully In which the student analyzed that if using natural colors, they will get colors that are not as bright as those from chemicals. Therefore, the student chose to use paints from chemicals to dye the mulberry paper. In making the paper, it was discovered the paper texture was not fine, and failed to form a sheet, causing problems. The student solved the problem by cutting the banana tree into small pieces. and blended thoroughly. As a result, a sheet of mulberry paper turned into more fine texture.*” Or in a folk performance” *I hit the stick out of rhythm and solved the problem by having everyone count the strokes of the stick.*” When finished, students presented before friends and teacher to criticize their works. Most of the students’ comments still had few reasons, not a variety of reasons. It is significant for the teachers to develop and train them more to criticize rationally. By practice more often, the students can develop their critical thinking better.

From the school’s self-assessment In terms of analytical thinking, problem solving, and critical thinking with consideration skills, it was discovered that before participating in the project, the students had critical thinking skills at high level, after participating in the project at the highest level.

**2.2) Creative thinking skills**, it was found the students are able to create a variety of creative ideas, for example,

*“I used embroidered fabrics to decorate bags made of mulberry paper to be more beautiful, adding value to the products I have made. I thought of designing the embroidery in a lotus pattern that is different from the heart pattern and tribal flowers. The embroidered fabrics are displayed in various tribal events. What is more, bottled waters can be made into a toy car.”*

From the school's self-assessment on creative thinking skills, it was found that before participating in the project, the students had creative thinking skills at **high level** and developed at the **highest level** of creative thinking skills after participating in the project.

**2.3) Communication skills**, the schools have set a policy to develop the use of Thai as a medium of communication among the students from 13 tribes through the 5-Step STEAM Design Process, in which each stage the students must use the language; both spoken and written language to create a piece of work for presentation. As a result, most students use Thai language to speak better. But for written language, especially Thai writing, they need further improvement. The reason is the students will write Thai according to the language spoken causing the Thai language to be written incorrectly. For example, the word “ **rongrian (school)** ” they will write “ **rongriang** ” ( written in their spoken language ). Anyway, the class teacher will always correct their writing.

From the school's self-assessment on communication skills, it was found that before participating in the project, the students had **high level** of communication skills **after** participating in the project at the **highest level**.

**2.4) Vocational skills**, the school provided diverse vocational skills training for the students. Most of the occupations that are practiced are culturally aligned with parent's occupation, and community context, such as pig raising, chicken raising, duck raising, embroidering, weaving, foot massage, body massage, Thai music, marching band, electronic tone, rice basket weaving, basket weaving, vetiver doll making, including agriculture such as growing cabbage, Kale, garlic, lettuce planting, as well as cultural performances of different tribes. Products from some occupations such as agriculture, vegetable growing, and animal husbandry will be sent for cooking at the school's canteen providing the students with three meals a day ( for boarding students in the school ). The students can also bring their occupational knowledge to continue at home with their parents extending the career to generate family income as well.

From the school's self-assessment on vocational skills, it was found that before and after participating in the project, the students had the **highest level** of vocational skills.

**2.5) Life skills**, It was found the school offered life skills practice for the students through learning from various learning areas, i.e. having students of each tribe work together as a group to practice using Thai as a medium for communication between other tribes and use Thai language to learning each learning area. Besides, they have learned how to take care of their own health, i.e. to get rid of head lice with local herbs, and how to use the hygienic toilet. In addition, the teachers trained them to do farming for cooking benefit, i.e. raising animals, growing vegetables for consumption in daily life, and be able to coexist with others in society.

From the school's self-assessment on life skills, it was found that before participating in the project, the students had **high level** of life skills but after participating in the project at the **highest level**.



### 3) Morals consisted of three topics:

**Discipline**, the students mentioned, “ *We are more disciplined; we stand in lines orderly, submit assignments on time, attend classes on time, work on time, take off and putt shoes in order, help parents do housework without delay, such as help mother wash dishes, keep things tidy, mop the floor, cook rice, and help the teachers raise animals... ”*

From the school’s self-assessment, it was found that before participating in the project, the students had **high level** of discipline, after participating in the project, at the **highest level**.

**Honesty**, “*I am sincere with my friends - do not take other people's things as mine and keep warning friends to follow regulations of the school.*”

From the school’s self-assessment, it was found that both before and after participating in the project, the students had the **highest level** of honesty.

**Public mind**. “ *I share embroidery designs with friends, help the teachers take care of younger students boarding in school, helping teach homework to children, clean dormitory, clean school compound, classrooms and other surrounding buildings without being told by the teachers at all the time, join reforestation in A Young Plant towards a Forest in Our Hearts Project, participate in forest ordination activities with the community. ”*

From the school’s self-assessment, it was found that both before and after participating in the project, the students had the **highest level** of public mind.

### Reflection from parents and school Committees

- **Parents:**

“*I agree with Princess Ubonratana School’s application of the STEAM Design Process to teaching and learning so that students can read and write. This is because the STEAM Design Process is a teaching process for students enabling them to actually practice develop life skills, discipline and ability to use technology in search of knowledge which is different from the traditional teaching and learning management. We are alumni of the school when we were students, dare not show, back home and never tell parents what we had learned, which is different from now – teachers’ instruction through asking the kids to think about what they want to know, plan their work and take action using the existing materials the school has in the Maker Space Room, create own ideas, use Thai language for presentations, inform mother what has learned and what the teachers asked to do today. The child is not fluent in Thai. Teachers use teaching tools to develop skills in reading consonants, vowels and compound words in reading and writing Thai, and teach children how to live each day in order to live in society happily. During COVID - 19 pandemic, our children stayed home not at school. The school organized classes by On Hand Instruction, sending worksheets and videos to the children and let them*

*take their own actions that are consistent with their life skills, such as having them grow morning glory at home, wash dishes, lay out the beds, pick up the beds, and plant the plants by themselves. These make happy learning for our children and become skillful in solving problems arising from operations”.*

In the children’s learning, parents take part in assisting their study by preparing learning materials such as providing coffee straws for children to make flowers, preparing materials for them to make fancy masks, guiding their works, searching information from the internet, taking a clip of their performance to teachers for evaluation. For example, to implement the salted egg project of a student, mother will shoot a video clip of her child's salted egg cooking process and send the teacher to evaluate the child's task. In addition, the mothers help school by cooking tribal food for children on special occasions.

**Parents' Suggestions:** In this regards, *“I want Princess Ubonratana School to adopt the STEAM Design Process in teaching and learning management for students even after the project ends ”.*

- **School Committees:**

School Committees agree with the school’s application of the STEAM Design Process to instruction. However, the teachers are advised to employ other teaching strategies to develop students as well. Because they perceived that teaching process alone cannot help students to be more effective. Also, the school committees supported the school with school supplies, food for students, Installation of water filter for the school (on behalf of Rotary Club of Chiangmai ), coordination with Thai Beverage Company to educate children about trees in the forest, coordination with Mae Fah Luang Foundation to educate about trees, recommendations on management of online learning and planning together with the administrators and teachers about parents’ visit to boarding students during the widespread of COVID - 19, help solve problems, and attend school meetings four times a year regularly.

What the school committees and parents have noticed the change in students was that most of the students are able to read and write. Teachers take care of all students like their own kids. The children do not play mobile phones while studying. On the other hand, they can be exposed to external media. The students are humble; always pay respects when they come across with an adult entering the school, more assertive, able to coexist in society, and make use of knowledge about learning Thai language to teach children and parents in the community. The students have learned different occupational skills based on individual tribal context, such as tribal embroidery, bringing banana ropes to weave into dolls.

**Suggestions of the School Committees** *“The students are to bring their knowledge back to teach children in the community. At the same time, the teachers are to keep on looking after those good and polite students like this forever.”*

**Implementation according to the supporting measures prescribed by the EEF**

It found that two EEF supporting measures successfully implemented by the school:

**1. Quality classroom instruction:** Before joining the project with the Starfish Country Home School Foundation, the school provided a variety of teaching methods, such as project-based teaching in Kindergarten Grades 1 – 3, teaching by experience, building activities to enhance experiences in primary education. STEM Education is offered in secondary education as well as the 5E teaching model consisted of 1 ) engage to generate interest, 2 ) explore, 3 ) explain and conclusion, 4) elaborate knowledge, and 5 ) evaluation, plus with the Brain-Based Learning (BBL ).

When joining the project with the Starfish Country Home School Foundation. In the first year, the school adopted the STEAM Design Process in the instruction from primary 1 to secondary 3 by allowing all the teachers to integrate into the learning area of Thai language, and into other learning areas taught by the core teachers, such as the learning area of science and technology, the learning area of mathematics, the learning area of social studies, religion, and culture, the learning area of health education and physical education, including the learning area of home economics. What is more, the STEAM Design Process is integrated with life skills which the students perform in the afternoon activities, such as pig raising, chicken raising, fish raising, vegetable growing, and tribal performances to be more fun and enjoyable, i.e. “Reeree Khaosan show”, the performance of percussion dance with musical instruments of the Akha tribe, changing the rows style in the show, wood slamming using music. The rehearsals supervised by local wisdom teachers and viewed the show by the student friends afterwards.

With regard to instructional management for many tribal students to use Thai language in reading and writing, a book entitled “Darunsuksa” written by F. Heilaire, (who was a brother teacher at Assumption School, composed in 1910 after spending only 9 years in Thailand) was used by Princess Ubonratana School. They are able to read and write Thai using as a medium for communication between teachers and students and between the students of different tribes. Darunsuksa is a book that teaches how-to reading in Thai language. It starts with a combination of middle, high, low, long vowels, short vowels, and tonal variations. There is a practice of reading the compound words in every chapter, teaching numbers, and teaching signs. Once the students have read it, there are chapters to read as moral tales such as the story of the Hare and the Tortoise, the Bullfrog, the Fox, the Ant, the Lion, Grandma and Grandpa, etc. Always, every story will advise morals and ethics to the students. In the elder’s class, teaching Thai is conducted via poetry, either by self-composed or from some old poems. Additionally, literature is employed for teaching how to read Thai as well, such as “ **Chalom (or bamboo basket) for Containing Water** ” (Khom Dam Din), “ **Phra Chai Chet** ”, “ **Nai Khanom Tom**”, and verse composition “**Subjects as Goods.**” There are four books of Darunsuksa set, namely 1) Assumption Darunsuksa, Kor Khor Level, 2 ) Assumption Darunsuksa, Beginner Level, 3) Assumption Darunsuksa Intermediate Level, and 4 ) Assumption Darunsuksa, Advanced Level, ( later changed the name to Darunsuksa ). Being widely popular in most schools, especially private school of the church, Darunsuksa is a textbook that facilitates effective Thai teaching and learning to ensure students’ reading and writing fluently. It has a broad and well-rounded vocabulary. There are also illustrations to enhance students’ enjoyment, fun, and enthusiasm in learning not boring. Later, there were some improvements regarding the use of Thai language in harmony of the current era, with the preparation of footnotes explaining the meaning of the words truly help students understand the

content, meaning of such words both in the original context and the context in use today, which is much clearer. The book Darunsuksa has been used in teaching Thai language for over 100 years and is still in use today (Banluesin, 2017).

When the school participated in the project with the Starfish Country Home School Foundation, the teachers used the STEAM Design Process, starting **with questions asking** students to think about “ how to read and write Thai”. As a group, the students searched for **knowledge and design** (engage to imagine stage) by designing interesting piece of work to interest people’s reading, such as making a knowledge sheet about reading, preparing a moral-tale book, and idiom/proverb booklets. Next, the students worked together to **plan**, determined what equipment to use from the Maker Space Room, looked for more materials, divided assigned tasks in line with abilities of each individual, determined the steps for making a moral-tale book, such as composing a moral tale, story of unity, then everyone took **action** according to the planned steps by composing a story on paper, and compiled into a book of moral stories. When finished, they presented to the teachers and classmates. Finally, **rethink and redesign**, classmates and teachers all together commented reflected the tale-content was too short, there should be more contents. Upon completion of the moral book, it was suggested the book be brought to young children for reading practice. The teachers evaluated with the Starfish Class tool and examined students’ works, evaluated students’ collaboration and overall evaluated by testing their knowledge.

During COVID - 19 epidemic, the school has made instructional arrangements as follows:

- 1) Boarding students to study on-site
- 2) Day school students studied on - hand, online, and on-demand with very few students. It can be seen from 35 students in primary 1, only 8-9 students participated in learning, there are 30 students in secondary 5-6, but only 10 students have Internet access for online learning. Students’ learning loss due to school closure. The teachers solved the problem by providing additional tutoring via Zoom by parents' mobile phones in the evening when parents free from work, asking them stop to pick up worksheets for students to do at home. Unfortunately, most students failed to complete all the worksheets as parents cannot teach their children. The teacher then asked the elders next door to help teach the younger children. Anyway, the problem was partially solved.

From teaching and learning through the STEAM Design Process, **the teachers have changed** as follows:

- 1) Enthusiastic about searching information and find out more to enhance teaching strategy.
- 2) The teachers are developed through online training, enabling them to use technology media better.
- 3) The teachers in the same and different learning areas share more experiences through knowledge sharing with via the PLC process .
- 4) The teachers have prepared more lesson plans than ever before.
- 5) The teachers have changed the role of an instructor to a coach and learned to raise questions for the students toward critical thinking.

**The students have changed as follows:**

- 1) Assertiveness, the students know how to think critically in solving problems on their own ( previously, the teachers helped solve the problems ).
- 2) Better use of Thai language in speaking and writing ( from their reading and writing practice via many media initiated by the teachers and students - there are a moving basket and mobile library in the school).
- 3) Being more creative, such as taking waste to recycle as toys, and utensils.
- 4) Becoming more disciplined, such as being responsible person, and punctual.
- 5) Teamwork – they now realize to work collaboratively with frequent knowledge sharings.
- 6) They are proud of themselves to be able to read, write, and socialize. This can be seen from the students - they greeted the school administrators when coming across and said, “ **I can read a book now.** ” “ **I can work with my friends from other tribes.**” “ **We help each other to finish assigned tasks.**”

From the school’s self-assessment, it was found that the teachers had the **highest level** of improvement in classroom teaching management both before and after participating in the project.

**Active teaching and learning management model** used by the teachers to manage learning are the 5 STEPs, STEM, science projects, the STEAM Design Process, including Maker Space.

**Further education of the students after finished the academic year 2020**, it was found that 26 students who finished Kindergarten 3 continued their primary education at Princess Ubonratana School, representing 100 %. 16 students finished primary 6 continued to secondary 1 at Princess Ubonratana School, representing 47.05%, while 18 students continued to study in other schools, representing 52.94 %. 59 students of secondary 3 (the highest class of school) continued to study other schools, representing 92.19 %, whereas 5 students continued to study vocational education, or 7.81%.

## 2. Student care and student safety

**2.1 Student care**, Princess Ubonratana School has organized activities to help students, such as visits their homes. All of the school administrators and teachers visit the students' homes once a month by visiting a village at a time. COVID - 19 outbreak made the administrators and teachers impossible to visit students' homes but let parents come to pick up the worksheets or talked to them on phone about student care in terms of study and assignments according to the worksheet assigned by the teachers. The students were screened for normal, at-risk and problematic groups. Problems faced by the students comprised:

- **Poor students**, there are poor students in the whole school ( 332 students ). Solution sought by the school was request for scholarship donations from kind-hearted donors.
- **Malnourished students**, it was found the school received lunch subsidy from the original affiliation for students at kindergarten and primary education level from the original affiliation, unfortunately excluded lower secondary students. The school’s solution was asking for rice donations from parents of the lower secondary students, 50 kilograms per person per year. Some parents nevertheless, gave 50

kilograms, some donated only 20 kilograms, while some parents gave none. To find the way out, the school therefore initiated rice-farming by students in the school compound for consumption and purchase more if needed. This is because the rice donated by parents and planted by the school is not enough to meet the students' consumption throughout academic year. Moreover, most students especially secondary students eat more than usual. In this context, the students grow vegetables, raise chickens, raise ducks, raise fish, and raise pigs as food for them three meals a day.

- **No playground equipment for the students** to exercise and play. The school asked for donations from the other schools or agencies but not enough to meet the needs of students.
- **Inadequate water for the students used in the dry season.** The school solved the problem by building water reservoirs for students to use in the dry season.
- **Students with physical problems,** they are underweight and their height below the threshold, the students are to drink milk - food supplement, eat all meals, and exercise.
- **Students with difficulty in reading and writing,** the teachers allow the students to come study in the evening by practicing their reading with the teachers.
- **Students with special needs,** there are 16 students with learning disorder. So far, they have school classes with normal children. A special teacher is appointed to teach Thai and mathematics, providing extra classes with the teachers in the evening by using Darunsuksa textbook. Usually, it takes two weeks for them to read and start reading in words. They can read two chapters. There are reading games for them to enjoy. They have fun and want to learn more. For ADHD students (attention deficit hyperactivity disorder – ADHD), the school encourages parents to take good care of them, to feel them warmth.
- **Students with mental health problems,** lonely students, not feeling warmth because boarding students are not frequently visited by their parents. To solve problem, the administrators asked the teachers to closely look after, telling close friends to talk with, so that students will not feel lonely. Elder children to take care the younger ones, or each tribe has a tribal chief to take care of the younger children in the same tribe, encourage them to talk and play so they don't miss home.

**2.2 Student safety,** Princess Ubonratana School's student safety is maintained. There is a fence around the school, the teachers on duty to take care of students in the morning and evening. They supervise students' play at all times. There is a dormitory teacher in the same room as students to oversee them around the clock 24 hours daily. At night, the school doors are locked with CCTV. There are meetings of the shuttle drivers to keep students safe. A patrol officer from Chiang Dao District Police Station regularly watches over the school. Por Luang (villager master) has a team to look after students' safety. Moreover, officials from Chiang Dao Sub-district Administrative Organization will come to provide basic fire fighting and evacuation fire drill training once in a semester to ensure students' safety.

From the school's self-assessment, it was found that both before participating in the project and after participating in the project, the school has provided care and safety to the students at the **highest level.**

Inclusive assistances provided to individual group of students are the following.

1. **Normal group** of 220 students are cared and overseen by visiting teachers to the students' homes both online and onsite hoping to develop the students' effective self-help.
2. **Children with special abilities**
  - **Children with mathematical abilities** in a number of 33 students, representing 11.26%. The school has promoted solving analytical thinking of math problem. As a result, the students have a systematic analytical thinking, and able to solve problems.
  - **Children with artistic talent** in a number of 33 students, representing 11.26%. They are encouraged to practice creative works of art more often. As a result, the students can create works out of their imagination and creativity.
  - **Children with language proficiency** in a number of 32 students, representing 10.92%. The school organized activities and created media to develop speaking, reading, writing and communication skills. As a result, the students can use language to communicate well.
  - **Children with musical abilities**, in a number of 52 students, representing 17.75%. The school has promoted potential students to music practice and meditation every day. As a result, they have well improved concentration in playing music.
  - **Children with athletic abilities**, in a number of 25 students, representing 8.53%. The school has encouraged them to play their favorite sports and are good at. Sports competitions are held in schools. As a result, the students become more skillful in sports, aware of the rules, sporting spirit, and bring about good relationships with their friends at the same time.
  - **Children with acting talent** in a number of 28 students, representing 9.56%. On regular basis, the school promotes their assertive skills to perform publicly in the community. As a result, the students dare to express themselves and appreciate the significance of their culture.
  - **Children with talent in embroidery and weaving** in a number of 29 students, representing 9.90%. The school trains the students' skills in designing a variety of patterns according to creativity, meanwhile developing embroidery and weaving skills regularly. As a result, the students can create products, and other works from their own imagination with new patterns not the same or repeated designs.
3. **Creative children** in a number of 293 students, representing 90.99%. The school provides suitable environment for them to learn in the real practice and learning management through the STEAM Design Process. In consequence, the students become more creative in producing new achievements.
4. **Children with special needs**
  - **Children with intellectual disabilities** in a number of 6 students, representing 2.05%. The school trains them skills in daily life. As a result, the students can learn to live with others.
  - **Children with learning disabilities** in a number of 10 students, representing 3.41%. The school puts them to study with normal children practicing how to live with others in society. As a result, the students increase learning skills corresponding to intelligence.
5. **Problem children**

- **Children being bullied** in a number of 10 students, representing 3.41%. The school has a teacher to give advice, warning and closely looking after the students. As a result, they can adapt themselves and cope with what may come.
  - **Children in broken families** in a number of 59 students, representing 20.14%. The school provides teachers to care, assist, while promoting morals and ethics. As a result, the students are warmly cared enabling them to live with others.
  - **Children are unable to read and write** in a number of 35 students, representing 11.95%. The school develops writing and reading development by teaching after school hours, asking the elder students to teach the younger ones. As a result, the students increase writing and reading abilities.
  - **Children with learning loss**, in a number of 70 students, representing 23.89%. The school gets them to study onsite by individually teaching. As a result, the students have better learning development.
- 6. Poor and disadvantaged children**
- **Poor and disadvantaged children who are not funded** in a number of 123 students, representing 41.98%. The school provides them with kinscholarships from kind donors offering assistance as appropriate. As a result, the students receive initial help.
  - **Poor and disadvantaged children funded by other agencies** in a number of 15 students, representing 5.12%. As a result, the students are given learning opportunities.

From self-assessment of the school both before and after participating in the project, it was found the school's building collaborative networks was at the **highest level**.

- **Efficiency:** From the past operations, it was found Princess Ubonratana School's efficiency in value, in-time, and maximum benefit at the **highest level**.

From the past year, it was found Princess Ubonratana School's efficiency in several aspects as follows:

- **Value:** The students can read and write. They are valuable and beneficial to society. The teachers teach students to be good people, forward knowledge to community, unselfish, grateful and behave for the benefit of community and society.
- **Benefit:** Graduated students are able to pursue their own careers. The students are contributors to society. The students can apply their knowledge to develop their future careers and earn income to support the family. The students can live in society happily.
- **In time:** The teachers achieved in helping students to read and write Thai language. The administrators and teachers developed themselves to use technology for teaching, in the meantime developed the students during COVID - 19 pandemic. The teachers helped students in a timely manner with the PLC Process when facing problems.
- **Effectiveness:** According to the school's self-assessment after participating in the program, it was found the school effectiveness with regard to accomplishment, pride, and development continuity was at the **highest level**, as follow:
- **Accomplishment:** The teachers are developed in learning and teaching 100% ( by attending meetings



with the Starfish Country Home School Foundation quite often), and The students are developed 100% ( but the level of development varies depending on the student's potential ) .

- **Pride:** The students produced their own products. Those are happy to study., Through self-development, the teachers are able to use technology in teaching and learning management as well as seeking knowledge on their own, and the students can use Thai language to communicate with creativity in self-improvement.
- **Continuous development:** The school will continue to employ the innovations introduced by the Starfish Country Home School Foundation even after completion of the project. Because the STEAM Design Process has effectively driven students toward the 21<sup>st</sup> century skills.

### Results of changes in school self-development

It was found that

1. The students are assertive possessing the 21<sup>st</sup> century life skills arose from learning through the STEAM Design Process with higher learning achievements at *high level*.
2. The teachers have developed a variety of instructional management; management of active learning was at the highest level. The teachers' knowledge sharing forums took place by the PLC Process. On top of that, the teachers are being continuously developed by the Starfish Country School Foundation enabling them to create innovations in learning management at the highest level.
3. The administrators developed and transformed to the whole school system, which uplifted them to academic leaders in the role of change agent at the highest level, and by way of building atmosphere and organizational culture at work that is conducive to the development of the whole school system at the highest level.
4. Through many projects, the school has freedom to adjust its operation in order to achieve the school's goals at the highest level. At work, the participation of both personnel inside and from outside the school has been highlighted. Under this favorable context, innovation of management and innovation in learning management emerged accordingly. There are learning resources and atmosphere advantageous to learning.
5. Parents have positive attitudes toward the school and turned to increasingly collaborate with the school in doing activities, leading to self-development learning at high level.
6. The community participated in learning management and looking after the students at **high level**, cooperating in the school activities, as they have earlier joined the school's knowledge sharing via the PLC Process online.

**Benefits obtained by school after completion of the project** as follow: The students improved basic health. The teachers are developed in terms of knowledge and learning management, leading to improved effective teaching. The administrators have a broad vision. The school has a better environment and health development. Parents have a positive attitudes toward the school and get involved in the school activities. The

community gives more support, promotes learning management, and takes care of the students closely. The original affiliation gives more support to the school's mission. The Starfish Country Home School Foundation sends to the school a team of knowledgeable and capable coaches to help, recommend, and implement six measures to develop diverse active learning management for the teachers.

**Effects:** The school established a policy to develop the whole school system at *high level*. The students have increased knowledge, skills, morals, and educational opportunities and higher quality learning at *the highest level*. The school achieved in building a network of cooperation in caring students with their families, and community at the *highest level*.

**Calculating effect size to measure changes in students:** Chaofa Ubonratana School extended toward caring the students' basic health through activity "We win over head lice" by having the teachers and students use herbs to get rid of head lice. The students' behavior was evaluated before and after the activity. Prevalence rate of students' head lice was found much lower than before with improved health after this initiative.

**Success factors are:** The administrators and teachers work as a team, the teachers and students cooperate very well in teaching, the administrators support teachers, acting as consultants to the teachers. The school received financial support from the EEF for its operations. Having a coach to give advice as consultant, assisting the teachers and school in a friendly manner, and the administrators possess transformational leadership, meanwhile the teachers are more ready to learn and improve themselves.

**Further innovation:** Since there are different tribes of students in the school, students in each tribe have poor basic health. The school therefore chooses to develop the basic health of the learners that will allow learners to aware of good sanitation habits and make use of knowledge in everyday life, at home and in the community.

**Satisfaction with the coach:** The administrators and teachers are satisfied with the coach's supervision, advice, and assistance at the **highest level** and wish the school be visited by the coach more frequently.

*The above operations have resulted in reading and writing skills of the students from all 13 hill tribes. They now can read and write Thai and forwarded Thai language knowledge to teach further their parents and other children in the community, so that they will be able to read and write Thai for efficient and effective communication with the general public. The students acquired skills in the 21<sup>st</sup> century, possessing better life skills, dare to speak, dare to think, becoming assertive and self-confident. In coexistence, the students of all races can live together as brothers, taking care of each other with unity, discipline and public mind. This is due to the commitment and dedication of the teachers serving as academic leaders - and Last but not least, with the transformational leadership of the school administrators as well.*

## Problems/Obstacles

1. The administrators and teachers have less time to rest, because they have to manage teaching and looking after boarding students all day long, 24 hours a day.
2. The school has a lot of other jobs to do which resulting in late submission.
3. Sometimes the administrators and teachers cannot attend meetings with the Foundation development because they have to attend the original affiliation's meeting.

**Recommendations** for the problems solving are to ask the Starfish Country Home School Foundation help record the VDO meeting of each gathering for the administrators and teachers to view in later days, and the coaches are recommended to help develop the teachers and schools more often.

## Conclusion

The self-improvement school project was granted by The Equitable Education Fund (EEF), Thailand. The purpose program was to improve the quality of 636 schools. Choafa Ubonratana School is one of the project schools. It found that self-improvement of Choafa Ubonrattana School was developed by Starfish Country Home School Foundation instruction granted by Equitable Education Fund (EEF). The STEAM Design process has been used for developing the school consist of Ask, Imagine, Plan, Create, and Reflect and redesign under the EEF supporting measures for the school development with 6 measures: 1) setting quality goal (School Goal), 2) developing teachers and administrators through professional learning community process, 3) management of effective information system, 4) development of quality instruction in classroom to be the active learning with various techniques, 5) creation of collaborative networks together, and 6) intense students care and safety system during 2020-2022.

After the school joined the project, the development has caused all 13 hill tribe students to be able to read and write in Thai. Students has developed skills in the 21<sup>st</sup> century especially on a better and improved living and professional skills to raise additional income for their families. They have a better quality of life. All of these occurred from the determination and quadrilateral focus on the work and sacrifice of the teachers, academic leadership, and change of school administrators. As a result, the school has been developed all of administrator, teachers, students as well as parents especially core learning outcomes of students with knowledge, skills, attitude and values at the National Educational Average.

## Recommendations

From the study of the self-Improvement project and Choafa Ubonrattana School development result, it shown that self-improvement school should be concerned for raising accessibility, equity, equality and quality of students as education for all and all for education. So, recommendations for educational agencies (Siridhrungsri & Suwan, 2022, p.23; Siridhrungsri & Witsarutapa, 2022, pp.92-93 ) are as follow:

### **Choafa Ubonrattana School**

1. To create an organizational culture for joint development, so when there are changes in administrator and teachers who have implemented the project, the development process will go on, such as the common development goals, PLC process, teamwork, knowledge sharing, participatory management and development, respecting and appreciating the value of each individual at teacher level, administrator level, student level, parents level, and community level, listening to and opening up to each other for feedback, and applying the DE process in self-assessment.
2. To develop STEAM Design process for student learning as way of life in and out class in order to apply for daily life.
3. To encourage and support teachers to design and develop self- integrated learning units through participation of students and teachers of different subject areas, reflecting the problems and needs of local and community active learning management, to cultivate students on learning attainment in the real practice, and live in harmony with community and society
4. To build a capable coach teacher or a capable core teacher at school level, class level, and/or individual subject level to ensure academic development, upgrading and learning from each other without having to wait for coaching from outsiders in the long run.
5. To adjust plan and different methods of student development i.e. learning from coaches, networks and educational movements, and learning development that cause active learning as well In the midst of COVID - 19 circumstance, such as organizing a mobile education vehicle, using learning box associated with worksheets that students can learn and do activities with parents, etc.
6. To employ the PLC process between teachers and parents to monitor, solve problems and improve students' learning, both in the form of online group, group meeting and building parents' leaders to coordinate learning management, etc.
7. To develop learning networks at school level, teacher level, and subject area level, both inside and outside the school, both in the same area, and at national level for knowledge sharing, building upon and expanding outcomes to a wider area. It is a development cycle that ultimately produces positive impact on students learning.

### **The development institute (Starfish country home school foundation)**

1. To develop management system, operation structure, and capability of coaches how to use innovations to develop learning management for the school.
2. To explore development needs, by modifying time and the teachers and administrator development approach compatible with the context, needs, time and availability of the teachers to be versatile and flexible, both normal system and the online system.
3. To coordinate with the original affiliation at supervisory level, support and/or administrative level in formulating development policy for using and expansion of the development results of the original affiliation in the upcoming time.

4. Upon completion of the project, the institute should serve as learning and development resources, in terms of body of knowledge collection, and methods by which may be established as a dissemination center and/or provide a development website with real-time information.

#### **Equity Education Fund (EEF)**

1. To continue supporting the project implemented by the funded institutes to accomplish more intense continuous development by giving school opportunities to choose receiving development based on the schools' contexts in terms of quality and students' opportunities to equally receive development at classroom and school level through the teachers and administrator development.
2. To coordinate the policy on teachers and school development in order to continuously raise the quality of education between the development institute and the funded institutes for further development and results expansion.
3. To build upon the successful school development with outstanding level of development, be prototype development model, source of learning and inspiration for other schools in terms of administrators, teachers and learning innovation.
4. To emphasize and support creation of educational equality of students, in terms of opportunities for receiving quality education and receiving thorough and equal care, inside and outside classroom through directly and continuously support from the funded institutes and schools either the body of knowledge or scholarship.
5. To conduct the research and development of the teachers and school development systems to persistently uplift the educational quality aiming at improving and developing the best approach and the most versatile. This is to enable schools to select and apply them in accordance with the school's context, local circumstance, and Thai society at broad overview level and in depth.
6. To promote the development of administrative leadership so as to develop efficient teachers and schools in terms of characteristic; such as vision, knowledge and competency in management, sacrifice. Managerial behavior included teamwork, decision-making based on information and knowledge, decisiveness, ability to utilize technology and apply technology to management, good governance, accountable responsibility, morals, ethics, building participation etc.
7. To promote the teacher development capable to create a variety of the active learning management according to the set guidelines and continue to successively develop building upon till ultimately leading to the results expansion.

#### **The Original Affiliation**

1. To facilitate, support and promote development activities of the institute receiving development fund and schools in the project to integrate the development with the school's learning management mission with indistinguish ability, to reduce the school's concerns over the original affiliation, in order to effectively achieve the school's learning management according to the development goals.

2. To inherit, carry on and/or screen the projects' innovations that are relevant to context, and/or formulate policies and guidelines for school development with wide-ranging innovations under academic support from the development institute.
3. To foster the development or apply the development of teachers and schools in accordance with the teacher and school development project guidelines in order to continuously improve the quality of education. They then will be able to develop teachers and school in their responsibilities with efficiency on their own.
4. To provide academic knowledge sharing between the project schools and the non-project schools within the responsible affiliation for application and expansion of results, as the case may be. This will contribute to successful educational mission of the original affiliation as a whole

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## Examining the Effect of Collective Teacher Efficacy on Organizational Commitment

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**Abstract:** This study examined the relationship between collective teacher efficacy and organizational commitment. The research was carried out following the correlational research design. The study group of the research consists of 320 teachers working in public schools in Bursa central districts. Demographic information form, collective teacher self-efficacy scale, and organizational commitment scale were used as data collection tools. Pearson correlation coefficient was calculated to examine the relationship between collective teacher efficacy and organizational component. Teaching is low and positively correlated with the affective continuance and normative commitment. Discipline is low and moderately positively correlated with affective, continuance, and normative commitment. Structural equation model analysis was conducted to examine the predictive effect of collective teacher efficacy on organizational commitment. Collective teacher efficacy affects organizational commitment positively. Collective efficacy has a remarkable impact on teachers' organizational commitment. It has been observed that when teachers' belief in collective efficacy develops, their emotional, attendance, and normative commitment to the schools and institutions they work for may increase. It is considered necessary that school administrators make plans to increase collective teacher efficacy.

**Keywords:** Collective teacher efficacy, Organizational commitment, Structural equation model

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### Introduction

One of the cornerstones of the education system is teachers. Teachers' feeling comfortable in the working environment, being free, contributing to the decisions taken, and improving themselves can increase the quality of the education they will provide. One factor that shows that teachers are satisfied with the environment in which they work is their organizational commitment. Teachers with high organizational commitment do not think of changing the institution they work. They feel emotionally attached to their institution. They feel like a part of the family in the institution they work for (Allen & Meyer, 1990). In this respect, increasing organizational commitment may enable teachers to contribute more to the achievement of the goals of their schools and institutions. Such commitment can encourage teachers to use constructive teaching methods such as student-centered learning, gaming, peer learning, group work activities (Badali et al., 2022; Banihashem et al.,

2022; Latifi et al., 2020, 2021a, 2021b, 2021c; Noroozi, 2018, 2022; Noroozi et al., 2012, 2016, 2016, 2021; Taghizadeh et al., 2022) in their classrooms. In order to make effective decisions that will increase teachers' organizational commitment, it is necessary to know the factors affecting organizational commitment. This study aimed to investigate the relationship between collective teacher efficacy and organizational commitment. The results will allow an understanding of how effective teachers' shared competencies in teaching and discipline are on their organizational commitment.

### **Organizational Commitment**

Commitment is accepted as an essential driving force for the continuation of personal and social life. An individual may show attachment to different people, institutions, ideas, or ideologies throughout life. Commitment is one of the intense emotions experienced by the individual. The individual's commitment to an institution, person, or idea brings some responsibilities. There may be obligations that an individual must fulfill towards the person or institution to which he or she is affiliated. It is usual for individuals to develop different types of commitment, such as forced, self-interested, moralistic, and emotional commitment, both in their private and social lives (Ergün & Çelik, 2019).

Organizational commitment explains the bond between the employee and the organization he is a member of. Employees with organizational commitment can ensure that their institutions work more effectively and efficiently. As organizational commitment increases, employees' intention to leave decreases. These individuals are less likely to display negative behaviors such as being late for work and absenteeism. The increased organizational commitment of employees may facilitate their adoption of the organization's goals and make more efforts to achieve them. Accordingly, the competitiveness of the organization may increase. Ensuring the employees' active participation in the workplace processes, making the employees feel valued, creating a career plan, and providing support to meet some crucial needs can increase organizational commitment. In the literature, there are studies examining organizational commitment in three dimensions (Allen & Meyer, 1990; Turner & Chelladurai, 2005). These dimensions are listed as continuance commitment, normative commitment, and affective commitment. Continuance commitment refers to awareness of the possible cost that may arise when leaving the organization (Chen & Francesco, 2003). This commitment can also be expressed as "rational commitment" or "perceived cost." This type of commitment, which is financially dominant, is based on the earnings of the employee or stakeholder. If the employee's earnings are high, the continuance commitment to the organization is expected to be high. Employees may be aware that when they leave the organization, they will be deprived of the opportunities the organization has given them. In addition, the fear that the accumulated knowledge will be lost and the thought that its reputation will be damaged are among the factors that ensure the employees' continued commitment to the organization.

Normative commitment is the employee's feeling of responsibility to stay in the organization he or she works for. This commitment means that employees believe it is right for them to stay in that organization conscientiously. The underlying commitment of the employees to the organization is mostly a sense of debt and

gratitude to that organization. Employees believe that their contribution to the institution they work for makes them committed to the organization (Allen & Meyer, 1990).

Affective commitment is employees' psychological attachment to their organizations, workplaces, and institutions. This commitment includes the knowledge, judgment, and feelings that individuals develop cognitively and effectively about the organization, such as loyalty, effort, and feeling of belonging, and the desire to be a part of the value system (Lambert, Hogan, Jiang, 2008). Employees with high emotional commitment tend to exert more effort to achieve the organization's common goals.

### **Collective Efficacy**

There are essential differences between collective efficacy and individual efficacy. Collective competence encompasses interactive, coordinated, and synergetic social dynamics. Collective efficacy perception refers to the collective efficacy perception created by the group rather than the sum of individual efficacy perceptions. Teaching is not a stand-alone profession. Teachers carry out the education process together and with support from each other. In this context, collective efficacy refers to the perception that the efforts of all teaching staff in a school will positively affect student achievement (Goddard, Hoy, and Woolfolk-Hoy, 2000).

Bandura (1995) stated that, as in every profession, the teaching profession is carried out in an interactive social system. Teachers often perform their duties alone in classrooms, but this does not mean that teachers are unaffected by the school context. People working in a group structure do not function in a wholly isolated or socially isolated manner from the influences of other individuals. The resources, barriers, and opportunities a particular system provides determine how influential individuals can be. People working together develop a sense of shared competence over time. When teachers working in the same school develop a sense of collective efficacy, the quality of education at school may increase (Tschannen-Moran and Barr, 2004). When the perception of collective efficacy increases, the effort required to teach students is also more likely to increase (Goddard, 2002). Collective efficacy is a vital school characteristic. Studies have shown that collective efficacy is an important feature that increases school success (Goddard et al., 2000).

The development of collective efficacy perception can increase the collective influence of teachers on school success. It can enable teachers to develop a sense of belonging to the institution where they work. This situation may affect teachers' organizational commitment positively. This study aimed to investigate the effect of collective teacher efficacy on organizational commitment. It has been predicted that collective teacher efficacy will positively affect teachers' organizational commitment.

### **Method**

This research was conducted following the correlational research design. Correlational research is a research

method in which the relationship between two or more variables is examined without any intervention, effect, or manipulation. Based on the relationships obtained with this research method, there is an opportunity to predict some results (Büyüköztürk et al., 2008).

### Study Group

The study group of the research consists of 320 teachers working in public schools in Bursa central districts. 43.8% (n=140) of the teachers are female and 56.3% (n=180) are male. of teachers; 5.3% (n=17) were pre-school, 30.6% (n=98) primary school, 36.3% (n=116) secondary school, and 27.8% (n=89) works at the high school level. While the rate of teachers with undergraduate education is 76.9% (n=246), the rate of teachers with postgraduate education is 23.1% (n=74). The average age of the teachers was 39.70 (Sd=7.69), and the average professional seniority was 15.64 years (Sd=7.70). 86.3% (n=276) of the teachers stated that they were married.

### Measurement Tools

Demographic information form: In line with the purpose of the research, a personal information form was developed and used to obtain information about the demographic characteristics of the teachers participating in the research. In the demographic information form, Multiple-choice statements about gender, teaching level, seniority, age, and marital status variables are included.

The collective teacher self-efficacy scale: The scale was developed by Tschannen-Moran and Barr (2004) and adapted into Turkish by Erdoğan and Dönmez (2015). The scale measures collective teacher efficacy in two sub-dimensions. There are six items in the dimension of student discipline, which is the first dimension, and six items in the dimension of teaching strategies, which is the second dimension. The scale is a five-point Likert type. In this study, the Cronbach Alpha internal consistency coefficients calculated for discipline and instructional strategies were 0.75 and 0.77, respectively.

The organizational commitment scale was developed by Allen and Mayer (1997). The validity and reliability study of the Turkish form of the scale was carried out by Erdoğan (2006). The scale, which consists of 18 items in total, has three sub-dimensions: affective commitment, continuance commitment, and normative commitment. The scale is a five-point Likert type. In this study, the Cronbach Alpha internal consistency coefficients calculated for the dimensions of affective commitment, continuance commitment, and normative commitment were 0.72, respectively; It was found to be 0.75 and 0.78.

### Data Analysis

Structural equation model analysis was conducted to examine the effect of collective teacher efficacy on organizational commitment. The fact that the Mardia kurtosis coefficient is less than 8 indicates that the multivariate normal distribution assumption is met (Yılmaz & Varol, 2015). In this study, the Mardia kurtosis

coefficient calculated with AMOS was 7.13. This value showed that the multivariate normal distribution assumption was met. Pearson correlation coefficients were calculated to calculate the relationships between the variables. Analyzes were performed using AMOS 24.0 and SPSS 25.0.

## Results

Collective teacher efficacy has two components: instruction and discipline. Organizational commitment has three components: affective, continuance, and normative commitment. Pearson correlation coefficients were calculated to examine the relationships between collective teacher efficacy and organizational commitment. The coefficients obtained are shown in Table 1.

Table 1. Pearson Correlation Coefficients

Variables	1.	2.	3.	4.	5.
1. Teaching	1				
2. Discipline	.79**	1			
3. Affective commitment	.22**	.30**	1		
4. Continuance commitment	.13*	.12*	.29**	1	
5. Normative commitment	.23**	.21**	.36**	.60**	1

\*\*p<0.01, \*p<0.05, N=320

Teaching is low and positively correlated with affective commitment ( $r=.22$ ,  $p<.01$ ), continuance commitment ( $r=.13$ ,  $p<.01$ ), and normative commitment ( $r=.23$ ,  $p<.01$ ) scores. Discipline is low and moderately positively correlated with affective commitment ( $r=.30$ ,  $p<.01$ ), continuance commitment ( $r=.12$ ,  $p<.01$ ), and normative commitment ( $r=.21$ ,  $p<.01$ ) scores.

The effect of collective teacher efficacy on organizational commitment was examined with the structural equation model shown in Figure 1.

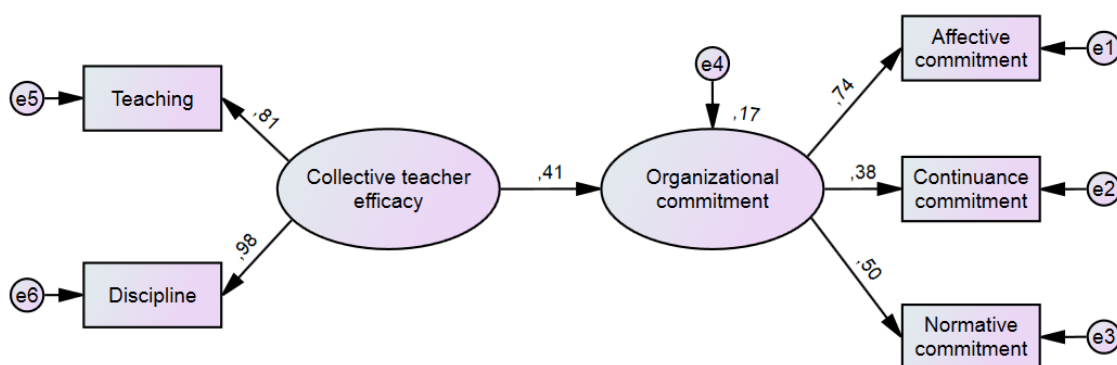


Figure 1. The Structural Equation Model

Collective teacher efficacy was included in the model as the independent variable, and organizational commitment was the dependent variable. The calculated fit values ( $\chi^2/df=1.86$ ,  $p=.14$ ,  $RMSEA=.05$ ,  $SRMR=.03$ ,  $CFI=1.00$ ;  $TLI=.98$ ,  $GFI=.99$ ,  $AGFI=.96$ ) indicated that the data and model fit perfectly (Bollen, 1989; Browne & Cudeck, 1993; Hu & Bentler, 1999; Tanaka & Huba, 1985).

Table 2. Regression Weights

			Estimate	Standardized Estimate	S.E.	C.R.	p
Collective teacher efficacy	--->	Organizational commitment	.51	.41	.09	5.44	***

\*\*\* $p<.001$

The model in Figure 1 shows that collective teacher efficacy positively affects organizational commitment ( $\beta=0.41$ ,  $p<.001$ ). As collective teacher efficacy increased, organizational commitment also increased. Collective efficacy explains about 17% of the change in organizational commitment.

## Discussion

This study conducted applied research on teachers working in Bursa, Turkey's preschool, primary, and high school levels. Within the scope of the research, the relationship between teachers' collective competencies and their organizational commitment was examined. It has been determined that teaching and discipline, which are components of collective efficacy, have positive relationships with affective, continuance, and normative commitment, which are components of organizational commitment. In addition, it was understood that collective efficacy predicted organizational commitment positively. The perception that the efforts of all teaching staff in a school will positively affect student achievement creates collective efficacy (Goddard et al., 2000). Teachers accomplish academic tasks together, contribute to student success, and realize the school's goals can support the formation of common synergy. It can make teachers feel they are an essential part of their institution. Depending on this situation, teachers' emotional and continuing commitment to their work institution may increase. The results obtained in this study showed that collective efficacy is a significant predictor of organizational commitment. The results are consistent with the results of the studies conducted in the literature (Aydoğmuş and Tükel, 2019; Cansoy, Parlar, and Polatcan, 2020; Ware and Kitsantas, 2007).

Some limitations of this study can be mentioned. The fact that the study group consists of teachers working in schools located in Bursa city center, primary and secondary school teachers are more numerous than preschool and high school teachers limits the generalizability of the results to teachers working throughout the country. It can be recommended that similar studies be conducted to cover teachers working in different provinces and districts. Considering the branches of teachers, it can be suggested to examine the relationships between their organizational commitment and their collective competencies.

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## Applications of Teapots as Unglazed Ceramic Surface Practice

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**Abstract:** Choosing the most suitable one for the artistic expression of ceramic among the unlimited firing and shaping techniques, the ceramicist is also able to create an artistic "style" by developing unique new methods. Artists who make coloured glaze applications on ceramics with very different firing techniques using various raw materials, pigment dyes and oxides have an important place in the art of ceramics. In addition, there are many artists who reject this approach and try to develop the colour possibilities of the ceramic body itself, or by making organic or inorganic additions to the clay used. The place of ceramic teapots as a form of ceramic art has been increased by ceramicists who use them as a means of expression in every period. This is also related to the fact that an unlimited number of ceramic teapots are encountered when scanning artists and works in ceramic art. In the research, applications were made in the form of unglazed ceramic teapots and it was evaluated in terms of its production within the framework of today's art understanding.

**Keywords:** Teapot, Ceramic, Glazing, Clay.

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### Introduction

In the first half of the twentieth century, the influence of Far Eastern culture, the development and adaptation of primitive shaping and firing techniques to the present day, the introduction of electrical energy to living spaces, and the easier establishment of individual workshops have created environments that will enable unprecedented developments in ceramic art. All these and similar developments heralded a process that gave freedom to ceramic artists and brought the artist to the forefront. In light of these developments, artists took important steps in technical issues specific to ceramics such as shaping, firing, and coloring, and became specialized. With specialization in the technical field, artists have revealed their own forms of expression, sometimes by trying many different techniques together, sometimes by concentrating on a single subject, and sometimes by rejecting all known limitations.

### Creative Process in Ceramic Art

It is the mind that hosts artistic creation. Images of reality take place in the individual's mind through

perceptions. In order for artistic creation to occur in the mind, images must transform into imagery. By transforming these images into imagery, the artist searches for the unique reality he wants to reflect in his mind and has the urge to reflect the feelings and thoughts he refines with the imaginary thought system to give them a material structure. According to Kağan; "Thought is a mental formation... In other words, thought without flesh and bones; it forms and lives in the artist's design. It is a design for the future work, floating in the creator's consciousness" (Kagan, 2008, p.380).

Forming, one of the most important steps of the creative process, is the visualization of a work designed in the mind by structuring it with materials and techniques in accordance with the desired expression. The process of shaping is not the display of an intellectual design that has been finalized in detail in advance, but an integrity that can return until the completion of the shaped thought, leading to more or less change. (Çalışlar, 1983, pp.33-35). Alain thinks that the artist can only sense these laws of shaping, which he characterizes as opposing forces, in the act of making and cannot plan them in advance (Lenoir, 2004, p.101). What Alain refers to as the laws of materials is the effective role of the physical properties of the material used on the artist during the formation of the work. Knowledge of materials and techniques in art is a necessity for learning and understanding the language of art.

This problem is as important for the art of ceramics, which takes its name from its material and the technical process in its production, as it is for all other branches of art. With a conscious use, the ceramic artist strengthens the expression of the ceramic work by making the common language of art, which other art branches also benefit from, a stakeholder in its material and technique, and in some cases, the material and technique itself can be a means of expression (Güler, 2006, p. 3).

Like other materials used in artistic shaping, the materials and shaping techniques that make up ceramic art have a great guiding effect on the creative process. The effect of the ceramic material on artistic expression can be possible with its physical and chemical properties as well as its shaping techniques. The visual effects of the material may vary according to the raw materials used, the structure of the clay, the firing degree, and the type. The color properties (fluidity, mattness, transparency, opacity) arising from the chemical structure of the applied glaze also contribute to the aesthetic integrity of the forms created.

Karabey (2004, p. 91) states that due to the flexibility and variability arising from the nature of the clay material, it transforms the clay into a subject structure by moving it away from being an object and wants to experience its own natural process with its ability to affect the creative process.

### **"Unglazed Clay Surface" Approach in Ceramic Art**

Glazes, metal oxides, pigments and paints consisting of different compositions applied to the ceramic surface or giving color to the body. Pigments are minerals or mineral mixtures that are ground into powder. These colorants help to color the glaze or lining to be applied to the ceramic surface and their visual effects may vary

according to the type of firing applied.

Glaze: "a thin layer of glass on which ceramic surfaces are coated in order to make the usage surfaces of ceramic products more resistant to external factors and to give color and aesthetics to the ceramic surface" (Güner, 1987:112). Arcasoy (1983:162) defines glaze as follows; "It is a glass or glassy formation that covers the ceramic clay in a thin layer and melts on it".

In ceramic applications, the glaze is an integral element with its texture and color. The ceramicist, who chooses the most appropriate one for his artistic expression from the unlimited firing and shaping techniques of ceramics, can also create an artistic "style" by developing new methods unique to himself.

"Apart from the classical materials and tools of the arts, the ways of shaping, the techniques and methods of shaping-expression (style), the way technical possibilities are used, fall within the concept of "art technique" and vary according to each artist. Because a work of art is the product of a personality. The artist's technique is a subjective quality that depends on his competence and mastery of using his organs rather than his materials and tools (Atalayer, 1994, p.21). In addition to artists who applied colored glaze applications on ceramics with various firing techniques using various raw materials, pigment dyes, and oxides, many artists rejected this approach and tried to develop the color possibilities of the ceramic body or the color of the body and the body by making organic and inorganic additions to the clay used to have an important place in the ceramic art of the XXth century and today. As the Swiss ceramic artist Philippe Barde said, "With naked clay, you can see the process. With glaze you hide what is going on" this summarizes the thoughts of artists working in this way.

The artist Jane Perryman (2004: 1) says: "The essential characteristic of unglazed clay is that it creates a unity between form and surface, rather than a separation between the elements of the clay and the glaze. Without a physical barrier of glaze, it can elicit an immediate response, revealing a range of direct aesthetic and tactile properties. The glaze is basically glass and is cold, shiny, and can cut when broken. It is not permeable, so it reflects light. The unglazed surface allows the clay to breathe." He points to the differences between glazed and unglazed surfaces. This connection established with the "Unglazed Clay Surface" is reinforced by the works of artists who try to utilize clay within its own possibilities, to develop these possibilities with various different add-ons, or to use the visual richness brought by firing types.

### **Applications of Ceramic Teapot Forms with Unglazed Surface**

The idea that forms the basis of this research is to create a visual perception by using clay within the framework of its own possibilities without any glaze or color application. For this reason, the personal applications put forward during the study process were shaped by benefiting from the experiences of many artists working in this way. In addition to the improvisational acquisitions provided by the plastic structure of clay in the shaping process of the realized applications, it was aimed to transform unglazed surfaces into teapot-shaped structures

that produce aesthetic value, and the relationship between technology-human and nature was evaluated in the applications and tried to be conveyed with a subjective approach in the creation process.



Teapot Application Study 1:



Teapot Application Study 2:

## Conclusion

In ceramic art, as in other art disciplines, the artist can choose the most appropriate material and technique to reflect the feelings and thoughts he wants to visualize. In the applications made within the scope of the research, unglazed ceramic surfaces were used to create a primitive structure, which is thought to be important in emphasizing the expression. The value put forth and the expression desired to be given are identified with unglazed surfaces. In the examples integrated with the use of unglazed surfaces, while the clay material represents all the values of the individual due to its unique natural and soft structure, the formal approach is associated with the possibilities offered to the individual by technology.


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## Task Significance and Meaningfulness: Implications for Work Engagement among Bankers

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**Abstract:** Work engagement is achieved through individuals who are involved and committed to work, and task significance which is one of the five core job dimensions under the Job Characteristics Model helps to drive this. This study investigates the influence of task significance on employee work engagement at the physical, emotional and cognitive levels among bankers in Nigeria. The study adopted a mixed research method and the scope was banks in Lagos State. Data was collected from 353 respondents through the use of questionnaire while 15 managers were identified for the interview. The study adopted a multi-stage sampling technique of purposive, stratified and random to determine the sampling frame. Structural Equation Modelling (Partial Least Square) was used for the quantitative analysis while the qualitative was analyzed using themes. The study concluded that task significance was important to employees who believed that their work was of impact and worth to the organization and all its customers. This study therefore recommended that management of banks should build a culture of team work among employees and with customers.

**Keywords:** Banks, Meaningfulness, Task significance, Work engagement.

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## Introduction

One major focus of organizations is making sure that employees are engaged because this determines their ability to succeed in the midst of stiff competition and a hostile labour market. Employees have been found to be a very important resource that enables the survival of the organization just as work has been found to be one of most important necessities for individuals' survival in terms of psychological and social needs. Therefore, as work is important to the individual so is the individual important to the organization. This calls for a collaboration of efforts on the part of the two parties such that the well-being of one is the sustenance of the other. This realization has led to much focus on ensuring that employees are involved in work physically as to be able to exert all their energy and efforts; cognitively as to spend a lot of time being creative about how work is done and emotionally which refers to the feelings of enthusiasm, happiness and pride both in the work place and in the people with whom one works (Khan, 1990).

Time has deemed it necessary for researchers and employers to see the need for a change in the design of work, such that individuals will feel involved in how work is done instead of being passive recipients of instructions. One of the means of achieving this is through the Job Characteristics Model that gives five core dimensions of work which are skill variety, task identity, task significance, feedback and job autonomy (Hackman & Oldham, 1976). These are supposed to lead to three psychological states of meaningfulness, safety and knowledge of results.

The focus of this study is task significance which is found to be an essential factor that leads to meaningfulness. Task significance takes the job to a level higher than the individual, to focus on organizational goals and on others in and outside the organization. This makes it an ideal strategy that organizations should invest in, especially in a work environment of heavy work demands, constant technological changes and insecurity such as is experienced by many banks.

The banking industry has faced a lot of global recessions and for the global south, there is an added disadvantage of a poor economy. It is however an industry that has a lot of attraction for the youth in terms of remuneration, good image and social standing. More so the industry is one of the few that has continued to thrive in a poor economy. However, the banking industry also has its challenges of heavy work demands and insecurity, which makes it an obvious place where having relevance and impact becomes a need of the employees. That is why the objective of this study is to examine the influence of task significance on physical, emotional and cognitive work engagement.



## Hypothesis

Task significance does not have any influence on the physical, emotional and cognitive work engagement of employees working in banks.

## Literature Review

Task Significance: this is described as the degree to which the job has a substantial impact on the lives or work of other people, whether in the immediate organization or the external environment (Hackman & Oldham, 1976; Oludeyi & Aborisade, 2018). A job is as important to the employees as it is to both internal and external customers who are impacted by the job. This contributes to work significance and it is considered essential for work engagement. (Bouwer, 2018).

The perception that a task is highly relevant to other people should lead to investing a higher level of energy, persistence and dedication, and should motivate to make a difference. These will in turn lead to a high level of work engagement (Othman & Nasurdin, 2019). Task significance has been found to be significant to work performance and other work outcomes, however, the findings as it relates with work engagement has been conflicting. Ngari et al 2018 found a significant relationship between the two variables while Othman and Nasurdin (2019) established a positive and significant relationship.

Task significance is strongly related to experienced meaningfulness as depicted in the Job Characteristics Model and also brings to the realization of the employee that their work is beyond the mere financial benefit to the organization (Redmond & Janicek, 2016). Meaningfulness is described as the worth or value of meaning a job has for the individual (Hackman & Oldham 1976). It is expressed by how employees feel about their jobs, co-workers and often times by relationship with customers. It also refers to people's experience of how purposeful and significant their career is, and how much this benefits them (Steger, 2017). Therefore, individuals will judge meaningfulness by how useless or trivial their specific job is (Hackman & Oldham, 1975). However, not all tasks have the same level of significance and therefore will not have the same level of meaningfulness. Tasks that are perceived as unnecessary will have lower meaningfulness, and those with high significance will enable a higher level of engagement (Othman & Nasurdin, 2019).

## Task Significance and Work engagement

Work engagement is believed to be a criterion that enables organisations achieve progressive advancement because it contributes to various positive work outcomes such as involvement, commitment and organizational citizenship while improving productivity and performance (Ajulo, Oyelere & Mutema, 2019; Udemba, 2018). Engagement as a concept was developed by William Kahn (1990) when he wrote about the psychological conditions of engagement. According to his work, life and work involve taking on roles, which people occupy in

different ways - physically, cognitively and emotionally (Ajulo *et al.* 2019). While Khan (1990) did not operationally define the three dimensions by which engagement is expressed, other writers have contributed to his work by looking at them and given them operational definitions. Work engagement is therefore the intentional involvement with or attachment to tasks, objectives, or organizational activities cognitively.

Knowledge of the importance of one's work is believed to be a basis for cognitive engagement because such employees are attentive and positive about their work, thereby having a high cognitive tendency (Oliveira, Ferreira & Ribeiro, 2017). Cognitive engagement was introduced by Khan (1990) to include the amount of time spent thinking about work, that leads to creative thinking and effectiveness. Cognition is believed to develop as a function of engagement that emanates from an employee's unique experience of work (Joo, Zigarmi, Nimon, & Shuck, 2017). At the cognitive level, employees understand the goals and strategies of their organization, and they are willing to contribute to achieving this through better performance (Terry, 2020). Joo *et al.*, (2017) found a strong positive influence of task significance with cognitive engagement. Their study which was conducted in a South Korean Conglomerate indicated that work cognition in form of positive work relationship with colleagues and supervisors will lead to a higher level of cognitive engagement.

Task significance refers also to the impact the employee has through building work relationships with colleagues and satisfying the customers, leading to an emotive connection with the workplace. Literature has shown that work engagement involves some level of emotions (Extremera, Mérida-López, Sánchez-Álvarez & Quintana-Orts, 2018; Kuok & Taormina, 2017), and this brings about a feeling of positive affectivity at work which is characterized by work enthusiasm (Joo *et al.*, 2017). Therefore, emotional engagement is described as employee attachment to work tasks and achieving organizational objectives characterized by having positive feelings, pride and enthusiasm that leads to better work achievement (Kuok & taormina, 2017).

The importance of task significance to the employee leads to exerting more energy and effort on work, which denotes physical work engagement (Falola, Oludayo, igbinoba, Salau & Borisade, 2018; Terry, 2020). The ability to exert more effort at work leads to better opportunities for problem-solving and drives passion and enthusiasm for the job (Dan Roşca & Mateizer, 2020). Okoseimiema and Eketu, (2019) wrote that engagement is about the passion and commitment that employee put in their work, these are referred to as efforts; Rich, Lepine and Crawford (2010) added that intensity and frequency of using physical energy are also relevant.

## **Theoretical Review**

The job characteristics model by Hackman and Oldham (1976) identifies five work dimensions that lead to three psychological states of which meaningfulness is one. The model theorized that skill variety, task identity and task significance will lead to a state of work meaningfulness for the individual. Task significance being the ability to have substantial impact of the organization, co-workers and other external customers is a work design that results in meaningfulness. JCM identifies values like purpose, belongingness and interpersonal relationships as means of

achieving meaningfulness (Hackman & Oldham, 1976). Other literatures have also shown that people who transcend their immediate needs and concerns to help others will experience meaningfulness (Steger, 2017).

Table 1. Cross Tabulation of the Demographic Results

	Bank A	Bank B	Bank C	Bank D	Bank E	Total
<b>Sex</b>						
Male	32	41	33	49	28	181
Female	45	28	32	29	38	172
<b>Total</b>	<b>77</b>	<b>69</b>	<b>65</b>	<b>76</b>	<b>66</b>	<b>353</b>
<b>Age</b>						
21-30	55	27	32	36	35	185
31-40	21	34	17	21	30	123
Above 40	1	8	16	19	1	45
<b>Total</b>	<b>77</b>	<b>69</b>	<b>65</b>	<b>76</b>	<b>66</b>	<b>353</b>
<b>Marital Status</b>						
Single	59	23	15	45	15	157
Married	18	45	50	31	51	195
		1				1
<b>Total</b>	<b>77</b>	<b>69</b>	<b>65</b>	<b>76</b>	<b>66</b>	<b>353</b>
<b>Qualification</b>						
OND	0	12	2	14	14	42
1 <sup>st</sup> degree	60	21	36	38	25	180
2 <sup>nd</sup> degree	16	34	27	24	27	128
Others	1	2				3
<b>Total</b>	<b>77</b>	<b>69</b>	<b>65</b>	<b>76</b>	<b>66</b>	<b>353</b>
<b>Work</b>						
<b>Experience</b>						
0-10 years	73	48	45	51	50	267
11-20 years	4	17	19	23	16	79
Above 20	0	4	1	2	0	7
<b>Total</b>	<b>77</b>	<b>69</b>	<b>65</b>	<b>76</b>	<b>66</b>	<b>353</b>
<b>Status</b>						
Junior level	67	35	39	51	48	240
Mid level	10	30	26	21	18	105
Senior level		4	0	4	0	8
<b>Total</b>	<b>77</b>	<b>69</b>	<b>65</b>	<b>76</b>	<b>66</b>	<b>353</b>

There is more of the younger generation between the ages of 21 and 40, almost even distribution of the

sexes and there is a high level of educated employees.

## Method

This study adopted the mixed method, of both quantitative and qualitative research techniques. The banking industry in Nigeria was the focus of the study and five of the biggest banks were selected. These banks were classified by the apex bank of the country. For the quantitative, a total number of 438 copies of questionnaire were distributed to employees in the selected banks, and 15 managers were randomly selected for the interview (Lopez & whitehead, 2013). 353 copies of questionnaire were retrieved representing 81% of the total given out. A pilot test was carried out to test for reliability of the research instrument. The hypotheses generated were measured using Structural Equation Modelling (SEM) Partial Least Square (PLS) to explain the relationship between the variables.

Table 2. Frequency Distribution

Item	Frequency and Percentage				Total	Mean	SD
	Very Often	Often	Some times	Never			
Impact on others	120 34%	135 38.2 %	63 17.8 %	35 9.9%	353 100 %	2.037	0.957
consequence of tasks on others	18 5.1%	45 12,7 %	136 38.5 %	154 43.6 %	353 100 %	3.207	0.852
No worth to organisation	42 11.9 %	53 15%	64 18.1 %	194 55%	353 100 %	3.161	.0873
Average Mean Score Decision =Satisfied	0.894				2.802		

## Results

### Descriptive Analysis

The demographics of respondents indicated an almost equal number of the genders working in the banks with 51% of males and 49% of females. The age category indicated that more than 87% of respondents belong to the younger generation (40years and less); and 75% had less than 10 years of work experience with 68% belonging to the junior officer cadre. This confirms that the banking industry is making a conscious effort of attracting the younger generation, which should provide an opportunity for learning and development especially in the areas of coaching and mentoring. This should also form a basis for providing work design that can lead to work

meaningfulness for employees, most of whom are young and in need of a solid foundation in the place of work.

### **Analysis of Results**

One of the five elements of work characteristics is task significance. Task significance consists of the impact on others, having no consequence on others (clarity of tasks) and no worth of tasks. (The last two questions were asked as negative questions, and 'never' or sometimes means they disagree with the statement). The frequency distribution for task significance is, therefore demonstrated in Table 2.

Table 2 indicated that a major number of employees believe their work affect others. At the same time, employees believe their task is of huge consequence to others and of worth to organizations. Gostautaitė and Buciuniene (2015) concluded in their study that work engagement increases when employees observe that their work is important to others who could be co-workers or customers. This finding is consistent with Simonet and Castille (2020) who concluded that task significance helps to explain work engagement and can predict work engagement and meaningfulness regardless of the other dimensions of job characteristics.

### **Hypothesis Testing**

Both structural and measurement models were considered for data analysis. The items adapted for measuring the task significance included the impact on others, adoption of consequence of tasks and worth of tasks. For the measurement model, all constructs and items were reflective with the minimum acceptable value loading factor of 0.60 (Fornell & Larcker, 1981).

H<sub>0</sub>: Task significance does not affect the employee work engagement (i.e. physical, emotional and emotional engagement) in the selected Nigerian banks.

The hypothesis had one exogenous variable (task significance) and one endogenous variable employee work engagement (i.e. physical, emotional and emotional engagement) in the selected Nigerian banks. All the research variables were measured using a structured questionnaire with a four Likert scale. The items adapted for measuring task significance include the impact on others, consequence of tasks and worth of tasks. For this reason, data were analysed at the structural/measurement levels and Banks level. The use of Partial Least Square-Structural Equation Modelling (PLS-SEM) was adopted in this research.

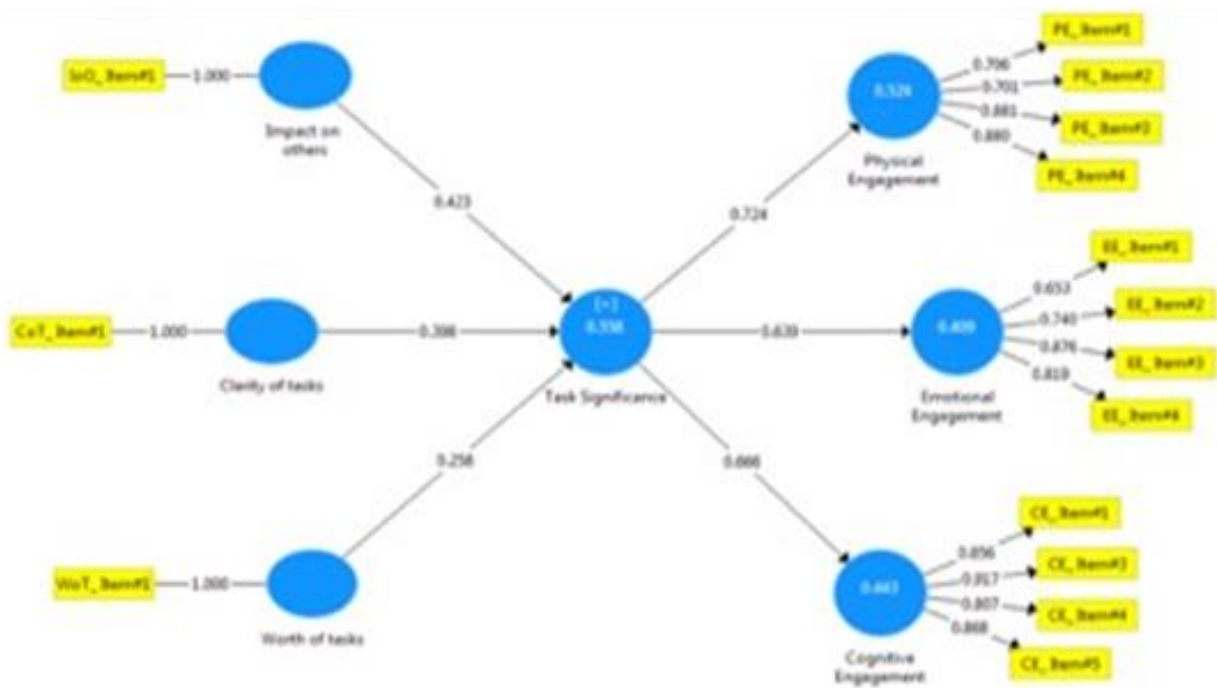
Table 3 indicated that all the constructs of the feedback and employee work engagement in the selected Nigerian banks had values higher than 0.80 and 0.70, which means that they had composite internal consistency and Cronbach Alpha reliability respectively. The factor loadings for the specific measures of construct ranged between 0.713 and 0.808. The instrument was adjudged reliable and valid since the fundamental requirement for the degree of fitness was satisfactorily met (Fornell and Larcker, 1981).

Table 3. Factor Loading for Task Significance in the Selected Nigerian Banks

	Factor Loading	Error Variance	Composite Reliability	AVE	Cronbach's Alpha	No. of Indicators
Indicators	> 0.7	< 0.5	$\geq 0.8$	$\geq 0.5$	$\geq 0.7$	
Task significance (TSG)			0.789	0.626	0.745	3
TSG1	0.713	0.287				
TSG2	0.808	0.192				
TSG3	0.736	0.264				

### Evaluation of Inner Structural Model

Structural equation modelling was used to assess the significant values of the path coefficients. Findings of structural models and path analysis for task significance on physical, emotional and emotional engagement) in the selected Nigerian banks were thus presented:



### Discussion

The model indicated a statistically significant path co-efficient between task significance and physical at  $\beta$  0.724; with emotional engagement, it was at  $\beta$  0.639 and with cognitive engagement at  $\beta$  0.666. All the path coefficients were of practical importance since the significance level is below .05. (Osibanjo, Adeniji, Salau, Atolagbe, Osoko, Edewor & Olowu, 2020).

The result suggested that the impact on others and consequence of task on others (clarity of tasks) had the highest beta values among the constructs that best predicted employee work engagement in the selected Nigerian banks; while, worth of tasks had the least value on employee work engagement. Specifically, the path analysis and bootstrapping based on the institutional-level was also developed to ascertain and assess how task significance influenced employee work engagement. This showed high predictive and explanatory power of the structural models and path analysis for the task significance and employee work engagement.

There were also qualitative findings to investigate the influence of task significance on work engagement. The findings emphasized that task significance was important for employees to feel engaged; this indicated that employees were important and loved to be recognized as important. The significance of work on others and the organization have been corroborated in the works of Adiarani, (2019); Sonnentag, (2017); Gostautaitė & Biciuniene (2015). From the qualitative findings, bank workers understood the importance of their work activities, their dependence on each other as co-workers, and more importantly to the customers they serve. This of course brings them in alignment with the vision of their organizations which in most cases involve rendering good service to customers.

## Conclusion

This study concluded that task significance is highly significant at every level of work engagement of physical, cognitive and emotional. Other studies have also established the importance of task significance to work engagement (Othman and Nasurdin, 2019; Bon and Shire, 2017). Task significance leads to psychological meaningfulness as explained by Khan (1990) and Hackman & Oldham (1976); this enables the employee to invest themselves more into work. This is further corroborated in the study by Cavanagh, Krieger and Henry, (2019) who concluded that attaining any of the psychological states leads to work engagement and better performance. This study also confirms various opinions and findings of several researchers that people who work beyond their immediate concerns to embrace the concerns of others will attain greater level of meaningfulness (Dik, Duffy, & Steger, 2012; Steger, 2017). This corroborates the Hackman and Oldham theory that task significance leads to work meaningfulness.

## Recommendations

This study proves that task significant is highly relevant to achieving work engagement among bankers, therefore bank workers should be given the needed support by building teams and units of people who have similar roles so that they can relieve each other when work demand is high. Employees of banks believe their jobs have consequence on others which means that management should make resources available to meet the demands of customers who are also vital for profitability. It is also important to build trust and integrity among employees considering that bank work needs a high level of trust. Therefore, employees should be trained on issues of ethics and responsibility to further enhance work relationships among colleagues and with customers. This will improve

the feelings of worth and value that employees feel towards their organizations here.

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## Examination of Figures Created by Artificial Intelligence Algorithms in the Context of the Grotesque Body

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**Abstract:** With the emergence of computer and robot technologies, it is seen that the phenomenon of "artificial intelligence", which is a futuristic concept in the world of science-fiction and art, continues its existence in many areas today. Artificial intelligence algorithms, which are equipped with the features of active and dynamic learning, to produce different solutions to different scenarios and to make different choices among memorized actions based on their own intelligence, serve humanity in many areas of our lives such as art, medicine, engineering and education. Working based on the principle that packages consisting of computer coding can respond with different algorithms, artificial intelligence software can complete actions beyond human limits, and can perform many other actions at the same time and in a much shorter time. Although artificial intelligence applications, which were active in many fields before, still have an experimental and developmental presence in artistic fields, the results they offer and the productions are already surprising people. Artificial intelligence applications, which present to the user's taste with different variations by making the desired visualizations based on the text in the desired art forms, can make abstract and conceptual arrangements as well as realistic and impressionist productions. While the grotesque theory, which is far outside of classical aesthetics and sometimes even wholly opposed to it, has just taken its place as a theory together with the renaissance and romanticism, we can say that this theory can be perceived by artificial intelligence algorithms and it can produce visual productions at a level that can comply with the principles of this theory. In this study, grotesque figures were created through the artificial intelligence-based visual production platform called DALL-E, which has been on the agenda recently, and the works were evaluated in the context of classical aesthetics and grotesque theory principles.

**Keywords:** Artificial Intelligence, Art, Grotesque

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## Introduction

"Art is the expression of imagination, the manifestation of creative impulse, and the communication of feeling and thought through an aesthetically pleasing form (Martha Scott Trimble, 1972)." Art is the process or product of deliberately arranging elements to appeal to the senses or emotions (Merriam-Webster's Collegiate Dictionary, 2003). Art has been a visual cultural product that has been used for centuries to convey and reflect an idea, a phenomenon, a thought or an emotion of humanity and has been constantly developing with civilization. Perceiving art and trying to make sense of it is considered equivalent to trying to make sense of our existence as human beings. Novitz argued that art is a human activity that takes the form of the creation of objects, performances or environments that may be beautiful, pleasurable or otherwise significant (Novitz, 1986). However, in our modern age of digitalization and artificial intelligence applications, it is a matter of curiosity to what extent the statement "art is a human activity" can maintain its validity.

Modern computers come in a variety of forms and can perform a range of tasks. Many people have computers that can take dictation or automatically check a written document for spelling errors; chess-playing computers can beat the world's Grand Masters; autonomous computer-controlled robots can explore other planets with minimal input from spaceflight engineers on Earth (Challoner, 2002, p:4).

The Internet and other forms of digital technology have had a significant impact on the art world. In many ways, the internet has expanded the reach and accessibility of art, making it possible for artists to share their work with a global audience and for audiences to access a wide range of art from around the world. Digital technology has also changed the way art is created and consumed. Many artists now use digital tools and platforms to create and share their work, and many art exhibitions and events are now organized online. The use of social media and other online platforms has also made it easier for artists to connect with audiences and for audiences to engage with art in new ways. At the same time, the proliferation of digital technology raises questions and concerns about its impact on the art world. While some artists or art audiences argue that the ease of access to art online has devalued the art market, others express concern about the impact of digital technology on the traditional art world and the role of the artist.

AI, or artificial intelligence, is the ability of a computer or machine to perform tasks that normally require human intelligence, such as learning, problem solving, decision-making and understanding language. AI systems can be designed to mimic human cognitive functions such as perceiving, reasoning and acting to perform a wide range of tasks. There are several different types of artificial intelligence, including the following:

Narrow AI: AI systems designed to perform a specific task or set of tasks. These systems cannot generalize their learning to other tasks or contexts.

General AI: AI systems that can perform a wide range of tasks and adapt to new situations and environments. These systems can learn and adapt in a similar way to how humans learn and adapt.

Supervised Artificial Intelligence: AI systems that are trained on a labeled dataset where the correct

output is provided for each input.

Unsupervised AI: AI systems that are not given any labelled training data and must discover patterns and relationships in the data on their own.

Reinforcement learning: AI systems that learn through trial and error by taking actions in an environment and receiving rewards or punishments based on the results of those actions.

AI has the potential to revolutionize many different fields, including healthcare, education, transportation and manufacturing. However, there are also concerns about the potential ethical and societal implications of AI, such as the potential for layoffs and the potential for misuse or abuse of the technology.

In the past, AI algorithms have mainly been used to create complex images with single objects and without the possibility of changing their composition. However, recent artistic applications of AI have created more expressive grotesque bodies by creating composited living and organic beings. This application is programmed to be able to compare an artist's production with other artistic productions (by searching for textures and colors) and then create corresponding variations on its own.

Grotesque is basically a term related to the body and body image. The similarities and differences between human and animal bodies are themes that artists think about when creating grotesque forms. Grotesque body images have existed since the beginning of art. Grotesque paintings were made where the limits of the human form were not enough for man. Dissatisfied with what is presented and represented, the artist wanted to explore alternative physical forms other than human beings and played with anatomy. Although the purpose of the grotesque body image has changed throughout the history of art, it has always been related to borders and has always referred to grotesque body depictions.

Grotesque is basically a term related to the body and body image. The similarities and differences between human and animal bodies are the themes that artists think about when creating the grotesque form. The grotesque body image has existed since the beginning of art. A grotesque image emerged where the limits of the human form were not enough for human beings. In different periods, artists who wanted to overcome the limits applied the grotesque body shape to the extent that the psychological and social environment of the period allowed. A grotesque portrait is a type of portrait characterized by distorted, exaggerated or otherwise unconventional features or proportions. It may depict a person or animal in a deliberately distorted or exaggerated manner to create a sense of unease or discomfort in the viewer. It aims to challenge the viewer's perceptions and expectations of what is normal or aesthetically pleasing. Some examples of grotesque portraiture include paintings, sculptures and other forms of visual art that depict subjects with exaggerated or distorted features. The idea of AI creating grotesque art is, in principle, possible. In principle, AI applications use several different ways to create art:

Generative art: AI systems can be trained to create original works of art using techniques such as deep learning and neural networks. These systems can be fed with a large dataset of images or other types of art and learn to produce new pieces that are similar in style or subject matter to the training data.

AI-assisted art: AI systems can be used to help artists create art by providing suggestions or variations on a particular theme or style. For example, an artist could use an AI system to generate ideas for compositions or colour palettes.

Art created by AI: AI systems can be used to create fully automated artworks by following specific instructions or working independently.

According to Faggella (2020), it is possible for AI to create grotesque art. Artificial intelligence systems can be trained to create original artworks using techniques such as deep learning and neural networks (Z., 2020). These systems can feed a large dataset of images or other art forms and learn to produce new pieces similar in style or subject matter to the training data (Minett & Jones, 2019). Additionally, AI systems can be used to help artists create art by providing suggestions or variations on a particular theme or style (Popović & Feinberg, n.d.), or to create fully automated artworks by following specific instructions or working independently (Thomas & Leite, 2020). However, it is important to note that although these systems can create art, they do not have the same creative abilities as humans and may not have the same level of nuance or originality as art created by a human artist (Faggella, 2020).

In practice and theory, it is possible to use technology in art. Technology has played a role in the creation of art for centuries, and in recent years the use of technology in art has become more widespread. As in every field, the economic, efficient and boundary-pushing benefits of technology are being tried to be used efficiently in the field of art.

There are many ways in which technology can be used in art, including the use of digital media, computer-generated images and interactive installations (Farrow, 2018). For example, artists can use digital tools to create paintings, sculptures or photographs, or they can use technology to create immersive experiences or interactive installations that allow viewers to interact with the artwork in new ways (Manovich, 2013).

Overall, it is clear that the internet and digital technology have had a significant impact on the art world and it is inevitable that this impact will continue to evolve in the future. Examining figures generated by AI algorithms in the context of the grotesque body could be an interesting and potentially valuable area of study as it could provide insight into how AI algorithms represent and interpret concepts. It may also shed light on how AI-generated images may differ from those created by artists and how these differences may affect the viewer's interpretation and understanding of the images. As a rich and fascinating area of research, this work can provide valuable insights into the ways in which AI algorithms perceive and represent the physical world.

### **Working Principle of Artificial Intelligence**

Artificial intelligence (AI) refers to the ability of a computer or machine to perform tasks that normally require human intelligence, such as learning, problem solving, decision making and language comprehension (Minett & Jones, 2019, p. 396). AI systems can be designed to mimic human cognitive functions such as perceiving,

reasoning, and acting to perform a wide range of tasks (Thomas & Leite, 2020, p. 1). Alan Turing, the famous British logician and mathematician, was the first to introduce the concept and philosophy of artificial intelligence. Before the Dartmouth conference, in 1950, he published an article entitled "Computing Machinery and Intelligence" in the August issue of the philosophical journal *Mind*. In this article, Turing carefully opened the question "Can machines think?" to a philosophical debate and rejected the objections against the claim that "machines can think" (Pirim, 2006). In modern times, the concept of artificial intelligence, sometimes referred to as machine intelligence, refers to the ability of a manufactured machine to mimic elements of human intelligence. As robots and computers moved from science fiction to reality in the twentieth century, the possibilities of artificial intelligence captured the public imagination (Pearce, 2011, p:11).

There are several different approaches to building artificial intelligence, including the following:

**Rule-based systems:** Artificial intelligence systems designed to follow a set of predetermined rules to accomplish a task (Minett & Jones, 2019, p. 397). These systems have limited ability to adapt to new situations or learn from experience.

**Expert systems:** Artificial intelligence systems designed to mimic the decision-making processes of an expert in a particular field (Minett & Jones, 2019, p. 397). These systems are based on a large number of rules or decision trees created by human experts and used to make decisions or recommendations.

**Neural networks:** Artificial intelligence systems designed to mimic the structure and function of the human brain fall into this category (Thomas & Leite, 2020, p. 1). These systems consist of interconnected nodes or "neurons" that can process and transmit information. Neural networks can be trained to recognize patterns and make predictions based on input data.

Deep learning can be defined as a type of machine learning that uses large datasets and multiple layers of interconnected neural networks to learn and make decisions (Thomas & Leite, 2020, p. 2). Deep learning algorithms can theoretically learn to recognize patterns and features in data without the need for explicit programming.

**Natural language processing (NLP):** Artificial intelligence systems designed to understand, interpret and create human language (Minett & Jones, 2019, p. 397). NLP systems can be used for tasks such as language translation, text classification and sentiment analysis.

Artificial intelligence systems or applications often require machine learning algorithms to improve their performance over time and continue to evolve based on the results of this learning. Machine learning is a method of teaching computers to learn from data without explicit programming. There are two main types of machine learning: supervised learning, where the computer is provided with labelled training data and a set of predetermined rules or algorithms to follow, and unsupervised learning, where the computer is not provided with any predetermined rules or algorithms and must learn to identify patterns in the data on its own (Minett & Jones, 2019, p. 397).

AI systems can be trained on large datasets to improve their accuracy and performance. This process involves feeding large amounts of data into the system and adjusting the parameters of the machine learning algorithms to optimize their performance. The goal is to ensure that the system makes predictions or decisions that are as

accurate as possible based on the data it has been trained on. Artificial intelligence has the potential to revolutionize many industries and is already being applied in fields as diverse as healthcare, finance, transportation and manufacturing. However, the development and deployment of AI brings with it ethical and social concerns such as bias, accountability, and the potential displacement of human workers (Minett & Jones, 2019, p. 396).

### *Dall-E Artificial Intelligence Art Practice*

Dall-E is a machine learning model developed by OpenAI and designed to create original images from textual descriptions. Introduced in a paper published in 2021, the platform is named after the famous artist Salvador Dali and Pixar's iconic Luxo Jr. lamp (Ramesh, et al. 2021). Dall-E aims to take a textual input (such as a sentence or paragraph describing an image) and generate a corresponding image. One of the unique features of Dall-E is its ability to create not only realistic, but also creative and surreal images. It is able to do this by drawing on a large dataset of images and text descriptions, which allows it to learn the relationships between words and visual concepts. Another version, DALL-E2, introduced by OpenAI in April 2022, is trained on 650 million text-annotated images of double libraries. The program uses GPT-3's 12 billion parameter reduction in combination with another model called CLIP (Contrastive Language-Image Pre-training), uses the transducer to replace text inputs with multi-pixel outputs, and then uses the CLIP image recognition system to refine the results. This recognition system is then used to categorize each image and then determine its description from a random list of captions. It thus attempts to link word and image in a functional "image-text dictionary" (Revell, 2022). Overall, Dall-E is an impressive example of the capabilities of modern machine learning models and has the potential to revolutionize the way we create and interact with visual media.

### **The Place of the Grotesque in Art**

Grotesque art is a style of art characterized by the use of bizarre, fantastic or nightmarish imagery. It often includes distorted or exaggerated forms and may aim to shock or surprise the viewer (Faggella, 2020). The term "grotesque" is derived from the Italian word "grottesco", which means "belonging to or relating to a cave". According to Gombrich, in art the term came to refer to a particular type of decorative style that emerged in Italy during the Renaissance, characterized by the use of fantastic or absurd images, often combined with elements of classical mythology or folklore (Gombrich, 1995, p. 479). The grotesque can be found in a variety of media, including art, painting, sculpture, literature and film. Minett & Jones argue that the grotesque is often associated with the surrealist movement in modern art (Minett & Jones, 2019). The origins of grotesque art can be traced back to ancient Rome, where it was used to decorate the walls of underground passages and tombs. In the Renaissance, grotesque art was popularized by artists such as Raphael and Michelangelo, who used it to decorate the Vatican's Raphael Rooms and the Sistine Chapel respectively (Gombrich, 1995, p. 480). Grotesque art continued to be popular throughout the Baroque and Rococo periods and had a lasting influence on modern art, with artists such as Salvador Dali and Francis Bacon incorporating grotesque elements into their works.

Grotesque art has often been used to express social and political criticism, as well as to comment on the human condition (Popović & Feinberg). For example, Goya's "Disasters of War" series of engravings depicted the horrors of the Napoleonic Wars in a grotesque style, and Bosch's "Garden of Earthly Delights" and "Haywain Triptych" used grotesque imagery to comment on corruption (Gombrich, 1995, p. 480). In literature, the grotesque was used as a tool of social criticism by writers such as Edgar Allan Poe, who used it to explore themes of madness, horror and the dark side of the human psyche.

Mikhail Bakhtin was the first to theorize the phenomenon of the grotesque, although the concept was introduced earlier. In Mikhail Bakhtin's theory of literature, the term "grotesque" refers to a particular kind of imagery and symbolism characterized by its focus on the body, materiality and the physical processes of life. The grotesque is often associated with carnival, a festive event in which the usual social hierarchies and norms are temporarily suspended and people are free to engage in playful, often absurd or bizarre behaviour and activities (Bakhtin, 2005). Bakhtin argued that the grotesque has the unique ability to subvert and challenge dominant ideologies and cultural values by disrupting the ordered, rational and controlled forms of representation typically used to represent the world. He saw the grotesque as a powerful tool for exposing and criticizing the fundamental power structures and ideologies that shape our understanding of the world.

In literature, the grotesque is often used to convey a sense of absurdity, absurdity and the irrationality of the world, and is often associated with themes of death, decay and the transience of life. It can also be used to evoke a sense of the grotesque body, with its excesses, deformities and wretched qualities. Grotesque art has the ability to shock and disturb the viewer and has often been used to challenge social norms and conventions (Thomas & Leite, 2020). But it can also be used to express the artist's own inner turmoil or to interpret the human condition in a more abstract way (Minett & Jones, 2019). Whatever the purpose today, grotesque art remains a powerful and enduring form of artistic expression.

## Method

In this study, the definitions of grotesque in the literature were investigated, the criteria that can constitute a grotesque image were determined and it was tried to examine whether the images created by artificial intelligence contain grotesque elements in line with these criteria. In this way, it is aimed to bring an enlightening approach to the issue of whether artificial intelligence algorithms can produce in line with a specific art concept such as grotesque. In this context, the criteria to be followed in the distinction of grotesque art elements are listed below. Since grotesque art is a highly subjective and interpretive form of artistic expression, there are no strict criteria for creating a grotesque work of art. However, some elements often found in grotesque art can be listed as follows:

Distorted or exaggerated forms: Grotesque art often involves the use of distorted or exaggerated forms, such as elongated limbs or exaggerated facial features (Gombrich, 1995, p. 480). This is used to create a sense of unease or disorientation in the viewer. Exaggeration in organic form often refers to limbs that



protrude too far from the body. Unusual elongation, swelling, bulging, bulging and disproportionate growth of the limbs that extend outward from the body are noticeable.

Strange or nightmarish images: Grotesque art often includes bizarre or nightmarish images intended to shock or surprise the viewer (Faggella, 2020). This may include the use of disturbing or surreal elements such as monsters, demons or other fantastical creatures.

Themes of social or political criticism: Grotesque art has been used as a means of social or political criticism, often commenting on issues such as war, poverty or corruption (Popović & Feinberg, n.d.). The use of grotesque imagery can help to convey the seriousness or horror of these issues more powerfully.

Expressions of the artist's inner turmoil or the human condition: Grotesque art can also be used to express the artist's own inner turmoil or to interpret the human condition in a more abstract way (Minett & Jones, 2019). The use of grotesque imagery can help the artist to communicate their feelings or thoughts in a more powerful and evocative way. In general, the criteria for creating a grotesque artwork will depend on the specific aims and intentions of the artist. Some artists may use grotesque imagery to shock or disturb the viewer, while others may use it to express a deeper meaning or comment on social issues.

## Results



Figure 1. Grotesque Portrait 1 made with Dall-E Module

The Dall-E module interface, <https://academic-accelerator.com/>, was accessed and the definition of "Grotesque Portrait" was given. In the portrait in Figure 1, which is one of the visual results given, the unusual bulges noticed

in the facial anatomy reflect grotesque effects. The excessive puffiness and sagging of the cheeks, the thickness of the skin on the forehead, and the curly hair and beard details give the impression that artificial intelligence can perceive this hybrid form.



Figure 2. Grotesque Portrait 2 made with Dall-E Module

Images such as demons, goblins, devils, goblins and monsters have been frequently used, frightening and frightening elements in the grotesque world. In the history of art, it is seen that the motifs belonging to these images are used one-to-one, or in some cases, they are intertwined with each other and made into a hybrid. A demon-like image is evoked by the sharp limbs. Sharp teeth, pointed jaws, pointed noses and most importantly pointed ears, which humans do not have. We can say that these sharpnesses are also present in Figure 2. In this image, it is realized that Dall-E is not only trying to create a demon anatomically, but also trying to reflect an eerie facial expression.

In Figure 3, the third image presented to us by the Dall-E module, we can see the reflections of the deformations and exaggerations in Figure 2. Although it is out of the frame, it is easily noticeable that the ears have a pointed form. The ratio of the width of the chin from the temples to the top of the skull is far outside the anatomy of a healthy human being. The facial lines with relief-like reliefs that are increased in certain gradations can again be an example of the exaggerations frequently encountered in the grotesque body.



Figure 3. Grotesque Portrait 3 made with Dall-E Modulewith Dall-E Module

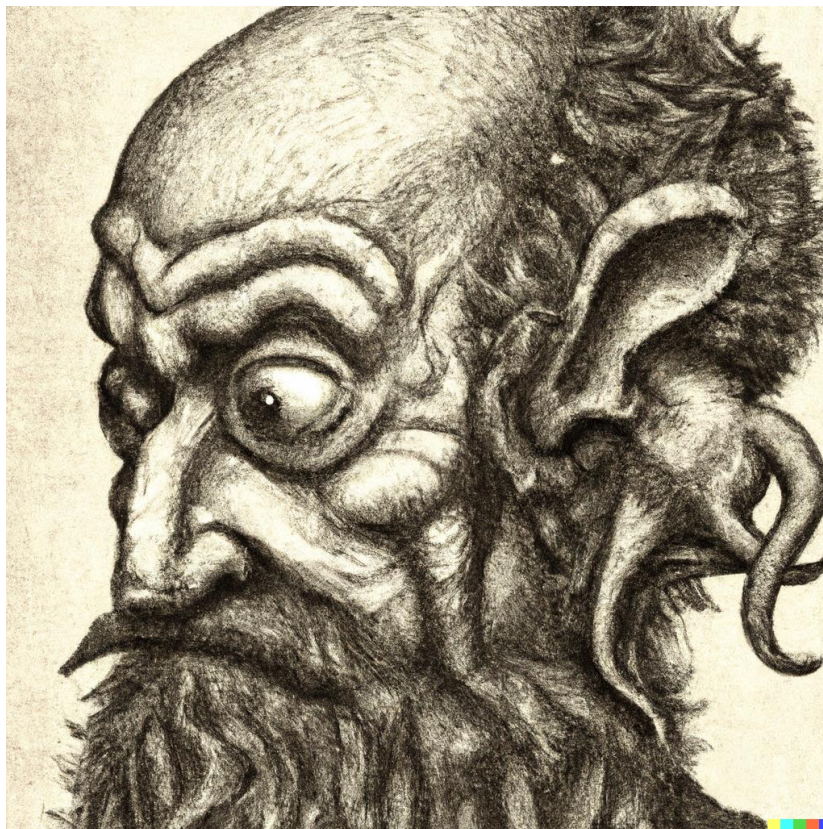


Figure 4. Grotesque Portrait 4 made with Dall-E Module

## Conclusion

AI can perform a variety of visual design tasks, but how realistic or compatible these tasks are with real-world objects depends on the design of the AI system and the data sets used. AI systems can create designs based on the data sets they have learned, and these designs can have various properties. For example, AI systems can draw portraits, and these portraits can be realistic or grotesque. However, the probability that the portraits drawn by artificial intelligence systems are grotesque may vary according to the number of grotesque portraits in the data set taught to the system and the qualities of these portraits. Therefore, the probability of AI systems drawing grotesque portraits may vary according to the design of the systems and the data sets used.

In total, the Dall-E module, which produces four different images with the same directive, presents us with four different portraits. It can be said that these portraits contain the grotesque details described in written sources. The limbs, tentacles and lumps extending outward from the anatomical body are the organic forms of the grotesque atmosphere. These details are also found in the visuals. The hybrid structures integrated with each other fit the definition of the grotesque body phenomenon as multi-living and integrated with nature.

In the light of this information, it can be concluded that the Dall-E module, which is an artificial intelligence application, can correctly comprehend the definition of the grotesque body and produce portraits with grotesque impressions.

## Recommendations

If we teach artificial intelligence systems the meaning and usage of a term, they can use these terms more accurately and meaningfully. For example, if we teach an AI system the meaning of the term "grotesque", the system can use this term more accurately and produce more meaningful results in its work.

The term grotesque means that something looks unrealistic, superficial or cartoonish. For example, a portrait being grotesque can make it appear unrealistic or exaggerated. Artificial intelligence applications can bring a variety of benefits in the field of art, but they can also create concerns that they can replace the originality, creativity and human touch that serve artists well. Therefore, the use of AI systems in the arts needs to be carefully considered in terms of how the systems can help artists' work and how they can support artists' originality and creativity. In addition, during the use of artificial intelligence systems in the field of art, care should be taken to ensure that the work of the systems is carried out in accordance with ethical rules. In addition, artificial intelligence modules, which can exhibit increasingly detailed learning and more advanced interpretations, are not lagging behind in categorizing a very specific concept such as the grotesque. The theory of the grotesque, which has been studied in the fields of theater and literature, will enrich the literature by conducting studies in art and other visual fields, and will guide individuals who want to work in this field and understand this theory.


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## Lower Secondary Students Using Mathematical Modeling for Managing Water Consumption: The Case of Asma

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**Abstract:** The main purpose of the current study is modifying students' daily drinking water and managing waste water through modelling activities as context and modelling cycle as tool. In this study, 12 students (13-14 years old) from the lower secondary school were participated. These students were participated in two sessions (60 minutes) each week for three months. Three modelling activities had been designed for this study. These modelling activities were related to the amount of water consumption. Classroom activities were video recorded and used as data in this study. In some cases, interviews conducted and used as complementary data. Tension which happened during the implementation of these two activities analyzed with activity system as a theoretical framework. The results of this study show that students were able to manage and modify their daily water consumption through doing modelling activities. Results of this study also show that power of mathematics could help students to solve their real-world problems and help them to have better life.

**Keywords:** Activity Theory, Modelling Cycle, Modeling Activity, Tension, Water Consumption.

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### Introduction

In the twenty-first century, climate changes have been happening in many parts of the world (Lowe, Lynch & Lowe 2014). These changes can make many problems including water shortage crises in many countries. For example, in Iran which have around 85 million populations, there is a crisis of water shortage (Madani Larjani, 2005). Therefore, the management of the water consumption is an essential issue for some countries. Modifying the consumption pattern is one of the water management strategies which appear in literature. Therefore, the modifying of water consumption pattern is an important issue in the real world that how doing it by using mathematical knowledge is very important. Hence, students need to have skills that by using them can to solve

the problems of the real world. In this regard, the many countries including Germany and China, their main goals of mathematics education are based on skills development about the relationship between real-world and mathematics world. For example, in the curriculum of China this is referred explicitly the issue which students " *experience relationships between mathematics and real-world* " (Ludwig & Xu, 2010, p. 78). However, because of the difference of two contexts of the real world and mathematics world, the connection between them is not possible (Bonotto, 2007). The studies have attributed the main of the cause of disconnection between them to the gap between the two worlds that have made mathematical learning problems (Gravemeijer, 1999). This gap has been made that students could not use their school mathematics in the out-of-school situation. In this way, Lave (1988, cited in Boaler, 1998) stated that students are not capable use learned- mathematics of school in shopping situations. Therefore, the filling of the gap between the two worlds is an important goal that will follow in this study. A review of the research literature on the real world and the mathematical world shows that connection between the real world and the mathematical world is possible under certain conditions. Since mathematics is a human activity (Freudenthal, 1991), studies show that if human activities rely on everyday experience and mathematics, one can establish a connection between the real world and the mathematical world. For example, Civil (2002), in his study developed activities that relied on student experience and everyday mathematics. By using these activities and mathematizing the real situation, he was able to the connection between the real world and the mathematical world. Hence, the mathematization process called mathematical modelling in the mathematical education domain (Reusser & Stebler, 1997, Cited in Bonotto, 2004). Mathematical modelling can be used as a tool to connect the real world and the mathematical world (Freudenthal, 1991). In general, the mathematical modelling is a reciprocal process in the mathematics education that links the real world and the mathematical world (Stillman, 2010; Garcia, Gascón, Higuera, & Bosch, 2006).

However, it is necessary to look at the importance of mathematical modelling in mathematics education until to understand its role in the relationship between the real world and the mathematical world. Many researchers from different countries have mentioned in their studies that mathematical modelling is one of the main topics in the school mathematics curriculum, for example, Borromeo Ferri (2108) says that "*The teaching and learning of mathematical modelling has become a key competency within school curricula and educational standards in many countries of the world*" (p. ix). At this time, many countries in the world that considered modelling as one of the major topics in mathematics curriculum (e.g. US (Doerr & Lesh, 2011), Queensland and Singapore (Stillman, 2010), the South African Curriculum (Knott, 2014), China (Ludwig & Xu, 2010), Brazilian curriculum (Biembengut & Faria, 2011), Venezuelan curriculum (Ortiz & Santoz, 2011), New Zealand (Schaap, Vos & Goedhart, 2011), Japan (Matsuzaki, 2011), Germany (Bracke & Geiger, 2011) and \*\*\* National Curriculum (2011)). In addition to countries' curricula focusing on modelling, international assessments have also focused on mathematical modelling, for example, it can be pointed out the results of Pisa 2006 Cited. The results of Pisa 2006 (OECD, 2007) show that students all over the world have difficulty in modelling tasks. Another challenge about modelling is that teaching, according to Niss (2007, cited in Stillman & Galbraith, 2011), is one of the challenges of curriculum teaching of applications and modelling in school mathematics education.

In addition to mathematical modelling, which has an aspect of integrating, the researchers have pointed to the use of cultural artefacts in modelling activities. Among them are researchers such as Alsina (2007); Bonotto (2004)

who in their study showed that the use of cultural artefacts is a prominent feature of modelling activities. Specifically, Bonotto (2007) points out in her study a variety of cultural artefacts such as bills of shopping, bottles, labels, etc. Because of these artefacts are as part of the everyday life experience of students, she considers them meaningful for students. According to Bonotto (2004) by using "cultural artefacts" can "creating a new tension between school mathematics, and the students' everyday-life knowledge." (p.315). Therefore, by using cultural constructs can create tension for students in the real world. So, these tension are the disagreements, dichotomies, problems, and concerns that arise concerning a subject for a person. The cultural artefacts used in this study are related to water consumption that creates tension for students. In fact, by using water consumption-based modelling activities can be creating new tension for students, which for analyze of them use the theory of Cultural-historical activity theory. In the activity theory, human activity is investigated on the base of the activity system that is consisted of six components. This activity system is shown in Figure 1.

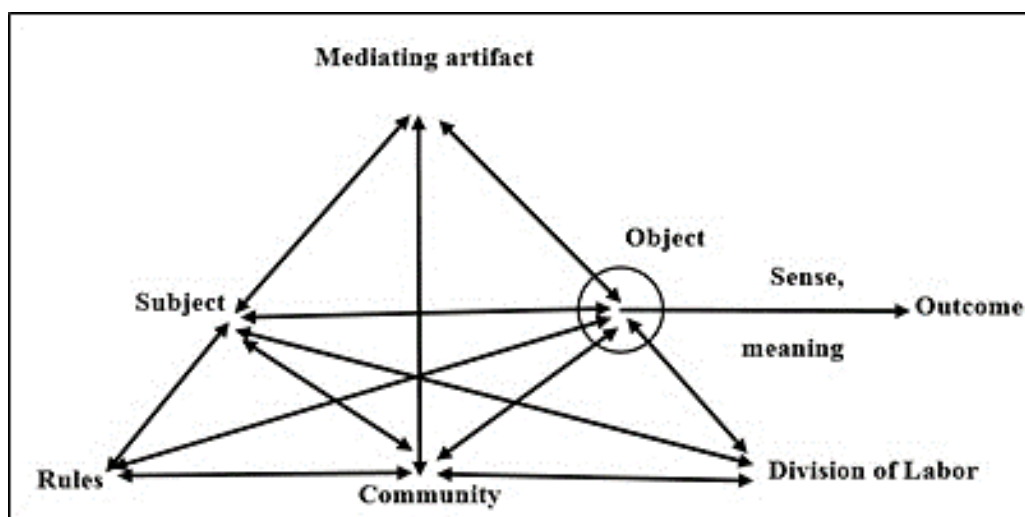


Figure 1. Structure of the Human Activity System (Engeström, 1987, p.6 cited in Engeström & Sannino, 2010)

In Figure 1, *the subject refers to the individual or subgroup whose position and point of view are chosen as the perspective of the analysis. Object refers to the 'raw material' or 'problem space' at which the activity is directed. The object is turned into outcomes with the help of instruments, that is, tools and signs. The community comprises individuals and subgroups who share the same general object. Division of labor refers to the horizontal division of tasks and vertical division of power and status. Finally, rules refer to the explicit and implicit regulations, norms, conventions and standards that constrain actions within the activity system. The circle around the object in Figure 3 indicates the purpose of the system differs from the personal purpose. (Engeström and Sannino, 2010, p. 6).*

The researchers consider the activity system of activity theory as the unit of analysis (Jonassen, 2000) which can be used to analyze the tension that occur in the activity system. However, the activity system that this study needs to use to define modelling activity systems is an activity system where elements are defined in the real world. In this regard, Jurdak (2006) uses Engstrom's activity system to present systems for problem-solving activities. He



introduced the activity system of problem-solving in three different context which is included school context, simulated real world context and finally real-world context (see Figure 2).

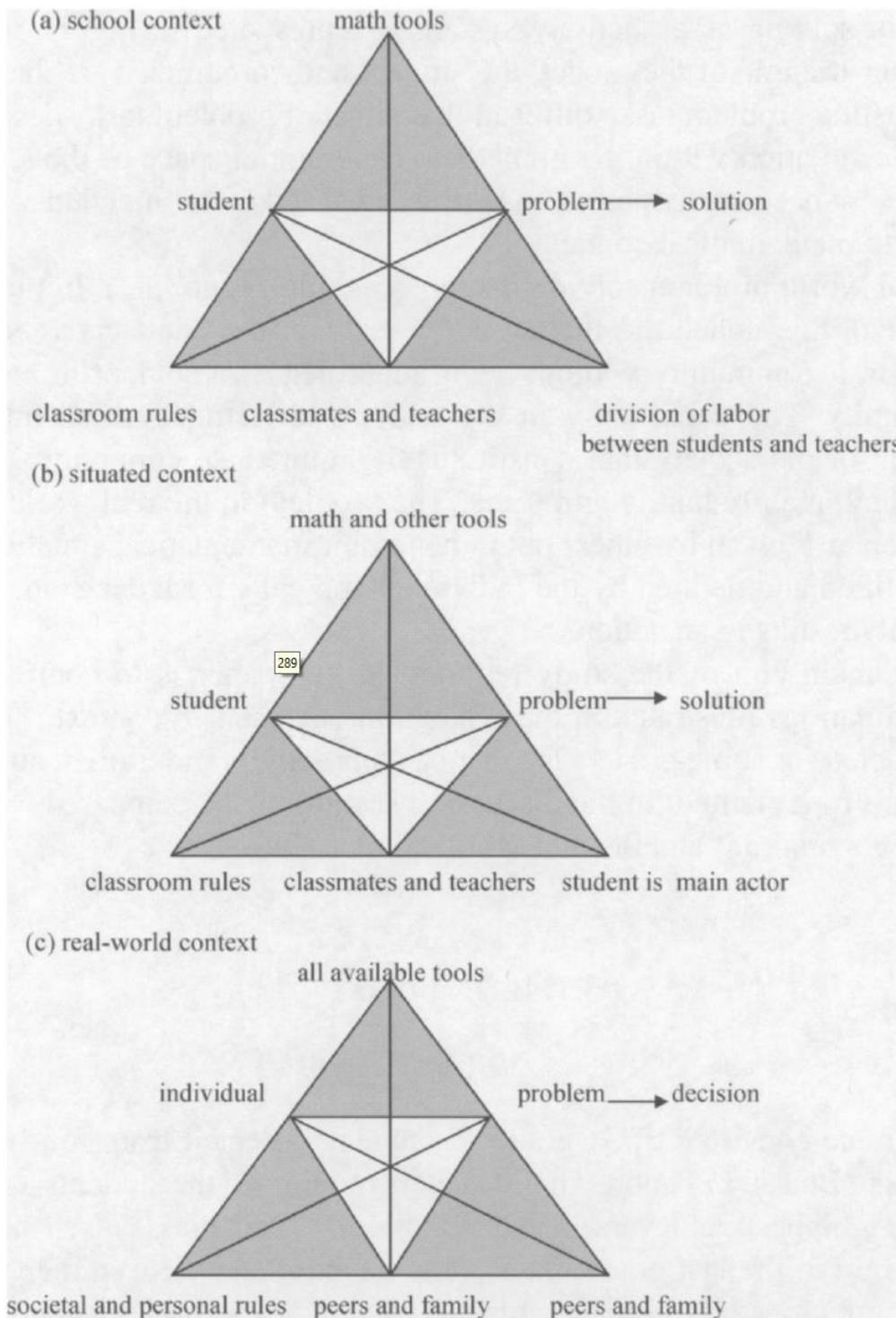


Figure 2. Problem Solving Activity System in (a) School Context, (b) Simulated Real-world Context and (c) Real-world Context

In the recent years, several studies have used activity theory for conducting research (e.g. David & Tomaz, 2012; David, Tomaz, & Ferreira, 2014; Engeström, 1996, 2015, 2016; Flear, 2016; Hashim & Jones, 2007; Yamagata-

Lynch, 2010; Tomaz, & David 2015; Jonassen, 2000; Mwalongo, 2016; Otrell-Cass, Andreasen, & Bang, 2016; Ramanair, 2106; Russell, 2009), however in current study a composite model that integrates activity theory and modelling cycle (modelling activity system) was used to investigate students tension in solving real-world problem which related to students everyday life. It seems modelling activity system is a new idea for research in this domain. In general, this study, by using mathematical modelling, it creates a series of tension in toward changing student's water consumption with using activity theory for analysing data. Specifically, the following research question guided the present study.

- How students could manage, and modify water consumption patterns through modelling activities?

## Methodology

### Context of the Study

There is an important issue for many countries around the world for water consumption. Because the population of the world growing fast and we need more water resources and in the same time we have to a reduce and diversify our water use. Upon united Nation webpage (Water and Sanitation - United Nations Sustainable Development) water scarcity affects more than 40 present of the global population and is projected to rise. UN website define 6 target goals for sustainable development of water resources which some of them mostly related to water consumption and management for example 6.1 and 6.4 (see Table 1).

Table 1. United Nation Target Goals for Water Consumption and Management

<ul style="list-style-type: none"><li>• 6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all;</li><li>• 6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations</li><li>• 6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally</li><li>• 6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity</li><li>• 6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate</li><li>• 6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes<ul style="list-style-type: none"><li>○ 6.A By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies</li><li>○ 6.B Support and strengthen the participation of local communities in improving water and sanitation management</li></ul></li></ul>
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### Origin of the Study

This study is part of that larger study, "Developing Conceptual Understanding by Volume Measurement". In that large study, 12 modelling activities were designed during the study, which three activities were selected for the present study. The focus of them is on modifying the pattern of water consumption.

### Participants

The participants in this study were the 12 students from the eighth-grade of a lower secondary school. These students were participated in two sessions (60 minutes) each week for three months. All the students are lived a village in south-east of Iran. The mean age of students was 13-14 years. Students had allowed to use handicraft, origami, and calculator. Students of the class were divided into several groups of three and two. They work on group at school time and then they continue their working at home individually. The task of each student was find a way for modifying their water consumption. Finally, all students present their idea through whole class discussions.

### Data Collection

Study data were collected during the 3 months from April 2022 to June 2022 through modelling activities, students and teacher notes, interview and observation of the class film. These data were from three modelling activities that students face "real challenge" during a modelling process (Alsina, 2007). "Real challenge", in this study, is the consumption water problem. These three activities were divided into two parts, the first part being water consumption modelling activities  $A_0$  and the second part being waste modelling activities  $A_1$ . Drinking-Water modelling activities consist of three interconnected activities, that respectively the modelling activity of daily drinking Water (see Figure 3 for activity  $A_{0,1}$ ).

Figure 4 clearly states the student's idea: "*I filed a bottle from water in the previous activity ( $A_{0,1}$ ) and it put on the refrigerator, I drank to water 450 ml till night. What is the doctor's opinion about my drinking water?*".

The teacher uses from student' idea " you see everybody in our city that a bottle of water in with themselves " and designs the activity  $A_{0,3}$ . In this activity, based on software information that indicates daily drinking water for exercise and non-exercise days, from students are asked to calculate their drinking water based on their weight and pour it into a bottle and always carry the bottle with themselves that the activity described Figure 6. In this activity, the students made the origami boxes using the instructions in the activity. Next, by busing made- boxes, students calculate their drinking water at home and report it to the classroom, and then the teacher checked the students' responses. The students had a problem in doing the modelling activity, their problem was solved. In finally, again students did the activity until they can right report their drinking water. Some students took this activity for two weeks and others for three weeks to confirm their initial report on the amount of drinking water consumed by the teacher. In this activity, 28 interviews were conducted with students, with an average of 15 minutes per interview. After the activity and the next activity in the classroom, students were asked to perform the above activity at home to determine the exact amount of drinking water. After that, the students will present

their report to the classroom. If the students do not do their calculations correctly, the students will do the activity again to confirm the answer by the teacher. After the teacher accepts the answer, the amount of drinking water by the student is presented to the doctor in a report. the teacher's interview with the doctor is recorded for half an hour, and it plays in the classroom the next day. And then, teacher interviews with each student in the classroom.

**A<sub>01</sub> : Modelling Activity Computing Consumption of Daily Water**

With making of the box that its steps are brought, to determine, how much water do you drink in all day?  
First time..... Figure of box..... Calculations..... What time.....  
How much water did you drink, total?

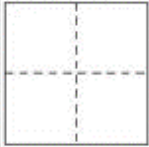
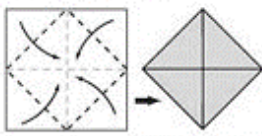


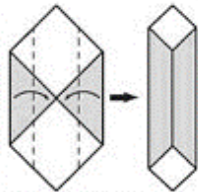
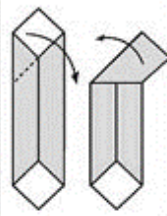
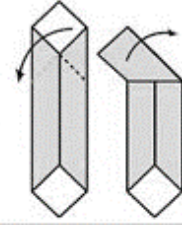

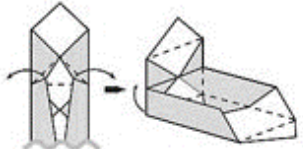
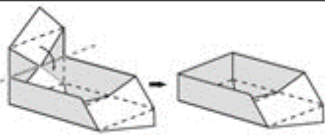
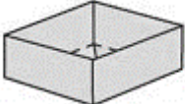
 <p>1.start with square a piece of paper.while side up fold the paper in half horizontally and vertically ,so the creases look like this</p>	 <p>2.fold four corners of the paper toward the center point</p>	 <p>3. Fold the top and bottom of this square into the center and open out again to create these creases.</p>	 <p>4. Open out the top and bottom triangle flaps</p>	 <p>5. Fold the sides of the model into the centre,creasing well.</p>
 <p>6. Fold down top corner of model and then open out again.</p>	 <p>7. Fold down model in the other direction</p>	 <p>8. Repeat step 6 &amp; 7 at the other end of the model, so you have the new creases at both ends, as shown.</p>	 <p>9. At one end of the model, open out model along the creases you just made. This will raise the top portion of the model vertically.</p>  <p>10. Fold top of model over into the box. Its taking shape!</p>	 <p>11. Repeat Step 9 and 10 at the other end of the box... and its finished!</p>

Figure 3. The Modelling Activity of Daily Drinking Water (A<sub>0,1</sub>) (cited in site: www.origami-fun.com)

### Data Analysis

As has been shown, activities related to water consumption pattern modification have developed over a while of the study, which is characteristic of the historical theory of activity referred to by Engeström (1996). These interconnected activities with each other form an activity system that uses the activity theory to analyze it. According to Engstrom, the activity theory is used to analyze systems of activity in which human activity is defined as the unit of analysis. Activity theory is used as a method and a theoretical framework applied to qualitative methodology topics for the analysis of qualitative data related to situations in which have cultural or social contexts (Yamagata-Lynch, 2010; Mwalongo, 2016; Hashim & Jones, 2007). The data of this study have

cultural or social aspects because they are modelling activities related to water consumption. On the other hand, research-based on the theory of activity should examine human activities in contexts of real-life activities (Ramanair, 2106). Therefore, the study examines the modelling activities that come from students' real life. Many studies of cultural-historical activity theory are conducted through the ethnographic methodology and case studies (Russell, 2009, p. 41), where data collection requires participant observation, interviews, and discussion in real-life contexts (Scriber 1985, Vygotsky, 1980 cited in Li, 2016, p 109). Therefore, this study was conducted by adopting a theoretical framework of activity theory using ethnography.

In this section, to emphasize the analysis of tension is that by the creation of them in modelling activity subsystems were caused modifying of water consumption pattern. These tension are as a source of change in students' water consumption patterns whose analysis of them is very important in the study. Hence, their analysis is carried out by Modelling Activity System.

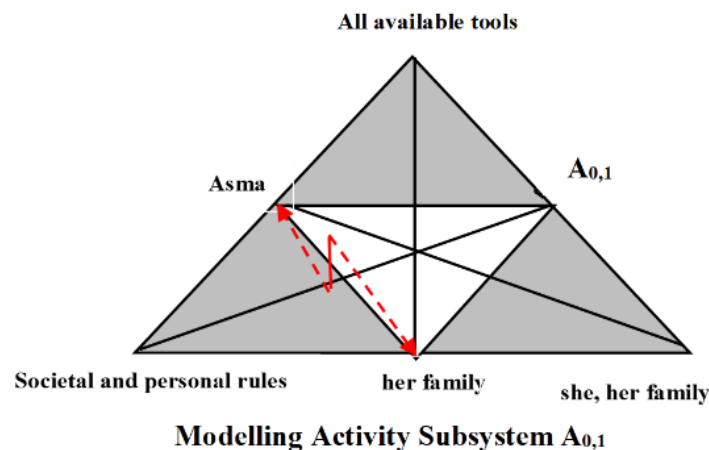


Figure 4. Tension ( $T_1$ ) of Consuming Culture of Daily Water in the Modelling Activity Subsystem  $A_{0,1}$

Interview Sample of Tension	<p>48 Student (Asma): I would pour my amount of drinking water in the bottle and to have with myself that I drink to based on my weight. My mother said to me, you can't drink to water with and poured it in bottle every day.</p> <p>49 Teacher: all of students should be to do Asma's work</p> <p>50 Student: we can't to do this work became we have work</p> <p>51 Student: I forget that to calculate amount of drinking water for each time</p> <p>52 Student: I went to the party. What to do?</p> <p>53 Student: people tell to us that you're crazy who drinking water pour in the box and to calculate it.</p>
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Figure 5. Interview of the Tension of the Modelling Activity Subsystem  $A_{0,1}$

As can be seen in Figure 4, for Asma, who is one of the subjects of the consumption of drinking water modelling activity subsystem ( $A_{0,1}$ ). In the activity, the tension was created for her by her family as a member of the community. This tension ( $T_1$ ) is related to consuming culture of daily water in the families that it can be found in

interview No. 48 (see Figure 5) for Asma at home. This is clear that her mother is created the tension for her by saying the word "You cannot drink this water and pour your water into the bottle every day". This interview reveals that the factor of tension, between Asma and her mother, is the artefact of a bottle that Asma's mother points it out in the interview. The same tension is created for another student who is members of the community. They say, "We can't work on Thursday, we can't count on water," and "We went to a party, what to do then?" In interviews 50, 51 and 52 illustrate the above tension. The intensity of this tension comes in Interview the *People tell us you are crazy.*" However, the focus of the analysis of study tension in this section is on the tension created for the Asma's.

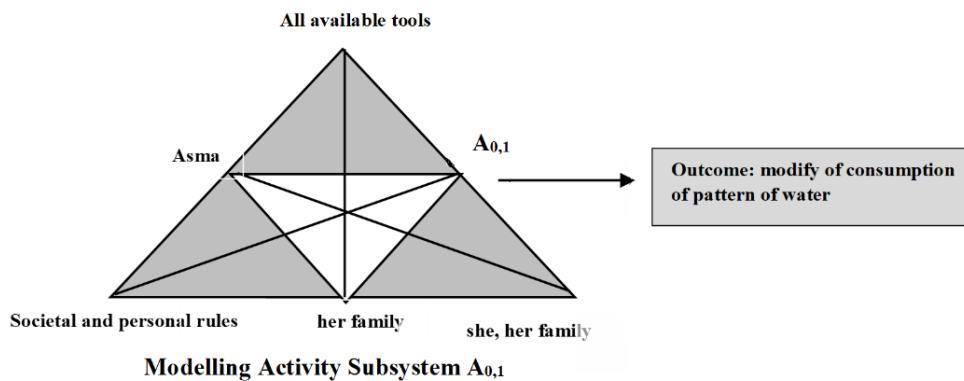


Figure 6. The Modifying of Tension ( $T_1$ ) of Consuming Culture of Daily Water in the Modelling Activity Subsystem  $A_{0,1}$

Interview Sample of	<p>54 Student (Asma): I said to my mother I want to measure my drinking of water and then filled the bottle. Then I poured the water bottle into the box of activity <math>A_{0,1}</math>. The length, wide and height were 10 cm. when I measured the volume of the water bottle that was, 1000 ml. so, I would drink one or two glasses of water in each day. when I did this action, I understood that I can to do this work.</p> <p>55 Teacher: how many days did you do it?</p> <p>56 Student (Asma): I did it one week and the action is a habit for me. Now, I have a bottle in my room until night I drank water. My mother saw to me that I can do this work.</p>
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Figure 7. Interview of the Modifying of the Tension of Modelling Activity Subsystem  $A_{0,1}$

But after the creation of tension ( $T_1$ ), the students overcome this tension by doing the modelling activity  $A_{0,1}$  and modify  $T_1$ . For example, one can refer to Asma's modifying of tension that is done in Figure 6 and Figure 7. When she confronts with this tension, actions according to the teacher's telling and succeed to change her water consumption into a daily habit and modified this tension. The modelling process this student has successfully done is as follows: "I said to my mother I want to measure my drinking of water "(Real World Problem) and then filled the bottle. Then I poured the bottled water into the box of activity  $A_{0,1}$ . The length, wide and height were 10 cm (Mathematical Model). When I measured the volume of the water bottle that was 1,000 ml (Mathematical Solution), after this student states that I would drink one or two glasses of water in each day (Real World Meaning Solution), this student's answer It doesn't make sense because she hasn't consumed all the water in the

bottle. So this answer doesn't make sense in the real world, so this student has to go through the modelling cycle again. In student interview 56, she states that *"I did this for one week and the action is a habit for me"*, indicating that the student has gone through the modelling cycle several times and after one week has been able to consume bottled water overnight (Accept Solution). Finally, this student has been reached to a meaningful answer to the real world, drinking daily water (Modify Consumption Water).

## Discussion & Conclusion

This study has added to the existing literature by 1) Exploring students' tension in the process of conceptual development of volume for modifying their daily drinking water. 2) The sample was selected from a region where previous studies in relation to activity theory and modelling have not been undertaken. 3) It seems that this study is a first study of its kind that have used modelling activity theory/system (a composite model that integrates activity theory and modelling cycle) for studying student's conceptual development during solving a real-world problem. 4) Finally this study shows that how out of school experiences could integrate with school mathematics for fostering students conceptual understanding. In David and Tomaz (2015) study, some activities developed and used which related to students a real-life, but in the current study all modelling activity ( $A_{0,1}$ ), In addition to being taken from students' everyday life situations, students were able to solve one the real situated problem related to water consumption. In  $A_{0,1}$  activity, students measure their water consumption for 24 hours using an origami artefact. Cultural artefacts had crucial rules in this study. Students make a box with a sheet of paper (origami) and calculate the volume of water consumption. They also used a water bottle for their estimation. These artefacts help students to make a connection between the real world and the math world. Different type of artefact was used in previous researches such as water bill in Tomaz and David (2015), supermarket bill and food label in Bonotto (2004 and 2007).

Finding the current study shows, that participated students were able to use the experimental process during modelling cycle. Indeed, they examine their math solution in the real world context and if necessary, they apply a new modelling cycle for refining their real-world solutions. In this way, students were able to decrease their water consumption and manage their water consumption pattern during this study. So, the results of this study reveal the importance of modelling cycle for changing math classes toward an experimental environment. According to Carreira and Baioa (2011) with using experimental modelling activities, we can provide a new approach in school mathematics, which students can encounter with a real-world problem with a practical perspective.

Finally, the results of this show the power of mathematics, which help students to solve their real-world problems and help them to change the situation in hard living conditions. Students, which participated in this study, help themselves and improve their health through managing their water consumption. Indeed, the output of this study caused improvement in the quality of student life and preserve water for the next generation in a dry environment. In this way, we reach sustainable development in water consumption, which is an important issue

for all people all around the world.

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## Contribution of Green Social Workers in Handling the Impacts of Climate Change on the Realization of Sustainable Development in Cilacap Regency

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**Abstract:** Climate change completely impacts the community, indirectly becoming an obstacle to realizing sustainable development as the global agenda. This situation encourages the involvement of all levels of society, one of which is the Green Social Worker. This study employed a descriptive quantitative method by conducting in-depth interviews with informants selected by the predetermined criteria. Green Social Workers are the Social Workers internalizing the Green Social Work paradigm in their professional practices. It is implemented by internalizing environmental, social, and economic values in responding to and dealing with a problem and is carried out holistically and transdisciplinary. In this context, Green Social Workers contributed to handling the impacts of climate change to realize sustainable development goals. Green Social Work involves the roles of Protectors, Consciousness-raisers, Lobbyists, Coordinators, Mobilizers, Translators, Co-producers, Dialogue agents, and Curriculum changers. These roles could practically reduce the risks of the impact of climate change in Cilacap Regency, Central Java Province, Indonesia.

**Keywords:** Green Social Worker, Climate Change, Sustainable Development

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### Introduction

Climate change is part of a natural disaster accompanied by the process of environmental degradation and harms

human life holistically. Its impact becomes a severe problem encountered by various levels of society without exception. Scientific studies explain that climate change causes diverse environmental changes that threaten the survival and welfare of the community. One of the real threats of environmental change is sea level rise, as emphasized in the Intergovernmental Panel on Climate Change (IPCC) report, which estimates that over 100 years, starting in 2000, sea levels will rise as high as 15-90 cm with an inevitable increase of 48 cm (Mimura & Hideo, 2000). Moreover, in 2021, the IPCC issued a code red on the impacts of climate change that were predicted to happen earlier.

Susandi, Armi, Herlianti, and Indriani (2008) also projected sea level rise for coastal areas. The findings revealed that several regions in Indonesia were threatened with losing their lands. The projection results for 2010, 2050, and 2100 showed that the land that would be lost was 7,408 km<sup>2</sup>, 30,120 km<sup>2</sup>, and 90,260 km<sup>2</sup>, respectively. The increase in sea level threatens not only the physical loss of land but also the non-physical environment, namely coastal ecosystems, including the lives of coastal communities. Demographic data show that 60%, more than 110 million people, of the Indonesian population live within a 50 km radius of the coastline. This circumstance seriously threatens the health and welfare of the community and directly affects the vulnerable (Kemp & Palinkas, 2015:3). Greene and Greene (2009) predicted that natural disasters would occur more frequently due to climate change and world population growth, significantly affecting social welfare.

Climate change significantly affects agricultural harvest times and people's livelihoods (Hazell & Hess, 2010:402). When food security threatens the survival and welfare of the community, it will affect other aspects of life. Taylor (2013: 98) explains how the sustainability of marine ecosystems directly impacts residents' livelihoods and welfare, especially in coastal areas. Erickson (2012:185) also state that climate change accelerates the impact of environmental degradation. Furthermore, climate change and excessive human activities, such as air pollution, also advance the process.

Various impacts of climate change are causing the most significant crisis for society (Dominelli, 2012:129). In particular, children who come from low-income families are categorized as very vulnerable to the upcoming risks (Rogge, 2000:46). Their daily lives in uninhabitable homes are also more endangered by natural conditions and extreme weather, and the elderly will suffer when it is too hot or cold (Mulligan, 2015). Erickson (2012:185) highlights that environmental elements such as water provide security for at-risk communities. When these natural resources experience a crisis, their survival will be threatened. Dominelli (2014a:342) explains that disasters stimulate social inequalities such as unemployment and increased levels of domestic violence. In addition, environmental injustice is also described as the human failure to conserve natural resources in the process of fulfilling their needs. Erickson (2012: 184) emphasizes that people's desire to improve their quality of life is at the core of strategic efforts to reduce the impact of climate change. The current severe situation cannot be separated from industrial developments that have caused intense environmental damage and contributed to climate change (Alston & Bestthorn, 2012: 63). Furthermore, those deteriorations are also caused by human population, growth, and consumption neglecting environmental sustainability aspects (Rogge, 2000:47). The damage to the natural environment has begun to impact natural resources, which are critical for the community's

survival. A new paradigm or approach in the Social Worker profession, namely Green Social Work, is introduced to cope with these impacts on vulnerable people. This approach contributes to sustainable development, considering that this profession is close to society.

## Method

This research employed a qualitative method based on the philosophy of postpositivism, an interpretive and constructive paradigm stating that social reality is whole, complex, dynamic, meaningful, and interactive (Creswell, 2017). Furthermore, Creswell (2013) asserts that this qualitative research method is naturalistic because it is carried out based on natural conditions at the time of its implementation. The case study approach was chosen because the discussed issue was considered unique and associated with Green Social Work in the Climate Village Program, which was developed and implemented by the government. Moreover, the present study emphasized the exploration and description of a case. The data collection technique is the most strategic step in research, as the researcher needs it to obtain information following the data standards set. In qualitative research, data collection is carried out in natural settings (natural conditions) (Sugiyono, 2010). The techniques for collecting research data include observation, interviews, and documentation.

## Results and Discussion

Climate is the average weather conditions involving complex interactions between physical, chemical, and biological processes that reflect the interactions between the geosphere and the biosphere occurring in the Earth's atmosphere. Therefore, the climate of a place or region is a statistical description of atmospheric conditions over a long period to describe the average weather variable (Murdiyarso, 1999). According to the IPCC report (2001), the climate system covers the five interacting components of the planet Earth. It also involves the atmosphere's interaction with various other elements. The concept of climate change used by the Intergovernmental Panel on Climate Change (IPCC) refers to "any change in climate over a period of time, whether caused by natural variations or due to human activities" (anthropogenic) (IPCC, 2001). The current condition results from increasing average air and sea temperatures, melting snow and ice, and rising sea levels (IPCC, 2007). Strong new evidence suggests that most global warming observed over the last 50 years is driven by human activities (IPCC, 2007).

Climate change has several impacts on coastal areas (IPCC, 2007). *First*, global warming is suspected to increase the frequency of storms. *Second*, global warming may increase seawater temperatures by 1-3°C. From a biological perspective, this increasing temperature raises the potential for the death and bleaching of coral reefs in tropical waters. It will reduce the production of fish and shrimp ponds and threaten the lives of coastal communities. In general, four types of possible impacts of sea level rise can be distinguished as follow (Noronha, 1991: Soegiarto, 1991):

1. Physical impact: increasing damages due to flooding and tidal waves, coastal erosion and

sedimentation, changes in river flow velocity, sea waves, and land subsidence.

2. Ecological impact: loss/reduction of inundation area (wetland) in coastal areas, seawater intrusion, evaporation of salt ponds, and loss/reduction of coastal plants, coastal habitat, arable land, and non-trade biomass.

3. Socio-economic impact: the effects on the settlement, damage/loss of facilities and infrastructure, damage to coastal communities/villages, human and property casualties due to a tidal wave, changes in economic activity, increasing flood insurance costs, loss/reduction of coastal recreation areas, and increasing costs of flood prevention.

4. Institutional/legal impact: changes in maritime boundaries, laws, regulations, coastal area management practices, needs for new institutions to deal with sea level rise, and increasing taxes.

It could also directly affect public health, welfare, and vulnerable communities (Kemp and Palinkas, 2015:3). Greene and Greene (2009) predict that natural disasters will occur more frequently due to climate change and world population growth. Climate change and natural disasters significantly impact social welfare, influencing agricultural harvest times and people's livelihoods (Hazell and Hess, 2010:402).

The threat to food security relates to the community's survival, prosperity, and other aspects of life. Taylor (2013: 98) explains how the sustainability of marine ecosystems directly impacts livelihoods and community welfare, especially in coastal areas. Erickson (2012: 185) also shows that environmental degradation is mainly caused by climate change and excessive human activities, such as air pollution.

Various climate change impacts accelerate an ecosystem's causality (Marten, G. G., 2010). Erickson (2012:185) highlights that environmental elements such as water provide security for vulnerable communities. When these natural resources encounter a crisis, their survival will be threatened. The concept of social, economic, and environmental sustainability presented by El-Hagggar, S., & Samaha, A. (2019) emphasizes that social, economic, and environmental conditions influence each other. Dominelli (2014a:342) also states that the disproportionate impact can be disastrous and lead to social inequalities such as unemployment and rising levels of domestic violence. In addition, environmental injustice is also described as a human failure to conserve natural resources in fulfilling their needs.

Erickson (2012: 184) emphasizes that people's desire to improve their quality of life is at the core of strategic efforts to reduce the impact of climate change. The current severe situation cannot be separated from industrial developments causing significant environmental damage and climate change (Alston and Bestthorn, 2012: 63). Furthermore, it is also caused by the human population, growth, and consumption that ignore the environmental sustainability aspects (Rogge, 2000:47). The deterioration on the natural environment caused by humans has started to affect the necessary resources for the survival of the community.

Lombard (2015:484) states that the Global Agenda that was echoed in 2012 announced the 2030 SDGs (UN, 2015). The Joint Agreement emphasizes sustainable development by focusing on social and economic sectors,

indicating the integration of social, economic, and environmental development. As stated in the 2030 Agenda (UN, 2015:3), the five aspects of sustainable development are eradicating community poverty, preventing planetary degradation, promoting a prosperous life for all, ensuring community peace without violence and conflict, and building a global partnership to achieve a goal.

The Global Agenda (2012) consists of four pillars. In this regard, the third component aims to promote environmental and community sustainability, guiding Social Work in performing social services to address poverty issues without damaging the natural environment. Social Work is committed to eliminating the negative impacts of climate change and is oriented toward the future of the Earth. Poverty alleviation and social injustice must be addressed by social work. However, it should be done without risking and degrading the natural environment. Therefore, Social Workers should thoroughly address those issues mentioned earlier, as prioritized by the 2030 Agenda (UN, 2015) and the Global Agenda (2012).

Green Social Work is a holistic and transdisciplinary approach for Social Workers to encourage the acceleration of sustainable development. Those who implement Green Social Work are called Green Social Workers. They are essential to balancing the social, environmental, and economic dimensions of a society vulnerable to climate change. In carrying out their tasks, Green Social Workers strive to:

- 1.Support the community to achieve equality of human rights, social and environmental in their place of residence.
- 2.Support the community to protect the environment; improve human welfare, flora, fauna, and physical ecosphere; and ensure environmental justice.
- 3.Mobilize communities in a variety of local, national, regional, and international networks or partnerships and alliances to promote people's well-being and the Earth's sustainability.
- 4.Empower vulnerable and marginalized individuals, groups, and communities, especially those aiming to influence commercial interests, institutional routines, policymakers, and other decision-makers involved in determining environmental policies and practices that impact the environment, especially in exploring information on economically exploited resources excessive and abused.
- 5.Mobilize residents to protect the local environment (Dominelli, 2012).

The roles of Green Social Workers in reducing environmental degradation and social vulnerability are:

- 1Protectors; play a role in protecting and not carrying out activities detrimental to the community, flora, fauna, and the environment.
- 2.Consciousness-raisers; design scenarios for reducing the greenhouse effect, develop alternative models of sustainable socio-economic development, and act as cultural interpreters to convey information in various backgrounds, disciplines, professions, organizations, and communities and their different cultures.

3. Lobbyists; promote prevention efforts at the local level, including the infrastructure to be built (e.g., housing and health facilities) by considering and integrating local conditions, traditions, and resources; advocate at the national and international levels for policy changes facilitating access to green technologies and the equitable sharing of resources regardless of national borders; and tackle human-caused climate change.
4. Coordinators; coordinate residents, various stakeholders, and resources in an environmentally friendly activity.
5. Mobilizers; help the community reduce carbon emissions and care for the physical environment.
6. Translators; translate ideas and information, make local knowledge easily accessible to scientific experts, and ease local people in comprehending scientific information.
7. Co-producers; involve scientific experts and residents in sharing their respective knowledge to find new solutions to identified environmental problems.
8. Dialogue agents; collaborate with scientists, local policymakers, and other professionals to work with residents to build arguments in the media in a dialogue to change environmental policies locally, nationally, and internationally.
9. Curriculum changers; investigate and provide input for curriculum changes that include climate change, sustainable development, and disaster interventions to build resilience in individuals and communities (Dominelli, 2011: 438).

Several scientific studies discussed the success of Green Social Work in realizing community welfare. Wu (2018) revealed Green Social Worker intervention during the reconstruction and recovery after the Ya'an earthquake in Sichuan, China. It was evident from the environmental reconstruction built in a holistic and participatory manner centered on the community. Green Social Workers carried out several activities, including stimulating residents' participation, improving professional design, and promoting long-term social and economic recovery. In addition, they collaborated with professional designers to discover local heritage as well as traditional customs and cultures, increase public awareness of the importance of local wisdom, and train residents in new skills based on traditions and new landscapes, aiming to strengthen their attention to the protection of cultural and natural heritage that could potentially support new livelihoods.

A study on Green Social Work by Adusumalli and Dutta (2018) discovered that a Green Social Worker conducted an assessment including disaster preparedness. It involved mapping physical vulnerability areas in and around villages, preparing mitigation action plans to prevent landslides so that springs are protected, identifying potential landslide zones, and sending information to the authorities. Luk (2018) investigated the development of Green Social Work in a small watershed management program through community participation in the tourism city of Lijiang, China. The findings corroborated that Green Social Workers were involved in a non-governmental organization (NGO) working with rural communities along small watersheds to discuss and negotiate collaboration, benefits, and risk sharing. Many adjustments were needed regarding the deliberation mechanism to accommodate and intervene in the community to realize an impact on increasing income, ecological preservation, and community management for sustainable development.



Social work is a practice-based profession and an academic discipline that aims to bring about social change and development, social cohesion, and empowerment and liberation of people. Its principles cover social justice, human rights, collective responsibility, and respect for diversity. It also engages people and structures to cope with life's challenges and improve community well-being with the support of social work theory, social sciences, humanities, and indigenous knowledge (IASSW, 2014). Various studies on Green Social Work mentioned earlier provided the novelty of science and technology and were consistent with this research, in which social workers' activities could not be separated from the professional role; in this case, there were practical activities in the field. In addition, the issue of the physical environment, such as climate change, has become the leading cause and effect of social problems now and in the future.

Engaging environmental issues in handling vulnerable communities affected by climate change is essential in Green Social Work. However, adopting an ecological justice perspective does not automatically make the ecological approach internalized into a theoretical framework for Green Social Work. Dominelli (2012:8) argues that the ecological approach still privileges by focusing primarily on interactions between people and the social and physical environment. People's reactions to the physical environment are the opposite of integrating the physical, social, economic, political, and cultural environments. An integrated environment is necessary for the holistic practice of social work, which intends to change inegalitarian social relations, power relations, and systems of distribution of resources.

## **Conclusion**

Climate change had several impacts on coastal areas (IPCC, 2007). Global warming was suspected to increase the frequency of storms. In the context of socio-economic, it affected the settlement environments in the form of damage/loss of facilities and infrastructure, coastal communities/villages, human and property casualties due to a tidal wave, changes in economic activity in coastal areas, increasing flood insurance costs, loss/reduction of coastal recreation areas, and increasing costs of flood prevention. It further impacted public health and welfare, affecting vulnerable communities directly. Climate change and natural disasters significantly affected social welfare. When food security threatened the community's survival and welfare, the other aspects of life would also be influenced. It implied that environmental degradation was primarily the result of climate change and excessive human activities, such as air pollution.

In particular, children from low-income families were categorized as very vulnerable to the upcoming risks. Environmental elements, such as water, provide security for at-risk communities. Their desire to improve the quality of life was at the core of strategic efforts to reduce the impact of climate change. In this regard, Social Work in the Global Agenda was committed to eliminating the negative impacts of climate change in a way oriented toward the Earth's future. In other words, it must not put the natural environment at risk of degradation. Green Social Workers contributed to balancing the social, environmental, and economic dimensions of a society vulnerable to climate change.

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## The Mediator Role of Hope in the Relationship Between Psychological Counselors' Mental Well-being and Psychological Resilience

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**Abstract:** The aim of this research was to investigate the mediating roles of hope and its sub-dimensions in the relationship between psychological counselors' mental well-being and resilience levels. The participants consist of 374 psychological counselors working in Gaziantep in 2020-2021 academic year. The research data were collected via "Mental Well-Being Scale", "Psychological Resilience Scale", "Integrative Hope Scale" and "Personal Information Form". For statistical analysis SPSS.25 program and PROCESS 4.0 extension were implemented. The research results indicated that there was a positive relationship between mental well-being and psychological resilience, hope and there was a significant relationship between trust/belief, lack of perspective, positive future orientation, social relations/individual value. There was a positive correlation with psychological resilience and hope; while there was a significant relationship between trust/belief and positive future orientation; It was seen that there was no significant relationship between psychological resilience, lack of perspective and social relations/individual value. When looked at the mediation models in the relationship between mental well-being and resilience, it was seen that hope, trust/belief and positive future orientation had partial mediating effects in this relationship. It was observed that lack of perspective and social relations/individual value did not have a mediating effect between mental well-being and resilience.

**Keywords:** mental well-being, resilience, hope

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### Introduction

The world we live and social life in is in a state of constant change. When some of us adapt to this situation, some of us have problems adapting to this change and face situations that will negatively affect their mental health. People feel the need to seek professional help when they are unable to cope with adverse environmental conditions, difficulties they encounter in business and family life. In order to solve the problems, a number of

helping professions such as psychiatry, psychological counseling and clinical psychology have emerged in this field (Türk PDR-DER, 2011). Today's people are psychologically affected by many areas such as the environment, economy and technology and try to adapt to it, and often encounter different difficulties in coping with this situation. This situation has increased the responsibilities of psychological counselors and the need for them (Yeşilyaprak, 2009). With the increase in the responsibilities of psychological counselors, this is exactly where concepts such as mental well-being and psychological resilience of psychological counselors come into play and gain importance. Psychological counseling and guidance is a service area that values people, accepts people and supports the process of self-realization of people and helps to create the necessary conditions for this (Yeşilyaprak, 2009). Even if psychological counseling and guidance services have a significant impact on the whole society and are for all individuals who need it, this service is mostly provided to students in schools in our country and schools are very important for this. Psychological counselors in schools are responsible for the delivery and effective implementation of guidance services (Yeşilyaprak, 2006). This situation has made psychological counselors important in education and increased the need for psychological counselors in schools. In this process, psychological counselors try to help the student develop himself and adapt to his changing and renewed social environment.

It is thought that the mental well-being of school psychological counselors who carry out psychological counseling and guidance services, which is one of the most effective parts of the contemporary education approach, is important for the execution of these services in a more beneficial way. Mental well-being constitutes a basic framework that includes psychological and subjective well-being. The World Health Organization (2004) defines mental well-being as “an individual's awareness of his own interests and abilities, coping with the difficulties he encounters in life, being useful in business life and contributing to the society he lives in”. The concept of psychological well-being was first used by Bradburn (1969). Psychological well-being is explained by the predominance of negative emotions of positive emotions in the person's perspective towards life. According to Bradburn (1969), the positive and negative feelings that an individual has in his life give us information about his psychological state and well-being. Psychological well-being, which has been one of the leading concepts in the field of psychology since 1980, is a concept defined as reaching an answer about how people can live more efficiently by evaluating their own life (İşgör, 2017). Ryff was the first to introduce the concept of psychological well-being to the psychology literature. Subjective well-being is defined as the positive and personal state of life satisfaction with the combination of our thoughts and feelings (Diener, 2001). Subjective well-being means reviewing one's life, thinking about it, and making a decision at the same time.

Psychological counselors communicate and establish relationships with many people during the day, try to listen to them, understand them, help them how to deal with difficult situations they encounter, and seek solutions to their problems. While trying to gain the ability to cope with these difficult situations faced by the individual and to stay strong in the face of them, he encounters various difficulties. In connection with this, it was thought that it was important to determine the psychological resilience of psychological counselors and it was desired to draw attention to the importance of the subject by considering this variable. Considering the studies conducted in recent years, it is seen that the concept of psychological resilience has gained importance. The main reason for

this is; The fact that people have to cope with the changing environment and difficult living conditions and the necessary skills are at the forefront (Okan, Yılmaztürk ve Kürüm, 2020). Positive psychology has revealed and focused on the strengths rather than the weaknesses of the person. Along with the emphasis on strengths, many concepts such as "psychological resilience", "psychological flexibility", "resilience" and "psychological resilience" have come to the fore. Murphy (1987) defines resilience as a concept that describes how we should cope with the difficult life events we encounter in our lives and how we should continue our lives as before after these events. Psychological flexibility; It is a concept that is based on being aware of the moment one is in and acting in order to achieve their goals (Hayes, 2004). Concept of resilience is defined (Rutter, 2006) as a concept related to the individual's resistance to the difficulties that occur in life, to struggle with them and to achieve successful results by overcoming all kinds of difficulties. Psychological resilience means adapting to the changes that occur in one's life as a result of the combination of protective factors and risk factors against traumatic events such as divorce, moving, natural disaster, and poverty. In short, it includes the adaptation phase that occurs as a result of the organism being faced with a risk situation (Kararırmak, 2006). Although various studies have been carried out abroad on psychological resilience, this subject has been incomplete in our country, its importance has not been understood and it has not been emphasized much. Considering the difficult conditions in our country, this concept becomes even more important for children and adolescents. It is thought that such an important concept will contribute to the literature in the field of preventive mental health.

Another concept of the research, Snyder (2002) defines hope as a type of goal-oriented thinking that individuals see as having the ability to develop, implement and maintain strategies in line with their goals. "What is the first thing that comes to mind when we say hope? The concept of hope has been the subject of study in almost every field, and what this concept is, its content and scope has been discussed for many years. In order to know what the concept of hope is and how it is formed, it is necessary to go back to the first years of childhood (Tarhan & Bacanlı, 2016). In short, hope is "a feature that gives a sense of well-being and motivates people to take action" (Frank, 1968; cited in Kemer and Atik, 2005). The concept of hope not only evokes the future, but also expresses dreams and goals for it. The word hope is also in the minds; It enlivens concepts such as belief, positive future, plan and dream. When the literature is examined, positive psychology has contributed to the field of guidance and psychological counseling, as in many fields, with all these concepts it includes.

Purpose of the research; What is the mediating effect of hope and its sub-dimensions in the relationship between psychological counselors' mental well-being levels and psychological resilience levels? In this study, the following hypotheses were tested within the scope of the purpose.

- 1) Hope has a partial mediating effect in the relationship between psychological counselors' mental well-being levels and psychological resilience levels.
- 2) Trust/belief, one of the sub-dimensions of hope, has a partial mediating effect in the relationship between mental well-being and resilience in psychological counselors.
- 3) Lack of perspective, which is one of the sub-dimensions of hope, has a partial mediating effect on the relationship between mental well-being and resilience in psychological counselors.

- 4) Positive future orientation, which is one of the sub-dimensions of hope, has a partial mediating effect in the relationship between mental well-being and resilience in psychological counselors.
- 5) Social relations/individual value, which is one of the sub-dimensions of hope, has a partial mediation effect on the relationship between mental well-being and resilience in psychological counselors.

## Method

This study, which examines the mediating role of hope in the relationship between psychological counselors' mental well-being levels and psychological resilience levels, was designed with the relational screening model, which is a subtype of the general screening model, and tested with structural equation modeling (SEM).

The study group consists of 374 psychological counselors who work in the institutions at the Ministry of National Education in Gaziantep in the 2020-2021 academic year and are determined by the appropriate sampling method.

Table 1. Demographic Information of the Participants

Variable	Frequency(n)	Percentage(%)
Gender		
Woman	224	61,2
MA n	142	38,8
Age		
21-31	204	55,7
32-42	114	31,1
43+	48	13,1
Marital status		
Single	181	49,5
Married	185	50,5
Education Status		
Bachelor's Degree	244	66,7
Master's Degree	122	33,3
Type of Institution		
Public Institution	302	82,5
Private Institution	64	17,5
Professional Seniority(Year)		
1-5 year	137	37,4
6-10 year	111	30,3
11-15 year	62	16,9
16+	56	15,3

Level of Education Served		
Preschool	20	5,5
Elementary School	91	24,9
Middle School	93	25,4
High School	98	26,8
Special Education	29	7,9
Guidance Research Center	35	9,6
Longest Served Education Level		
Preschool	16	4,4
Elementary School	80	21,9
Middle School	115	31,4
High School	96	26,2
Special Education	29	7,9
GRC	30	8,2

Before the data collection process, necessary permissions were obtained from Gaziantep University Social and Human Sciences Ethics Committee and the Directorate of National Education. After obtaining the necessary permissions, the data were collected online (Google Form) and analyzed using SPSS.25 and Hayes' PROCESS 4.0 extension. In order to apply parametric tests, it was examined whether the data obtained from the scales had a normal distribution. The distribution of the scores obtained from the scales was examined using the normality test, skewness coefficient and histogram graphics. The values of the normality test are given in Table 2.

Table 2. The Results of the Normality Test for the Variables

	Psychological resilience	Hope	Trust	Lack of perspective	Positive future orientation	Social relations	Mental Well being
N	374	374	374	374	374	374	374
X	63.72	100,7	44,08	17,82	20,57	18,28	56,14
S	8.52	12,87	6,91	7,28	2,99	3,72	8,93
Median	64.00	101,0	45,00	17,00	21,00	19,00	56,00
Minimum	40.00	65,00	24,00	6,00	11,00	7,00	28,00
Maximum	81.00	138,0	54,00	36,00	24,00	24,00	78,00
Kolmogorov- Smirnov	.061	.074	.089	.073	.141	.081	.061
p	.002	.000	.000	.000	.000	.000	.002
Skewness	-.328	.245	-.629	.399	-.946	-.446	-.423
Kurtosis	-.315	1,12	-.116	-.426	.627	-.235	-.209



When Table 2. is examined, it is seen that the variables do not show normal distribution according to the Kolmogorov-Smirnov test result ( $p < .05$ ). However, the skewness coefficient values were examined and it was determined that the skewness and kurtosis coefficients were within the limits of -2 and +2 (George and Mallery, 2010). In addition, it was seen that the mean, median and mode values of the obtained scores were close to each other. Since the histogram graphs showed that the scores were not skewed to the right or left, they were gathered on the normal distribution curve, it was decided to use parametric tests.!!

In line with the first sub-goal of the research, Pearson Product-Moment Correlation Analysis was conducted to determine whether there is a relationship between the above variables. Then, the stages of analyzing the intermediary model were started. The significance of the effects between the variables was examined using the bootstrapping method. Bootstrapping method produced 95% bias corrected confidence intervals. In this method, the indirect effect is in focus and the lower (LLCI) and upper (ULCI) limits of the confidence interval are determined for the significance of the effect value. Confidence intervals that do not contain zero are considered statistically significant (Gürbüz, 2019).

In this research, Model 4 stated by Hayes (2013) was used in the mediation analysis. In the model, the predictor variable was mental well-being, the mediating variables were hope, and the sub-dimensions of trust-belief, lack of perspective, positive future orientation, social relations-individual value variables were determined as the mediator variable, and psychological resilience was the predicted variable. Mediator variables are placed in the model one by one. The significance of the indirect effects in the analyzes was evaluated using the bootstrapping method and 5000 resamples at a 95% confidence interval.

In the established models, the effects between the variables were coded as a, b, and c path, and as the predictor variable (X), the predicted variable (Y) and the mediator variable (M). The mediating effects of the total hope score and sub-dimensions of trust-belief, lack of perspective, positive future orientation, social relations-individual value variables were tested separately. "Personal Information Form, Mental Well-Being Scale, Psychological Resilience Scale, Integrative Hope Scale" scales were used as data collection tools in our research.

## Results

### Results of Descriptive Statistics

The independent variable of the research is mental well-being, hope and trust, which are the sub-dimensions of hope, lack of perspective, positive future orientation and social relations-individual value, and the dependent variable is psychological resilience. The mean ( $\bar{X}$ ), lowest and highest scores and standard deviation values for the variables used in the study are presented in Table 3. When Table 3 is examined, it is seen that the trust-belief variable has the highest mean, and the lack of perspective variable has the lowest mean among the sub-dimensions of the hope variable.

Table 3. Descriptive Statistics of Dependent and Independent Variables

Variable (n=374)	$\bar{X}$	Ss	Min.	Max.
Psychological resilience	63,72	8,52	40,00	81,00
Hope	100,77	12,87	65,00	138,00
Trust-belief	44,08	6,91	24,00	54,00
Lack of perspective	17,82	7,28	6,00	36,00
Positive future orientation	20,57	2,99	11,00	24,00
Social relations-individual value	18,28	3,72	7,00	24,00
Mental well being	56,14	8,93	28,00	70,00

### Results of Correlation Analysis Between Resilience Hope and Mental Well-Being Variables

In the study, Pearson Correlation analysis was conducted to reveal whether there is a significant relationship between the variables of resilience, hope and mental well-being. The findings obtained as a result of the analysis are given in Table 2.

Table 2. Correlations among Variables

	1	2	3	4	5	6	7
<b>1. Psychological resilience</b>	1						
<b>2. Hope</b>	.52**	1					
3. Trust-belief	.65**	.79**	1				
4. Lack of perspective	-.16**	.37**	-.21**	1			
5. Positive future orientation	.56**	.66**	.74**	-.21**	1		
6. Social relations	.47**	.72**	.69**	-.11*	.52**	1	
<b>7. Mental well-being</b>	.76**	.59**	.72**	-.17**	.56**	.58**	1

When the analysis results in Table 2. are examined, the mental well-being scores are; positive with overall hope, positive future orientation, and social relationships-personal worth and trust-belief scores; It is seen that there is a significant negative correlation with the lack of perspective score. Psychological resilience scores; positive with total hope, trust-belief, positive future orientation, social relations and mental well-being scores; It is seen that there is a significant negative correlation with the lack of perspective score.

### Analysis Results Regarding Research Models

The Results of the Mediation Analysis Regarding the Mediation Role of Hope in the Relationship Between Mental Well-Being Levels and Psychological Resilience are given in Figure 1.

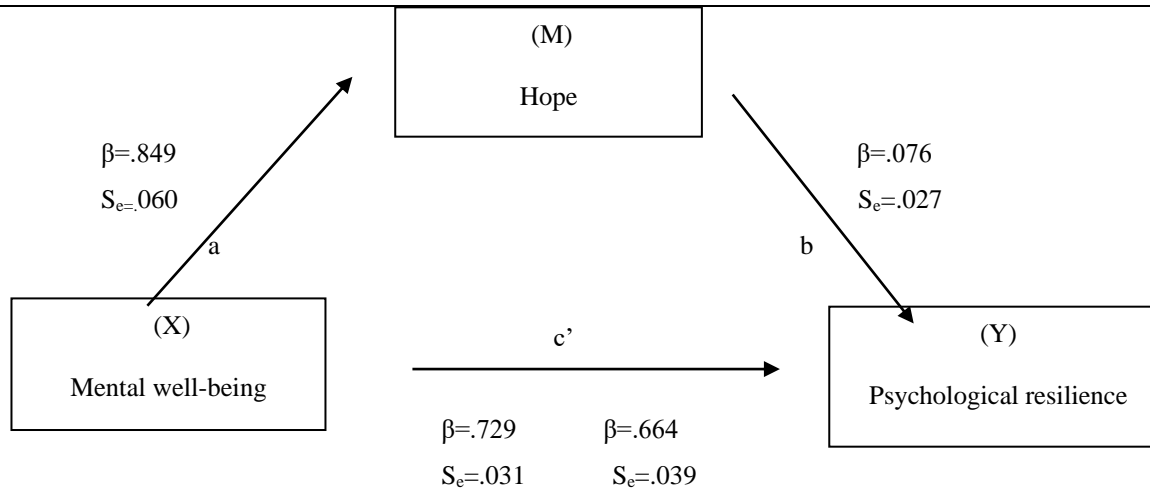


Figure 1. Research Model of the Mediation Relationship of Hope

When Figure 1 is examined, the mental well-being variable significantly affects the mediating variable hope ( $\beta=.84$ ;  $p<.001$ ). It is seen that the regression model related to the model established in the table is also significant ( $R^2=.34$ ;  $F(1, 372)=198.4$ ;  $p<.001$ ). It was concluded that the mediating variable hope and mental well-being significantly affect psychological resilience. When the mediator variable hope is included in the model, it is seen that the effect between mental well-being and psychological resilience changes and this effect decreases. Therefore, hope has a partial mediating role in the relationship between mental well-being and resilience. It is seen that the effect of the bootstrapping analysis for the significance of the mediator variable is also significant. The significance of the partial mediation effect of hope is explained by the absence of zero between the two values in the specified confidence interval and the same directional signs. Another finding of the study is that mental well-being and hope together explain 59% of the variance observed in resilience levels ( $R^2=.59$ ;  $F(2, 371)=271.12$ ;  $p<.001$ ). Since it was determined that hope has a partial mediating role in the relationship between mental well-being and resilience, Hypothesis 1, which states that hope has a mediating role in the relationship between mental well-being and resilience, was accepted.

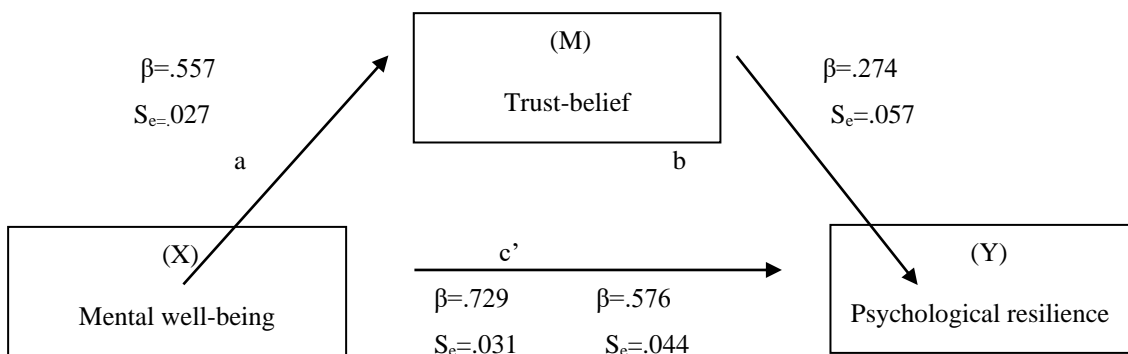


Figure 2. Research Model of the Mediation Relationship between Trust and Belief

When Figure 2. is examined, the mental well-being variable significantly affects the mediating variable trust-belief ( $\beta=.55$ ;  $p<.001$ ) It is seen that the regression model related to the model established in the table is also

significant ( $R^2=.519$ ,  $F(1, 372)=402.09$ ,  $p<.001$ ).

It was concluded that the mediating variable trust-belief and mental well-being significantly affect psychological resilience. When the mediating variable trust-belief is included in the model, it is seen that the effect between mental well-being and psychological resilience changes and this effect decreases. Therefore, trust and belief have a partial mediator role in the relationship between mental well-being and resilience. It is seen that the effect of the bootstrapping analysis for the significance of the mediator variable is also significant. The significance of the partial mediation effect of trust-belief is explained by the absence of zero between the two values in the specified confidence interval and the same directional signs. Another finding of the research is that mental well-being and confidence together explain 60% of the variance observed in psychological resilience levels ( $R^2=.60$ ;  $F(2, 371)=288.75$ ;  $p<.001$ ).

Since it was determined that trust has a partial mediating role in the relationship between mental well-being and resilience, Hypothesis 2, which is expressed as trust belief has a mediating role in the relationship between mental well-being and resilience, was accepted.

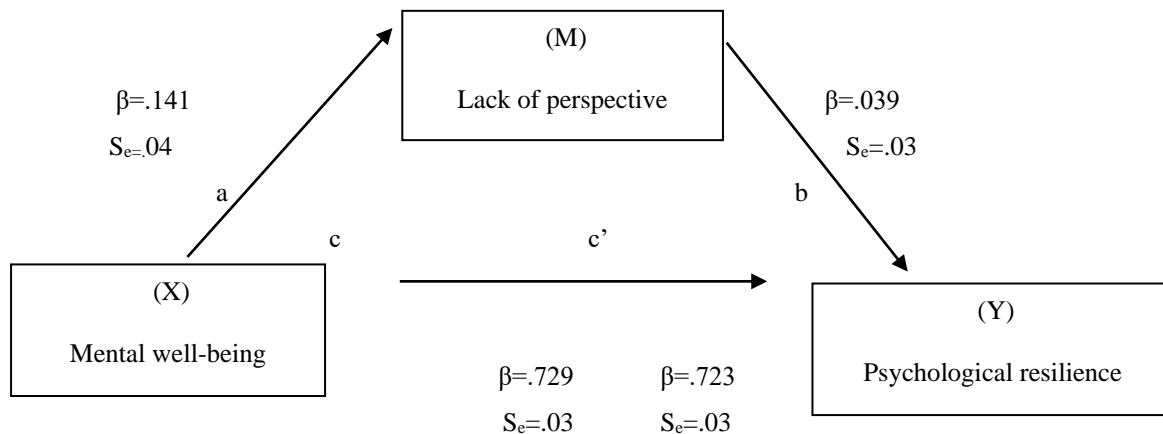


Figure 3. Research Model of the Mediation Relationship between Lack of Perspective

Mental well-being variable significantly affects the mediating variable lack of perspective and psychological resilience. It is seen that the regression model related to the model established in the table is also significant ( $R^2=.030$   $F(1, 372)=11.57$ ,  $p<.001$ ). However, it was concluded that there was no significant relationship between mediator variable perspective deprivation and resilience. It is seen that the indirect effect of mental well-being on resilience through perspective deprivation is not significant. Therefore, lack of perspective does not have a mediating role between mental well-being and resilience. Hypothesis 3, which states that lack of perspective has a mediating role between mental well-being and resilience, was rejected.

When Figure 4. is examined, the variable of mental well-being significantly affects the mediating variable of positive future orientation ( $\beta=.19$ ;  $p<.001$ ). It is seen that the regression model related to the model established in the table is also significant ( $R^2=.323$ ,  $F(1, 372)=178.2$ ,  $p<.001$ ). It was concluded that the mediator variable

positive future orientation and mental well-being significantly affect psychological resilience. When positive future orientation, which is a mediating variable, is included in the model, it is seen that the effect between mental well-being and psychological resilience changes and this effect decreases. It is seen that the effect of the bootstrapping analysis for the significance of the mediator variable is also significant. When the confidence interval for positive future orientation is examined, it is explained by the absence of zero between the two values and the same directional signs. Another finding of the research is that mental well-being and positive future orientation together explain 60% of the variance observed in psychological resilience levels ( $R^2=.60$ ;  $F(2, 371) = 289.44$ ;  $p < .001$ ).

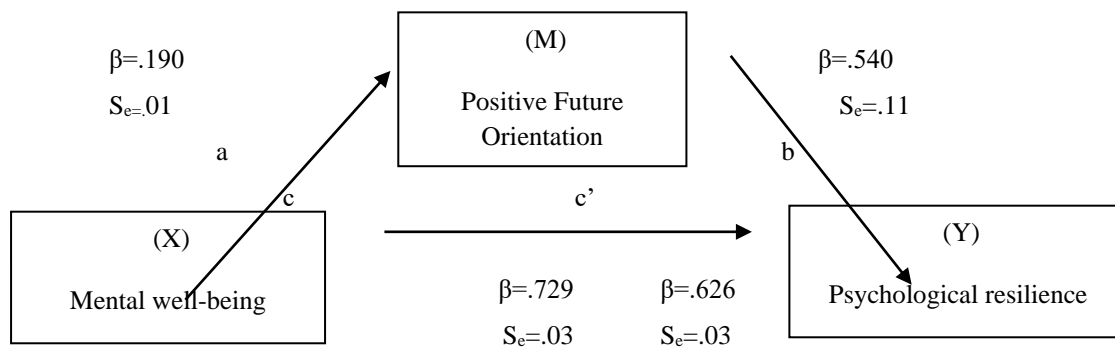


Figure 4. Research Model of the Mediating Relationship of Positive Future Orientation

Since it was determined that positive future orientation has a partial mediating role in the relationship between mental well-being and resilience, Hypothesis 4, which states that positive future orientation has a mediating role in the relationship between mental well-being and resilience, was accepted.

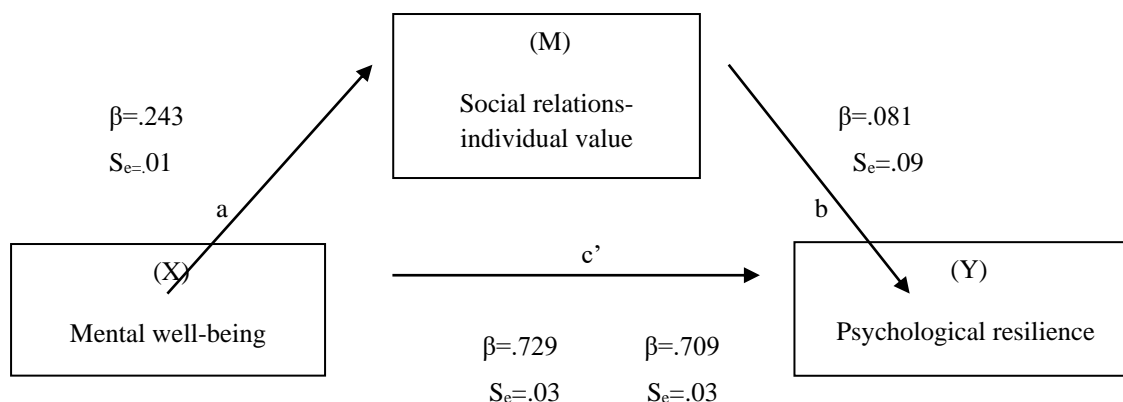


Figure 5. Research Model of the Relationship between Social Relations and Individual Value Mediation

Mental well-being variable significantly affects social relations-individual value and psychological resilience, which are mediating variables. It is seen that the regression model related to the model established in the table is also significant ( $R^2=.323$ ,  $F(1, 372)=178.2$ ,  $p < .001$ ). It was concluded that the relationship between the mediating variable social relations-individual value and psychological resilience was not significant. It is seen

that the indirect effect of mental well-being on psychological resilience through social relations-individual value is not significant.

Since it was determined that the social relations-individual value variable did not have a mediating role in the relationship between mental well-being and resilience, Hypothesis 5, which stated that social values, individual value mediator variable had a mediating role in the relationship between mental well-being and resilience, was rejected.

## Discussion

### Discussion on the Mediator Role of Hope in the Relationship Between Mental Well-Being and Resilience

“What is the mediating effect of Umut in the relationship between mental well-being and resilience?” Depending on the sub-problem, "Hope has a partial mediating effect on the relationship between mental well-being and resilience." The research hypothesis was analyzed in the findings section and the obtained findings confirm the hypothesis. According to Snyder et al., (2000), psychological counseling; It is a process that aims to bring about a change in the lives of individuals by increasing the current level of hope. Our study, in which the concept of hope is used as a partial mediating variable instead of many different variables, may also support the research group.

One of the findings obtained is that there is a positive and significant relationship between mental well-being and psychological resilience. When the literature is examined, it is seen that there are studies (Keyes, 2002; Keyes et al., 2010; Sağ and Bilican 2020) expressing results parallel to this finding. Considering the results of the study conducted by Duman et al (2020), it is seen that there is no significant relationship between mental well-being and psychological resilience. According to the results of the research; As the mental well-being levels of psychological counselors increase, there is an increase in their psychological resilience levels. Studies supporting these results in the literature (Taşdemir, 2018; Karacaoğlu and Köktaş 2016; Sağ, 2016; Odacı et al. 2021; Malkoç & Yalçın, 2015; Çelik, 2016; Souri & Hasanirad, 2011; Pidgeon & Keye, 2014) ; Miller & Chandler, 2002; Sagone & Caroli, 2014; Allen, 2016; Christopher, 2000; Felten & Hall, 2001) found a significant relationship between psychological well-being and resilience. In studies on subjective well-being (Çetinkaya Siviş, 2013; Terzi, 2005; Kararımak and Siviş Çetinkaya, 2011; Martin Krumm et al., 2003; Tusaie and Patterson, 2006) the results show similarity.

One of the findings obtained is that there is a positive and significant relationship between mental well-being and hope. When the literature is examined, it is seen that Demirtaş et al. (2018) has a study that expresses results in parallel with this finding. Snyder (2002) conducted the most comprehensive study on the concept of hope and found that there is a significant relationship between hope and psychological well-being. When the literature is examined, it is seen that there are studies (Michael and Snyder, 2005; Shorey et al., 2003; Snyder et al., 1996; Valle et al., 2006; Kylma, 2005; Ciarrochi et al., 2007) expressing parallel results to this finding. is seen. There are studies indicating that there is a significant relationship between subjective well-being, which is one of the

concepts of mental well-being, and hope (Magaletta & Oliver, 1999; Vacek et al., 2010; Kato & Snyder, 2005; Kirmani et al., 2015).

The relationship between mental well-being and resilience was also examined in the model in which the mediating effect of Hope was tested, the third "Relationship between psychological resilience and hope". The findings show that there is a positive and significant relationship between psychological resilience and hope. When the literature is examined, studies expressing parallel results with this finding (Kararımak, 2007; Zengin, 2013; Kaya, 2007; Aydın, 2010; Collins, 2009; Horton & Wallender, 2001; Mandleco & Peery, 2000; Werner, 1995; Klohn, 1996) ) appears to be.

### **Discussion on the Mediator Role of the Sub-Dimensions of Hope in the Relationship Between Mental Well-Being and Resilience**

“What is the mediating effect of trust/belief on the relationship between mental well-being and resilience?” Depending on the sub-problem, “There is a partial mediating effect of trust/belief on the relationship between mental well-being and resilience.” The research hypothesis was analyzed in the findings section and the obtained findings confirm the hypothesis.

Findings show that there is a significant relationship between mental well-being and trust/belief. Uslu and Şimşek (2020), in a study they conducted, stated that trust and well-being affect employee psychology and are among the factors that reflect it. Another finding is that there is a significant relationship between resilience and trust/belief. In order to talk about the psychological resilience of individuals, the individual must be exposed to a risk situation or difficult life events (Masten & Reed, 2002). According to Tümlü and Reçepoğlu (2013); Individual risk factors that affect psychological resilience include “low self-confidence of the individual”. Individuals with psychological resilience believe that they have the ability to manage the process well when faced with difficult life events (Skodol, 2010). For this reason, self-confidence and self-efficacy are among the priority conditions for resilience (Rutter, 1987).

“What is the mediating effect of lack of perspective on the relationship between mental well-being and resilience?” Depending on the sub-problem, “There is no mediating effect of lack of perspective on the relationship between mental well-being and resilience.” The research hypothesis has been analyzed in the findings section and the obtained findings are in the nature of rejecting the hypothesis. Considering the literature, although there is no study on this subject, Schrank et al. (2011) refers to the lack of perspective in the scale he developed about hope as “lack of hope”. In this part of study, a literature review on the equivalent concept of hopelessness was conducted. In many studies (Bluvol and Ford-Gilboe, 2004; Gilman et al., 2006) it has been determined that the lack of hope causes various psycho-social problems.

Findings show that there is a significant relationship between mental well-being and lack of perspective. In their study on mental well-being, Gürkan and Gür (2019) concluded that as the perception of hopelessness increases,

the level of mental well-being decreases. Another finding is that there is no significant relationship between psychological resilience and lack of perspective.

“What is the mediating effect of positive future orientation on the relationship between mental well-being and resilience?” Depending on the sub-problem, “Positive future orientation has a partial mediation effect on the relationship between mental well-being and resilience.” The research hypothesis was analyzed in the findings section and the obtained findings confirm the hypothesis. Seligman (2002) states that a person needs to go through the process of “psychological immunization” in order to feel powerful. Bringing positive traits such as focus on the future and optimism is more valuable than medication or any therapy. At this point, the people who will bring these characteristics to the individual are the psychological counselors, who also form the working group of our research.

The findings show that there is a significant relationship between mental well-being and positive future orientation. Another finding is that there is a significant relationship between resilience and positive future orientation. Schrank et al. (2011) also mentions the concept of “goal/target setting” within the scope of positive future orientation in the scale he developed about hope. While Gizir (2007) talks about the concept of psychological resilience, he mentions that among the individual protective factors are life goals and positive expectations for the future. This situation supports that there is a significant relationship between positive future orientation and psychological resilience.

“What is the mediating effect of social relations/individual value on the relationship between mental well-being and resilience?” Depending on the sub-problem, “There is no mediating effect of social relations/individual value on the relationship between mental well-being and resilience.” The research hypothesis has been analyzed in the findings section and the findings are in the nature of rejecting the hypothesis.

The findings obtained indicate that there is a significant relationship between mental well-being and social relations/individual value. When the literature is examined, well-being (Chu et al., 2010), psychological well-being (Iraz et al., 2021; Emadpoor et al., 2016; Aydın et al., 2017) and subjective well-being (Nur Şahin, 2011; Saygın, 2008) expressed results in parallel with our findings. The relationship between social support and well-being in the elderly is stronger than in other age groups (Yalçın, 2015). Another finding is that there is no significant relationship between psychological resilience and social relations/individual value.

## Conclusion

Positive, high and significant relationship between psychological resilience and mental well-being; positive, moderate and significant relationship between hope, trust/belief, positive future orientation and social relations/individual value; It was determined that there was a negative, low and significant relationship between perspective deprivation.



Positive, high and significant relationship between mental well-being and trust/belief; moderate and significant relationship between hope, positive future orientation and social relations/individual value; It has been determined that there is a negative, low and significant relationship between perspective deprivation.

It has been determined that hope, trust/belief and positive future orientation have partial mediating effects on the relationship between mental well-being and resilience. At the same time, it was determined that lack of perspective and social relations/individual value did not have a mediating effect on the relationship between mental well-being and resilience.

## Recommendations

- 1) The relationship between the concepts of mental well-being, psychological resilience and hope has not been investigated before in our country. For this reason, there is a need to enrich the findings of the study.
- 2) Various seminars can be held to increase mental well-being, psychological resilience and hope levels of psychological counselors. In addition, it is recommended to organize the course content in undergraduate education programs by focusing on positive psychology.
- 3) Studies on the concept of mental well-being are limited in our country. Studies should be increased for a better understanding of this concept.
- 4) When the literature is examined, it is noteworthy that there are few studies on psychological counselors in our country. Studies on psychological counselors should be increased.
- 5) According to the findings; It was determined that as the hopelessness level of psychological counselors increased, the level of mental well-being decreased. For this reason, working environments can be improved so that psychological counselors can gain efficiency from their business life.
- 6) In studies on hope, it has been determined that the "Integrative Hope Scale" is not used much and it is not examined in terms of the sub-dimensions of the concept of hope. In future studies, the sub-dimensions of the Integrative Hope Scale can be considered in terms of various variables.
- 7) Based on the findings, in order to better understand and support the factors affecting the psychological resilience levels of psychological counselors who will start their profession, mental well-being and hope-based occupational and school adaptation workshops can be organized.

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## Opinions of Psychological Advisors on PDR Services Carried Out Through Distance Education During the COVID-19 Epidemic

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**Abstract:** This research was conducted to determine the opinions of psychological counselors working in Gaziantep about their professional experiences during the COVID-19 epidemic period. The semi-structured interview form prepared for data collection was applied face to face in accordance with the course of the epidemic process. The data obtained from the data collection tools used in the research were coded and the quantitative data were analyzed using SPSS and the qualitative data were analyzed using MAXQUADA2020. As a result of the analysis, it was determined that psychological counselors faced problems such as internet connection problems during distance education, low participation of students, difficulty in using the Web tool, high number of siblings in the family, late arrival of tablets to be delivered to students to benefit from online education, lack of privacy due to family members being at home. has been done. In addition, it was observed that psychological counselors were worried about revealing their images in online interviews. It has been determined that online guidance services are mainly carried out in the form of group guidance and educational guidance services. In addition, it was stated that psychological counselors had hesitations about opening the camera during the online video training and guidance process they carried out with the students. It was found and discussed that the psychological counselors were able to benefit from the online training they received during the epidemic, that they were of the opinion that distance education should not continue after the epidemic is over, and that they did not find their professional and personal satisfactions satisfactory throughout the process.

**Keywords:** Distance Education, Guidance and Psychological Counseling Services, Psychological Counselor

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### Introduction

The world has experienced many epidemics throughout history. The coronavirus epidemic is one of them. Coronavirus has been defined as a contagious virus that causes respiratory tract infection (T.C. Ministry of

Health, 2020). This new virus, which emerged in seafood and animal markets, was named COVID-19 due to the crown appearance on its surface (Er and Ünal, 2020). The virus, which was first seen in Wuhan, China, has spread rapidly all over the world. The virus spreads rapidly to individuals in close contact through droplets from the mouth. The most common symptoms of the virus are dry cough, high fever and fatigue. Although it is determined that the symptoms appear 5 days after receiving the virus, in some cases, they can appear between 2-14 days (Budak and Korkmaz, 2020). However, the severity of the disease varies according to age and chronic disease criteria in individuals (Aşkın, Bozkurt, & Zeybek, 2020). The data of the World Health Organization defines individuals aged 65 and over and individuals with weak immunity, asthma, high risk of heart attack, liver and kidney diseases, and obesity as a high-risk group (WHO, 2020). Symptoms appear after 2-27 days after contact with infected individuals (Wikipedia, 2020). At the same time, many of the individuals have the disease without showing any symptoms. The data shared by the Ministry of Health also show that 80% of the patients recovered from the disease mildly, and 20% completed their treatment under hospital conditions (T.R. Ministry of Health, 2020). When the current situation is evaluated, the countries with the highest number of people caught in COVID-19 and died from COVID-19; They are listed as the United States of America, Russia and Brazil (WHO, 2020). If the epidemic continues at the same intensity, it seems likely that at least 3 million people will die in the world. This shows that 2% of the world population can be infected and 2% can result in death (Aşkın, Bozkurt and Zeybek, 2020). In the table in Turkey, as of October 2022, cases exceeded 16 million and deaths exceeded 101 thousand (T.R. Ministry of Health, 2022).

It started the epidemic process in Turkey as of March 11, 2020. Studies on coronavirus have begun to take their place in the literature. With the beginning of the epidemic process, the world has changed from the way of life to the flow rate (Bozkurt, 2020). Mankind has slowed down to slow the spread of the virus. The COVID-19 epidemic process, which is still in effect, has caused serious changes in our society and family structures, along with many other areas such as health, education, culture, economy, socio-cultural areas.

With the start of the process, many activities were suspended in order to ensure social isolation. As of March 16, 2020, Turkey has entered a new era in education and it has been decided to close educational institutions. As of March 23, 2020, phones, tablets and laptops quickly took their place in education. Digital concepts have started to be used more in education, and areas of need such as anxiety, stress, and resilience have come to the fore (Bozkurt, 2020). EBA (Educational Information Network) was developed and alternative solutions were sought. Innovations in education necessitated the start of the distance education process very urgently. There are many advantages to using distance education. However, distance education has brought many difficulties with it.

There are explanations that distance education will continue as a form of education from now on. Improving the distance education process, which has not yet reached the efficiency of face-to-face education, has been the most basic need of education (Başaran, Doğan, Karaoğlu, & Şahin, 2020). In the improvement of the distance education process, the experiences and awareness of the teachers, students and parents who have experienced the process will guide us at the point where we should start. In the researches, the distance education process was evaluated by especially referring to the teachers' opinions and awareness. As an example of these studies;



Bakioğlu and Çevik (2020) positive contributions of the distance education process to Science teachers in their article "Science Teachers' Opinions on Distance Education in the COVID-19 Pandemic Process", Bayburtlu (2020) "Turkish According to Teachers' Opinions in the COVID-19 Pandemic Period Distance Education Process" In the article "Educational Education", the shortcomings of the distance education process were emphasized. The distance education process has been clarified with the researches carried out in different branches and the areas that need improvement on a branch basis have been revealed. However, these studies are not sufficient for the field of education (Duban and Şen, 2020). No research has been found in the field of guidance yet. The difficulties encountered also affected the guidance services carried out in schools. Since common distance education guidance services are not determined in educational institutions, the subjective experiences of psychological counselors come to the fore. The platforms used, the studies applied, the activities carried out were left to the choice of the psychological counselors and the use of digital platforms according to the needs and accessibility of the students. Thus, different guidance services emerged. The basis of guidance services is formed in interaction and communication environments. The communication language in virtual environments and the interaction we tried to create from camera glasses and the basis of guidance services were also tried to be established through distance education. If the communication and interaction created from the date of transition to distance education are investigated, it will contribute positively to the effectiveness of the guidance services maintained through distance education. When the literature on the subject is examined, it has been decided to conduct research covering "Psychological Counselors' Opinions on Counseling Services Provided Through Distance Education During the COVID-19 Epidemic Period".

In this context, "What are the opinions of psychological counselors regarding the PDR services conducted through distance education during the COVID-19 epidemic period?" The answer to the problem has been sought. The purpose of this holding is to determine the evaluations of the experiences of psychological counselors during the COVID-19 Epidemic Period, which has been experienced in the world since March 11, 2020. In the research, using the part-time interview formula, the content, dimensions, duration of the service provided by psychological counselors in online education, cooperation with other institutions or other devices in the school, and answers to the areas needed in these process/problems that need to be solved were sought. Using open-ended questions rather than short-answer questions, they are allowed to unpack configurations and reason.

Guidance and psychological counseling services, which were carried out to complete the developmental needs within the scope of personality services needed by students who continue their education at different education levels, were carried out face to face with comprehensive guidance programs. With the start of online education services due to the epidemic, guidance and psychological counseling services have also started to be carried out as online services. In the epidemic period, which started unexpectedly and without adequate preparations in terms of infrastructure, difficulties were encountered in the services carried out from time to time or many negativities that reduced the efficiency of the service. However, as technology, social networks and online education gain importance not only in our country but also all over the world, it is necessary to adapt to this process in order to be more effective in guidance services. Considering the fact that online services will also exist in guidance and psychological counseling services, it is thought that this study will contribute to the problems encountered in this

study and by trying to reach the data for the solution. Thus, this research, which is carried out by consulting the opinions of psychological counselors, is also important in the formation of the infrastructure that will be needed for the online conduct of guidance services during such epidemic periods.

Guidance and psychological counseling services are a helpful resource for individuals to get through their developmental period in a healthy way. Individuals experience the most critical developmental periods in school. Guidance activities offered in schools play a major role in raising healthy individuals. Guidance and psychological counseling services in schools can be provided both face-to-face and online. Guidance and psychological counseling services provided through distance education are also important in terms of the opinions, expectations, criticisms and experiences of psychological counselors during the epidemic. How they use guidance and psychological counseling services in the distance education process has been considered important and researched. All the results obtained in the research can be used to guide online guidance services.

Since online guidance services were not used much in our country before, it initially created an environment of uncertainty for psychological counselors. While this research can shed light on our colleagues who still have uncertainty with the experiences of psychological counselors, online guidance services will develop further as it focuses on the problems that need to be solved.

With the increase in the use of Web 2.0 tools, interpersonal communication tools have also changed. With the spread of the Internet, online counseling was born. Online consultation can be done not only by voice and video, but also by e-mail and instant message. There may be many reasons why individuals prefer online counseling. Individuals who are unable to leave their homes, travel frequently, are far from counseling centers where they can get help, have sufficient financial means, and can express themselves more comfortably online may prefer online counseling (Alleman, 2002; Cook & Doyle, 2002; Joinson & Paine). , 2007; Kilroe, 2010; Murphy et al., 2009; Shaw & Shaw, 2006). For individuals experiencing these situations, online consultations can be considered a useful service both in the past and in the future.

Online counseling has many advantages. The distance between people no longer matters, and people can get help from a consultant in any city they wish (Cook & Doyle, 2002; Kilroe, 2010; Shaw & Shaw, 2006). Another advantage is that the problems of self-disclosure that people experience in face-to-face counseling are less experienced in online counseling (Alleman, 2002; Joinson & Paine, 2007; Shaw & Shaw, 2006). In the research, men who experience gender confusion prefer to receive online counseling instead of face-to-face counseling for fear of stigma (Joyce, 2012). We also see online psychological counseling services in government institutions in our country from time to time. An example is the Ministry of Health's Smoking Cessation Line, Call 171, the Turkish Armed Forces' hotline (Bozkurt, 2013). Individuals can get online psychological counseling services from these units whenever they want.

In online counseling, like face-to-face counseling, first of all, a good therapeutic relationship is established between the client and the counselor. Then, the best intervention route for the client is determined (Barack, Hen,

Boniell-Nissim, & Shapira, 2008; Cook & Doyle, 2002). Before the sessions, information about the process, namely the making session, is given to the clients (Bozkurt, 2013). It is very important for the counselor to apply therapeutic skills and conditions such as content and emotion reflections, summarization, here and now, in the sessions, as in face-to-face counseling (Haberstoh, Parr, Bradley, Morgan- Fleming, & Gee, 2008).

An example of the beginning of online counseling was the website "Metanoia" created by Martha Ainsworth in 1990. Martha started her own website (<http://www.metanoia.org>) because she could not find a solution to her needs while searching for psychological help online during a period when she did not have the opportunity to receive face-to-face counseling.

Today, numerous institutions and counseling centers in the world and in our country offer online psychological counseling services to individuals. In 2013, on the Google search engine, online therapy reached an average of 165,000 monthly (Bozkurt, 2013). When it comes to 2015, this figure is similarly 150,000 (Google Adwords, 2015). The figures show that individuals' demand for online psychological counseling is quite high. Online psychological counseling is carried out by the counselor and the client, as in face-to-face counseling, by communicating with audio and video on the screen or by correspondence (Barak, 1999; Bozkurt, 2013). With the demand for online counseling, the start of the coronavirus epidemic process and quarantine practices, people have found solutions to their psychological counseling needs by taking online counseling at home instead of going to institutions. Therapeutic interventions are established over the phone or the internet, and mental health services are provided with audio and video calls. As well as individual interviews, group consultations are also held (Özdemir & Barut, 2020). Interaction is made with speakers, microphones and computer cameras in calls made via video conferencing. With the return of schools to online education, teachers have started to communicate with their students through many online applications. The Eba application also provided the opportunity for online training in the process. The most popular application used was Zoom. Psychological counselors have also established therapeutic interaction with students through video conferencing to individual and group interviews.

With the rapid development of technology and the social distance created by the pandemic process, the forms of communication between people have also been shaped. People have started to provide their chats by correspondence through applications (Zeren and Bulut, 2018). People have started to create new identities for themselves by using avatars by hiding their identities from time to time in their correspondence. Avatar refers to a virtual identity (profile) that people create for themselves (Suler, 2000). When people do not want to turn on their images and sounds, they resort to instant messaging solutions a lot. Thus, people feel more comfortable and freer, and they can show behaviors that are suitable for the self they want (Erdem & Özdemir, 2020). Counseling via instant message is a type of counseling preferred by clients who do not want to receive counseling via video conference.

Counseling can also be done simultaneously by means of a message without images and sounds. The process continues mainly on the text. The client and counselor do not see each other. The client writes down the problem

and the counselor makes therapeutic interventions, as in face-to-face counseling. Feedback is provided with skills such as reflections and summarization. For psychological counseling via instant message, the client and the counselor carry out the counseling with software suitable for the process (Bozkurt, 2013).

For clients and consultants who will send instant messages via e-mail, the client writes the question to the consultant via e-mail. The counselor provides therapeutic feedback via e-mail. The only difference from instant messaging is that the parties are not in the process simultaneously (Özdemir and Barut, 2020).

With the distance education, the easiest and most effective way of communication between teachers and students and parents has been instant messaging. Thanks to instant messaging, it has been possible to inform more individuals at the same time. With the onset of the epidemic process and the closure of schools, teachers have ensured that their classrooms are moved to online groups. Both student and parent groups and general information were provided from the groups. Before the epidemic process, teachers were not very active on online platforms with parents and students, but today, communication in schools has moved to these platforms. Thus, the time and place limit in reaching the teacher has been lifted. However, this situation created a disadvantage for teachers. Violations to personal life began to occur.

Psychological counselors have also used instant messaging a lot to deliver guidance services. A good alternative has been created for students who cannot express themselves comfortably or who do not want to share their voices and images. Instant message will always exist in education and guidance services.

Psychological counseling via e-bulletin, it is a one session consultancy. Users ask questions to experts by subscribing to their web base. Experts answer users' questions and all other users can view the content in a question-and-answer format. At the same time, the expert can share information on the website on which he can transfer information. Again, all users can see and read this content (Bozkurt, 2013).

Prior to the introduction of distance education into our lives, Eba was used as a platform for teachers to transfer information. However, with the introduction of distance education into our lives, Eba has started to be used more actively in e-bulletin sharing. Other online platforms were preferred for sharing e-bulletins with parents and students. Information was delivered to many people in a very short time via e-bulletin and information transfer became easier. In particular, psychological counselors shared information with students through e-bulletins in line with the annual plans of the guidance service.

One of the self-help guides is the bibliotherapy method. With the onset of the epidemic process, the time spent on the Internet has increased even more. Clients can find guides that will be good for them by clicking on the internet and read the articles that interest them (Bozkurt, 2013). During the distance education process, parents and students have been exposed to a lot of information transfer on the internet. Guidance service also shared with parents and students to read the right information sources. Apart from the e-bulletins prepared by the guidance service, parents and students were directed to help guides made from the right sources. Parents and students also achieved successful results with the help guides (Bulut, 2010). In this process, bibliotherapy was applied as

internet-based.

Internet based use of assessment and evaluation tests, Most of the tests performed in clinics and centers are suitable for online administration. The evaluation of the tests is also done through computer programs. Thus, the application and evaluation of the tests became simpler, faster and easier. The control is entirely with the user. The user can pause or end the test at any time (Bozkurt, 2013).

When the epidemic started and the restrictions were applied, individuals could not leave their homes and could not apply measurement and evaluation tests. It has been started to be implemented in an internet-based way in order to meet the needs of individuals and not to prolong the measurement and evaluation process. School essays, textbooks, and online psychological tests were all done online. Psychological counselors shared online questionnaires, tests and inventories that they could apply. The "Guidance Needs Determination Questionnaire" applied at the end of the year was also applied online and the results were reported.

Since psychological counseling is a profession based on mutual interaction and communication, it has been one of the most difficult groups on the way to distance education. It was wondered what kind of problems psychological counselors encountered during this process, how they coped with these problems, what the expectations of other stakeholders were, whether they turned the epidemic process into an opportunity, and whether they also experienced burnout or satisfaction. In line with these curiosities, it is thought that the research will be important in terms of benefiting from the experiences of other psychological counselors.

Our psychological counselors, who are primarily involved in the field during the crises our country is experiencing, should be closely concerned not only with the physical effects of the students but also with the psychological negative effects during the epidemic process (Doğan and Koçak, 2020). It is known that individuals overcome crises more easily when they are together. Close attention will also ensure that the student receives the message "I am not alone". First of all, crisis intervention action plans should be made in schools. The school personnel and duties that will take place in the implementation phase of the plan should be determined in advance. All personnel should be informed and trained in line with these duties. Trainings such as stress and anxiety disorders, loss and mourning, lack of motivation, and focusing problems, especially after traumas, will be very useful. Additions and necessary arrangements should be made on these issues for both parents and students in our education plans for the coming years (Çetin Dalgıç, Bulut, & Şengül, 2021).

## Method

This study was designed with a phenomenological research design, one of the qualitative research methods, as the participants shared their experiences during the distance education process. Phenomenology is a method that aims to describe the experiences of individuals or groups in depth (Yıldırım & Şimşek, 2018). Individual interviews, observations, and focus group interviews are used for this purpose (Akdağ, 2019).

Criterion sampling, one of the purposive sampling methods, was used in the selection of the interviewed psychological counselors. With the purposeful sampling method, the opportunity to work in-depth with individuals with sufficient criteria is obtained (Baltacı, 2018). With the criterion sampling type, participants who meet the predetermined criteria are studied (Büyüköztürk, 2012). It was determined that the psychological counselors participating in the research should work actively in an institution in the 2020-2021 academic year and during the distance education process. Psychological counselors who were not involved in the distance education process were not included in the study. The study group of the research consists of 22 psychological counselors who are actively working in the province of Gaziantep during the distance education process. Consent was obtained from the participants in the study. The names of the participants were not taken, and the working group was formed on the basis of completely volunteerism. Participants in the study K1, C2, K3, .... It is coded as K22. Information about the participants is given below.

The age range of the participants is between 24-48 years and their seniority is between 1-23 years. Fifteen of the participants were female and 7 were male. Two of the female participants are graduates, and the remaining 20 participants are undergraduates. 1 of the participants work in kindergarten, 8 in primary school, 8 in secondary school and 5 in high school. 20 of the participants work in public schools and 2 of them work in private schools. 13 of the participants are single and 9 of them are married. 6 of the participants have children, their number is between 1-3 on average. There is no participant with a special needs child. Participants generally carried out the distance education process from computers and phones. All of the participants used their own internet during the distance education process. None of the participants used the internet provided by the Ministry of National Education to teachers. 9 of the participants did not experience internet connection problems, and 13 of them experienced this problem. Participants generally preferred Eba, Zoom, Whatsapp, school site, Uzemsoft, Kaunt platforms during the distance education process. While 9 of the participants rate the level of difficulty in using technology as 1 on a scale of 0-10, 10 of them rate it as 2; 2 rated 3 and 1 rated 4.

The aim of this study is to examine the opinions of psychological counselors on guidance services in the distance education process, semi-structured interviews were conducted face to face and the information received from the participants was noted. At the same time, the observation results of the participants during the interview were also recorded on the form.

In order to collect data in the study, semi-structured interview form, one of the qualitative data collection tools, was used and the interviews were supported by the data obtained from the observation technique. In order to ensure the reliability of the study and to collect the data correctly, the study was carried out face-to-face under appropriate conditions. In the field of guidance and psychological counseling, the opinions of 2 field experts and 5 psychological counselors were received, contributing to the form validity of the items in the interview form. Open-ended questions were asked in the prepared semi-structured interview form. The interview form consists of 20 questions. The first 9 questions are about the demographic information of the individuals, and the 11 questions are about the experiences and opinions of the individuals about the guidance services carried out in the distance

education process. For example, problems encountered and coping methods, student participation, parent expectations, etc. The information obtained during the observation was also recorded in the observation form.

Since quantitative data such as quantitative studies cannot be obtained in qualitative studies, increasing credibility is the most important factor (Arastaman, Öztürk Fidan, & Fidan, 2018). In this study, first of all, expert opinions were used to increase credibility. As a result of the examination of the interview form by 5 psychological counselors and 2 field experts, it was concluded that the form had content validity. In order to further increase the internal validity of the study, the triangulation technique was used. In this technique, two or more methods are used together and the results are compared. There is also a complementarity between the methods (Başkale, 2016). While applying the interview questions in the study, the observation form was filled at the same time, so that the answers given by the participants to the questions in the interview form were also supported by observation.

Participants in the study K1, C2, K3, .... It was coded as K22 and the answers given during the interview were transferred to the computer. The experiences and opinions of the participants regarding the guidance services in the distance education process were determined. Themes were created according to the content of the questions in the interview form, and the answers given by the participants were separated according to the themes. Thus, the analysis is completed. In the event that distance education is re-planned, it is aimed that this study will be a guide for guidance services.

## Results

### Findings according to the problems faced by school counselors during the distance education process and their coping methods:

Psychological counselors were asked if they had any concerns about the problems encountered during the distance education process, coping strategies, evaluation of student participation and online interviews during the epidemic. The answers given by the psychological counselors were coded and presented in Table 1. When Table 1 is examined, 20 school counselors stated that student participation in the distance education process was insufficient, and only two school counselors stated that student participation was at a sufficient level. During the distance education process, the online meetings of the school counselors are the most productive study(8), family communication(4), epidemic process(3), exam(3), resilience(3), healthy life(2), technology addiction(3), distraction(2), leisure time(2), fear-anxiety(2), time management(1), depressive mood(1), disaster management(1), stress management(1), bullying (1) issues are seen.

Table 1. Problems Faced by School Counselors During Distance Education and Coping Methods

Main theme	Codes
Evaluation of student participation	Participation was low (20)

	Participation was high (2)
	Exam(3)
	Psychological resilience(3)
	Disaster management(1)
	Stress management(1)
	Healthy living(2)
	Technology addiction(3)
	Family communication(4)
Online conversation topics	Efficient study (8)
	Distraction(2)
	Epidemic process(3)
	Bullying(1)
	Leisure (2)
	Fear-Anxiety(2)
	Time management(1)
	Depressed mood(1)
Worried about online conversations?	Yes (13)
	No (9)
	Connection issues(9)
	Low student participation (19)
	The difficulty of the web tool(1)
Problems encountered	Excess number of siblings(4)
	Tablets arriving late(1)
	Lack of privacy(1)
	Difficulty in time management(1)
	Disciplinary issues(1)
	Phone call(2)
	Support from classroom teachers(6)
	Using eba(1)
	Using Whatsapp (2)
Coping methods	Inability to find a solution (5)
	Making announcements (3)
	Choosing low-intensity times(1)
	School administration support(1)
	Parent collaboration(2)

Counselors working with kindergarten and primary school groups mostly gave answers to technology addiction, family communication, and bullying, while counselors working with secondary school and high school groups gave the answers to exam, stress management, time management, distracted and productive study. During the distance education process, 13 school counselors are concerned about online interviews and do not open their



images. In the participant description; The reason for concern was the taking of personal images and the presence of their families. Another participant description is; I am afraid of doing something wrong with families. 9 school counselors share their images without any worries. The most common problems faced by school counselors in the distance education process are; low student participation(19), connection problems(9), high number of siblings(4), difficulty of web tool(1), lack of privacy(1), late arrival of tablets(1), discipline problems(1), difficulty in time management( 1) is indicated. Example from participant description; Since there are too many children in a house, they cannot all attend the class at the same time. The coping strategies used by school counselors are; support from classroom teachers (6), not finding a solution (5), making announcements (3), using whatsapp (2), calling by phone (2), using Eba (1), choosing times when the hours are low (1), school management support(1), parent cooperation(1).

### **Findings according to the contribution of online trainings to the professions of school counselors during the epidemic period:**

During the epidemic, many trainings were offered online. School psychological counselors were asked whether they participated in these trainings and whether they were productive. The answers given by the school psychological counselors are presented in Table 2.

Table 2. The Contribution of Online Training to the Professions of School Counselors During the Epidemic

Main theme	Period	
	Answers	Codes
Have you participated in online trainings and were you productive?	Yes(18)	I got the yield(14)
	No(4)	I did not yield(4)

When Table 2 is examined, it is stated that 18 school counselors participate in online trainings, and 4 school counselors do not participate in online trainings. 14 school counselors who participated in online trainings stated that they were efficient from the trainings, and 4 school counselors stated that they were not efficient from online trainings. Examples of participant descriptions; I was not aware of online trainings, it was very useful for my professional and personal development, after a while I could not get efficiency because I had difficulty in focusing, the killer was low, but it kept me alive professionally.

### **Expectations from school counselors within the scope of guidance services in the distance education process and the findings according to the interviews:**

School psychological counselors were asked about the expectations of the administration, parents and students while conducting the guidance services in the distance education process, individual/group interviews, in which guidance service area and how often. The answers given by the school psychological counselors are presented in Table 3.

Table 3. Expectations and Interviews From School Counselors Within the Scope of Guidance Services in the Distance Education Process

Main theme	Codes
What were the expectations of the administration?	Making individual interviews(3) Coming to school at least once a week and being supportive in administrative matters(9) Dealing with exam students(1) Didn't have expectations(4) Conducting seminars(3) Active use of school social media(1) Collaborating with parents on absenteeism issues(1) Supporting classroom teachers(1)
What were the parents' expectations?	Didn't have expectations(15) Increasing academic success(4) Technology addiction(2) Ensuring continuity in lessons(1) Keeping motivation high(2)
What were the students' expectations?	Interviews about the exam(3) Seeing us from time to time and doing events(6) Didn't have expectations(12) Bullying(1) Study plan preparation(1) Making individual interviews(1)
Were there more individual or group meetings?	Individual interviews(9) Group interviews(13)
How often did you interview?	10 students per week(1) Twice a month(3) Every week(10) 1-2 hours every day(2) 1-2 meetings per week(2) Once a month(4)
In which field of guidance did you interview the most?	Educational(12) Personal-social(9) Professional(1)

When Table 3 is examined, the expectations of the administration from school psychological counselors in the distance education process; Coming to school at least once a week and being supportive in administrative matters(9), did not have expectations(4), holding seminars(3), individual interviews(3), dealing with exam students(1), using school social media actively(1) collaborating with parents on absenteeism issues (1),

supporting classroom teachers (1). Example from participant description; They stated that because my administration wanted me to come to school, I could not make many online interviews.

Likewise, the expectations of the parents; they did not have expectations(15), increasing academic success(4), technology addiction(2), keeping motivation high(2), ensuring continuity in lessons(1). Example of participant description; The participant stated that when I made too many announcements, my parents complained.

The expectations of the students are; they did not expect (12), seeing us from time to time and doing activities (6), interviews about the exam (3), bullying (1), preparing a study plan (1), making individual interviews (1). 9 school counselors stated that they made more individual interviews, while 13 school counselors stated that they held more group interviews. Psychological counselors who conduct interviews with the group mostly work at the primary school level. Psychological counselors who conduct individual interviews mostly work at secondary and high school levels.

The interviews made; Every week (10), once a month (4), twice a month (3), 1-2 meetings a week (2), 10 students (1) every week, 1-2 hours every day (1). Among the counseling service areas interviewed, 12 school counselors gave educational guidance, personal-social guidance 9 school counselors, and 1 school counselor gave vocational guidance. School counselors working in kindergarten and primary school age groups preferred interviews in the field of personal-social guidance more, while counselors working with secondary school and high school age groups stated that they preferred interviews in the field of educational and vocational guidance more.

**Findings according to the difficulties that await school psychological counselors when the epidemic process is over:**

The school counselors were asked about the expected difficulties when the epidemic was over, and the answers given by the school counselors are presented in Table 4.

When Table 4 is examined, the school psychological counselors as the difficulties waiting for us after the epidemic process is over; discipline-behavior problems(12), adjustment problem(11), academic retardation(8), technology addiction(5), introversion(3), anxiety disorder(2), bullying(1), psychological retardation(1), attention They predicted the problem (1) as not studying efficiently (1), learning anxiety (1). Example of participant descriptions; The main difficulty is that it is waiting for us after the pandemic process is over.

Table 4. Difficulties Waiting for Psychological Counselors When the Epidemic Process is Over

Main theme	Codes
	Learning anxiety(1)

What are the difficulties that await psychological counselors after the epidemic is over?

Discipline-behavior problems(12)  
Inability to study efficiently(1)  
Compatibility problem(11)  
Attention problem(1)  
Introversion(3)  
Academic retardation(8)  
Psychological retardation(1)  
Technology addiction(5)  
Anxiety disorder(2)  
Bullying(2)

**Findings according to whether distance education will continue after the epidemic is over and if it will, what improvements will be made:**

School psychological counselors were asked whether distance education should continue after the epidemic process is over, and if so, with what improvements. The responses received are presented in Table 5.

Table 5. Whether or not Distance Education will Continue After the Epidemic is Over and If It will, Improvements to be Made

Main theme	Answers	Codes
Should distance education continue?	Yes it should continue(7) No it should not continue(15)	Seminars should be given to psychological counselors(1)
		Infrastructure should be improved(4)
		It should not be done in younger age groups (2)
		It should only be used in emergencies(2)
		It can be done in the form of parent trainings(1)
		It can be used to identify the student and identify needs(1)
		May be supportive(1)

When Table 5 is examined, 15 school counselors stated that distance education should not continue, and 7 school counselors stated that distance education can continue. School psychological counselors stating that distance education can continue; infrastructure should be improved (4), it should not be done in small age groups (2), it should be used only in emergencies (2), it should be done in the form of parent training (1), psychological counselors should be given seminars (1), they may be supportive(1). In the research, most of the participants were asked whether they should continue distance education or not; They stated that “definitely distance education should not continue”. It was observed that 7 psychological counselors (K1-K2-K3-K4-K5-K6-K7)

stated that distance education should continue. Not at primary school level, but at higher levels (P5), the infrastructure should definitely be improved (P6), it can be used to support students (P7).

**Findings according to the evaluation of professional and personal satisfaction received from the guidance services carried out during the epidemic process:**

School psychological counselors were asked to evaluate their professional and personal satisfaction from the guidance services carried out during the epidemic. The responses received are presented in Table 6.

Table 6. Evaluation of Professional and Personal Satisfaction Received from the Guidance Services Carried Out During the Epidemic Process

Main theme	Answers
Do you find your professional and personal satisfaction satisfactory?	Yes (2) No (20)

When Table 6 is examined, 20 school counselors do not find their professional and personal satisfaction with the guidance services they provide during the distance education process satisfactory, while 2 school counselors find their professional and personal satisfaction with the guidance services they provide during the distance education process. Some examples of participant responses; I experienced both personal burnout and professional burnout, I adapted more easily with the pandemic coinciding with my first year in the profession. Even though my personal satisfaction was good, I think that I could not take preventive-developmental interventions from time to time in the professional sense.

## Discussion

The findings obtained in this study, in which the opinions of psychological counselors regarding the PDR services carried out through distance education during the COVID-19 epidemic period, were examined.

According to the findings obtained from the first problem of the study, almost all of the psychological counselors (90.9%) who participated in the study evaluated student participation as low. Similarly, in a study conducted in Elazig, student participation was found to be low (Kazu, Bahçeci, Kurtoğlu-Yalçın, 2021). In another study, it was reported that student participation could be achieved except for a few students in a study conducted at all levels of private schools (Alper, 2020). The topics of online interviews made during the distance education process; It was concluded that effective study, family communication, psychological resilience, epidemic process, healthy life, distraction, fear-anxiety, leisure time, bullying, stress management, disaster management, time management, depressive mood. It was determined that more than half of the psychological counselors (59.1%) were worried during online interviews and did not open an image. They stated that the reason for this was the anxiety of having their images taken and the families being with the students. One of the problems

encountered in the distance education process is the low student participation. Another big problem is connection problems. At the same time, the disadvantage of having too many children at home, the high number of siblings and the difficulty of all of them to attend classes at the same time constitute another problem. Difficulties were experienced because there was no preliminary informative study and habit about the Web tools used. Disciplinary problems were encountered in the distance education process, especially in younger age groups. Since school counselors are assigned with many tasks in the distance education process, difficulties have been experienced in providing time management. Time management problem is seen more in the answers of psychological counselors working in private schools. It was concluded that the tablets arrived late, the student could not open himself very much with his family, and problems were experienced because there was no privacy. In a study, teacher candidates were asked about the problems they experienced and it was seen that there were similar problems (Dinç, 2020). As a solution to these problems, it was concluded that the methods of getting support from the classroom teachers in the announcement of the lessons, making the announcements, making the phone calls, reaching the students via whatsapp, school administration support, parent cooperation, choosing the times when the class hours are low and providing the ease of student entrance are used. (22.7%) stated that their psychological counselor could not find a solution.

According to the findings obtained from the second problem of the study, 81.8% of the psychological counselors participated in online trainings during the epidemic process. Psychological counselors who did not participate stated that they were not aware of it. It was concluded that 22.2% of the participating psychological counselors could not get efficiency from the online trainings they attended. Psychological counselors who were not efficient stated that they could not focus and their training participation rate was low.

According to the findings obtained from the third problem of the research, it was concluded that the administration's highest expectation from psychological counselors in the distance education process is that they come to school at least once a week and be supportive in administrative matters. Psychological counselors stated that they expected support especially in tablet distribution and processing of online course programs into the system. 18.2% of the psychological counselors had no expectations from the administration in the distance education process, 13.6% were expected to hold seminars, 13.6% had individual interviews, 4.5% supported the active use of school social media, It was concluded that 4.5% expects students to be taken care of, 4.5% to cooperate with parents on absenteeism issues, and 4.5% to support classroom teachers. It has been concluded that more than half (68.2%) of the expectations of the parents from the guidance services in the distance education process, while the other participants have expectations about increasing academic success, technology addiction, ensuring continuity in lessons, keeping motivation high. In the distance education process, 54.5% of the students stated that they did not have expectations. On the other hand, it was concluded that those who said that they had expectations were to do entertaining activities from time to time, to conduct interviews about the exam, to prepare a study plan, to conduct individual interviews and to talk about bullying. Psychological counselors (59.1%) conducted interviews with more groups. These interviews were mostly held every week. There were psychological counselors who met with ten students once a month, twice a month, once or twice a week. The interviews were carried out primarily in the educational field of guidance, then in the personal-social and

professional fields, respectively, according to the majority. The distance education process has created environments where students can learn on their own. It has also been seen in the studies in the literature that the importance of educational guidance studies is that students' learning to learn is one of the aims of educational guidance (Ağır, 2017) and educational guidance was needed much more during the pandemic process.

Findings from the fourth problem of the study revealed that disciplinary behavior problems, adjustment problems, academic retardation, technology addiction, anxiety disorder, bullying, psychological retardation, attention problems, inability to study effectively, learning anxiety were the difficulties waiting for psychological counselors after the epidemic ended. In a study examining psychological resilience during the pandemic process, it was reported that people's anxiety and depression levels increased (Bozdağ, 2020).

Findings obtained from the fifth problem of the study argue that psychological counselors (68.2%) should not continue distance education. Psychological counselors who said that distance education can continue (31.8%) said that the infrastructure works should be strengthened in order to improve the process, that it should continue in older age groups rather than younger age groups, that it could replace face-to-face education only in emergencies (snow, epidemic..). It has been concluded that in cases where they do not attend the seminars much, it can be done in the form of parent training, it can be used at the beginning of the year to get to know the student and identify needs, and distance education can be done to support students in the process. In a similar study conducted by Yılmaz, Mutlu, Güner, Doğanay and Yılmaz (2020), it was reported that parents also stated that the distance education process should be used for support purposes. In the study of the problems encountered in the distance education process with primary school teachers, infrastructure reinforcements were reported as a solution proposal (Saygi, 2021).

Findings obtained from the sixth problem of the study, it was concluded that most of the psychological counselors (90.9%) of the guidance services carried out during the epidemic did not find their professional and personal satisfaction satisfactory. In a similar study, it was reported that the motivation levels of psychological counselors were moderate (Çetin Dalgıç, Bulut, & Şengül, 2021).

## Conclusion

As a result; It can be said that psychological counselors find student participation in online guidance and psychological counseling and guidance services low, and that one of the problems encountered is not reaching the sufficient number of students. Online interview topics vary according to the type of school where the counselors work and the needs of the students. Psychological counselors do not feel very comfortable because of their concerns that I will make mistakes in online interviews or they may take my image and voice. It has been seen that psychological counselors have common problems and methods of coping with these problems. This study is a support guide for psychological counselors who have similar problems and cannot find a solution.

During the pandemic process, it can be said that online trainings not only for students but also for teachers are beneficial for psychological counselors. More than half of the psychological counselors who participated in online trainings stated that they were productive.

In the distance education process, while students expect more fun activities from psychological counselors, it has been determined that parents have academic expectations. The lack of a clear job description of psychological counselors in this process reveals different expectations of school administrations. The frequency of individual and group interviews varies according to the type of institution in which the psychological counselors work. Although it is stated by the participants that studies are mostly carried out in the field of educational guidance during the distance education process, it can be said that the age groups in which the psychological counselors work are effective in this regard. It was observed that the majority of psychological counselors expressed their opinion that distance education should not continue.

Psychological counselors who express an opinion in this direction mostly work with younger age groups. It can be said that the problems encountered during the epidemic process will be among the similar problems that psychological counselors will encounter after the epidemic ends. Almost all of the psychological counselors stated that they did not find their professional and personal satisfaction from guidance services satisfactory in the distance education process.

## Recommendations

Based on the stated results, the following suggestions can be made for future research;

1. In order to provide effective guidance services in the distance education process, trainings that support psychological counselors' better use of Web 2.0 tools can be planned.
2. Clearer job descriptions of psychological counselors for distance education by the Ministry of National Education can prevent different expectations of school administrators locally.
3. Regional-local planning can be done in order to carry out the guidance services more efficiently in the distance education process.

## Notes

This study is derived from the "Opinions of Psychological Advisors on PDR Services Carried Out Through Distance Education During the COVID-19 Epidemic" master's thesis completed in Gaziantep University, Department of Educational Sciences.

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## Collective Teacher Efficacy and Job Satisfaction: A Study of Relations

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**Abstract:** This study examined the relationship between collective teacher efficacy and job satisfaction. The study group of the research consists of 290 teachers working in public schools in Türkiye in Bursa central districts. The teachers work at the preschool, primary, secondary, and high school levels. The research was conducted following the correlational research design. Correlational designs examine the direction and severity of relationships between two or more variables. Demographic information form, short form Minnesota Satisfaction questionnaire, and the collective teacher self-efficacy scale were used to collect data. Pearson correlation coefficients were calculated, and the relationships between collective teacher efficacy and job satisfaction were examined. The predictive effect of collective teacher efficacy on job satisfaction was investigated using structural equation model analysis. According to the results, discipline and teaching components positively correlate with internal and external job satisfaction. Collective efficacy has a significant impact on teachers' job satisfaction. Based on the findings, some suggestions for practice and research were developed.

**Keywords:** Collective Teacher Efficacy, Job Satisfaction, Correlational Designs

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### Introduction

Like other institutions, educational institutions should consider their employees' wishes and desires. This way, educational institutions can reach their goals by increasing productivity (Selvitopu & Şahin, 2013). Teaching is the cornerstone of educational institutions. The most critical responsibility in increasing student success and realizing school goals falls on teachers. In addition, teachers have an essential role in the development and change of societies. The responsibility of shaping the students who are the future of society belongs to the teachers. All teacher behaviors in and out of the classroom affect the students and form a model for them. Teachers determine how students, who are the future of society, will become individuals in the future (Recepöğlü, 2013).

Collective efficacy and job satisfaction are among the variables that affect teachers' work performance (Little and Madigan, 1997). The relationship between collective teacher efficacy and leadership styles has been studied more

in the literature. Limited studies examine the relationship between collective teacher efficacy and job satisfaction (Stephanou et al., 2013; Ruma et al., 2010). This study investigated the effect of teachers' collective efficacy perceptions on job satisfaction. The results will contribute to understanding the relationship of collective efficacy with variables other than leadership and school success.

### **Job Satisfaction**

The concept of satisfaction is expressed as all the emotions that arise when a person's needs, expectations, wishes, desires, or needs are met. Being satisfied also means getting pleasure and satisfaction from a formation, a job, a case, or an impulse. On the other hand, job satisfaction is a feeling that arises when the job's physical characteristics and the employees' wishes are compatible. It is assumed that if the expectations of the employees and the working conditions are compatible, the satisfaction levels of the employees will be high, and if they are not, the satisfaction levels of the employees will be low (Özer, 2015). When there is job dissatisfaction, there is a difference between the results obtained by the employee and the expected results. A contradiction arises with this difference. Particularly in organizational change, when promises are made to employees about their income, rights and security and these promises are not fulfilled or when change efforts are unsuccessful, there is a decrease in the employee's income instead of an increase. This situation leads to deception, insecurity, personal unhappiness, and job dissatisfaction (Er Yeşil & Fındık, 2014).

Positive and negative attitudes developed by employees towards their work have a significant effect on organizational behavior. Attitudes towards working conditions are directly related to job satisfaction. If these attitudes are positive, the satisfaction levels of the employees are high; negative, it is seen that their satisfaction level is low. Many managers want to understand the satisfaction or dissatisfaction of the employees they manage. Because job satisfaction is related to organizational commitment and work performance, the fact that individuals are satisfied with their work environment reveals that they develop positive feelings towards their work and institutions. Individuals with job satisfaction try to fulfill their duties best and spend more time at work (Özkalp, 2013). Job satisfaction is an abstract but positive state of mind that one feels for one's job. Satisfaction with a job does not depend only on the job being done. The degree of satisfaction or dissatisfaction with his job also determines job satisfaction. The material or moral values a person expects a job to add directly affect job satisfaction (Oran, 2016).

Factors such as job expectations, personality traits, work experience, length of service, education level, age, and gender can affect job satisfaction. In addition, organizational factors such as wages, job security, promotion opportunities, managerial relations, co-workers, working conditions, and the nature of the job are also influential on job satisfaction (Akman, 2018). Accordingly, it can be stated that there are internal and external factors that create job satisfaction. Factors such as interest in the job and liking to do the job constitute internal job satisfaction. Factors such as wages, promotion, and working conditions constitute external job satisfaction.

Teachers' job satisfaction is essential for themselves and the educational institutions they work for. Because

teachers' job satisfaction can affect the quality of the service provided and the efficiency of the school, the realization of the school's goals and the quality of education, the quality of the education offered by the teacher, who is satisfied with his work and expresses this clearly, will also increase. On the other hand, teaching is not a stand-alone profession. Teachers carry out their education and training services with the decisions they make together in the school. They exchange ideas on discipline and teaching issues and support each other. In this way, they contribute to the success of the students and the school. Collective efficacy perception means that teachers believe that they can achieve a job together. Investigating the relationship between collective teacher efficacy and job satisfaction is essential.

### **Collective Efficacy**

One of the most important concepts introduced by Bandura with Social Cognitive Theory is self-efficacy. Another concept, which is an extension of self-efficacy for teams, teams, and communities, is collective efficacy (Bandura, 1997). Collective efficacy is defined as the belief in the capacity of the group to organize and execute the skills necessary to achieve specific goals (Bandura, 1995). According to another definition, collective efficacy is the competence of a group to share the expectations and achievements imposed on its members (Zaccaro et al., 1995). Collective efficacy is not simply the sum of individual members' efficacy beliefs. The product of the interactive dynamics of group members acting together is expressed as collective competence (Goddard, Hoy, and Hoy, 2000).

Research on collective efficacy beliefs has revealed that teachers have not only individual-oriented efficacy perceptions but also efficacy perceptions regarding the collective capacities of teachers in a school. It has been stated that these group-oriented perceptions reflect a new organizational feature defined as collective efficacy (Goddard, Hoy, and Woolfolk-Hoy, 2000). Studies have shown that collective efficacy is one of the essential features that improve the quality of teaching. It has been determined that perceived collective efficacy strongly correlates with school student achievement (Schumacher, 2009; Knobloch, 2007; Jackson, 2009). Collective efficacy is effective on student performance, creates strong bonds between parents and teachers, increases the quality of academic activities at school, and reduces the effects of adverse socio-economic conditions (Goddard et al., 2000).

Teachers' collective efficacy perceptions can affect their job satisfaction levels. Because the structure or nature of the group with which the person acts is an essential factor in job satisfaction. A workgroup with good friendships and support from each other significantly affects employee satisfaction (Özkalp, 2013). If the group in which the individual is included provides various support, comfort, advice, and work to the employee, such an environment will positively affect job satisfaction. Even if the person does not like his job, he may be satisfied with his job because of his friends. A good business group can make working life more enjoyable. This study investigated the effect of teachers' collective efficacy perceptions on job satisfaction. The results will help understand collective teacher efficacy and job satisfaction.

## Method

This research was conducted following the correlational research design. Correlational designs aim to examine the direction and severity of relationships between two or more variables (Büyüköztürk et al., 2008). This study investigated the relationships between collective teacher efficacy and job satisfaction.

## Study Group

The study group of the research consists of 290 teachers working in public schools in Türkiye in Bursa central districts. 43.4% (n=126) of the teachers are female and 56.6% (n=164) are male. 4.8% of the teachers work in preschool, 29.7% in primary school, 37.2% in secondary school, and 27.8% in high school. The average age of the teachers was 40.21 (Sd=7.76).

## Measurement Tools

Demographic information form: In line with the purpose of the research, a personal information form was developed and used to obtain information about the demographic characteristics of the teachers participating in the research. In the demographic information form, Multiple-choice statements about gender, type of school, and age. Short Form Minnesota Satisfaction Questionnaire (SFMSQ): The scale was developed by Weiss, Dawis, and England (1967), and the short form consists of 20 items. The scale has dimensions that measure internal and external job satisfaction. The scale is a five-point Likert type. Higher scores on the scale indicate higher job satisfaction. The Cronbach Alpha coefficients for internal and external job satisfaction were 0.85 and 0.88.

The collective teacher self-efficacy scale was developed by Tschannen-Moran and Barr (2004) and adapted into Turkish by Erdoğan and Dönmez (2015). The scale measures collective teacher efficacy in two sub-dimensions. There are six items in the dimension of student discipline, which is the first dimension, and six items in the dimension of teaching strategies, which is the second dimension. The scale is a five-point Likert type. In the current study, the Cronbach Alpha internal consistency coefficients calculated for discipline and instructional strategies were 0.78 and 0.75, respectively.

## Data Analysis

Structural equation model analysis was conducted to examine the effect of collective teacher efficacy on job satisfaction. The fact that the Mardia kurtosis coefficient is less than 8 indicates that the multivariate normal distribution assumption is met (Yılmaz & Varol, 2015). In this study, the Mardia kurtosis coefficient calculated with AMOS was 6.15. This value showed that the multivariate normal distribution assumption was met. Pearson correlation coefficients were calculated to calculate the relationships between the variables. Analyzes were performed using AMOS 24.0 and SPSS 25.0.

## Results

The relationships between collective teacher efficacy and job satisfaction were examined using Pearson correlation coefficients. Collective teacher efficacy has two components: instruction and discipline. Job satisfaction also has two components: internal and external satisfaction. The coefficients obtained are shown in Table 1.

Table 1. Pearson Correlation Coefficients

Variables		1.	2.	3.	4.
1. Teaching	r	1			
	p				
	N	290			
2. Discipline	r	.80**	1		
	p	<.01			
	N	290	290		
3. Internal satisfaction	r	.29**	.34**	1	
	p	<.01	<.01		
	N	290	290	290	
4. External satisfaction	r	.36**	.37**	.77**	1
	p	<.01	<.01	<.01	
	N	290	290	290	290

\*\*p<.01

Teaching is positively correlated with internal ( $r=.29$ ,  $p<.01$ ) and external ( $r=.23$ ,  $p<.01$ ) satisfaction scores. Discipline is positively correlated with internal ( $r=.34$ ,  $p<.01$ ) and external ( $r=.37$ ,  $p<.01$ ) satisfaction scores. It has been observed that as teaching and discipline increase, internal and external satisfaction increases.

The effect of collective teacher efficacy on job satisfaction was examined with the structural equation model shown in Figure 1. Collective teacher efficacy was included in the model as the independent variable, and job satisfaction was the dependent variable. The calculated fit values ( $\chi^2/sd=2.66$ ,  $p=.10$ ,  $RMSEA=.08$ ,  $SRMR=.01$ ,  $CFI=.99$ ;  $TLI=.98$ ,  $GFI=1.00$ ,  $AGFI=.95$ ) indicated that the data and model fit perfectly (Bollen, 1989; Browne & Cudeck, 1993; Hu & Bentler, 1999; Tanaka & Huba, 1985).

The model in Figure 1 shows that collective teacher efficacy positively affects job satisfaction ( $\beta=0.44$ ,  $p<.001$ ). As collective teacher efficacy increased, organizational commitment also increased. Collective efficacy explains about 19% of the change in job satisfaction.

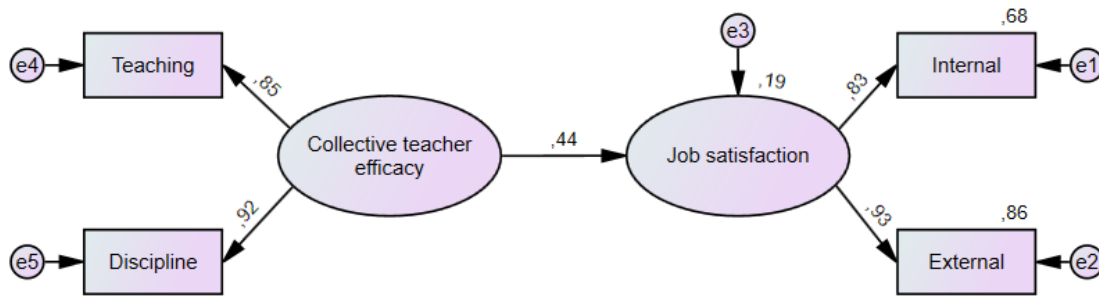


Figure 1. The Structural Equation Model

Table 2. Regression Weights

		B	$\beta$	S.E.	C.R.	p	
Collective teacher efficacy	--->	Job satisfaction	.43	.44	.07	5.94	***

\*\*\*p<.001

## Discussion

This study examined the relationship between the collective efficacy perceptions of teachers working in preschool, primary, secondary and high schools and their job satisfaction. The results showed that teachers' collective efficacy perceptions positively correlate with job satisfaction. It has been understood that collective efficacy significantly affects teachers' job satisfaction.

Collective efficacy has two critical components: discipline and teaching strategies (Tschannen-Moran and Barr, 2004). This study revealed that discipline and instructional strategies have positive relationships with teachers' internal and external job satisfaction. In addition, it has been understood that collective efficacy is an essential predictor of teachers' perceptions of job satisfaction. Although the teaching profession seems to be a stand-alone profession, teachers have to cooperate with other colleagues to do their job healthily. They cooperate with the school administration and parents to organize the activities in the classroom and provide the necessary materials. Therefore, the relationships that teachers establish with their colleagues, administrators, and parents can affect their satisfaction with their work (Stephanou et al., 2013; Ruma et al., 2010). Teachers' collective perception of competence can help them overcome difficulties more easily. This situation may cause them to be more satisfied with their work environment, co-workers, and management. It is a common situation that the feelings of job satisfaction of teachers who are satisfied with their working environment increase.

A working group with good friendships and support for each other significantly affects employee satisfaction (Özkalp, 2013). If the group in which the individual is included provides various support, comfort, advice, and work to the employee, such an environment will positively affect job satisfaction. Even if the person does not like



his job, he may be satisfied with his job because of his friends. A good business group can make working life more enjoyable. The results obtained in this study support the theoretical explanations. It has been observed that the relationship between collective teacher efficacy and leadership characteristics has been investigated more in the literature (Alanoglu, 2022; Calik et al., 2012; Liu et al., 2022; Meyer et al., 2022; Ninković and Knežević Florić, 2018). In this study, unlike the studies in the literature, it was determined that collective teacher efficacy positively affected job satisfaction.

It can be recommended that school administrators include regulations that will increase the collective competence of teachers. The number of environments where teachers can cooperate should be increased. In this way, teachers can be provided job satisfaction by increasing their collective efficacy. Future research may explore the factors that mediate the relationship between collective efficacy and job satisfaction. It can be recommended that similar studies be conducted to cover teachers working in different provinces and districts.

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## Management of Education for Students with Special Needs in Regular Elementary School

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**Abstract:** Students with special needs face difficulties in teaching and learning activities in a regular elementary school. There are various aspects that affect their learning process in a regular school. The study objectives are: (1) to know the implementation of education for students with special needs in a regular elementary school. (2) to know if the school encounters obstacles in implementing education for special needs students. This study uses a case study method. Furthermore, the researcher collects the data through observation, interview, and documentation. The subjects of the study are the headmaster, teachers, and parents. The study results are: (1) to provide the service for students with special needs, the school proposes special assistant teachers to assist them. In addition, the teachers modify the learning activities that suit students' abilities and needs. (2) obstacles in the management of education for students with special needs are education financing, facilities and infrastructure, and less competent human resources.

**Keywords:** Educational Management, Special Needs, Elementary School

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### Introduction

Many countries consider inclusive classes for special needs students as a significant objective of their education policy. The entire world is in action to promote it. Recent data shows that the number of parents who choose a regular school for their children with special needs is increasing. Likewise is the number of students with special needs that go to regular school in the last decade (Ferguson, 2008). The primary purpose why parents enroll their special needs children in regular school is to improve their social life (Nakken & Pijl, 2002). They expect that their children can build positive relationships with their peers. Therefore, the schools as the provider of education open the chance for every student (including students with special needs) they may get an education. In direct practice, inclusive education creates opportunities for students with special needs to learn with different students

(Suparno, 2010). According to (Ilahi, 2013) inclusive education is education that accentuates anti-discrimination, equal rights, and obligations.

Children with special needs (CWSN) who learn in an inclusive class are expected to develop social competence and improve life skills (Arifudin, 2021). The government already strives to provide education services for children with special needs (CWSN). It is stated in the Government Regulations Number 72 the year 1991 about special education, Permendiknas Number 70 the year 2009 about inclusive education for students with disabilities and distinctive intelligence and talents. Based on the observation and interview with the headmaster and teachers/homeroom teachers in one elementary school in Malang Regency, the researcher got the information that the school accepts children with special needs (CWSN) and provides the same education service as the regular or non-CWSN students. They are not ready to manage and organize educational programs for children with special needs (CWSN).

There are several substantive aspects that the school should observe in managing institutional education: (a) learning management; (b) students management; (c) education staff management; (d) facilities and infrastructures management; (e) financial management; (f) school and community relations management. The policy regarding student acceptance should meet the requirements. The school should consider some factors related to the school's actual condition even though the students may get the same education service (Badrudin, 2014). The elements are class capacity, available budget, existing facilities and infrastructure, number of available teachers and educational staff, etcetera (Ansar, 2019). Thus, the objectives of this study are (1) to know the implementation of education for students with special needs in a regular elementary school. (2) to know if the school encounters obstacles in implementing education for special needs students.

## Method

The study applies a descriptive qualitative method using a case study approach. A descriptive method is a problem-solving procedure that is investigated by portraying real subjective/objective conditions based on the facts or as it is (Darmadi, 2014). In a qualitative study, the case study is a research strategy to observe programs, processes, or activities (Creswell, 2014). The subjects of the study are the headmaster, teachers, and parents. The researcher collects the data through observation, interview, and documentation.

To analyze the data, the researcher uses an interactive analysis technique consisting of four components from Miles and Huberman (Sugiyono, 2018) they are: first data reduction. Reducing the data means focusing on the main things. Second, data presentation. After reducing the data, the researcher presents the data. Third, drawing conclusions. In this process, the data is temporary and will possibly change if the researcher finds new things during data collection. The researcher uses the technique to know the management of education for students with special needs in a regular elementary school

## Results

The study results show that the regular elementary school that accepts students with special needs could not meet the standard of education implementation for them. As we know, the organization of special education is different from the regular one. Through the study, the researcher finds that the school does not have written recommendations regarding supporting facilities and infrastructures in organizing special education. To provide education services for special needs students, homeroom teachers should modify learning activities by considering their needs and abilities. However, the teachers in regular schools are not prepared to assist students with special needs and cannot monitor them effectively. To solve the problem, the headmaster discussed with education supervisors who suggested that the school should propose a special assistance teacher to the head of the education department. Moreover, to support the implementation of education for students with special needs, the school will propose child special education training for teachers and education staff. Besides learning activities, human resources, and teachers, the important thing in organizing education for students with special needs is the availability of supporting facilities and infrastructures. Due to the observation, the facilities and infrastructures that the school has are enough to support non-CWSN learning activities. Yet, it is not enough for students with special needs. From the interview with the headmaster, the researcher receives information that the availability of facilities and infrastructures is related to the school budget. It is because the school does not plan to organize education for students with special needs, so they do not have a budget for supporting facilities and infrastructures. Furthermore, the school budget is also related to the availability of special assistance teachers. As a result, the school cannot fulfill special assistance teachers' needs even though they have proposed it to the education department. Because of the school budget limitations and the absence of special assistance teachers, the school discusses it with the parents of students with special needs. The interview result shows that the parents of students with special needs are ready to help the school to fund the special assistance teachers. The parents wanted to do that in an effort to provide proper education for their special needs children. Indeed, they consider that social interactions with peers are essential to support their children's development

## Discussion

The results of the study denote that in fact, regular school is not ready to implement education for students with special needs. However, to give a chance to students with special needs, the school accepts them and tries to provide education services for them. Because the schools do not have a plan to implement education for students with special needs, consequently, they should notice several things, one of which is the availability of teachers. To realize it, the school proposed special assistance teachers to the education department. The role of special assistance teachers is urgent to help students with special needs in learning and understanding lessons more effectively (Machrus & Desmita, 2019). Besides, the role of other teachers and education staff in providing service for students with special needs is important as well. Hence, the school proposes to conduct training on how to guide and assist students with special needs. It aims to provide teachers in handling students with special needs. The results of the study by (Atmojo et al., 2020), indicate that five times training on how to handle

students with special needs can escalate the knowledge and skills of teachers in dealing with them. In addition, it allows teachers to develop and implement suitable learning designs and to use needed learning media for students with special needs. The suggestion to conduct the training for teachers aims to upskill the regular teachers to handle students with special needs. Thus, they can appropriately modify learning materials that suit the needs and abilities of students with special needs. Learning materials modification is related to the level of breadth and depth of material, and the level of difficulty that adjusts students' abilities. The modification of the learning process can be conducted using teaching methods, the place of learning, learning media, etc. (Natalia & Nisa, 2020). The data from the Data and Information Center, Ministry of Education, Culture, Research, and Technology, for the 2019/2020 academic year mention that the number of elementary school students at special schools in Indonesia reaches 85.936 (Statistik PLB Pusdatin Kemendikbud, 2020):

**TABEL / TABLE : 11** **SLB19/20**  
**JUMLAH SISWA MENURUT JENJANG PENDIDIKAN TIAP PROVINSI**  
**NUMBER OF PUPILS BY LEVEL OF EDUCATION AND PROVINCE**  
**STATUS SEKOLAH / STATUS OF SCHOOL : NEGERI+SWASTA / PUBLIC+PRIVATE**  
**SEKOLAH LUAR BIASA (SLB) / SPECIAL SCHOOL (SS)**  
**TAHUN / YEAR : 2019/2020**

No.	Provinsi Province	SD Primary S	SMP Junior SS	SM Senior SS	Jumlah Total
1	DKI Jakarta	3.568	1.583	985	6.136
2	Jawa Barat	13.624	6.443	4.443	24.510
3	Banten	3.432	1.518	980	5.930
4	Jawa Tengah	11.495	4.499	2.988	18.982
5	DI Yogyakarta	2.713	1.446	1.028	5.187
6	Jawa Timur	12.100	4.781	3.561	20.442
7	Aceh	2.354	1.012	541	3.907
8	Sumatera Utara	3.921	854	405	5.180
9	Sumatera Barat	4.644	1.609	781	7.034
10	Riau	2.111	810	454	3.375
11	Kepulauan Riau	875	360	191	1.426
12	Jambi	1.191	483	384	2.058
13	Sumatera Selatan	1.634	641	456	2.731
14	Bangka Belitung	702	230	172	1.104
15	Bengkulu	888	373	208	1.469
16	Lampung	1.273	498	308	2.079
17	Kalimantan Barat	1.074	308	185	1.567
18	Kalimantan Tengah	654	323	206	1.183
19	Kalimantan Selatan	1.505	603	399	2.507
20	Kalimantan Timur	1.477	605	470	2.552
21	Kalimantan Utara	302	98	53	453
22	Sulawesi Utara	866	394	259	1.519
23	Gorontalo	473	275	173	921
24	Sulawesi Tengah	830	359	235	1.424
25	Sulawesi Selatan	2.899	1.088	679	4.666
26	Sulawesi Barat	827	393	132	1.352
27	Sulawesi Tenggara	1.866	843	446	3.155
28	Maluku	574	230	119	923
29	Maluku Utara	515	331	192	1.038
30	Bali	1.244	539	474	2.257
31	Nusa Tenggara Barat	2.163	772	481	3.416
32	Nusa Tenggara Timur	1.519	669	444	2.632
33	Papua	474	170	88	732
34	Papua Barat	149	68	38	255
<b>Indonesia</b>		<b>85.936</b>	<b>35.208</b>	<b>22.958</b>	<b>144.102</b>

Catatan / Notes :

1. SD / Primary S = Sekolah Dasar / Primary School

2. SMP / Junior SS = Sekolah Menengah Pertama / Junior Secondary School

3. SM / Senior SS = Sekolah Menengah / Senior Secondary School

Source: <http://publikasi.data.kemdikbud.1>

In relation to that, ideally more schools should implement inclusive education. However, besides teachers and education staff resources, the availability of facilities and infrastructures is urgent to implement inclusive education. The study by (Ackah-Jnr & Danso, 2019) mentioned that the physical environment has a significant

function in the implementation of inclusive education. It is also explained at the Convention on the Rights of Persons with Disabilities (CRPD) held by the United Nations (UN) that accessibility of participation for persons with disabilities should facilitate them as much as possible, one of which is supporting facilities and infrastructures (*Convention on the Rights of Persons with Disabilities (CRPD)*, 2006). The facilities and infrastructures fulfillment in inclusive education implementation is closely related to education financing. The results of the study state that the school does not plan to organize education for students with special needs so the school budget does not cover the demands. Therefore, the planning of education programs must be clear because the school uses it as the rationale to spend the school budget responsibly. It means that the school should present accountability regarding financial management (Anggraini, 2013). In addition, the school budget also affects the fulfillment of special assistance teachers because the school does not include the cost in its budget plan. From the results of the study, the researcher finds that the school communicates it to the parents of students with special needs. The discussion results that the parents are ready to help the school to fund the special assistance teachers.

## Conclusion

The analysis results show that some public or private elementary schools already accept students with special needs (CWSN) despite their readiness to implement inclusive education or the absence of individual education programs for students with special needs (CWSN). In regular schools, neither special assistance teachers are available nor do training for teachers to handle students with special needs to assist them in the teaching and learning process. Moreover, the regular school does not provide facilities and infrastructures to support inclusive education. Several points like emotional encouragement, concern and responsibilities from parents are needed for better attention and services for children with special needs (CWSN). The implementation of education for students with special needs in regular schools encounters various obstacles. Considering the substance of education management that requires improvement, the substance of education management consists of (a) curriculum and learning management; (b) student management; (c) educator management; (d) facilities and infrastructure management; (e) financial management; (f) public relations management. From 6 substances in education management, there are several urgent substances, including educator management. This is very important because it relates to how educational services are provided to students with special needs. Another urgent substance is financial management because finance in educational institutions influences various other aspects.

## Recommendations

The study of education management for students with special needs covers broad discussion with complex problems. Thus, the role of all components has to be studied deeply. In a micro range, researchers should observe more about the role of the headmaster as a manager of an educational institution and teachers as the executive function of education. Whereas in the macro scope, the role of the government is to facilitate children with special needs so they get the right to study. Moreover, there are many aspects that influence the implementation



of inclusive education for students with special needs.

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## Subject Origination and Methodical Analysis of Thesis Made in the Field of Social Studies Education in Turkey

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**Abstract:** The aim of this study is the postgraduate thesis studies in the field of social studies education in Turkey between 2015 and 2021; to examine according to descriptive, methodological and subject distributions. Document analysis technique, which is one of the qualitative research designs, was used in the research. The main data source of the research is postgraduate theses. These theses were obtained by scanning in YÖK Thesis Center, and a total of 785 postgraduate theses, of which 659 are master's and 126 are doctoral theses, were examined. In the research, "Thesis Classification Table" and "Methodical Classification Table" were used as data collection tools. Content analysis technique, which is one of the analysis techniques used for qualitative research, was used in the research. According to the descriptive distribution results of the research; When the thesis type distributions were examined, it was observed that the master's theses were much more than the doctoral theses and the universities where the most studies were conducted were Gazi and Marmara universities. When the research type distributions of the theses were examined, it was observed that the most qualitative research type was used, and the scanning design was mostly used as a design. When the sample distributions of the theses were examined, it was observed that they mostly worked with secondary school students. According to the subject distribution results of the research; It was observed that subjects belonging to the categories of attitude/opinion/concern/belief and teaching method/technique/strategy/approach were studied. Another result is; It is the result of the theses made in the field of social studies education that there are some methodological deficiencies. It has been observed that some of the theses examined do not have a method section, and some theses have a method section, but are very incomplete and faulty in content.

**Keywords:** Social Studies Education, Graduate, Subject Orientation.

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## Introduction

Postgraduate studies in the field of education have a very important place in revealing the problems of countries in the education system. Postgraduate studies contribute to the advancement of science academically in terms of revealing the problems in education and providing solutions or suggestions for these problems (Tereci and Bindak, 2019). From this point of view, it is very important to examine the master's and doctoral dissertations conducted in the field of social studies education.

It has been seen that there are a number of difficulties in the process of researchers who want to work in field education in Turkey to reach the previous studies in the field and to support the studies to be carried out. Apart from this, within the scope of field education projects, scientific and Technological Research Council of Turkey (TUBITAK) and Turkish Academy of Sciences (TUBA) and could not be supported by organizations such as the research fund of the University Mone and provide a limited level of financial support is known. Although there are many reasons for this situation, another reason is that field education is not understood at an adequate level (Karamustafaoglu, 2019). Social studies education has an important place in field education. Based on this, the studies to be carried out on the field will improve the quality of the field. This study is important in terms of providing convenience to researchers by revealing issues that have not yet been studied in the field or revealing what the priority issues that need to be studied in the field will be.

The importance of original studies has increased over time and thus it has gained a respectable position in the scientific community by separating from other studies (Tereci and Bindak, 2019). For this reason, it is very important to scan the literature for researchers who will conduct a scientific study. In this context, this study is the graduate students in the field of social studies education in the subject area of this thesis is to identify and 2015-2021 were classified according to their work, and figure out what is the state of the field in our country, and for guiding researchers to do research in the field is important. In addition, this study is very important in terms of revealing what the deficiencies are in the theses made in the field of social studies education and what new researchers should pay attention to in their studies.

In this research, in the field of social studies education in Turkey between the years 2015-2021 of Masters and doctoral theses; i) the year of publication, type of dissertation, thesis, dissertation, University and the title of the thesis in terms of features, (II) the terms of the characteristics of thesis methodological and III) in terms of the distribution of the subject aims to examine. For this purpose, answers to the following questions have been sought.

1. What is the distribution of theses in the field of social studies education in Turkey according to the type, year, university and supervisor title?
2. What are the methods used in theses in the field of social studies education in Turkey?
3. What are the general orientations when looking at the topics of theses in the field of social

studies education in Turkey?

## **Method**

### **The Pattern of the Research**

In this research, document analysis (analysis), which is one of the qualitative research patterns, was used. Qualitative research is a type of research that includes some philosophical orientation/approaches, focusing on how people interpret their own experiences and what kind of meaning they attach to these experiences. Qualitative research is an inductive process with rich descriptions that focuses on meaning and understanding (Merriam, 2018).

Qualitative research; basically consists of three different data collection. These are observation, interview (interview) and documents (Patton, 2014). Interviews; mostly cover parts related to people's experiences, feelings and thoughts. Observations are concerned with the observable parts of human behavior, actions and interpersonal interactions. Dec. On the other hand, documents include the examination of all kinds of written texts (Patton, 2014). Since each of the theses constituting the main data source of this research has the property of being a document, the document analysis technique was used in the research.

### **Universe and sampling**

The sample of the research consists of 785 graduate theses registered at Dec Thesis Center and published in the field of social studies education between the years 2015-2021, 659 of which are master's and 126 are doctoral theses in total.

### **Data Collection Tool**

In order to collect the data of the study, the "Thesis Classification Table" (October A) was created in Microsoft Word and the descriptive information about the theses was classified under categories. These categories are; thesis number, thesis type, thesis year, university where it was made, 1. the title of consultant and 2. the title of consultant is in the form of. In determining the methodological characteristics and subject orientation, a "Methodological Classification Table" was created using the same method and classified into categories. These categories are; the thesis number is in the form of research method, research model, sample group, data collection tool, data analysis method and subject.

### **Analysis Of The Data**

In the analysis of the data, the content analysis method used in qualitative research was used. "Content analysis is a systematic process for identifying content communication" (Merriam, 2018). Content analysis mostly refers to

text analysis, such as interview notes, documents, and diaries. In other words, content analysis is used as an attempt for the researcher to determine the meanings of the data and to make sense of the data by taking the voluminous qualitative material in the center (Patton, 2014). The main purpose of content analysis is to collect similar data around certain concepts and themes and to organize and interpret these concepts and themes in a way that the reader can easily understand (Karataş, 2015).

## Results

In this part of the research, the findings showing the university distributions of the theses in the field of social studies education, which were published between 2015-2021 in Turkey and have reached the full version, are presented in the form of frequency and Decimals in the form of tables.

Table 1. Distribution of Theses published on Social Studies Education in Turkey according to Universities

University	f	%
Gazi University	69	8,78
Marmara University	48	6,11
Niğde Ömer Halisdemir University	38	4,84
Ataturk University	30	3,82
Euphrates University	30	3,82
Tokat Gaziosmanpasa University	27	3,43
Uşak University	26	3,31
Afyon Kocatepe University	25	3,18
Sakarya University	25	3,18
Akdeniz University	24	3,05
Kastamonu University	23	2,92
Necmettin Erbakan University	23	2,92
Muğla Sıtkı Koçman University	21	2,67
Kirsehir Ahi Evran University	20	2,54
Inönü University	19	2,42
Aksaray University	18	2,29
Sivas Republican University	18	2,29
Erzincan Binali Yıldırım University	16	2,03
Bolu Abant İzzet Baysal University	16	2,03
Aydın Adnan Menderes University	14	1,78
Kütahya Dumlupınar University	14	1,78
Recep Tayyip Erdoğan University	14	1,78
Adıyaman University	13	1,65

University	f	%
Anatolian University	12	1,52
Ondokuz Mayıs University	11	1,40
Amasya University	11	1,40
Manisa Celal Bayar University	10	1,27
Ağrı Ibrahim Çeçen University	10	1,27
Giresun University	10	1,27
Pamukkale University	10	1,27
Gaziantep University	10	1,27
Yıldız Technical University	10	1,27
Erciyes University	9	1,14
September Dokuz Eylül University	9	1,14
Burdur Mehmet Akif Ersoy University	9	1,14
Caucasian University	8	1,01
Bursa Uludag University	8	1,01
Balıkesir University	8	1,01
Çukurova University	7	0,89
Trabzon University	5	0,63
Karadeniz Technical University	5	0,63
Nevşehir Hacı Bektaş Veli University	5	0,63
Hatay Mustafa Kemal University	5	0,63
Çanakkale Onsekiz March University	4	0,50
Istanbul University	4	0,50
Van Yüzüncü Yıl University	4	0,50
Ankara University	3	0,38
Ordu University	3	0,38
Eskişehir Osmangazi University	3	0,38
Mersin University	3	0,38
Bartın University	3	0,38
Zonguldak Bulent Ecevit University	3	0,38
Sinop University	2	0,25
Hacettepe University	1	0,12
Trakya University	1	0,12
Duzce University	1	0,12
Ege University	1	0,12
Bahçeşehir University	1	0,12
Kahramanmaraş Sütçü Imam University	1	0,12

University	f	%
Kocaeli University	1	0,12
Kilis 7 Aralık University	1	0,12
<b>Total</b>	<b>785</b>	<b>100</b>

Table 1 shows the distribution of graduate theses published in the field of social studies education in Turkey according to the universities where they were conducted. According to this table, the Universities of graduate thesis work maximum, respectively; Gazi (f=68), Marmara (f=48), Niğde Ömer Halisdemir (f=38), Atatürk (f=30), the Euphrates (f=30), Tokat Gaziosmanpaşa (f=27), Butler (F=26), Afyon Kocatepe (f=25), Sakarya (f=25) and Akdeniz (f=24) of universities. Again, according to this table; the universities where graduate thesis studies are carried out the least, respectively; Hacettepe (f=1), Thrace (f=1), Düzce (f=1), the Aegean (f=1), Bahçeşehir (f=1), Kahramanmaraş Sütçü İmam (f=1), Kocaeli (f=1) and Kilis 7 Aralık (f=1) universities.

The fact that the vast majority of dissertations were conducted at Gazi and Marmara universities can be explained for various reasons. One of these reasons can be explained by the fact that the academic staff numbers of these two universities are higher than other universities. Another reason is; this can be explained by the fact that the graduate programs of these universities have been opened earlier than other universities and the research opportunities offered to students are wider.

Table 2. Distribution of Research Patterns used in published Theses on Social Studies Education in Turkey

Research Pattern	f	%
Scanning (descriptive, relational, cross-sectional, general, singular)	247	30,99
Experimental pattern	116	14,55
State study (case study)	84	10,53
Document review	62	7,77
Phenomenon science (phenomenology)	58	7,27
Descriptor (Expander) sequential pattern	49	6,14
Action research	46	5,77
Nested (embedded) pattern	25	3,13
Descriptive	21	2,63
Converging parallel pattern	12	1,50
Simultaneous pattern	11	1,38
Interview technique	11	1,38
Basic qualitative research	7	0,87
Variation pattern	5	0,62
Explorer sequential pattern	4	0,50
Historical research	4	0,50



Research Pattern	f	%
Oral history	2	0,25
Embedded theory	2	0,25
Ethnography	1	0,12
Design-based research	1	0,12
Multi-stage mixed method	1	0,12
Intervention pattern	1	0,12
Narrative questioning	1	0,12
Unspecified	26	3,26
<b>Total</b>	<b>797</b>	<b>100</b>

Table 2 includes the distribution of research patterns used in theses published in the field of social studies education in Turkey. According to this painting; the most commonly used pattern in theses appears to be a scanning pattern (f = 247) by a large margin. Then the most commonly used patterns, respectively; experimental pattern (f = 116), state study (f = 84), document review (f = 62), fact science (f = 58), descriptive pattern (f = 49), action research (f = 46), nested pattern (f = 25), descriptive (f = 21), converging parallel pattern (f = 12), mate timed pattern (f = 11) and interviewing technique (f = 11). This is the order; basic qualitative research (f = 7), variation pattern (f\_5), explorer sequential pattern (f = 4), historical research (f = 4), oral history (f = 2), and shepherd theory (f = 2) follow the patterns. The number of theses for which the research pattern is not specified appears to be f = 26. The least used research patterns are: intervention pattern (f = 1), narrative inquiry (f = 1), multi-stage mixed method (f = 1), design-based research (f = 1), and ethnograph (f = 1).

Table 3. Distribution of Published Theses on Social Studies Education in Turkey based on Subject Orientation

Subjects studied in theses	f	%
Attitude/opinion/anxiety/belief	234	28,74
Teaching approach/method/technique/strategy	208	25,55
Skill/level/self-proficiency review	78	9,58
Textbook review	55	6,75
Perceptions/awarenesses	49	6,01
Teaching program review	38	4,66
Work/book review	20	2,45
Metaphor	17	2,08
Concept teaching/misconception	13	1,59
Field information/occupational competency	13	1,59
Problems faced in education-education	10	1,22
Design an educational model/process/learning environment	9	1,10
Lesson reviews	9	1,10

Subjects studied in theses	f	%
Value training	7	0,85
Institution/association review	5	0,61
Dissertation/article review	5	0,61
Magazine/newspaper/film/poetry review	5	0,61
Moral identity profile/personality types	4	0,49
Cognitive structure	4	0,49
Material enhancement	3	0,36
App/website/social media group review/development	3	0,36
Current affairs/controversial topics	2	0,24
Design events	2	0,24
Teacher-made exams	2	0,24
Scale enhancement	2	0,24
Meta-analysis	2	0,24
Program development/recommendation	2	0,24
Digital/active citizenship	2	0,24
Teacher-student relationship	1	0,12
Family participation in lessons	1	0,12
Oral history study	1	0,12
School culture	1	0,12
Teaching styles	1	0,12
Measurement-assessment	1	0,12
Reasons for preferring the teaching profession	1	0,12
Citizenship type	1	0,12
Civic engagement strategies	1	0,12
Informal reasoning	1	0,12
Ecological footprint	1	0,12
<b>Total</b>	<b>814</b>	<b>100</b>

Table 3 includes the distribution of theses published in the field of social studies education in Turkey based on subject orientation. According to this painting; thesis in the field of social studies studies most often shows that attitude/opinion/anxiety/belief (f = 234) and teaching approach/method/technical/strategy (f = 208) are studied. This order is followed by skill/level/self-efficacy review (f = 78), textbook review (f = 55), perception/awareness (f = 49), and teaching program review (f = 38). The teacher-student relationship (f = 1), family participation in classes (f = 1), school culture (f = 1), reasons for preferring the teaching profession (f = 1), and measurement-evaluation (f = 1) appear to be treated as subjects only once. This is the case. shows that studies in the field of social studies have been piled into a particular subject area.

## Discussion and Conclusion

In this research, in the field of social studies education in Turkey between the years 2015-2021 of Masters and doctoral theses; i) the year of publication of the thesis, dissertation type Thesis University and the title of the thesis in terms of features, (ii) the methodological characteristics of the thesis and (III) subject the distributions were investigated. In the direction of this research, the following results have been reached.

The title characteristics of the graduate theses published in the field of social studies education; The type of thesis, the year the thesis was published, the university where the thesis was made and the thesis advisors are as follows: The most theses published in the field of social studies education were published in 2019. The year in which at least the thesis is published is 2021. Deciently, when the type of graduate theses is examined, it is among the results that master's theses are much more than doctoral theses.

In addition, according to the distribution results of the universities where the Deciphered theses were published, it is among the results reached by the research that the most theses were published at Gazi University. When examined in terms of the title characteristics of thesis advisors, it is seen that in the vast majority of thesis advisors, faculty members with the title of Associate Professor are advising on theses.

The distribution results of the theses published in the field of social studies education according to the research method, research design, study group, data collection tool and data analysis method are as follows: It is observed that the most commonly used research method in theses is the qualitative research method. It is observed that the most used research pattern in the theses examined is the scanning pattern. In addition, it is among the results that there are theses in which the research pattern is not specified. Dec. When the study group of the theses is examined, it is seen that the students at the secondary school level are the most in the study group. It is observed that the interview technique is used the most as a data collection tool in the thesis. And again, as an analysis technique in these theses, we see that t-test and content analysis techniques are used much more than other analysis techniques with very close ratios to each other.

Another finding of this research, in which thesis studies conducted in the field of social studies education are examined, is the conclusion that the theses conducted in the field have a number of methodological shortcomings. It has been observed that there are no method sections in some of the theses examined, and although there is a method section in some theses, it is very incomplete and erroneous in content. For example; it is among the findings that the information about which analysis the research mentioned in the abstract section of the theses uses is not included in the method section or that a different analysis is performed in the method section than the analysis method mentioned in the abstract section. Dec. In addition, it was observed that the analyses included in the method section and claimed to be used in the research were not used in the findings section.

## Recommendations

The findings regarding the topics studied in the theses in the field of social studies education are as follows:


It is observed that the subjects under the category of attitude / opinion / anxiety / belief and teaching approach / method / technique / strategy are studied the most in the theses made in the field of social studies education in the second year. This order is followed by skill /level /self-efficacy examination, textbook examination, perception /awareness and curriculum examination categories. It is observed that the teacher-student relationship, family participation in classes, school culture, reasons for choosing the teaching profession, and assessment and evaluation issues are discussed as topics only once.

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## Distance Education Experiences of Social Studies Teachers: Current Situation, Problems and Solution Suggestions in Gaziantep Province

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**Abstract:** In this study, it is aimed to examine the experiences of Social Studies Teacher Candidates in the Distance Education process. In this study, which is qualitative research, the phenomenology design was used. The study group of the research consists of Social Studies Teacher Candidates studying at Gaziantep Province Nizip Education Faculty. The data of the study were collected by semi-structured interview technique according to 14 open-ended questions created by the researcher and the expert. During the data collection process, some face-to-face interviews were conducted. Due to the COVID (19) pandemic, which has affected the world and our country, some of the data has been collected via mail and forms. The obtained data were analyzed by content analysis technique. The findings obtained from the analysis of the data are presented in tables. The results obtained within the framework of the experiences of the pre-service teachers gave direction to the research. According to the results obtained in the research, it was stated that the interest of the pre-service teachers who took lessons with distance education decreased and that the distance education lessons had advantages and disadvantages, that distance education lessons were important in continuing education, but they could not replace face-to-face education. The lack of any preparations for distance education and the inability to get used to distance education and the inability to overcome the psychological difficulties in the pandemic process were effective in shaping the views of pre-service teachers. It has been concluded that due to the poor infrastructure of the country due to its geographical regions, the lack of full participation in the classes and the fact that students do not have sufficient equipment and devices economically, they have negative opinions about distance education.

**Keywords:** Distance Education, Social Studies

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## Introduction

The importance of education and training in the progress of the world and societies is very great. Since the day it has existed, people have understood the importance of passing on their knowledge to new generations. Until the discovery of the manuscript, people have always transmitted orally. Past human communities have passed on the information they want to pass on to new generations with epics and fairy tales. These fairy tales and sayings that people pass on to future generations are also considered part of education. The discovery of writing by the Sumerians has been a turning point in human history, and every community that has come over the years has contributed to the development of education by bringing a new perspective to education. (Tuncer & Taşpınar, 2008; Güneş, 2016; Özmen & October, 2013).

Education has undergone very important evolutions from the past to the present. This change is a long process, from fairy tales and oral expressions to educational programs. These knowledge accumulations in the process have prepared the ground for the formation of today's technology. The importance that people attach to education and training has also been the policy of the world's states. In order to ensure their future, the states have used education as a tool and invested in the most important ore in the world, namely human beings (Tuncer & Taşpınar, 2007).

With the increasing population, people's expectations and desires are also changing and changing. The resources and tools available in the world are not enough for these wants and needs of people. Depending on this situation, it is insufficient at some points in education and training. Since the opportunities available to countries are limited, they have had to lean towards different orientations in education and training (Ergüney, 2015). Educational and technological developments follow each other. Advances in technology have given rise to important alternatives in the education world, which is experiencing difficulties in terms of population, time and opportunity equality (Bilgiç & Tüzün, 2015).

With technological developments, a lot of electronic tools and equipment have entered our lives. It has been an important issue to make these technological tools a part of education and various alternatives have been developed. One of these alternatives is distance education, which has recently started to take a lot of place in our lives (Tuncer & Taşpınar, 2007). The importance of educational institutions in traditional education and training from the past to the present is an undeniable fact. The increasing population and the lack of educational institutions, as well as the idea of saving people's time, are among the most important reasons that led to the introduction of the concept of distance education into our lives. Educators who are looking for alternative systems to eliminate inequality of opportunity have made significant improvements in distance education (Aka, Bayram, Peker & Vural, 2019; Duman, Horzum & Gökmen, 2016). Distance education, which emerged and developed by mail in 1728, has progressed with today's technology (Ak, Oral & Topuz, 2018). Although distance education has emerged as an alternative to traditional education, it is beginning to cease to be an alternative depending on the evolving conditions of the world. Distance education activities are increasing day by day

depending on the new conditions brought about by the world order (Ecil, Sözen & Şahin, 2014).

The inadequacy of the traditional understanding of education in reaching the student once again emphasizes the necessity of distance education. Throughout the history of the world, humanity has had to face too many disasters and epidemics. These disasters and epidemics in the history of humanity have affected the education and training life and caused traditional education to be unable to be done. Distance education has been a very important vision to eliminate this problematic situation in education and training (Kurnaz & Serçemeli, 2020). It is aimed to reintroduce individuals who have to fulfill their daily responsibilities and are therefore deprived of the educational process to education (Kırık, 2014). Distance education has an important place in the lifelong learning approach with the opportunities it offers (Mercan, 2018). Distance education also provides an important benefit to the educational budgets of countries by providing the opportunity to meet the educational needs of individuals whose age, interests, abilities, working principles are different and who have educational disabilities for various reasons. In addition, distance education aims to reach all segments of society, meet the educational needs of individuals and reveal the entrepreneurial spirit of individuals, significantly helping the personal development of individuals (Ekici, 2003). In this process, the student and the teacher continue the educational process by communicating with each other, albeit in different environments. Individuals who cannot come to educational institutions for various reasons and stay away from education can attend classes from their homes, outside the city or even abroad, regardless of time and place, without a school environment (Şahin, 2021).

21. with the development and change brought by the century, the use of computers in education and training is increasing day by day. It is observed that the use of computers in industrialized countries began in the 1970s in Turkey with the development of computer-aided programs in education and training since 1984. The use of computers in education and training in Turkey was effectively initiated with a project by the Ministry of National Education (MEB) in 1984-1988. (Akpınar, 2006). Universities should aim to provide qualified education to their students by increasing their support for distance education over time. It is observed that 83,103 students out of 7,541,890 registered students studying in higher education institutions (YÖK, 2020) are studying from distance education (YÖK, 2020).

The fact that the distance education system is spreading day by day in higher education institutions and the world is dealing with an epidemic increases the need for distance education. The world has had to Decelerate education due to many events since the past. As in many areas due to the impact of the pandemic, it has experienced difficulties in the field of education and, as mentioned above, it has prepared the ground for the widespread use of distance education (Altıparmak, Kapıdere & Kurt, 2011).

### **The Purpose and Importance of the Research**

In previous research on distance education, studies have been conducted to help traditional education and reach many audiences. The COVID-19 pandemic, which occurred today and caused many casualties, has affected the educational life of millions of students, as well as preventing people from social life. If we look at the history of

the world, many epidemics have occurred in the past and are likely to occur in the future. The world has Decoupled education in such epidemic processes and preferred the distance education path (Aksoy, Bozkurt, & Kurşun, 2021).

By having to participate in the distance education process in our country, traditional education has been Decommissioned and the distance education process has started. In this process, students have encountered many problems and experienced difficulties in the educational process. The aim of this study is to investigate the problems experienced by students who have Decoupled from the traditional education process and participated in distance education during the COVID-19 pandemic, as well as the solutions to these problems, and to indicate them with the findings (Akbal & Akbal, 2020).

With the work we have done, suggestions for solving the problems that occur in the distance education process are aimed. The problems experienced by the students in the distance education process will be revealed with this study and solution suggestions will be produced. Unlike other studies, this study is student-centered and will be conducted on in-depth examination of the problems experienced by students. With this study, Turkey and the world may have to give up traditional education in a possible epidemic, in which case, studies on this issue will help to provide the most qualified distance education with the least problems. With this research, it is desired to contribute to the related field by minimizing the problems encountered in the distance education process.

The point in conducting this research is to create a qualified education system in order to prevent individuals from being deprived of the education and training process if face-to-face education cannot be done, and to organize this system in such a way that it is student-centered, and to emphasize the importance of students' opinions.

It will be seen in the study to what extent distance education activities are carried out within the framework of the opinions of teacher candidates, and what kind of problems distance education causes, and what is the current state of education and training. What distance education activities will add to education and training life and to what extent they will make a difference from the usual order of face-to-face education, will these differences reflect positively or negatively on the education and training life of teacher candidates will be one of the important questions that the research is looking for answers to.

With this study, the opinions of the students who are in the distance education process about the process will be included. During this process, answers to the following questions will be sought.

1. What are the advantages and disadvantages of distance education?
2. Does the student participate fully in distance education courses?
3. Is communication between students provided Decisively in distance education courses?
4. Is it possible to socialize and interact between individuals Decisively in distance education courses?
5. Is it done with the full meaning of measurement and evaluation in distance education?
6. What are the technical difficulties experienced in distance education?



7. How is the suitability of the courses for distance education?
8. What is the biggest or most important problem you have encountered in the distance education process?

In today's education system, where distance education is very important, this work will be carried out with the aim of student-centered evaluation of the program by taking the opinions and ideas of the students in the system about the program. The findings and results to be obtained from this study will reveal the problems encountered in the implementation of distance education and show the need for effective integration of distance education into education, not as an alternative (Asandaş & Hacicaferoğlu, 2021).

## Method

### The Pattern (Model) of the Research

This study, which aims at Distance Education Experiences of Social Studies Teacher Candidates, was conducted with semi-structured interview technique based on qualitative research approach. Semi-structured interview; It is a type of interview that allows the research to go beyond the planned and provides the flexibility of the researcher to make changes to the questions. In a semi-structured interview, the researcher can simultaneously use both single-choice answers and an in-depth examination of the work done in the relevant field (Büyüköztürk, Çakmak, Akgün, Karadeniz, & Demirel, 2012).

In this study, the phenomenology (phenomenology) pattern, which is a qualitative research method, was used in order to keep the perception and ideas of the students in the foreground. The reason for using this method is that it is a study to be done with an interview form and that phenomenology is an important pattern consisting of experiences. In addition, this pattern was preferred in terms of suitability for the purpose, since the experiences will be discussed in interviews with students participating in distance education courses.

### The Participants of the Research

The research was conducted in the spring semester of the 2020-2021 academic year with the participation of teacher candidates from each class studying at the Department of Social Studies Teaching Program of the Nizip Faculty of Education of Gaziantep University. The problems encountered by teacher candidates in the distance education process and the solution suggestions against them will be discussed as the main criteria. The criterion sampling method, one of the sampling methods, was used in the research.

Social studies teacher candidates who are studying at Nizip Faculty of Education have been identified. In the determination of teacher candidates, students from each class were determined on the basis of volunteering. 4 Due to the fact that they see more course content in the research and the possibility of more qualifications in their opinions. The weight is given to the teacher candidates who are studying in the classroom.

By obtaining the necessary permissions from the faculty where the social studies teacher candidates who make up the working group are studying, the collection of opinions has been started. In this direction, the necessary planning has been made for the interview with the teacher candidates. Social studies teacher candidates were informed about the purpose of the interview, the problem situation and sub-problems, and the interview process. During the interview process, our participants were informed that we can terminate the interview at any time and leave questions unanswered. The interviews have been arranged to be held at the appropriate time so that the social studies teacher candidates can give the most appropriate answers to the research. Information about the gender, class information and age of the teacher candidates who participate in the semi-structured interview form are given below.

Table1. Distribution of the Gender Characteristics of the Participants in The Semi-Structured Interview Study

<b>Gender of the Participants</b>	<b>Frequency</b>	<b>Percent (%)</b>
<b>Female</b>	29	%64,44
<b>Male</b>	16	%35,56
<b>Total</b>	45	%100

#### **Data Collection Tools**

Due to the pandemic that affected the whole world during the data collection phase of the research, the interviews were rearranged depending on the availability of teacher candidates. Due to the difficulties caused by the pandemic period and the health problems that have arisen, some of the interviews were conducted face-to-face and some of them were conducted with an online interview. Of the study, research problem and sub-problems, and the problems they face from these experiences and experiences of our participants in distance education solution proposals for these problems created by the researcher in order to determine whether the similarities and differences between the open-ended questions, semi-structured interview form was used. In our research, 14 open-ended questions were asked to obtain the distance education experiences of social studies teacher candidates and their opinions within the framework of these experiences. Care has been taken to create these questions, which constitute the draft semi-structured interview form, in such a way as to allow in-depth analysis of teacher candidates' views on distance education. In the preparation of the research questions, the literature was examined and a semi-structured interview form prepared with 14 open-ended question techniques was created in order to determine the opinions of social studies teacher candidates on the subject. The semi-structured interview form was presented to five experts in the field of social studies education in the preparation of the draft.

#### **Analysis of the Data**

In order to apply the semi-structured interview form, some of the interviews were conducted face-to-face and some of the interviews were conducted online. Due to the pandemic, interviews could not be conducted face-to-face, so some of the interviews were conducted by online forms via e-mail. On the other hand, the participants

were given the necessary information and the necessity of giving sincere and sincere answers to the questions was emphasized. On the other hand, the names of the teacher candidates participating in our research are not used, and the code names are Ö1, ..... It was used in the form of Ö45 and the necessary information was given to the teacher candidates. The data collected in the direction of interviews with social studies teacher candidates were evaluated through content analysis. Direct citations were made to the study and an attempt was made to clarify the analyses.

## Results

### Findings for the First Subproblem

The answers of the participants to the question about the advantages and disadvantages of distance education were analyzed and given in Table 2.

Table 2. Findings on the Advantages and Disadvantages of Distance Education.

Codes	Participants	Frequency (f)	Percent (%)
<b>Economy</b>	Ö1, Ö2, Ö3, Ö6, Ö10, Ö11, Ö12, Ö13, Ö14, Ö15, Ö18, Ö19, Ö20, Ö34, Ö35, Ö42, Ö43,	21	% 46,67
<b>Technical Failures (Technological equipment deficiencies)</b>	Ö2, Ö4, Ö6, Ö9, Ö11, Ö14, Ö15, Ö16, Ö21, Ö23, Ö24, Ö25, Ö28, Ö33, Ö37, Ö38, Ö39, Ö42,	18	% 40
<b>Flexibility of Access to Education</b>	Ö1, Ö2, Ö3, Ö4, Ö5, Ö7, Ö8, Ö9, Ö10, Ö11, Ö13, Ö14, Ö15, Ö16, Ö19, Ö20, Ö21, Ö26, Ö27, Ö31, Ö32, Ö42, Ö45	24	% 53,33
<b>Lack Of Interaction</b>	Ö1, Ö2, Ö5, Ö6, Ö7, Ö8, Ö9, Ö12, Ö13, Ö14, Ö17, Ö21, Ö22, Ö24, Ö25, Ö27, Ö31, Ö36, Ö38,	19	% 42,22
<b>The Insecurity of Measurement and Evaluation</b>	Ö4, Ö15, Ö37, Ö41,	4	% 8,89
<b>Web Access Problems</b>	Ö11, Ö12, Ö19, Ö33, Ö40,	5	% 11,11
<b>Lack Of Experience</b>	Ö26, Ö29, Ö30,	3	% 6,67

Table 2. when examined, it is seen that distance education answers the most about the flexibility of access to education (53.33%) and the least about the lack of experience (6.67%).

When the table regarding the advantages and disadvantages of distance education of our participants is examined, it is seen that the participants touch on the advantages and disadvantages of distance education activities. The participating teacher candidates stated in their opinions that it is advantageous to enter distance education classes regardless of the location. Again, according to the opinions of the teacher candidates, they see the Decency feature among the advantages of distance education due to the lack of physical environments and the fact that there are expenses such as eating and drinking to go to these environments and that these environments are not in distance education. The participating teacher candidates agreed in their views that there are disadvantages of distance education and that the most important of them is the inability to interact. Since the lack of interaction and technological Decisiveness cause negative consequences in terms of interaction between students and participation in classes, it is observed that teacher candidates express negative opinions about distance education. Following this, 6.67% of our participants stated that the distance education policies applied in our country have come up with a result that can be called unsuccessful due to the lack of a similar or substitute activity and the lack of compliance of the people who study with the distance education conditions in the history of the education system in our country, according to the opinions of some of them, which were formed by 6.67% of our participants.

*"In my opinion, distance education has more disadvantages than advantages. The advantages are savings in time, transportation and some expenses, while the disadvantages are that students' rights to learn by living by doing are taken away from their hands, which leads to difficulties in collecting important competencies that students should have during the lesson, such as focus, willingness and paying attention to the subject." (Ö,12 Interview Date: 02.05.2021, 15.45).*

*"Recording the lesson is an advantage for me. Because when we don't fully understand the subject, we can open it again and follow up. It can be a problem for people who take lessons from the top. It is not possible to attend two classes at the same time. Even if it is, it is impossible to understand the other lesson while listening to one." (Ö,10 Interview Date: 02.05.2021, 13.30).*

*"As an advantage of distance education, students can continue their education where they left off during the current coronavirus days. In addition, they can follow the lesson they missed or the lessons they need to repeat. October. As a disadvantage, students are faced with an education system that they have never seen before and are not used to. Problems such as interrupting exams due to any disconnection during exam times, such as midterm and final courses, can be sorted out." (O4, Interview Date: 08.05.2021 13.30).*

### **Findings for the Second Subproblem**

The answers of the participants to the question about their participation in distance education (mentally and psychologically) were analyzed and given in Table 3.

Table 3. Findings Regarding the Student's Full Participation (Mental and Psychological) in Distance Education Courses

Codes	Participants	Frequency (f)	Percent (%)
<b>Lack of Environment</b>	Ö1, Ö2, Ö7, Ö10, Ö11, Ö12, Ö13, Ö18, Ö21, Ö24, Ö25, Ö27, Ö28, Ö29, Ö31, Ö33, Ö35, Ö37, Ö38, Ö44,	20	% 44,44
<b>Student Awareness</b>	Ö3, Ö5, Ö9, Ö32, Ö34, Ö41,	6	% 13,33
<b>Lack Of Experience</b>	Ö4, Ö19, Ö21, Ö25, Ö30, Ö40, Ö42, Ö43, Ö45,	9	% 20,00
<b>The Problem of Focusing</b>	Ö6, Ö7, Ö8, Ö11,	4	% 8,89
<b>Lack Of Supervision</b>	Ö5, Ö6, Ö7, Ö8, Ö11, Ö14, Ö15, Ö16, Ö19, Ö20, Ö22, Ö26, Ö28, Ö43,	14	% 31,11
<b>Student Frivolity</b>	Ö1, Ö2, Ö4, Ö6, Ö7, Ö8, Ö11, Ö13, Ö15, Ö16, Ö18, Ö20, Ö22, Ö23, Ö26, Ö36, Ö39, Ö45,	14	% 31,11

Table 3. when examined, it is seen that they gave answers most about the lack of environment characteristic of distance education (44.44%) and least about the focusing problem characteristic (8.89%).

According to Table 3, the answers of teacher candidates to the question that is the subject of our research are that most of the teacher candidates participating in distance education have problems attending distance education classes and cannot fully participate in the lessons (mental and psychological). Teacher candidates state that the distance education process affects students psychologically and causes frivolity in students. Prospective teachers come to the consensus that distance education is far from them because distance education is a new system and they are used to the classroom environment. Teacher candidates have similar views on distance education, and at the most important point of these views, they complain that distance education is far from the classroom environment and that not every student can have an equal environment.

It has been stated that teacher candidates encounter multiple problems in their participation in the lessons and that their attitudes to the lesson have changed while dealing with this problem. When the answers given by the teacher candidates in terms of full participation in distance education are examined, it is seen that the teacher candidates have a negative opinion on the subject. It was seen in the statements of the teacher candidates that 44.44% of the students had problems caused by the environment and that they had a lot of problems in this regard. Ö1 supports this with his statements;

*“No, I don't think so, because we are in a home environment, the physical environment of each student is different at school, while everyone is studying in the same environment, everyone is studying in*

*different environments in distance education. I don't have a room at home, I attend classes in the room where I stay with my family, and of course, there may be events that will create a distraction, so I can't fully participate in the lesson. Apart from these, we can attend classes in distance education and take care of different jobs, for example, my mother can call me during the lesson, and the lesson is interrupted, and we literally cannot concentrate on the lesson because it is convenient to be at home” (Ö1, Interview Date: 06.05.2021 14.30).*

The answers given by different teacher candidates were also interviewed for similarity.

*“I don't think that in distance education classes the student literally did my killer. Because no matter how much we try to give ourselves in the lessons, many sounds can come from around because we are at home. Both mentally and psychologically, we are very comfortable at home listening to lectures in our pajamas. Because the environment and the situation we are in pushes us to this. In addition, while listening to the lesson, any family member can enter the room and distract you. In addition, the student has the right to enter the course he wants when he wants. Therefore, when a student does not enter a live lesson, he does not consider himself left behind from the lesson. In addition, the teacher does not know who is listening to the lesson and how, so he focuses only on the topic he needs to tell. This makes the student realize that there is no obligation to listen in face-to-face education, and the student cannot fully participate in the lesson” (Ö28, Interview Date: 03.05.2021 13.30 ).*

The result revealed in the analysis of the opinions of teacher candidates is that the lack of classroom environment is noticeable in terms of ensuring full participation of students in distance education courses. Students are considering the low interest in distance education due to the habits brought about by face-to-face education. Students come to the consensus that distance education causes a gradual decrease in the interest and seriousness of the lessons due to these negativities and report negative opinions about distance education.

### **Findings for the Third Subproblem**

The answers given by the participants to the question about the communication between the students of distance education were analyzed and given in Table 4. The answers given by the participants to the question about the communication between the students of distance education were Deciphered.

Table 4. when examined, it is seen that distance education gives the most answers about the feature of confusion in communication (35.56%) and the least about the feature of weakening in togetherness (6.67%). 35.56% of the social studies teacher candidates who participated in our semi-structured interview form emphasized that there were problems in providing communication in distance education courses and that distance education did not work efficiently enough in terms of communication and that communication was not provided as needed. In the answers given by teacher candidates to the research question, it is stated that distance education is insufficient for communication and this inability causes confusion during communication with students.

Table 4. Deci-sions Related to Communication between Students of Distance Education

Codes	Participants	Frequency (f)	Percent (%)
<b>Confusion in Communication</b>	Ö1, Ö2, Ö6, Ö7, Ö9, Ö16, Ö22, Ö25, Ö32, Ö33, Ö34, Ö35, Ö37, Ö38, Ö43, Ö45,	16	% 35,56
<b>Decreased Interest in the Lesson</b>	Ö2, Ö5, Ö8, Ö11, Ö12, Ö14, Ö15, Ö27, Ö28, Ö41,	10	% 22,22
<b>Inability to Socialize</b>	Ö3, Ö9, Ö14, Ö32,	4	% 8,89
<b>By application</b>	Ö1, Ö4, Ö10, Ö17, Ö18, Ö20, Ö21, Ö33, Ö42,	9	% 20
<b>Weakening the Union</b>	Ö19, Ö30, Ö39,	3	% 6,67
<b>Inability to Share Information</b>	Ö27, Ö29, Ö30, Ö31,	4	% 8,89
<b>Insincerity</b>	Ö33, Ö35, Ö38, Ö40, Ö44,	5	% 11,11

They suggest that teacher candidates see communication as one of the most important shortcomings in the distance education process and that students' interest in the lessons decreases due to the inability to provide this communication. The opinions of the teacher candidates that the students will have problems in their social lives due to the fact that there are such problems in communication are also interesting.

The opinions of teacher candidates that communication can only be done with practice and that this cannot be enough also come to the fore. Also, if there was a consensus with regard to remedying this lack of communication, lack of Fixed of failure that students get to socialize with dishonesty among themselves, and unity has a negative impact on academic achievement of students in these accept the view that weakening.

*"I think there is no communication between students because I don't think there is enough information exchange by writing. Dec. Because not enough communication is provided, Decouples and communication difficulties arise between students. As a result, the student's interest in the lesson may gradually decrease. For an active learning environment, it can be said that distance education, in which students should have good relationships with each other, has many negative features at this stage" (Ö2, Interview Date: 07.05.2021 11.30).*

*"Unfortunately, communication between students is Decoupled. We could work together on topics we didn't know in the classroom and generate ideas, but we can't do this in a virtual environment. Everyone has work to do after the distance education lesson is over (housework, or similar work) we can't talk about that lesson for a long time, or we go through cursory with short conversations" (Ö8, Interview Date: 10.05.2021 15.45).*

According to the opinions of 22.22% of the other prospective teachers in our study group, they state that there are serious problems with communication in distance education courses. They are very uncomfortable to this problem of teacher candidates and teacher of these restrictions and restrictions among themselves in communication with the teachers ' interest in lessons, and reduces highlights in normal life becoming more passive.

*“The time limit given in online courses and therefore the instructors are in a hurry to raise the course topics. Therefore, the interaction of the students neither among themselves nor with the instructor can be ensured Decisively. One of the problems caused by this is that students cannot socialize with their friends, and therefore the bond they have established with their friends weakens and causes the student's enthusiasm and desire for classes to decrease” (Ö14, Interview Date: 13.05.2021 15.30).*

### Findings for the Fourth Subproblem

Participants in distance education courses socialization and their answers to the question about the interaction between individuals were analyzed and are presented in Table 5.

Table 5. Findings on Decommunization and Inter-individual Interaction in Distance Education Courses.

Codes	Participants	Frequency (f)	Percent (%)
<b>The System Is New</b>	Ö3, Ö18, Ö22, Ö27, Ö32,	5	% 11,11
<b>Face-To-Face Environment</b>	Ö1, Ö2, Ö6, Ö7, Ö10, Ö12, Ö14, Ö17, Ö23, Ö26, Ö29, Ö34, Ö35, Ö37, Ö38, Ö41,	16	% 35,56
<b>One-Sided Interaction</b>	Ö4, Ö5, Ö8, Ö11, Ö16, Ö19, Ö20, Ö24, Ö25, Ö30, Ö33, Ö36, Ö40, Ö43,	14	% 31,11
<b>Insufficient Time</b>	Ö15, Ö28, Ö44, Ö45,	4	% 8,89
<b>Student Effort</b>	Ö21, Ö39,	2	% 4,44

Table 5. when examined, it is seen that they gave the most answers about the face-to-face environment feature (35.56%) and the least answers about the student effort feature (4.44%) in distance education courses.

According to Table 5; The opinion that the intended socialization and interaction cannot be fully realized in distance education courses comes to the fore. It is revealed that students and teachers should be in constant communication for the purpose of socialization in distance education courses, but since this situation is not very possible in distance education courses, interaction between each other and teachers cannot be made at the desired level for students to socialize Decently. As stated by the participant candidate of social studies teacher Ö37, it was stated that there were problems with socialization and interaction in distance education courses and that socialization could not be done much. The importance of sharing the same environment and making eye contact



for effective communication and socialization of teacher candidates was emphasized, and in order for effective communication and intended socialization to occur, it was emphasized that the virtual classroom environment should be eliminated.

*“No, I don't think it was done. For effective communication, students need to share the same environment and make eye contact. The rest of the communication is far from sincerity and not effective. For effective communication, it is necessary to have a physical environment and to eliminate the virtual environment” (Ö37, Interview Date: 23.05.2021 13.00).*

*“We are having problems with socializing because for us, socializing means spending time together face to face Decently. In other words, the intended socialization is not experienced, only thanks to our distance education lessons, we are not completely isolated from each other. As for the interaction between individuals, I think that the messaging in class groups is positive. Dec. Everyone can answer everyone, everyone can talk to everyone. I think the interaction between individuals takes place in a positive way because we miss the school, the classroom and our friends” (Dec 26, Interview Date: 18.05.2021 11.00).*

### Findings for the Fifth Subproblem

The answers of the participants to the question about the feasibility of measurement and evaluation in distance education have been analyzed and given in Table 6.

Table 6. Findings on the Full Implementation of Measurement and Evaluation in Distance Education.

Codes	Participants	Frequency (f)	Percent (%)
<b>Copy</b>	Ö2, Ö7, Ö8, Ö15, Ö18, Ö23, Ö24, Ö27, Ö28, Ö31, Ö32, Ö33, Ö36, Ö37, Ö39, Ö41, Ö45,	17	% 37,78
<b>The Time Problem</b>	Ö4, Ö6, Ö26, Ö40,	4	% 8,89
<b>Inequality of Opportunity</b>	Ö11, Ö16, Ö28, Ö29, Ö42,	5	% 11,11
<b>Inefficiency of Lessons</b>	Ö9, Ö13, Ö17, Ö22,	4	% 8,89
<b>Face-to-Face Assessment</b>	Ö1, Ö5, Ö12, Ö14, Ö19, Ö20, Ö21, Ö25, Ö34, Ö38, Ö43,	11	% 24,44
<b>Diversity of Questions</b>	Ö10, Ö30, Ö35, Ö44, Ö45,	5	% 11,11
<b>Student Awareness</b>	Ö30,	1	% 2,22

When Table 6 is examined, it is seen that they gave the most answers about the copy feature (37.78%) and the least answers about the student awareness feature (2.22%) in distance education measurement and evaluation.

According to Table 6 of our participants, make up a large part of their answer for the research problem, and %37,78 distance education students in research as a percentage of the most discussed point is very low and the reliability of assessments and evaluations made by the trainees in the exams learning refers to the opinion that public opinion is in the nature of participation in illegal ways. It is a common opinion that there are problems in the measurement and evaluation of distance education and that measurement and evaluation will not be healthy in terms of not being able to provide complete control over students.

*“I don't think you do a good enough assessment and evaluation in the distance education program. For example, how fair the exams are is a relative situation. Some students can take others to the exam instead of themselves or do it via the Internet. No matter how smooth the evaluations are, they can lead to injustice among the students” (Dec 2, Interview Date: 07.05.2021 11.30).*

*“In the measurement and evaluation phase, I believe that distance education is not useful at all. Others can take the exams, it is very easy to copy, and teachers make it easier by asking multiple-choice questions, which makes the student lazy” (Ö37, Interview Date: 23.05.2021 13.00).*

Another opinion that our participants touched upon and underlined with importance was the opinion that measurement and evaluation in distance education courses should be evaluated face-to-face, not by distance education. Participants believe that measurement and evaluation will be carried out in a healthy way only under the supervision of the teacher and by sharing the same environment.

*“I do not think that measurement and evaluation in distance education can be done in full sense, because for the reliability of measurement and evaluation, face-to-face interviews with students and tests in which the teacher and student are in the same environment should be applied. This is important in terms of its reliability and validity. While systematic mistakes can be made even in face-to-face assessments, there are more likely to be mistakes in distance education” (Ö12, Interview Date: 02.05.2021 15.45).*

Based on their expression of our participants to the research problem of assessment and evaluation in distance education courses and literally could not have done one of the reasons why the teacher as inefficient in terms of time and go easy on the question of multiple-choice questions to ask a lot of teachers has a negative impact on the measurement and evaluation of the opinion that between the candidates is an important point.

*“I don't think that measurement and evaluation are done literally, our teachers, who usually ask classical questions in face-to-face education, usually ask multiple-choice questions when distance education starts, in this case, it causes the student to memorize more. The most important factor in making the measurement and evaluation literally is diversity, because there is no diversity in distance education, it cannot be done literally” (Ö10, Interview Date: 02.05.2021 11.30).*

### Findings for the Sixth Subproblem

The answers of the participants to the question about the technical difficulties experienced in distance education courses and their overcoming were analyzed and given in Table 7.

Table 7. Technical Difficulties Experienced in Distance Education Courses and the Table of Findings on Overcoming Them

Codes	Participants	Frequency (f)	Percent (%)
<b>Network Problem</b>	Ö1, Ö2, Ö8, Ö9, Ö10, Ö14, Ö15, Ö16, Ö18, Ö24, Ö29, Ö30, Ö34, Ö38, Ö40, Ö44, Ö45,	17	% 37,78
<b>System Crash</b>	Ö1, Ö2, Ö5, Ö7, Ö11, Ö12, Ö14, Ö17, Ö18, Ö20, Ö21, Ö25, Ö27, Ö28, Ö31, Ö35, Ö37, Ö39, Ö43,	19	% 42,22
<b>Development of Infrastructure</b>	Ö3, Ö4, Ö13, Ö20, Ö23, Ö25, Ö28, Ö29, Ö40,	9	% 20
<b>Course program</b>	Ö4, Ö11, Ö41,	3	% 6,67
<b>Economic Support</b>	Ö6, Ö20, Ö32, Ö33, Ö34, Ö36, Ö42, Ö45,	8	% 17,78
<b>Power Outage</b>	Ö7, Ö8,	2	% 4,44
<b>Expert Help</b>	Ö19, Ö22, Ö26,	3	% 6,67

Table 7. when examined, it is seen that they gave the most answers about the system crash feature (42.22%) and the least answers about the power failure feature (4.44%) in distance education courses.

According to Table 7, the intensity of the answers given by teacher candidates to the research problem is based on the statement that the system has become unusable due to too much intensity and distance education courses have been interrupted. 42.22% of our participants frequently say that the system freezes and the screen becomes unusable due to the simultaneous use of students in distance education courses.

*“Due to the fact that too many people enter the system used for distance education at the same time, the access to the system is disrupted or there is a disconnection in the connection during the lesson. The problem of some students' lack or insufficient internet access, disruption of access to the System and disconnections during the lesson can be solved by strengthening the infrastructure of the system. For students who do not have Internet access or are inadequate, telecom companies have provided free internet to their users, especially for use in distance education courses during this process we are experiencing” (Ö20, Interview date: 27.05.2021 13.00).*

*“There are many technical difficulties experienced in distance education. These are: The system crashes, getting kicked out of the lesson when disconnected, problems due to clutter at the entrance to*

*the lesson, the recorded lesson is sometimes deleted, the teachers sometimes forget to record the lesson because a student who watches the lesson later misses the beginning of the lesson, some of our teachers have difficulties such as getting the lesson done at another time due to the difficulties, they have in entering the lessons. In order to overcome these difficulties, first of all, the distance education infrastructure needs to be good and new. Students and teachers who are weak in distance education should be informed about this issue” (Ö28, Interview Date: 03.05.2021 13.30).*

Based on the statements of our participants; statements aimed at solving the problems experienced in distance education courses, statements about improving the infrastructure of the country and providing material and moral support to students receiving education have an important share.

*“The most important of the technical difficulties are the Internet problems and system login errors. The university that provides distance education courses should meet the internet needs of all students and correct the system errors experienced. They can make the complex structure of the system even simpler, and the system should be accessed from all devices, and students should be provided with material and moral support. The system becomes more efficient when errors are corrected” (Ö29, Interview Date: 20.05.2021 13.30).*

Participants' answers, although the technical difficulties experienced as a percentage of the share has the common feature of the expression for the solution of the system of distance education to students and an expert guide that will help you minimize the application and a detailed time course and intensity of systemic problems that you can take appropriate curriculum. The participants concentrate on these statements and think that the solution is in this direction.

*“The lack of computer or webcam or internet facilities for some students in distance education constitutes a barrier to access in distance education. In addition, the lack of experienced, technologically knowledgeable specialists can cause many problems, especially technical ones” (Ö19, Interview Date: 12.05.2021 13.00)002E*

*“During school hours and in the lower structure of the system can be strengthened exam time connection problem, or are not on the course or exam at the same time as much as possible to ensure that school instead of a university curriculum and examination program editable” (O4, Interview Date: 08.05.2021 13.30).*

### **Findings for the Seventh Subproblem**

The answers given by the participants to the question about the suitability of the courses for distance education were analyzed and given in Table 8. When Table 8 is examined, it is seen that they gave answers most about the compensatory education feature of distance education (42.22%) and least about the mixed education feature (2.22%).

Table 8. Table of Findings on Whether the Courses are Suitable for Distance Education

Codes	Participants	Frequency (f)	Percent (%)
<b>Teaching Practice</b>	Ö1, Ö3, Ö4, Ö10, Ö14, Ö15, Ö16, Ö19, Ö20, Ö22, Ö33, Ö37, Ö44, Ö45,	14	% 31,11
<b>Compensatory Training</b>	Ö2, Ö7, Ö9, Ö11, Ö12, Ö13, Ö14, Ö17, Ö24, Ö25, Ö26, Ö29, Ö30, Ö32, Ö35, Ö36, Ö38, Ö41, Ö43,	19	% 42,22
<b>Homework</b>	Ö5, Ö6, Ö8, Ö18, Ö23, Ö28, Ö34, Ö39, Ö40,	9	% 20
<b>Equipping the System</b>	Ö21, Ö27, Ö31,	3	% 6,67
<b>Coeducational</b>	Ö42,	1	% 2,22

According to Table 8, based on the statements given by teacher candidates in terms of the suitability of courses for distance education, distance education focuses on the opinion that the suitability of courses for distance education varies depending on the content of the courses. It is emphasized that it is impossible for teacher candidates to teach the teaching practice (internship) course by distance education and that this course should be given face-to-face.

*“Due to the fact that I study in a verbal section, many of my courses are suitable for distance education. For example, our teachers who enter history classes can easily create the atmosphere and lecture narrations they create in face-to-face education in distance education. The only problem is that when we ask our teachers a question in face-to-face education, our teachers, who can answer a long question for a long time, have greatly reduced their response time due to the limited time in distance education. I also have classes that are not suitable for distance education. The teaching practice lesson can be given as an example of this topic. It is impossible for us to carry out this course, which we go to secondary schools in our area on a certain day of the week, with distance education. Applications such as homework or exams are not enough to gain the skills that are intended to be given to us students in this course” (Ö20, Interview Date: 27.05.2021 11.00).*

Our teacher candidates are similar on the view that distance education is not suitable for some courses and that these courses cannot be processed efficiently with distance education. As a solution for teacher candidates, they have prioritized the necessity of face-to-face compensatory education by taking the necessary precautions for courses that are not suitable for distance education.

*“Now there is a situation that not every stone sits in every gap, we had some lessons that were suitable for distance education, and some were not, for example, in the Ottoman language lesson, personally, I had a lot of trouble, because the articles were in Ottoman, I literally could not read. In terms of the nature of the training for such courses, it was necessary to give it to everyone again the next year.*

*Unless there is a systemic problem, of course, another alternative should be offered to those studying in the last grade” (Ö17, Interview Date: 12.05.2021 13.30).*

Our participants emphasize that the suitability of the courses they take for distance education has changed and they focus October on the necessity of minimizing the limitations of distance education by giving assignments in addition to these courses. Participants emphasize that some courses are insufficient with distance education, and teachers should eliminate this inadequacy with assignments.

*“Courses that are not suitable for distance education can be done face-to-face. Although my lesson is about me, I don't have a lesson to force. It is also important to support the lessons by giving assignments so that the lessons will be more efficient by reinforcing them” (Ö39, Interview Date: 27.05.2021 13.45).*

The most striking expression of the statements given by our participants about the research problem is the view that distance education and face-to-face education should be given together. Dec. In the period when there are limitations of distance education and these limitations, the necessity of face-to-face education is kept in the foreground.

*“In the context of the suitability of distance education courses, we can say that while some courses can be taken by distance education, some courses cannot be taken by distance education. For example, there are no practical courses among the courses that can be taken by distance education. Dec. Range The solution to this is that the courses are both official and offline, that is, the existence of a mixed Education system will keep this process more balanced” (Ö42, Interview Date: 25.05.2021 15.45).*

### **Findings for the Eighth Subproblem**

The answers of the participants to the question about the biggest problem encountered in the distance education process were analyzed and given in Table 9. When the table is examined, it is seen that they gave answers most about the inability to get used to the process of distance education (15.56%), and least about the lesson time and teacher awareness (4.44%).

According to Table 9, in the light of the data we received for the research problem, the participants suffer technical failures due to the lack of infrastructure, and these technical failures significantly impede the continuity of distance education. It is important to emphasize that the most important problem in distance education courses is the technical glitches that are not in the hands of the *students*.

*“The biggest problem I faced was that I could not enter the system and I could not attend classes because I could not enter the system. My second problem is that I had problems sending assignments to teachers because of the system. Another problem is the inability to return to the previous question*

during the exam and the problems such as the fact that our teachers gave too short time” (Ö21, Interview Date: 25.05.2021 13.30).

Table 9. Findings Related to the Biggest Problem Encountered in the Distance Education Process.

Codes	Participants	Frequency (f)	Percent (%)
Period	Ö4, Ö14	2	% 4,44
Not Getting Used to The Process	Ö5, Ö9, Ö16, Ö22, Ö29, Ö36, Ö42	7	% 15,56
External Factors	Ö8, Ö11, Ö12, Ö31	4	% 8,89
Technical glitches	Ö1, Ö2, Ö7, Ö8, Ö10, Ö11, Ö12, Ö14, Ö15, Ö16, Ö19, Ö21, Ö23, Ö24, Ö25, Ö30, Ö31, Ö33, Ö34, Ö37, Ö38, Ö39, Ö40, Ö44, Ö45	25	% 55,56
Impossibility	Ö17, Ö32	2	% 4,44
Virtual Environment	Ö18, Ö20, Ö28, Ö35, Ö43	5	% 11,11
Knowledgeable Guide	Ö22, Ö23, Ö27	3	% 6,67
Teacher Awareness	Ö26, Ö41	2	% 4,44

Regarding the sustainability of distance education courses, it is important for our participants to emphasize that teachers should prioritize distance education while increasing awareness of distance education and approaching students. The most important point that our participants touch on about distance education is that it is important to continue education under equal conditions, with equal opportunities and aware of the process.

*“I didn't have a big problem, just something that made me nervous. When our teachers give homework, they read hundreds of assignments at the control stage after they have delivered them. And that's for me, 'I wonder if they read the entire assignment without skipping any lines?' the question is why. Of course, we would like to read the entire assignment that we have prepared with effort and care, but there are so many students that I don't know if our teachers can keep up with this, and this is an important problem for me” (O26, Interview Date: 18.05.2021 11.00).*

*“The biggest problem was that we didn't have internet in the early days of the pandemic and I didn't have a computer, I took care of them, but teachers are taking on too much responsibility because it is distance education” (O32, Interview Date: 19.05.2021 11.00).*

## Discussion and Conclusion

In this study, it is aimed to examine the situation of distance education in our educational life and solution proposals in line with the opinions of teacher candidates. In this direction, the opinions of 45 social studies

teacher candidates were taken. As a result of the examination of the opinions of social studies teacher candidates, it is understood that distance education has ceased to be an alternative education during the pandemic period and has become the center of our education and training life. The fact that distance education has started to be used excessively throughout the world also leads to an increase in studies on distance education. In this study, which developed within the framework of the opinions of social studies teacher candidates, we can say that we have concluded that distance education is different from face-to-face education and cannot replace face-to-face education.

It is seen in the opinions of teacher candidates that there are advantages and disadvantages of distance education. During the negotiations, especially the lack of infrastructure and technical failures come to the fore. The fact that there is a communication problem in distance education, which is often emphasized in the opinions of teacher candidates, and the lack of interaction at the desired level also leads to the fact that students look at distance education negatively.

It is an undeniable fact that the school has an important vision in our education and training life. The high participation rate of students in face-to-face educational environments also affects their academic achievements and social skills. On the other hand, the low participation rate of distance education compared to face-to-face education causes negativities in terms of student development. According to the opinions of the teacher candidates, it turns out that the desired progress in the social development of the students cannot be shown in the courses taken by distance education. The results of the evaluations of social studies teacher candidates in terms of distance education and face-to-face education are reflected in their statements. It turns out that distance education of teacher candidates is less efficient than face-to-face education. The fact that distance education is not suitable for the content of the courses in particular has caused the perspectives of teacher candidates to be negatively affected. Considering that distance education and face-to-face education will always exist in our education and training life, the conclusion prevails that distance education cannot replace face-to-face education and will remain in the form of an alternative education system.

As a result of this study, the current state of distance education has been shaped in line with the opinions of teacher candidates, and it is concluded that distance education courses will be less efficient and the quality of education will decrease even more. On the other hand, it is undeniable that distance education will be a good alternative education, and even integrating face-to-face education and distance education will bring a new vision to our education and training life. The high probability of providing both distance education and face-to-face education together in the coming years due to the impact of today's world conditions and technological developments suggests that there will be significant changes in the educational policies of countries.

## **Recommendations**

As a result of the research process and the results, some suggestions were presented. The recommendations in



question are listed below:

- It is necessary to eliminate the lack of infrastructure and network problems, which are the most frequently mentioned issues in the opinions of teacher candidates.
- There are a lot of technical problems encountered in distance education courses and it is necessary to have a technical expert to deal with these encountered problems.
- The distance education system should be further developed and the interaction of students and teachers should be increased.
- In order to eliminate the doubts of teacher candidates about measurement and evaluation in the distance education system and to make the measurement and evaluation more reliable, it is necessary to eliminate the deficits of the system by carrying out the necessary studies.
- Due to the flexibility of the distance education system, it is proposed to investigate in depth the psychological effects of teacher candidates and individuals participating in distance education activities in terms of learning and teaching.

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## Media and Model Learning to Develop Skill in Speaking Bahasa Indonesia

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**Abstract:** It is expected that students who learn Indonesian will be able to communicate both orally and in writing. However, students continue to face numerous difficulties when confronted with Indonesian conversation, such as feeling uncomfortable, stammering, or simply remaining silent when they are asked about their opinions. As such, this study will consolidate the findings of past studies on the topic of increasing speaking skills, particularly for elementary school students, using a literature review technique. This study collects data from Google Scholars and papers published in 2020-2021 which are filtered using the keyword "speaking skills for elementary school students." The study's findings suggest the need for role models and learning material that are age-appropriate for elementary school students. The range of enjoyable learning models, distinctive learning media, and even the combination of various models and media can serve as references for teachers aiming for establishing a meaningful learning environment, particularly for elementary school students looking to enhance their speaking skills.

**Keywords:** Media Learning, Model Learning, Speaking Skill, Elementary School

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### Introduction

In life, speaking is an activity that takes place all the time. Yet, for some, it is considerably the most difficult, complex, and anxiety-inducing linguistic skill (Bashori et al., 2020; Sa'bani, 2009). While being able to clearly express themselves in the written form, many can frequently be inarticulate. Additionally, a number of students

who fluently have a casual conversation with their peers outside of the class using the vernacular may find it difficult when it comes to talking in Indonesian about a certain topic in class. Not only that, speaking skills cannot be acquired rapidly and must be honed since the childhood (Kusmintayu et al., 2012; Putri et al., 2020)

Early childhood is a golden period in all aspects of human development, physically, cognitively, emotionally, or socially (Maulina & Budiyo, 2021). Language is one facet of rapid development that can be achieved during the elementary school years. Students will develop the ability to verbally communicate their emotions so that people around them are aware of what they are going through. However, a child may still have difficulty in expressing it. Thus, children's speaking skills must be developed to ensure that children do not encounter additional difficulties and that those around them understand (Khusniyawati, 2020)

Given the concept of speaking, this skill links numerous parties, locations, and even situations. Furthermore, speaking abilities incorporate components of language, psyche and also performance. Speaking is regarded the most important of the four language skills when learning a second or foreign language (Bahadorfar & Omidvar, 2014). Not only for foreigners, Bahasa Indonesia is even still limited to Indonesians who actually speak a different language of their mother tongue since there are a sheer variety of local languages. On a formal basis, speaking abilities are developed during the learning process in schools and colleges. But in fact, students have not fully acquired the speaking aspects.

Several difficulties inherent in speaking skills in Indonesian schools include students' lack of confidence when speaking in front of the class, nervousness while expressing opinions, fear of being wrong, embarrassment, stammering, and even remaining silent when the teacher ask questions (Permana, 2015; Priatna & Setyarini, 2019). Moreover, in distance learning students are so passive and do not provide significant feedback during the teaching and learning process of Indonesian (Imelda et al., 2021). Whereas learning Indonesian in elementary schools aims to improve students' ability to communicate effectively, not only in writing but also orally. However, speaking abilities remain one of the language skills that students do not totally understand (Susanti, 2015) and there is still a lack of learning media provided by educators to stimulate students' responses to be active in speaking (Imelda et al., 2021)

Based on the aforementioned problems, the teacher's role as an educator is to facilitate effective learning in order to improve students' speaking skill. Because the availability of media in classrooms and the use of character-based models will significantly assist the learning process (Darmuki et al., 2020; Meylinda et al., 2016). Thus, efforts must be made to assist learning in order to develop speaking skill through the use of appropriate learning models and media. The learning model serves as a guide for achieving specific learning goals (Sagala, 2005; Trianto, 2007). While learning media is one of the tools and strategies that can be used by educators to attract attention (Pramesti, 2015). As such, this study will synthesize research findings on how to enhance speaking skills using innovative models and learning media. Moreover, employing digital technology is thought as a feasible option today (Arifin et al., 2021).

## Method

This study employs the literature review method, which identifies, evaluates, and interprets accessible and relevant research on a particular topic (Klumpner et al., 2007). The purpose of this study is to examine how to improve students' Indonesian speaking abilities in elementary schools. The researchers use Google Scholars to conduct a keyword search of "Speaking Skills, Elementary School Students." The researchers filter a lot of publications that appear with these keywords for publication dates between 2020 and 2021. The time period chosen is related to the state of emergency curriculum implementation, which results in distant learning and a reduction in the frequency of direct communication in schools. The main articles are reserchers conducted by [19] Anjeli & Latifah, 2021; [20] Dessiane & Hardjono, 2020; [21] Hartati et al., 2021; [22] Nurdiana, 2020; [23] Pratiwi et al., 2020; [4] Putri et al., 2020; [24] Ramadhania & Kristiantari, 2020; [25] Yusron et al., 2020.

## Results and Discussion

Efforts to improve the speaking skill of elementary school students in Indonesian can be classified according to the type of media and learning model used.

### Improving Speaking Skills through Learning Media

The variety of media is a form of effort to leave a more lasting impression on students. Based on the findings, Yusron (2020) has used the Pop-Up Book as a background based on observations at SDN 2 Surodakan that demonstrated grade III students' limited ability to speak and make stories. According to the findings from observations and interviews, nearly 82% of students were unable to properly express the actual meaning through stories. There was a significant increase when the Pop-up Book media was used in conjunction with the experimental method. Using three-dimensional media, Pop-Up transforms into a teaching medium displaying books with pictures and audio that can be changed accordingly. As a result, students may see and hear simultaneously. This simplifies the process for students, particularly if they are directly involved in the use of existing media (Ananda, 2017). This media is considered in accordance with the character of elementary school students who have exploration abilities and high imagination power (Parmini, 2015). Additionally, one of strategies that elementary school students can employ for resolving story problems is to use pictures (Ariawan & Pratiwi, 2017).

The next media is the flash card used by Putri et al., (2020) at the elementary school level, fifth grade, to improve their Indonesian speaking abilities. According to the findings of the Classroom Action Research, it is concluded that the use of Flash Cards learning media can help develop speaking skills. The use of flash cards as a learning aid, particularly for conveying messages visually. The images are created by hand or printed. Thus, students are given the opportunity to speak using flash card images. Prior to the move, the importance placed on fifth-grade students' language skills was only 8.32 %. The first cycle's results increased to 70.59 %, while the second cycle's

results increased to 85.29 %. Along with being a medium for improving speaking skill, flash card media can also help third grade elementary school students develop their writing skills (Emilsa & Guslinda, 2019). Additionally, flash cards have the following advantages: they can help strengthen vocabulary, they are visually appealing, flexible, and affordable, they can be used for a variety of age groups, and they are ideal for teaching word structure and games (Haycraft, 1978).

Another medium that can also be the right choice for elementary school students is comics. According to Dessiane & Hardjono (2020), Effective learning in elementary school includes the use of teaching aids to attract the interest of easily bored students. Apart from avoiding boredom, comics can also be an easy-to-understand medium of learning, as they contain pictures and words that form stories with clear and simple message delivery characters (Dessiane & Hardjono, 2020). Teacher offers a diverse collection of comics, including comedy, adventure, and drama. Finding comics that are appropriate for students, on the other hand, is not easy. Numerous factors must be examined, including the following: (1) the story's substance contains a positive message that can be absorbed by students; (2) etiquette; (c) simple pictures (Andrefa et al., 2019). By considering these factors, comics can be a medium that aids in the development of speaking skills, as proven by Nurfadillah (2018) through classroom action research, in the third cycle it reached 98%. In addition, comics also have a digital form, technological developments make electronic comics more fun and accessible (Ruiyat et al., 2019).

Different from the previous media, using dolls as learning media to improve speaking skills (Anjeli & Latifah, 2021). This medium is consistent with the characteristics of elementary school students who are still in the theory of Jean Piaget's concrete operational stage. At this stage, students' thinking abilities are still limited to concrete objects and are deficient in abstract concepts (Bujuri, 2018). Thus, students continue to require an intermediary, namely the media, to facilitate comprehension of the teacher's message. Finger puppets transform inaccessible objects into something genuine, despite their imitation form. Furthermore, sock puppet media has been used (Permana, 2015). The puppet media engages students in discussion and group activity, ensuring that educators do not dominate learning. According to the analysis of the use of puppet media in Indonesian language learning, there is a beneficial, effective, and efficient influence. Socks dolls not only increase children's speaking abilities, but also their abilities in a variety of other aspects, including listening, reading, and writing (Permana, 2015).

In addition, the media that utilizes the use of technology to improve the speaking skills of elementary school students is podcasts (Suriani et al., 2021). Podcasts act as media that hone speaking skills because they contain various topics of conversation in various forms, such as conversations, discussions, debates, talk shows, monologues, speeches, and lectures. In addition, the advantage of podcasts is that they can be listened to anywhere while doing other activities (Laila, 2020). Based on these reasons experimental research was conducted in class V of SDN 13 Batu Gadang, Padang City to see the effect of using podcasts on the speaking skills of elementary school students. The results show that students' speaking skills in the group using podcasts are better than the group using conventional media. Based on the results of this study, teachers in Indonesia should indeed improve digital literacy to utilize digital-based media that can support students' speaking skills.

The current applications that can be used as references in the process of learning speaking skills are Clarisketch and Plotagon. Clarisketch is an application that allows users to make their short video by taking a picture and drawing while speaking. Clarisketch can support students' speaking fluency, can reduce students' filler when speaking, and help students use the right vocabulary (Cephilman, 2020). Plotagon is an award-winning storytelling tool for all ages. The features are easy to use, free, can increase imagination and creativity. Plotagon increases interest in learning in particular on speaking skills (Oktaviani & Hasanudin, 2022).

### **Improving Speaking Skills through Learning Model**

Apart from being a tool for knowledge transformation, the learning model is regarded to be capable of fostering a positive learning environment (Yusnarti & Suryaningsih, 2021). Several learning models that can be used to improve the speaking skills of elementary school students include the Think Talk Write Model, Role Playing, Paired Story Telling, and Storytelling Models. The Think Talk Write (TTW) model encourages students to think, speak, then write so that learning objectives can be achieved (Iru & Arisi, 2012). This learning model is not focused on educators and even requires a high level of student participation to make learning enjoyable and exciting (Savitri et al., 2021). The TTW model has a very significant effect on improving the speaking skills of elementary school students (Pratiwi et al., 2020). Using the quasi-design experimental method, it was determined that the average value for using this model was 83.56, compared to 77.05 for the class using the conventional model.

The next model is the Round Robin which was applied by Nurdiana (2020). Researchers discovered difficulties with students' speaking skills at SDN.99/IX Danau Kedap, Muaro Jambi Regency. Each student faces a unique set of difficulties, both linguistic and nonlinguistic. Pronunciation, intonation, word choice, and sentence structure are all linguistic features. While non-linguistic difficulties include sound quality, fluency, eye sight, and a willingness to respect others. The Round Robin model incorporates cooperative learning by grouping students into 4-6 people, (2) allocating a number to each student to facilitate teacher assessment, (3) assigning a worksheet to each group, (4) each student must express opinions on a given theme, (5) one of the students begins expressing opinions to group members, (6) other group members listen to the presentation of opinions, and (7) after the member is finished, Students can convey their ideas in their own ideas when they use this model, which also helps them develop patience (Warsono, 2013).

The next model is role playing that has been applied by Hartati et al., (2021), a model that seeks to create learning based on the habit and pleasure approach of students so that they are enthusiastic and happy to follow the learning that takes place. Through classroom action research, the role-playing model has succeeded in increasing the indicators of pronunciation, intonation, expression, and dialogue of fourth grade students of SD X Bandung City. Role playing is considered to be the right way because it combines pronunciation, intonation, facial expressions, and even movements when speaking so that speaking skills and students' self-confidence can increase (Priatna & Setyarini, 2019). One of the benefits of role playing is that it helps children's spoken language improve and become more easily understood by others (Djamarah & Zain, 2006).

Another model that is also one of the efforts to improve speaking skills is the paired story telling model (Yusron et al., 2020). In summary, this learning model begins with the teacher's segmentation of learning topics. Then, conduct a brainstorming session on the subject, dividing the group into pairs. Following that, each pair is assigned a subtopic. Following that, students keep track of and communicate information with their partners. Then, using the information collected, each student composes another section. Finally, this activity concludes with a discussion about the topic (Lie, 2007). The speaking skills of third grade students at SD Cluster VIII Mengwi Bandung have greatly improved as a result of this model. It is considered that the pair story model increases student participation since it is appropriate for simple tasks, gives numerous opportunities for interaction and input, and is efficient and successful (Lie, 2007).

## Conclusion

Efforts to increase elementary school students' speaking skills can be made by utilizing media and learning models that are enjoyable and age appropriate. When implementing learning models and media, it is critical to pay attention to elementary school students' cognitive abilities, which are still limited to the concrete and deficient in the abstract. However, the imaginative and exploratory abilities are fairly high. As a result, it requires learning processes and teaching aids that are relevant to children's life to accomplish certain learning objectives. Puppet media, pop-up books, comics, and flash cards are all examples of media that educators can utilize. The role-playing model, paired storytelling, round robin, and think talk write are all examples of learning models that can be used. Researchers have used this material and model successfully to improve students' speaking abilities at the elementary school level, including throughout the distance learning time. In addition, during the distance learning period there are learning innovations that are specifically digital-based. Research has even been conducted to examine the influence of media such as podcast, clarisketch, and plotagon. In fact, these media are not yet popularly applied in Indonesia so that they become recommendations for research that can be carried out and developed to improve speaking skills

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## Implementation of Formative Assessment on Students' Writing Skills in The NewNormal Period

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**Abstract:** The formative assessment offers a more informative aspect to improve teaching and learning activities than the summative assessment usually applied by teachers. This study aims to identify how junior high school teachers conduct a formative assessment on blended learning and the impact of using formative assessment. The research method used is a case study method with a qualitative approach. Data was collected through assessment documents made by the teacher and the results of interviews. Data analysis was carried out using the theory of Miles et al. The results showed that teachers conducted formative assessments mostly through WhatsApp and Google Classroom. Students are assigned to share their ideas and opinions on the subject matter in writing activities. Some assignments encourage students' critical thinking. Meanwhile, the impact obtained from this formative assessment is that the teacher can build teaching and learning activities well because students become active during evaluations, such as in discussions. The effect of the feedback given directly by the teacher personally is also one of the important formative assessment strategies for learning activities and assessment practices in student skills. This research will be useful for teachers who carry out formative assessments on writing skills and for other researchers to carry out the same research topic.

**Keywords:** The Formative Assessment, Writing Skills, Blended Learning, New Normal

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## Introduction

The COVID-19 pandemic is still a major concern until now. Many things have changed, one of which is the teaching and learning process. It has become an important history and record in the world of education. Previously daring learning has turned into blended learning in the new normal era. Currently, learning is returning to the normal learning era in schools. However, current learning combines face-to-face learning with maintaining health protocols. Blended learning provides two methods under the education system idea by the Ministry of Education and Culture Nadiem Makarim during this pandemic. In addition to teachers conducting face-to-face meetings at school by explaining the material to students, in addition to maintaining a safe distance, teachers can take advantage of technological sophistication such as applications that are useful as learning support, one of which is in collecting assignments to make it easier for teachers to carry out activities.

A study from Lake & Olson (2020) only needs to consider teachers who do not understand the subject matter and how to make the most appropriate decisions in a pandemic situation. Assessing blended learning is a challenge for many teachers. The question of how well teachers can utilize technology teaching tools has become an important issue. Challenges will arise if teachers are not good at using gadgets or other technological devices, such as the problem of internet network access that is not good if it is in a remote area; limited competence of teachers in the use of learning applications; and the teacher-student-parent relationship in bold learning that has not been integrated. The situation can improve and predict the teachers. They may feel unsure whether they can survive and overcome this challenging situation or not. Agung & Surtikanti (2020) also found that students admitted difficulties in understanding the teacher's instructions on assignments.

In general, assessment can be divided into two, namely, formative assessment and summative assessment. Formative assessment is carried out in the middle or during the learning process, which is carried out every time the learning unit or sub-subject can be completed to know the extent to which students "have been formed" following predetermined teaching objectives (Sudijono, 2007:25). Black & William (1998) states that formative assessment is all actions teachers and students take to develop themselves. It shows that it is useful for teachers who are trying to increase class activity. The teacher is the only actor who is not actively involved, but also the students. While Sadler, as quoted in (Nicol & MacFarlane-Dick, 2006), states that assessment aims to get feedback to develop and improve student learning. Formative assessment is an assessment that offers information as meaningful feedback for the development of learning. The feedback itself is one of the essential aspects of formative assessment (Bennett, 2011). How to provide feedback varies as long as it meets the goals and needs.

According to Black & William (2009), there are several strategies regarding formative assessment for conception

- a) Clarify and share learning intentions and criteria for success;

- b) Engineering effective class discussions and other learning tasks that gain students' understanding;
- c) Provide feedback that moves students forward;
- d) Activating students as a source of learning from each other
- e) Enabling students as owners of their learning.

Bennett (2011) states that this strategy is related to cognitive-scientific theory, especially regarding social interaction during learning. Share expectations, questions, feedback, self-assessments, and later pleasures to assist students in assessing and improving their work. These strategies are important when conducting this form of assessment. The strategy helps the essence of evaluation be achieved.

In addition, appropriate practice is also written with strategy-based instruction (Graham & Perin, 2007), which provides teaching and learning strategies and active participation of students during learning. An important strategy stimulated by formative assessment is the feedback that provides more meaningful and realistic activities that encourage independent learning (Mcdowell et al., 2011). Formative feedback is an important aspect of formative assessment to help students assess and improve their writing and enlighten teachers on future instruction in teaching.

Teachers cannot rely solely on summative assessment practices and strategies during distance teaching. Reflection on practices and strategies and an assessment of these approaches should be carried out from different perspectives. There are several points to consider, such as language test criteria and different student situations. Therefore, formative assessment is considered ideal because it provides opportunities for students to be more involved in its implementation so that the learning process becomes student-centered. Davidson & Mandalios (2009) stated that teachers could apply formative assessment to monitor student progress. Formative assessment supports student-centeredness and originality of assignments, although it somehow requires extra time and energy from the teacher to design the assessment.

Writing skills in Indonesian is one of the four language skills that are very important to get the right assessment so that students can learn better through the assessment results. Teachers usually assess students' writing by giving grades with some corrections. This kind of assessment is a summative assessment, assessing student learning outcomes in the form of numbers as a result. Bennett (2011) states that summative assessment is carried out to assess student achievement at the end of the assessment. The summative assessment focuses more on learning products and not processes. As a result, students are only interested in grades without taking their mistakes seriously. Therefore, summative assessment has a minimal role in encouraging writing learning. At the same time, formative assessment is more promising in assessing student writing results because it is always balanced with feedback and directives from the teacher or other students.

Today, formative assessment is increasingly recognized for language evaluation (Lee & Coniam, 2013). Teachers can take the information gathered from formative assessments to make further assessments and

choose appropriate learning strategies going forward. Formative assessment is believed to be beneficial for students' writing skills. Teachers can identify how far or how well students learn and observe their progress. This study describes how Indonesian junior high school teachers conduct formative assessments in this pandemic era. It focuses primarily on the strengths and weaknesses of assessment in achieving its objectives which can be expressed through the type of task and the impact that can be had when using formative assessment in learning.

## Method

This research uses qualitative research. Qualitative research describes words and language about things experienced by research subjects, such as behavior, actions, and perceptions (Moleong, 2010). The method used in this research is a case study of the formative assessment conducted by junior high school teachers. Yin (2018) states that the case study is a method to examine real-world phenomena. In this case, the writer explores the practice of formative assessment in writing skills and its impact on teaching and learning activities.

Researchers conducted research in junior high schools in Banjarmasin and found teachers who applied formative assessment to assess students' writing. In this study, twenty-seven junior high school students aged 13 to 15 years and an Indonesian language teacher at a school in Banjarmasin, Indonesia. The students are in their first year, which is class VII. Students are taught various text genres such as fables, personal letters, and reviews.

Researchers conducted research in the second semester. The formative assessment carried out consists of self-assessment and peer assessment, and conferences or small discussions. Feedback from peers and teachers is provided during the assessment. As an aspect of general formative assessment, formative feedback is offered at the individual and group levels (Black & William, 1998). In this study, the teacher used peer feedback and teacher feedback from students in addition to the discussion at the end of the assessment.

Data collection is in the form of document collection and interviews conducted through the WhatsApp platform with one teacher who applies formative assessment to his teaching. The selected document is a form of assignment made by the teacher to improve students' writing skills which are carefully observed. The researcher collected documents and interviewed the teacher through the Whatsapp platform. Interviews were conducted by video call or voice note. After the data was collected, the researcher analyzed the data and presented the results according to the research questions.

Data in the form of a teacher evaluation document aims to determine the form of formative assessment tasks carried out by teachers, and data from interviews will describe the impact of formative assessment on teaching and learning activities in writing. The writer carefully observes the collected assignments, classifying them based on assessed writing skills. The analysis process is based on Miles's (2014) qualitative analysis model, including data collection, data presentation, and concluding. First, the researcher used data reduction. The

researcher selects and identifies assignments made by the teacher and associated with categories. Second, the data is presented in tabular form, which is then analyzed and conclusions are drawn. The researcher analyzed the teacher's statements and responses to the interview using an inductive procedure analysis (Thomas, 2006).

## Results

As emphasized earlier in the introduction, conducting assessments in online learning requires more aspects to be considered. Before the pandemic spread, the ideal assessment criteria had been carried out by teachers. Nevertheless, media considerations and student conditions now add to the complexity of the assessment design during the pandemic. Below will be described each task designed by the teacher to improve students' writing skills and the impact of formative assessment on learning.

### Assignments to Improve Students' Writing Ability

In writing skills, students are assigned to share their feelings and opinions about the assignments given by the teacher. Writing competence can be seen from the ideas contained in student assignments. The teacher assigns tasks according to the curriculum, basic competencies, indicators, and learning objectives written in the lesson plans. Below is an example of a writing assignment.

#### Task 1

Read interesting fables from various sources (textbooks, storybooks, or the internet) and write down the series of events in the story. Include your thoughts on the story!

#### Task 2

Write a personal letter to someone you want to meet!

Task 3  
Read storybooks about education and do a review according to the systematic writing.

According to the syllabus and lesson plans, these assignments are given to class VII students at different times. The time allocation for doing assignments depends on the difficulty. However, usually, the teacher gives a grace period of one week and does not rule out the possibility of giving time tolerance for students who experience various obstacles such as signals, quotas, and even some who do not have a device, so they have to borrow from their parents or closest people. Assignments and materials are delivered through WhatsApp Groups for classes specifically for Indonesian subjects. Students work on assignments in their books and send them to the teacher concerned in JPEG (photo) format and include photos while working on assignments.

The above writing task may be challenging for both teachers and students, especially in today's distance learning. On the teacher's side, it is not easy to judge the product of the written results. After all, it does not mention some clear guidelines such as the length or the shortness of the text because it will be much more



complicated if students send assignments to the teacher with long texts. In addition, the act of copying writing from the internet also makes the next challenge for the teacher during the assessment. Thus, providing a specific current topic for writing activities is very good because it offers students the opportunity to find out what is going on. However, teachers need to carefully design clear guidelines and rubric criteria for assessing student writing.

### **Impact of Formative Assessment**

Researchers interviewed teachers via video calls via Whatsapp, and some used zoom meetings to determine the impact of formative assessment. This interview provides a clearer explanation of the impact of formative assessment on teaching and learning activities and the practice of writing assessment. Through data analysis, several themes were concluded that formative assessment had several impacts in the context of writing skills during this pandemic. In the first question, the teacher stated that formative assessment brought new experiences in the practice of assessment in writing skills during the pandemic.

“As a teacher, this kind of assessment is more effective in the current situation because it makes me open to students' mistakes in writing. Although initially, it was very difficult to assess and contact the students one by one personally, the impact was that the students knew what they had to improve in their writing. Back again, activities like this require extra time.”

Responding to the second question related to changes in student learning activities, the teacher explained that formative assessment builds better learning activities. The teacher mentioned that students were actively involved in the assessment because students had more opportunities to learn from their own mistakes. The self-assessment is carried out during the evaluation or assessment session.

“When I did this formative assessment, I noticed that students could learn more after the evaluation I gave personally. Students become more aware of their mistakes in writing, so students are not fixated on their condition and correct their mistakes. However, some students again make the same mistakes as using capital letters or punctuation marks.”

The third response is related to formative assessment strategies such as discussions on student learning activities. The teacher explained that the discussion encouraged some students to be more active.

“Yes, I think the discussion can stimulate some students to be active in their learning and evaluation. Usually, the discussion is carried out in the Indonesian class Whatsapp group. I usually tell them about the added value for active students to provoke student responses. For students who have signal problems, I will tolerate that.”

Meanwhile, regarding the effect of feedback, the teacher explained that feedback positively impacted student learning and assessment practices. Feedback from their colleagues and teachers is very helpful as a reflection and things that need to be considered for improvement in future writing. The following script illustrates the impact:

“Yes, I think feedback is good for student learning. Input from friends and teachers can make them learn about things that need improvement in writing.”

Regarding using rubrics for assessment, teachers claim that they use rubrics to determine student grades. Interestingly, teachers tend to give inaccurate scores without considering the rubric. This fact was obtained from the teacher's explanation of how they applied the rubric in their evaluation.

“I usually give a score for writing assessments depending on the student's mistakes. Some students work completely but carelessly. There are those whose structure is not clear, but the writing rules are correct, there are also those who have corrected their mistakes, but the choice of words is not quite right. At least I give a score of 60 for those who do. The rest is like that.”

The next question, the teacher, was asked about the effectiveness of the formative assessment. The teacher assumes that formative assessment can show the performance and development of students.

“In my opinion, its effectiveness depends on the student's needs. However, with the formative assessment, we can see students' progress in writing according to the rules.”

From the interview results, it can be revealed that formative assessment has a positive impact on teaching and learning activities and assessment practices in Indonesian writing. Feedback and discussion provide greater benefits for teachers and students to correct errors in writing. It is from this feedback that formative assessment can be achieved.

## Discussion

The study results indicate that after identifying the form of the test designed by the teacher as a formative assessment, it can be seen that the teacher is responsible for providing evaluations that are per the curriculum during this COVID-19 pandemic. It is proven that the assignments given can encourage students' critical thinking. In addition, teachers need to make assessment designs that consider the four skills, especially writing skills, and implement them through language, applying the concepts of reliability, validity, practicality, and authenticity.

The study also found that self-assessment and peer feedback as core components of assessment was helpful

for teachers and students to reflect on their learning. It is because, through reflection, students can do better to get an improvement in writing. Information about students' strengths and weaknesses that are useful for students' future writing (Mak & Lee, 2014). This result is in line with the strategy proposed by (Black & William, 1998). Formative assessment provides feedback that encourages students to progress. In other words, this assessment creates opportunities for students to do self and peer feedback and comments from the teacher. These activities are important factors in developing students' writing because they exchange ideas and use information from feedback to seek progress.

The second point is about the impact of formative assessment on teaching and learning activities in writing skills. Among the research conducted on the impact of assessment and written assessment this study aims to determine formative assessment's effect on learning it in writing. The results showed that formative assessment positively impacted learning activities and assessment practices. Data from interviews depicting teachers and students benefiting from formative assessment. Teachers assume that formative assessment creates an assessment-related experience. It also builds better learning activities because students are actively involved during the evaluation. The impact is in line with the formative assessment strategy proposed by Black & William (2009), namely activating as a source of learning from one another. The students learn from each other during the assessment.

The discussion idea is to prove that formative assessment encourages students to be more active and not confident in expressing their ideas in discussion sessions. It provides opportunities for students to share their knowledge to improve in writing. Therefore, discussion sessions have a good impact on student learning activities. In addition, teachers feel that this activity is very helpful in providing effective teaching. These results align with formative strategies in engineering effective class discussions and other learning tasks that gain student understanding. Through this assessment, students also gain a deeper understanding.

The influence of feedback or feedback given by the teacher personally becomes one of the important formative assessment strategies for learning activities and practices in student skills. Among the impacts of formative assessment on teaching and learning activities, the most crucial impact is for the students themselves and the teachers. The main impact is through formative assessment strategies or aspects such as teacher discussions and comments; students become active learners in writing in Indonesian subjects. Students not only write and get grades from the teacher but also self-assess and can also judge their classmates with peer feedback. With this assessment, students gain reflection on learning. They can correct their shortcomings and improve their competence in writing so that they get learning that is not based on final grades but in a meaningful process.

## Conclusion

Writing is one of four language skills that must be mastered by students as well as an assessment of writing is equally important. The study results indicate that teachers need to design evaluations that are more detailed and

comprehensive. In addition, it was found that formative assessment is very good to do, especially in this new normal period, because it has a more significant impact on teachers to be able to change teaching activities according to student needs through distance learning or face-to-face. Formative assessment needs to be done because it can help students develop several aspects of writing skills, such as grammar, writing content, and linguistic rules. Therefore, teachers or schools must consider formative assessment as an assessment that can be done in any subject.

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## Exploring the Role of Received Peer Feedback for Students' Learning Outcomes in Online Higher Education

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**Abstract:** In this article, we aim to explore the differences in the received peer feedback among successful, less successful, and unsuccessful students in higher education. This exploratory study was conducted in online settings and in the context of argumentative essay writing. In total, 135 undergraduate students participated in an online module and they completed three tasks in three consecutive weeks. In the first week, they wrote an argumentative essay. In the second week, students provided two sets of feedback on their peers' argumentative essays based on the given criteria. In the third week, students were requested to revise their argumentative essay based on the received feedback. Students' success was defined based on their improvements from the original essay to the revised essay. The results showed that unsuccessful and less successful students received more affective and descriptive feedback from their peers compared to successful students. The findings of this study provide practical implications on how peer feedback approaches should be implemented to help students write better argumentative essays in online learning environments.

**Keywords:** Argumentative essay writing, Higher education, Online learning, Peer feedback

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### Introduction

Writing a good argumentative essay is a crucial skill for university students (Akhteh et al., 2022; Noroozi et al., 2012; Valero Haro et al., 2022). A high-quality argumentative essay should include a clear introduction, a position that is supported by arguments and evidence, followed by presenting counter-arguments against the

position, and a response to the counter-arguments against the position, which could lead to a conclusion on the issue (Noroozi et al., 2016; Noroozi, 2018; Noroozi et al., 2020). In real educational settings, It is challenging for students to perform well and include all elements of argumentative essays in their report (Fan & Chen, 2019; Ferretti & Graham, 2019; Noroozi, 2022).

In the literature, peer feedback is found to be a successful learning strategy in higher education to enhance students' argumentative essay writing skills (e.g., Latifi et al., 2020, 2021; Latifi & Noroozi, 2021; Noroozi et al., 2011, 2016; Taghizade et al., 2020). For example, Latifi and Noroozi (2021) showed that supported peer feedback enhances students' argumentative essay writing quality. This supported peer feedback guided students to encourage in the learning process by allowing them to review the quality of peers' essays, discover gaps in their essays, and suggest improvements based on the given criteria (Latifi et al., 2021; Lizzio & Wilson, 2008; Noroozi & Hatami, 2019). However, providing high-quality peer feedback is also a challenging task for students especially for argumentation tasks that demand high level of cognitive processing. Some students lack knowledge of feedback, and others simply cannot translate this knowledge into practice (Latifi et al., 2021; Noroozi et al., 2016). A review of prior studies reveals that the success of feedback mainly depends on its quality (Kerman et al., 2022; Carless et al. 2011; Er et al., 2021; Taghizadeh Kerman et al., 2022). Effective feedback should include elements like affective statements (such as compliments or praise), a brief overview of the work, identification and localization of the problem(s), solutions to the problem(s), and action plans for future improvements (Lu & Law, 2012; Patchan et al., 2016; Wu & Schunn, 2021). Students normally reject comments that do not include high-quality feedback elements (Dominguez et al., 2012; Patchan et al., 2016; Wu & Schunn, 2020). This may results in a lack of uptake of the feedback and as a result the whole feedback process may be considered as ineffective.

According to the literature, few studies have attempted to examine the effects of the quality and features of the received peer feedback on students' uptake of peer feedback in the learning processes and outcomes (e.g., Misiejuk et al., 2021; Nelson & Schunn, 2009; Wu & Schunn, 2020; 2021). The literature provides little evidence on how features of received peer feedback can influence students' performance, particularly in the context of argumentative essay writing in online settings. This study was conducted to further explore and address these issues by answering the following research question:

What are the differences in the features of received peer feedback among successful, less successful, and unsuccessful students in the context of argumentative essay writing in online settings?

## Method

### Participants

In this study, 135 undergraduate students participated, however, only 101 students completed the module. About 69% of participants were female ( $N = 70$ ) and 31% of participants were male ( $N = 31$ ). To comply with ethical

considerations, participants were informed about the research setup of the module. They were assured that no data could be linked to any individual participant. Furthermore, ethical approval from the Social Sciences Ethics Committee at Wageningen University and Research was obtained for this study.

### **Procedure**

A module called “*Argumentative Essay Writing*” was designed and embedded in an online learning platform called Brightspace in the selected course. The module was followed for three consecutive weeks, and in each week, students performed one task. In week one, students were invited to write an argumentative essay on one of the three offered topics (task 1). In week two, students were requested to provide feedback based on the criteria embedded in the platform on two argumentative essays of their peers (task 2). In week three, students were asked to revise their essays based on the feedback sets they received from their peers (task 3).

### **Measurements**

#### *Quality of Students’ Argumentative Essay*

In this study, a coding scheme developed by Noroozi et al (2016) was used to analyze the quality of students’ argumentative essays. This coding scheme was developed using the elements of high-quality argumentative essay writing (e.g., Noroozi et al., 2016; Toulmin, 2003), including eight elements: (1) introduction on the topic; (2) taking a position on the topic; (3) arguments for the position; (4) justifications for the position; (5) arguments against the position; (6) justifications for the position; (7) response to counter-arguments; and (8) conclusion and implications. The coding scheme is scored from zero (the lowest quality level) to three (the highest quality level) for each element.

All the points obtained by students for these elements were summed up together and indicated the students’ overall scores for the quality of the written argumentative essay. Students’ argumentative essays were assessed in two steps: the original argumentative essay and the revised essay. Cohen’s kappa coefficient analysis was used to measure the inter-rater reliability between the coders, and the results showed that there is a reliable agreement between the coders (Kappa = 0.70,  $p < 0.001$ ).

#### *Quality of Students’ Received Peer Feedback*

The authors developed a coding scheme to assess the quality of students’ peer feedback based on a review of relevant recent studies (e.g., Nelson & Schunn, 2009; Patchan et al., 2016; Wu & Schunn, 2020). This coding scheme analyzes the features of peer feedback, which includes three elements: (1) affective, (2) cognitive (description, identification, and justification), and (3) constructive. The features of this coding scheme were scored from zero (poor quality) to two (good quality).

All the given points were summed up and represented the students’ overall score for the quality of their received



peer feedback. Since each student received two sets of feedback, the average score from the two sets of feedback was considered as the overall score for the quality of the received peer feedback. Similar to the argumentative essay analysis, the same two coders participated in the coding process for peer feedback analysis, and Cohen's kappa coefficient results for inter-rater reliability among coders were found to be significant ( $Kappa = 0.60, p < 0.001$ ).

## Analysis

In this study, we first controlled the effects of gender on the relationship between the independent grouping variable and the continuous dependent variables. Second, we used a percentile rank measurement to categorize students into three groups: Successful (students whose progress in argumentative essay writing from pre-test to post-test was higher than 67th percentile) ( $N = 34, 34\%$ ), less successful (students whose progress in argumentative essay writing from pre-test to post-test was between 33th to 67th percentile) ( $N = 23, 23\%$ ), and unsuccessful students (students whose progress in argumentative essay writing from pre-test to post-test was between less than 33th percentile) ( $N = 42, 42\%$ ).

Then, the MANCOVA test was conducted to compare the differences in the quality of received peer feedback features among the successful, less successful, and unsuccessful students. Since the sample sizes were unequal, we used the Tukey-Kramer test to determine the pairwise comparisons. In addition, the Levene test showed that the groups were homogeneous and the Kolmogorov-Smirnov test showed that the data were normally distributed ( $p > 0.05$ ). Also, Box's Test of equality of covariance matrices showed that the observed covariance matrices of the dependent variables are equal across groups (Box's  $M = 38.42, F(30, 18426.45) = 1.17, p = 0.23$ ).

## Results and Discussion

### **What are the differences in the features of received peer feedback among successful, less successful, and unsuccessful students in the context of argumentative essay writing in online settings?**

The results showed that unsuccessful, less successful, and successful students differed in terms of mean scores of their received peer feedback quality (Wilks'  $\Lambda = 0.82, F(10, 182) = 1.86, p < 0.05, \text{Partial } \eta^2 = 0.09$ ). This difference was mainly due to the affective and descriptive features of feedback. Unsuccessful students received more affective and descriptive feedback than successful students. Less successful students received more affective and descriptive peer feedback than successful students (see Table 1).

This study found that students' success in writing argumentative essays is significantly influenced by the type of feedback they receive. According to this study, students should be encouraged to provide more cognitive and constructive comments than affective feedback to perform well in writing argumentative essays. Students often tend to give more affective feedback, despite the efficiency of the cognitive and constructive comments. This

suggests that teachers should encourage students to give more complex forms of feedback. These findings are consistent with and supported by previous research indicating that the effectiveness of peer feedback depends on its type and features (see Carless et al., 2011; Taghizadeh Kerman et al., 2022; Wu & Schunn, 2020).

Table 1. Differences among Successful, Less Successful, and Unsuccessful Students in Terms of Mean Scores for Received Peer Feedback Quality

Variables	Group	Received peer feedback quality		Pairwise comparisons	Difference among unsuccessful, less successful, and successful statistics
		Mean	SD		
Affective	Unsuccessful	1.66	0.17	Successful< Unsuccessful * Successful< Less successful **	F (2, 95) = 4.27, p < 0.05*, Partial η <sup>2</sup> = 0.08
	Less successful	1.70	0.17		
	Successful	1.57	0.14		
	Total	1.64	0.17		
Cognitive Description	Unsuccessful	1.40	0.28	Successful< Unsuccessful * Successful< Less successful *	F (2, 95) = 3.91, p < 0.05*, Partial η <sup>2</sup> = 0.07
	Less successful	1.44	0.32		
	Successful	1.22	0.36		
	Total	1.35	0.33		
Identification	Unsuccessful	0.67	0.29		F (2, 95) = 0.33, p = 0.71
	Less successful	0.69	0.29		
	Successful	0.73	0.39		
	Total	0.69	0.32		
Justification	Unsuccessful	0.02	0.04		F (2, 95) = 2.75, p = 0.07
	Less successful	0.04	0.06		
	Successful	0.06	0.08		
	Total	0.04	0.06		
Constructive	Unsuccessful	0.78	0.36		F (2, 95) = 0.50, p = 0.60
	Less successful	0.76	0.31		
	Successful	0.84	0.41		
	Total	0.80	0.36		

(P<0.01)\*\*, (P<0.05)\*

Future research should compare the effects of the provided and received feedback elements on students' performance in writing argumentative essays. This can give insight into the roles that the assessor and assessee play in the feedback process and how it affects how well students perform in writing essays for higher education.

### Conclusion and Recommendations

This study adds to our understanding of the peer feedback process and performance of students and sheds light on the differences among successful, less successful, and unsuccessful students in their peer feedback performance for writing argumentative essays. This study highlights the importance of high-quality feedback in the success of writing argumentative essays. Based on this research, it is necessary for students to be sufficiently trained and encouraged regarding the elements of high-quality feedback and how to provide it, especially providing cognitive and constructive feedback.

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## The Effects of Instant Messages on Distance Learners' Perception of Transactional Distance and Sense of Community

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**Abstract:** In this research, the effects of consistently delivering instant messages to individuals attending distance education on their perceptions of transactional distance and sense of community were examined. Messages are planned to be recollective and informative to the students. Students who volunteered to take part in the study were university students from various and sundry departments. Distance learners (N=99) are distributed to four distinct treatment groups in random manner while keeping the number of female and male students were approximately same within groups. Instant messages were designed to have utmost minimal impact on neither classroom dynamics nor the content and structure of the lessons. Each group received these messages on their smartphone. WhatsApp groups were formed and scheduled messages were sent regularly. When pretest and post test scores of transactional distance perception and community sense analyzed, result indicate that the students who receive these messages tend to have lower scores of transactional distance perception and higher scores of community sense.

**Keywords:** Distance education, E-learning, Online education, Transactional distance

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### Introduction

Distance education, also known as online learning or e-learning, has become a popular mode of education in recent years. This mode of education offers flexibility and convenience for students, as they can access course materials and participate in class discussions from anywhere with an internet connection. However, distance education can also present challenges, such as the potential for communication breakdowns and misunderstandings between students and instructors.

One concept that has been explored in the literature is the idea of transactional distance, which refers to the

psychological and emotional distance between students and instructors in a distance education setting. According to Moore (1973), transactional distance refers to the "gap between the learner and the teacher" in a distance education setting (p. 7). This gap can be caused by a variety of factors, such as differences in communication styles, lack of nonverbal cues, and lack of face-to-face interaction. Transactional distance can also be influenced by the learner's prior knowledge and experiences, as well as their individual learning style and preferences (Moore, 1989).

This separation can create barriers to learning, and can lead to feelings of isolation and disconnection among students. To overcome this challenge, effective distance education programs need to address transactional distance and foster interaction and engagement between students and instructors.

The concept of sense of community was first introduced by McMillan and Chavis (1986), who defined it as "a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together" (p. 9). Since then, many researchers have expanded upon this definition and have identified various dimensions of sense of community, including affective, behavioral, and cognitive components.

The concept of sense of community has been extensively studied in the context of physical communities, but has only recently been explored in the context of online communities. Instant messaging (IM) is a popular form of online communication, which has been found to be associated with a sense of community among users.

One of the key factors that contribute to a sense of community in IM is the presence of shared values, beliefs, and interests among users. For example, in a study of IM use among university students, participants reported that they felt a sense of community with other users who shared their interests and values (Kraut et al., 1998). Additionally, the presence of social norms and expectations that guide behavior in IM can also contribute to a sense of community, as these norms and expectations provide a sense of belonging and identity for users (Walther, 1996).

Another factor that contributes to a sense of community in IM is the presence of social support among users. IM allows for real-time communication, which can facilitate the exchange of emotional and instrumental support among users (Kraut et al., 1998). This can be particularly helpful in times of crisis or stress, as IM can provide a sense of connection and support for users who may not have access to these resources in their physical communities.

Transactional distance can have negative effects on student engagement and motivation, leading to lower levels of learning and achievement. One strategy that has been suggested for reducing transactional distance in distance education is the use of instant messaging (IM).

Instant messaging is a form of synchronous online communication that allows users to exchange messages in



real-time. It has become a popular method of communication in both personal and professional contexts, and has also been used in education to facilitate interaction and collaboration among learners and instructors.

However, the use of IM in distance education also has some potential drawbacks. For example, IM can be disruptive to the learning process if not used properly, and can lead to a lack of focus and concentration among learners. In addition, IM can also create challenges for instructors, such as the need to respond to a large volume of messages in a timely manner and the potential for misunderstandings or miscommunications.

To maximize the benefits and minimize the drawbacks of using IM in distance education, it is important for instructors to establish clear guidelines and expectations for its use. This can include setting designated times for IM communication, providing prompt and detailed feedback on questions and concerns, and using IM in conjunction with other forms of communication, such as email and discussion forums.

## **Method**

### **Design**

A survey was administered at the beginning and end of the distance education course to all groups. The independent subdimensions of the study included four types of periodic informative instant messages relating to autonomy, structure, dialogue, and sense of community, with various orders. The dependent subdimensions were perceived transactional distance and sense of community. All students received standard course-related instant messages via email, but the experimental groups also received additional instant messages via a popular messaging app installed on their smartphones.

### **Setting**

The study took place in which undergraduate and higher education vocational students at a private university in Istanbul, Turkey were required to take a number of online courses each semester. These courses included foreign language, Turkish language, and information and communication technology. The classes were held through web conference on weeknights, with each lesson lasting an hour except for Turkish language lessons which lasted 80 minutes with a 10-minute break in the middle. The semester consisted of 14 weeks and 14 online classes were held during this time

In addition to the online classes, students were enrolled in the university's distance education system, which was essentially a web-based learning management system with additional features. The instructor had the option to post materials weekly, but this was at their discretion and they could modify their choice if students made suggestions. The instructor also had the option to upload other materials, such as presentations used in class. There was interactive content available for each course, including midterm exams given in the fifth and tenth weeks of the semester. Each midterm contributed 4% to the overall course grade and consisted of 20 multiple-choice questions that needed to be answered within 30 minutes.

Students were also required to turn in an assignment each semester. They had four weeks to complete the homework after the instructor selected the subject and published it to the system. This assignment contributed 28% to their overall course grade. At the end of the semester, final exams were administered in person and typically consisted of 25 to 40 multiple-choice questions. These exams contributed 60% to a student's overall course grade. Students could contact the distance education office via phone, email, or in person, and they could also message their instructors using the learning management system.

### **Participants and Sampling**

The population of this study consisted of undergraduate and higher education vocational students. A convenience sampling method was used to select participants, who were first- and second-year undergraduate students enrolled in various academic departments and programs at the institution. The age range of the participants was 18 to 21. A total of 160 distance learners were contacted, and 99 of them agreed to participate. The experimental groups each included 23, 20, 17, and 21 participants, while the control group had 18 participants. The number of male and female participants was taken into account in the process of forming the groups.

Group 1 received messages only relating to the learner's autonomy and the structure's subdimensions, while group 2 received messages regarding the subdimensions of structure, dialogue, and sense of community. Group 3 received messages only about the subdimensions of dialogue, learner autonomy, and sense of community, and group 4 received messages about the subdimensions of structure, dialogue, learner autonomy, and sense of community.

### **Data Collection Instruments and their Administration to Students**

In this study, the perception of transactional distance scale (Horzum, 2011) and the sense of community scale in online distance education environments (Ilgaz & Aşkar, 2009) were used in this study.

Students completed a survey measuring their perception of transactional distance before their final exam at the end of the autumn semester. Most students completed the questionnaire using paper and pencil and finished it in less than 20 minutes. Some students needed to complete the survey electronically, so it was converted to Google Forms and a link was sent to their email addresses through the distance education department's learning management system. The instructions for the survey were included at the beginning of the electronic version. The survey was due in two weeks, and the same process was used at the end of the spring semester.

### **Results**

The researchers calculated the scores for the different subscales on the transactional distance scale, and then checked to see if the data was normally distributed. If the data was normally distributed, they used a paired

samples t-test to see if there were any significant effects of using periodic informative instant messages. If the data was not normally distributed, they used the Wilcoxon signed ranks test instead.

For the sense of community scale in online distance education environments, there was only posttest data available. The researchers checked the distribution of this data and found that it was not normally distributed. Therefore, they used the Kruskal-Wallis H Test to determine whether there were any significant differences between the means of the different groups' scores.

After above-mentioned procedures have been conducted, results are aggregated in a single table for convenience and ease of reading (see Table 1). The students in the S+LA group had significantly different scores for their perception of the learner autonomy on the pretest and posttest. The participants in S+D+SoC group had significantly different scores for their perception of dialogue, structure, autonomy and community sense. Also the distance learners in S+D+LA+SoC group had significantly different scores for their perception of dialogue and sense of community.

Table 1. Summary Table for Dialogue, Structure and Autonomy Subdimensions

Treatment	Dialogue	Structure		Autonomy	
		Structure Flexibility	Content Organization	Control	Learner Autonomy
S+LA	* -	* -	-	* -	+
S+D+SoC	+	+	+	+	-
D+LA+Soc	-	-	-	-	-
S+D+LA+SoC	* +	-	-	-	-
Control	-	-	-	-	-

*	Wilcoxon Signed Ranks Test	+	Significant Difference
	Paired Samples t Test	-	No Significant Difference

## Discussion

The study found that when participants received instant messages related to structure and learner autonomy, their scores for perceived learner autonomy decreased. However, the messages did not affect their perception of structure. This aligns with previous research on the topic (Bere, 2013; Smit, 2012).

Additionally, when distance learners were sent instant messages about dialogue, structure, and sense of community, their scores for these subdimensions increased. This suggests that the messages may have a positive

impact on these factors. These findings confirm relevant literature as well (Doering, Lewis, Veletsianos, & Nichols-Besel 2008, Wang, Woo, & Quek, 2012).

According to the findings, when distance learners are sent instant messages about the all subdimensions together, their perceptions of dialogue and sense of community have improved. These findings confirm relevant literature as well (Calvo, Arbiol & Iglesias, 2014).

However, sending messages regarding all these subdimensions except for structure at once had no effect on perception scores, which conflicts with existing literature. It is recommended that future studies test the effects of instant messages on these subdimensions individually.

All in all, study finds partial evidence on sending periodic informative instant messages to distance education students about structure, dialogue, and sense of community have increased their perception of structure and dialogue, while decreasing their perception of transactional distance and increasing their perception of sense of community. These findings align with previous research on the topic.

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## Analyzing the Correlations between Prospective Teacher's Competence in Designing Digital Materials and their Acceptance and Use of Technology

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**Abstract:** The aim of this study was to investigate the relationship between preservice teachers' digital material design competencies and their use and acceptance of technology. The study was designed based on the Unified Theory of Acceptance and Use of Technology developed by Venkatesh et. al. in 2003. Sample of the study consists of 199 pre-service teachers attending to the faculty of education in a state university in Ankara/Turkey. As data collection tools, Digital Material Design Competencies Scale developed by Göçen Kabaran ve Uşun, (2021) and Preservice Teachers' Acceptance and Use of Technology Scale developed by Kabakçı-Yurdakul, Ursavaş ve Becit-İşçitürk (2014) were used. As a result of the analysis of the data collected in the study, it was found out that; preservice teachers' digital material design competencies are at a high level. When preservice teachers' Acceptance and Use of Technology level is investigated, it was observed that the variables of performance expectancy, effort expectancy, social impact, facilitative situations, self-efficacy and attitudes towards technology use were significant predictors of pre-service teachers' behavioral intention for technology use. According to Pearson Correlation analysis, there is a statistically significant positive, linear and strong relationship between preservice teachers' digital material design competencies and their acceptance and use of technology ( $r=.914$ ,  $p=.000$ ).

**Keywords:** Use and Acceptance of Technology, Unified Theory of Acceptance and Use of Technology, Digital Material Design Competencies, Preservice Teacher

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### Introduction

The continuous development of information and communication technologies (ICT) and their entrance into human life in several different ways also bring about many changes in social life. The changes require us to use technology in numerous areas in our life. One of the areas is education, which is in one-to-one interaction with

human life. Due to the fact that a goal of education is to raise individuals in accordance with the needs of the society, educational structure should also keep pace with such technological changes (Akkoyunlu, 1995: 106).

Teaching processes in which technology is included generally emerge as the use of digital teaching materials. Today's students are described as "digital students" and the description is used to mean that those students adopt technology and use it so as to discover, inquire and improve their personal learning and to contribute to others' knowledge (Smaldino et al. 2015). It is claimed that today's technology literate students' interest in technology will also facilitate them to have interest in knowledge presented through digital teaching materials and that the learning experiences designed with such materials will help them to develop positive attitudes towards learning (Yavuz-Konokman, 2019). In parallel to the continuous use of technology, the need for instruction and curriculum approaches which support bringing students and technology together arises. Technologies which keep developing enable teachers to create appropriate platforms on the internet and to generate teaching materials specific to them and to the class (Birişçi, et. al, 2018).

Prospective teachers who have completed their training at university are expected today to have the knowledge and self-confidence which enable them to use the computer technology in the classroom in the best way possible (Meral et al. 2001). It may be said that it is not enough for teachers in today's teaching processes to have only technological knowledge and that they are expected to synthesise technology with pedagogical knowledge and content knowledge as professional teaching knowledge. Teachers primarily should set their goals in including technology in learning environments. "For instance, questions to ponder could include, is the intent to teach technology skills or content knowledge? Is the ultimate goal of implementing technology systems to infuse technology into current teaching practices? Is the goal to promote student-centered learning, effectiveness and student success?" (Wedlock and Trahan, 2019). On the other hand, people react to novelties which they are not informed of or which they think they cannot use, and thus they resist changes (Çelik and Bindak, 2003: 29). The question of what might be the factors causing acceptance or refusal of technology has gained more importance through this process (Marangunić and Granić, 2015). Several models and theories have been developed so far in order to predict whether not individuals can use information and communication technologies (Teo and Noyes, 2014). The models in general aim to find what internal or external factors influence the intention to use- the basic component of using technology- and then to explain behaviours of adopting technology.

Technology acceptance model (TAM) is the model which was developed by Davis (1989) so as to determine individuals' behaviours of technology use. The model explains individuals' acceptance of technology through the variables of perceived benefits (PB) and ease of use (EU). PB is individuals' perception of whether they can increase their performance in using technology. EU, on the other hand, is individuals' perception of whether the technology they use is easy to use or not (Davis, 1989). The TAM is the model which has been widely used and approved in the area of ICT adoption research for different contexts and environments.

Technology acceptance model 2(TAM2) was created by adding new variables to TAM which was developed by Davis (1989). The new variables which influenced perceived benefits and intention to use were added to TAM by

Venkatesh and Davis (2000). Subjective norm, image, convenience to work, output quality and result demonstrability were the external variables which affected perceived benefits. Experience and volunteering were the regulatory variables which affected both the perceived benefits and the intention to use. Technology acceptance model 3 (TAM3) is the model developed by Venkatesh and Bala (2008) and known as the final shape of TAM. It contains the binding factors of perceived ease of use added to TAM2. The model examines the effects of other external variables on perceived ease of use (EU) and perceived benefits (PB)- the two significant belief internal variables.

While research studies conducted to develop TAM and TAM2 are concerned with identifying the correlations between variables, studies on TAM2 focus on generating more tangible and applicable outputs. Venkatesh and Bala (2008) argue that manager support before and after using a new technology is a significant component in individuals' process of technology acceptance. They emphasise that one of the tasks of managers is to develop applications which match individuals' perceptions of new technology with their job requirements and which encourage them to use the new technology (Venkatesh & Bala, 2008).

This study uses Unified theory of acceptance and use of technology (UTAUT) to explain prospective teachers' state in terms of technology acceptance and use. The UTAUT was developed by Venkatesh et al. (2003), and- as different from other theories- it has four external variables referred to as performance expectancy (PE), effort expectancy (EE), social influence (SI) and facilitating condition (FC). PE is the technology using individuals' degree of expectations that increase in performance will be made possible in their work (Venkatesh et al. 2003). The moderator variables on the effects of PE on technology acceptance are gender and age. EE is the degree of conveniences that technology use will bring (Venkatesh et al. 2003).

Regulatory variables are gender, age and experience (Venkatesh et al. 2000). SI is the degree to which other people around consider the use of technology important; and the moderator variables are gender, age, volunteering and experience (Venkatesh et al. 2003). Facilitating condition (FC) can be defined as the availability of organisational or technical infrastructure which will be necessary during technology use (Venkatesh et al. 2003). The moderator variables described for FC are age and experience (Venkatesh et al. 2000). Behavioural intention in UTAUT is considered as a critical indicator of technology use (Venkatesh et al. 2003). Figure 1 shows the correlations between the components of the model and the variables.

As clear from Figure 1; performance expectancy, effort expectancy and social influence have direct effects on the behavioural intention to use technology whereas facilitation conditions and behavioural intention to use technology have direct effects on the use of technology. The variables of self-efficacy and attitudes towards use- which are available in the theory of planned behaviour- are not present in the unified model of technology acceptance and use as the direct determiners of behavioural intention. However, due to the studies arguing that these two variables affect behavioural intention available in the literature, they each were considered as factors by the developers of the scale used in the study.



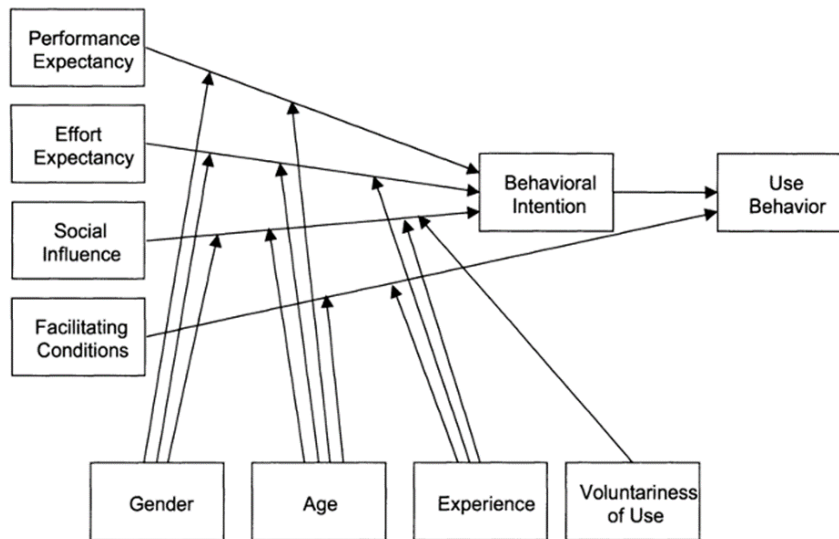


Figure 1. UTAUT (Venkatesh et al. 2003)

On examining the studies concerning the use of the technology acceptance model in education, it was found that Uğur (2017) analysed quantitatively educational faculty lecturers' levels of using the Web 2.0 tools and their purposes in using them, the problems they encountered and the factors influential in their use of them. The researcher used "web 2.0 tools use scale" developed on the basis of combined model of technology acceptance and use to collect the data and "web 2.0 tools use survey" to find the demographic information, levels of web 2.0 skills, goals in using web 2.0 tools and the problems encountered in using them. As a result, the researcher found that the most commonly used tools were videos, documents/storage, presentations, social networks, surveys and wiki. It was found in the study that such variables as gender, age, title and seniority did not have effects on the number of web 2.0 tools. The findings also indicated that lecturers used web 2.0 tools mostly in presenting the content, assignments, audio-visual enrichment, projects, communication, promoting cooperation and professional development. It was also found that skill levels in web 2.0 tools and age groups might have effects on performance expectancy, effort expectancy, facilitating conditions, self-efficacy, attitudes, anxiety and intention. Yıldız Durak (2019) analysed prospective teachers' use of online social networks for educational purposes on the basis of the unified theory of acceptance and use of technology. In consequence the study found that the use of online social networks for educational purposes was affected respectively by social effect, performance expectation and effort expectation, and behavioural intention of using these technologies. Diri and Açıkgül (2021) identified high school students' levels of mobile technology acceptance in learning mathematics on the basis of the unified theory of technology acceptance model 2. The researchers analysed students' levels of acceptance according to gender, types of school, age, having access to the internet, experience in using mobile technologies, competence in using mobile technologies, experience in using mobile technologies in learning mathematics, frequency in using mobile technologies in learning mathematics and levels of perceptions of self-efficacy. As a result, they found the students' levels of acceptance to be medium. They also found that the students' levels of acceptance differed significantly according to their access to the internet, their experience and competence in using mobile technologies, their frequency of and experience in using mobile technologies in

learning mathematics. Besides, their levels of perceptions of self-efficacy explained 5.7% of the variance in mobile technology acceptance.

Teo et al. (2012) evaluated the behavioral intentions of prospective teachers in Turkey to use computers in the future within the framework of TAM. It became apparent as a result of SEM which was done for data analysis that perceived usefulness, attitudes towards computer use and self-efficacy in computers had direct effects on prospective teachers' intention to use technology; that they had indirect effects on their perceived ease of use, technological complexity and facilitating conditions and that perceived benefits were the strongest determiner of behavioural intention. In the light of these results, it was concluded that the TAM model was effective in explaining prospective teachers' acceptance of technology. Libenberg, et al. (2018) analysed the factors influencing university students' acceptance of ICT use on the basis of the unified theory of acceptance and use of technology (UTAUT) model. As a result, it was found that PEx, FC and EfEx showed high practically significant relationships with BI. SE and ATT as mediators of the model are confirmed, however gender as moderator did not reflect the original findings of UTAUT. Hoi (2020), in a study which analysed 293 university students' use of mobile instruments in language education according to the unified theory of acceptance and use of technology model, found that attitudes and performance expectancy were influential in students' acceptance and use of technology.

### **The Significance and Purpose of the Study**

Despite the fact that today's prospective teachers use digital media and information and communication technologies commonly, the same may not true for using instructional technologies. Use of technology in teaching environments can be disrupted if prospective teachers- who are learners and also the future teachers- consider technology only as an element of their daily. Instructional technologies should be adopted by students and teachers so that they can be fully used (Buzzard et al. 2011). It would be useful to investigate prospective teachers' acceptance of technology so as to make predictions on their use of technology in their classes in the future because teachers' skills, knowledge and beliefs are shaped during pre-service teacher training (Gürer, 2021). When the benefits that digital materials provide for students and the digital transformations occurring in the area of education are taken into consideration, it can be said that teachers' efficacy in designing the digital materials they are going to use in their classes is important. Hence, this study investigates whether or not there are any significant correlations between prospective teachers' competence in designing digital materials and their acceptance and use of technology.

The study conducted for this purpose uses descriptive survey model. Studies which enable collection of data to identify the desired features of a group are called studies of survey (Büyükoztürk et al. 2015: 14). The participants of the study were educated at a state university in Turkey/Ankara, from the faculty of education in German (3%), Physical Education (5.5%), CEIT (3.5%), Biology (2%), Science (10.1%), Physics (1.5%), French (1%), English (4.5%), Chemistry (1%), Elementary Mathematics (6%), Preschool (31.7%), Grade (9%), Turkish (11.6%), Secondary Education Mathematics (2.5%), PDR (2.5%), and Special Education (4.5%) departments,

who studied at different grade levels, successfully completed the Instructional Technology course 199 teacher candidates. When the distribution of the group by gender is examined, it is seen that 154 of the participants are female and 45 are male. The research problems were formulated as in the following:

- 1) How competent are prospective teachers in designing digital materials?
- 2) At what level are prospective teachers in terms of acceptance and use of technology?
- 3) Are there any correlations between prospective teachers' competence in designing digital materials and their acceptance and use of technology?

## Method

### Data Collection Tools

#### *Competence in Designing Digital Materials Scale*

The competence in designing digital materials scale (CDDMS), which was developed by Göçen Kabaran and Uşun (2021), is in 5-pointed Likert type and it contains 31 items. The scale has 4 sub-factors labelled as "competence in designing and developing" (CDD), "technical competence" (TC), "techno pedagogical competence" (TPC) and "competence in application and evaluation" (CAE). It can be used to determine competence of teachers of differing branches and of differing grade levels in designing digital materials. Cronbach's Alpha for the whole scale was found as .98. In addition to that, the figure was .97 for the factor of competence in designing and developing, .94 for the factor of technical competence, .96 for the factor of techno pedagogical competence and .95 for the factor of competence in application and evaluation.

#### *Prospective Teachers' Acceptance and Use of Technology Scale (UTAUT-PST)*

The scale- which was developed by Kabakçı-Yurdakul, et al. (2014)- consists of 23 items and 7 factors. The factors were labelled as "performance expectancy", "effort expectancy", "facilitating conditions", "social influence", "self-efficacy", "attitudes towards use" and "behavioural intention". The scale items are in 5-pointed Likert type and were formulated as "I absolutely agree", "I agree", "I am indecisive", "I disagree" and "I absolutely disagree". Cronbach Alpha coefficient for the whole scale was found as .95. It was found to range between .85 and .92 for the sub-factors. It was also confirmed through confirmatory factor analysis that the scale had 7-factor structure. All of the items in the scale are positive statements and the scale does not have any reversely coded items. According to the 4 factors of the scale, the distribution of the items is as in the following: Performance expectancy: items 7, 10, 20, 21 and 23; effort expectancy: items 3 and 4; facilitating conditions: items 1, 11 and 19; social influence: items 5,8 and 13; self-efficacy: items 6,12 and 14; attitudes towards use: items 2, 9 and 17 and behavioural intention: items 15, 16, 18 and 22. In coding in section 2 of the scale, 1 point was assigned to "I disagree", 2 points to "I agree partially", 3 points to "I am indecisive", 4 points to "I agree" and 5 points to "I absolutely agree". The interpretations for the findings were based on the calculations made through the arithmetic average. The minimum score receivable from the scale was 23 whereas the maximum score receivable was 115. Thus, the difference between the maximum score and the minimum score was 82.

## Findings

This study sought answers to

- 1) How competent are prospective teachers in designing digital materials?
- 2) At what level are prospective teachers in terms of acceptance and use of technology?
- 3) Are there any correlations between prospective teachers' competence in designing digital materials and their acceptance and use of technology?

Table 1 shows the results of descriptive analysis done to reveal prospective teachers' competence in designing digital materials.

Table 1. Prospective Teachers' Levels of Designing Digital Materials

Factors of the Scale	$\bar{x}$	SS	Level
Competence in Designing and Developing	3.7063	.58474	High
Technical Competence	3.7582	.63677	High
Techno Pedagogical Competence	4.0515	.62413	High
Competence in Application and Evaluation	4.0578	.62035	High
CDDMS	3.8768	.54306	High

An examination of the competence levels according to the average scores the participants received from the scale and from the factors of the scale- which are shown in Table 1 demonstrates that prospective teachers have high level of competence in the whole scale and in all the sub-factors of the scale. Descriptive statistics and multiple linear regression were used in relation to research problem two. The results of the analyses are shown in Tables 2 and 3.

Table 2. Prospective Teachers' Levels of Acceptance and Use of Technology

Sub-Factors	$\bar{x}$	SS	Düzey
Facilitating Conditions	3,7437	,84066	I am indecisive - I agree
Performance Expectancy	4,2073	,59623	I agree
Effort Expectancy	4,2236	,67157	I agree
Social Influence	3,6533	1,09475	I am indecisive - I agree

Sub-Factors	$\bar{x}$	SS	Düzey
Self-Efficacy	3,7521	,77123	I am indecisive - I agree
Attitudes Towards Use	4,0955	,65933	I agree
Behavioural Intentions	4,0138	,70541	I agree
UTAUT-PST	3,9574	,84066	I agree

When the descriptive statistics in Table 2 are examined, it is seen that the pre-service teachers tend to give the answer "I agree" to the items in the UTAUT-PST scale.

Table 3. The Results of Multiple Regression Done for Prospective Teachers' Intentions to Use ICT

	B	Sh.	$\beta$	t	p	R	R <sup>2</sup>	F (6,199)	p
Facilitating Conditions	.130	.003	.209	46.332	.000				
Performance Expectancy	.190	.006	.216	31.205	.000				
Effort Expectancy	.086	.004	.110	19.231	.000				
Social Influence	.129	.002	.269	60.910	.000	.998	.997	8299.460	.000
Self-Efficacy	.136	.003	.199	39.258	.000				
Attitudes Towards Use	.160	.006	.200	26.516	.000				
Behavioural Intentions	.166	.005	.223	32.042	.000				

It is evident from Table 3 that performance expectancy, effort expectancy, social influence, facilitating conditions, self-efficacy and attitudes towards use are all effective in prospective teachers' behavioural intentions to use technology. According to the multiple linear regression, all of the variables are the significant predictors of acceptance and use of technology. ( $F(6,199) = 8299.460, p < .05$ ). The six variables altogether explain 99% of the variance in the acceptance and use of technology.

Pearson's correlation test was done for the third and the last research problems. The results of the Pearson's correlation test-which was done to determine the correlations between prospective teachers' competence in developing digital materials and their acceptance and use of technology are shown in Table 4. According to the results of Pearson's correlation test, high level positive and linear correlations were found between the

participants' competence in developing digital materials and their acceptance and use of technology ( $r=.914$ ,  $p=.000$ ).

Table 4. The Correlations between Prospective Teachers' Competence in Developing Digital Materials and Their Acceptance and Use of Technology

Scale	N	r	p
Competence in Developing Digital Materials	199	.914	.000
Acceptance and Use of Technology			

## Conclusion and Discussion

This paper, which investigated whether or not there were any significant correlations between prospective teachers' competence in designing digital materials and their acceptance and use of technology, primarily analysed the participants' competence in designing digital materials. They were found to have high levels of competence in all of the factors of technical competence, techno pedagogical competence and competence in application and evaluation. The basic reason for the result might be that all the participants had taken the Instructional Technologies and Materials Development course and passed the exams for the course and that they had prepared lesson plans containing several traditional and digital materials within the scope of the course.

An examination of prospective teachers' acceptance and use of technology according to such variables as performance expectancy, effort expectancy, social influence, facilitating conditions, self-efficacy and attitudes towards use demonstrated that the great majority of the participants had expectations that their performance in classes would increase, their effectiveness in teaching their classes would increase, their process of teaching the classes would be facilitated and that the case would be important for them, for their colleagues and for their parents through the use of technology. According to the results of multiple linear regression, all of the variables were the significant predictors of the acceptance and use of technology ( $F(6,199) = 8299.460$ ,  $p<.05$ ). The six variables altogether explained 99% of the variance in the acceptance and use of technology. In a similar vein, Wang et al. (2009) also aimed to determine the variables influential in the acceptance and use of mobile internet technologies. According to the results obtained in the study, the variables of the unified theory of the acceptance and use of technology model explained behavioural intention to use mobile internet technologies by 65%. Aliano et al. (2019), in a study which investigated the use of smart phones in education according to the unified theory of acceptance of technology model with the participation of 370 university students, found that all the factors were the significant predictors of the acceptance and use of technology. Persada et al. (2019) investigated Z-Generation students' inclinations towards digital learning by using the unified theory of acceptance and use of technology model. The results indicated that the UTAUT model explained 33% of the students' inclinations towards digital learning.

Another part of the research is to determine the relationship between pre-service teachers' digital material design

competencies and their acceptance and use of technology. In this study, it was concluded that pre-service teachers' digital material design competencies were positively and highly correlated with technology acceptance and use. According to this finding, technology acceptance and usage status has an impact on the ability to design digital materials. It is possible to say that pre-service teachers who internalize technology and accept to use it professionally consider themselves competent in designing digital materials.

## Recommendations

Teachers gain their occupational skills, knowledge and beliefs during pre-service teacher training. They will feel comfortable if they learn during the pre-service period how to use instructional technologies in their classes effectively and how to integrate digital materials into their classes effectively. Thus, they will not have difficulty in integrating the new technologies into their classes, they will not have prejudices against such technologies and will have high levels of acceptance of them in their professional life. Therefore, courses and applications through which prospective teachers will experience new instructional technologies should be included in teacher training curricula.

The studies concerning prospective teachers' acceptance of technologies prioritise the idea that determining prospective teachers' behavioural intentions to use technology helps to make predictions about the use of technology in classrooms in the future and that it also helps teacher trainers and policy followers to design courses and teacher training curricula (Gürer, 2021). Therefore, the number of studies which investigate prospective teachers' levels of technology acceptance and variables influential in the issue should be increased.

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## Safeguarding Accountability Under Austerity of the COVID-19 Pandemic (The Diagonal Accountability)

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**Abstract:** This article will assess the impact of austerity measures on government accountability and finish with a discussion on diagonal accountability supplementary to horizontal and vertical accountability. Methods in research with literature review. Providing an adequate monitoring budget is mandatory as stipulated by the Indonesian Government Regulation Number 72 in 2019 on Local Government Institution, which is followed by the Regulation of the Minister of Home Affairs Number 64 in 2020. Government accountability is not excluded from the list of aspects affected by the COVID-19 pandemic. The Indonesian government's accountability suffers from austerity and cut-back management subject to the current pandemic. The traditional horizontal and vertical accountability fall short in satisfying the need for adequate public sector accountability, especially under the unprecedented pandemic causing economic turbulence and health deterioration. Thus, accountability should call for diagonal accountability, enforcing citizen participation support to the already established horizontal and vertical accountability. However, diagonal accountability must be coupled with a conducive environment with several prerequisites to impact the enhancement of government institutions' accountability positively.

**Keywords:** Indonesian Government, National Regulation, Local Governance

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## Introduction

People around the globe are currently living in an unprecedented environment after the COVID-19 pandemic struck in late 2019. Many aspects of life are affected, including public institution governance which forces government institutions to undergo massive and rapid adjustments to maintain the desired level of performance. In response to the pandemic, the Indonesian government enacted the so-called “new normal” that in part accentuates the interactions between public servants in and off office. Furthermore, the central government of Indonesia decided to refocus various budgets and local governments have to comply and adjust their program to tackle the adverse impact of the COVID-19 pandemic. As such, the initial performance targets of government institutions needed to be restructured and readapted subject to budget availabilities. The impact of the new normal and the budget refocusing on the level of accountability in the public sector is instrumental. Internal auditors were hindered from commencing direct supervision due to the physical distancing norm and travel curfews taking place during the pandemic. Moreover, the budget cut-back has been unfavorable to the central and local governments' monitoring and supervision activities. The "new normal" coupled with the unfavorable financial support for monitoring and supervision activities leads to a presumably decreasing accountability in public sectors.

In this context, this article assesses the state of government accountability subject to austerity measures, cut-back management, physical distancing, and new-normal life and work culture in Indonesian government institutions under the COVID-19 pandemic and proposes possible accountability arrangements to address current shortcomings. As such, proper measures are needed to keep the deterioration of accountability to a minimum with more civil society direct involvement might serve as a plausible interception supplementary to the vertical accountability in tandem with the already established horizontal accountability mechanism between government institutions, which in this discussion is termed as “diagonal accountability”. This article will proceed with a literature review relevant to the discussion and will continue to assess the impact of austerity measures on government accountability and finish with a discussion on diagonal accountability supplementary to horizontal and vertical accountability.

## Literature Review

The discourse on accountability has been central in public sector governance (Bovens, 2007a; Bracci et al., 2015; Ferry & Murphy, 2018; Hood, 2010; Michels & Meijer, 2008; Mulgan, 2000). Accountability has been loosely defined but shared as a recommendable quality or a must-have of officials, public organizations, and agencies (Dubnick, 2007). The need for accountability is evident, and it could only be present when a government provides high-quality but low-cost services and delivered them considerately (O’Connell, 2005). In relevance to authority, Considine (2002, p. 22) sees accountability as a flexible capability to navigate and address problems with inherent power to gain the most efficient and effective outcomes. Accountability, in general terms, takes the form of either a virtue or a mechanism (Bovens, 2007a, 2010). Bovens (2010) depicts a transatlantic division in

the debate of accountability as a virtue or a normative rule, predominantly in the US, while on the other side (the UK, Australia, and Europe), it is utilized as a social mechanism that holds actors accountable for their actions. Where accountability answers such notions as "accountable officials, accountable public management, and accountable behavior", it is seen as a virtue (O'Connell, 2005). However, accountability as a virtue is difficult to substantiate as a consequence of the non-existence of common measures of such behavior. Bovens (2010) examples this argument with the difference in the virtue standard between politicians and civil servants in European parliamentary systems. Bovens (2010, p. 949) states that "the former is supposed to be responsive to parliament, the media, and a variety of stakeholders, whereas the latter are first and foremost expected to be loyal to their political principals and to refrain from public appearances. However, these standards have changed over time and often vary according to political perspective and affiliation."

On the other side, where debates put it as a mechanism or a system, accountability is a relational dimension between agents and principals or between actors and forums. Forums or principals, in this sense, can be a person such as a supervisor or minister or an institution such as parliament or a courthouse. In contrast, the counterpart can be an individual or an organization. The formal accountability relationship between actors in an organization, both public and private, is often referred to as passive accountability. One actor is held responsible for his acts toward other actors or forums and may face the consequences for his conduct (Bovens, 2007a; Bracci et al., 2015; Ferry & Murphy, 2018; Wang & Zhou, 2016).

Another concept significant to the discussion of this article is austerity. Austerity debate dates back to the end of the '70s to the early '80s when scholars established the school of decline and cut-back management (Bracci et al. 2015, p. 879). Mark Blyth, in his book "Austerity-the History of a Dangerous Idea", defines austerity as "a form of voluntary deflation in which the economy adjusts through the reduction of wages, prices, and public spending to restore competitiveness" (Blyth 2013, p.2). Additionally, Anderson & Minneman (2014) state, "the term austerity has been used to refer to a wide range of deficit reduction policies, ranging from tax increases on the wealthy during economic booms to significant cuts to social welfare programs during recessions." Johansson & Siverbo (2014) argue that "budget deviation" is a common instrument in the public sector to maintain organizational performance and maximize overall welfare relative to financial uniqueness. In addition, New Public Management (NPM) practices encourage the value for money and efficiency of public sectors (Christensen & Lægred, 2007; Lane, 2000) and have been instrumental in response to austerity shocks. To this end, austerity has a complimentary dichotomy as a condition and conditioning. Nonetheless, for this discussion, austerity will be portrayed as an approach to balancing the nation's fiscal and monetary subject to economic turbulence from any cause with cutting management and program refocusing as instruments.

Important for this discussion, moreover, is the concept of diagonal accountability. Diagonal accountability refers to the combination of horizontal accountability and vertical accountability. In the public domain, vertical accountability is an exercise of citizens to use their electoral votes or exert the power of their civil society organizations to check the service delivery of government (Goetz & Jenkins 2001, p. 364). In comparison, horizontal accountability is defined as a relationship between "peers, equals, stakeholders or concern outside the

hierarchical relationship between the central government and executive agency” (Schillemans 2008, p. 176) and is normally carried out by one arm of the government to others (Goetz & Jenkins 2001, p. 364). However, the two forms of accountability are short of satisfying the need for accountability in civil society, where their confidence in such approaches is low (Goetz & Jenkins, 2001). Furthermore, monolithic accountability, where one person supervises the whole action, is contested due to potential abuse of power, and dispersed accountability across different agents is preferable (Mulgan, 2003), giving an avenue to the rise of hybrid accountability.

## Result

The current COVID-19 pandemic is an unprecedented occurrence affecting elements of life, including political and governance dimensions of nations around the globe. Many countries are forced to perform necessary measures to tackle the spread of the COVID-19 virus. However, such efforts need to scrutinize trade-offs between each nation's health and economic aspects. Pressures are high as to which proxies are chosen by the government, including the government of Indonesia, to produce the most rationale and acceptable intervention in restabilizing the deteriorating economic activities along with the physical and mental health of the society. Mitigating the adverse impact of the COVID-19 pandemic, the Indonesian government fabricated budgetary and non-budgetary measures. The fiscal measures in this respect were proxied through the policy of reallocation and refocusing of the government budget to address the need for sufficient operational funds in health service facilities. On the other hand, restrictive interventions towards societies' activities were put in place to maintain physical and social distancing among millions of Indonesians, affecting the delivery of public services and the performance of governmental activities.

Governments' accountability is, among other aspects, adversely affected by the enactment of budgetary and non-budgetary measures. For example, there is a 31 percent decline in the budget of the Inspectorate General of the Ministry of Home Affairs from Rp. 78.885.141.000 in 2019 to Rp.54.780.543.000 in 2020. Government monitoring activities were severely affected by such budget decline as other expenditures were difficult to cut due to their significance to operational and day-to-day office activities, such as wages and utility bills. Therefore, the inadequate fund for monitoring activities resulted in a deficient output clouding government institutions' accountability judgment. Furthermore, Indonesia's arrangement on the large-scale social restriction (Pembatasan Sosial Berskala Besar/PSBB) since April 2020, as stipulated in The Government Regulation 21 in 2020 on The Large-scale Social Restriction in the Acceleration of the Handling of the Corona Virus Disease 2019, hindered the direct monitoring activities on local governments. The Inspectorate General of the Ministry of Home Affairs (MOHA) recorded a significant decline in on-the-spot monitoring activities from 34 in 2019 to none in 2020. Moreover, virtual monitoring as a replacement for direct monitoring insufficiently satisfied the purpose of quality assurance in public service delivery because the Inspectorate General of MOHA conducted just 25 monitoring activities in only 25 out of 34 provinces in Indonesia.

The level of accountability between 2019 and 2020 can also be shown by putting the number of findings and recommendations in the respective years into comparison. There was a significant decrease in findings between 2019 and 2020, from 442 to 132, or 29,86 percent. On the same trend, recommendations for audit in 2019 and 2020 decreased significantly by 76 percent. The number of recommendations produced in 2019 stood at 717, while 2020 produced only 175 recommendations. Even though such figures may not necessarily represent the level of accountability in local governments as deeper analysis is required, it portrays a concerning realm as improvements in local governments' accountability are based on audit and monitoring findings and recommendations. The decline in the number of findings and recommendations in 2020 is closely related to remote audit and monitoring activities because such an audit mechanism limits data collection and information collection. In addition, the lack of source documents containing information responsible for the decline of findings and recommendations also led to inconclusive audit results in nine provinces, where the audit team failed to conclude due to insufficient information and data. Moreover, audit findings and recommendations play an instrumental role in determining the degree of accountability of local governments. The quick response in following up on audit recommendations signifies well-founded accountability by local governments. For example, the Inspectorate General of the Ministry of Home Affairs ranked ten provinces with the fastest audit recommendations follow-up, where the Province of Central Java was ahead of every other province. The speed of the follow-ups signifies the willingness to be held accountable and to tailor necessary corrective actions in public service delivery.

Furthermore, the pandemic has pushed the government to focus more on programs directly linked to preventive actions against the spread of the coronavirus. Watchdogs, including The Inspectorate General of MOHA, are obliged to oversee the delivery of such programs in local governments, e.g. vaccination programs. Therefore, other focuses of audit of monitoring were left unchecked. Data from SIWASIAT (application established to enhance data audit analysis), shows that monitoring activities in 2020 were focused only on the management of COVID-19 in 25 provinces, the government support for direct local elections in three provinces, and budget performance in North Sulawesi. This is in stark contrast to nine focuses of monitoring in 2019, including a) local tax and retributions, b) Procurements, c) Social grants and assistance, d) planning and budgeting, e) licensing and non-licensing of the mineral and coal, plantation and forestry sectors, f) population administration and civil registration affairs, g) government affairs in peace and public order and community protection, h) government affairs in community and village development, and i) travel expenditure for official purposes. As such, monitoring results in 2020 present a relatively vague image of the actual quality of government accountability.

## **Discussion**

### **Problems of Horizontal and Vertical Accountability**

Against the currency of local governments' accountability amid the COVID-19 pandemic, an instrumental question arises on what are the alternatives to maintain and increase the degree of accountability of local governments because the COVID-19 pandemic has shown us that traditional accountability mechanism with a

horizontal trajectory is inadequate to perform optimum quality of public organization accountability. A crucial element that shapes the inconclusive accountability quality, in part, is that the government is confronted by imperfect information and information asymmetry of local governments' accountability as a result of the impact of the current pandemic. As the coordinator of inculcation and supervision activities toward public services delivery, the central government comes short in providing necessary information essential to the evaluation process in producing imperative recommendations to improve the quality of local governments' accountability. Moreover, horizontal accountability between government organizations deals with agency problems from various causes, including the COVID-19 pandemic. The institutional agency problem theory introduced by Barry Mitnick emphasizes that agency problem occurs when a conflict of interest between principal and agents occurs. The root of this problem lies in incentives to pursue agents' interests. This discussion put national regulations and local governments as principal and agent, respectively. Under budget-cutting management, for example, local governments are incentivized with interest to reallocate the yearly budget to satisfy their predominant development programs, which often exclude monitoring, supervision, and reporting activities resulting in clouded accountability. Providing an adequate monitoring budget is mandatory as stipulated by the Indonesian Government Regulation Number 72 in 2019 on Local Government Institution, which is followed by Regulation of the Minister of Home Affairs Number 64 in 2020 with the following arrangements:

- a) Provinces with an annual budget of up to four trillion rupiahs must allocate at least 0,9 percent of their total expenditure for monitoring activities;
- b) Provinces with an annual budget from four to ten trillion rupiahs must allocate at least 0,6 percent of their total expenditure and above 36 billion rupiahs for monitoring activities;
- c) Provinces with an annual budget above ten trillion rupiahs must allocate at least 0,3 percent and above 60 billion rupiahs of their total expenditure for monitoring activities, the provincial yearly monitoring budget is listed in the table below:

Table 1. Province Monitoring Budget 2021

No	Province	Total Budget	Monitoring Budget	%	Kriteria
					Over 0,3% but less than 60 billion rupiah
1	Aceh	Rp 16.763.469.972.136	Rp 59.288.752.022	0,35	
2	Sumatera Utara	Rp 13.749.499.451.958	Rp 70.727.615.000	0,51	Sufficient Less than 6% and less than 36 billion
3	Sumatera Barat	Rp 6.780.124.354.738	Rp 18.667.473.154	0,28	

No	Province	Total Budget	Monitoring Budget	%	Kriteria
					rupiah
					Less than
					6% and
4	Riau	Rp 9.132.748.802.329	Rp 32.493.658.409	0,36	less than
					36 billion
					rupiah
5	Kepulauan Riau	Rp 3.986.942.728.300	Rp 35.882.486.534	0,90	Sufficient
6	Jambi	Rp 4.516.148.844.342	Rp 36.227.791.782	0,80	Sufficient
					Over 0,3%
					but less
7	Sumatera Selatan	Rp 10.729.096.013.693	Rp 33.623.919.000	0,31	than 36
					billion
					rupiah
8	Kepulauan Bangka Belitung	Rp 3.108.627.167.834	Rp 19.416.147.485	0,62	Less than
					0,9%
9	Bengkulu	Rp 3.052.194.137.387	Rp 19.551.269.630	0,64	Less than
					0,9%
					More than
					36 billion
10	Lampung	Rp 7.480.925.281.643	Rp 41.499.850.000	0,55	rupiah but
					less than
					0,6%
					More than
					36 billion
11	DKI Jakarta	Rp 72.967.009.600.455	Rp 129.847.503.027	0,18	rupiah but
					less than
					0,9%
12	Banten	Rp 15.948.254.311.169	Rp 60.802.400.000	0,38	Sufficient
					Over 60
					billion
13	Jawa Barat	Rp 44.615.065.661.799	Rp 114.107.425.091	0,26	rupiah but
					less than
					0,3%
					Less than
14	Jawa Tengah	Rp 27.190.833.343.000	Rp 48.692.907.000	0,18	60 billion
					rupiah and
					less than



No	Province	Total Budget	Monitoring Budget	%	Kriteria
					0,3%
15	DI Yogyakarta	Rp 6.091.572.432.696	Rp 41.005.822.464	0,67	Sufficient
					More than
					60 billion
16	Jawa Timur	Rp 33.008.197.503.338,10	Rp 89.347.450.000	0,27	rupiah but
					less than
					0,3%
					Less than
					0,6% and
17	Bali	Rp 8.537.890.262.352	Rp 29.335.610.952	0,34	less than
					36 billion
					rupiah
					Less than
					0,6% and
18	Nusa Tenggara Barat	Rp 5.528.931.855.427	Rp 22.882.458.587	0,41	less than
					36 billion
					rupiah
					Less than
					0,6% and
19	Nusa Tenggara Timur	Rp 7.584.929.735.729	Rp 33.875.307.639	0,45	less than
					36 billion
					rupiah
					Less than
					0,6% and
20	Kalimantan Barat	Rp 7.035.492.541.090	Rp 35.922.786.919	0,51	less than
					36 billion
					rupiah
					Over 60%
					but less
21	Kalimantan Tengah	Rp 4.889.696.415.086	Rp 34.003.464.635	0,70	than 36
					billion
					rupiah
					Less than
					0,6% and
22	Kalimantan Selatan	Rp 5.526.165.272.537	Rp 25.507.382.646	0,46	less than
					36 billion
					rupiah

No	Province	Total Budget	Monitoring Budget	%	Kriteria
23	Kalimantan Timur	Rp 11.616.186.000.000	Rp 39.146.734.000	0,34	Sufficient
24	Kalimantan Utara	Rp 2.364.056.627.000	Rp 22.877.906.527	0,97	Sufficient
25	Sulawesi Utara	Rp 4.087.615.938.923	Rp 42.936.435.523	1,05	Sufficient
26	Gorontalo	Rp 1.912.519.212.778	Rp 16.345.179.150	0,85	Less than 0,9%
27	Sulawesi Tengah	Rp 4.297.164.739.359	Rp 19.335.858.129	0,45	Less than 0,6% and less than 36 billion rupiah
28	Sulawesi Barat	Rp 2.062.542.227.645	Rp 18.447.849.991	0,89	Less than 0,9%
29	Sulawesi Selatan	Rp 12.046.405.712.940	Rp 60.000.000.000	0,50	Sufficient
30	Sulawesi Tenggara	Rp 5.235.191.610.164	Rp 25.829.235.250	0,49	Less than 0,6% and less than 36 billion rupiah
31	Maluku	Rp 4.015.217.740.467	Rp 30.083.044.979	0,75	Over 0,60% but less than 36 billion rupiah
32	Maluku Utara	Rp 3.335.957.359.387	Rp 25.922.653.648	0,78	Less than 0,9%
33	Papua Barat	Rp 7.744.110.211.743	Rp 26.776.757.502	0,35	Less than 0,6% and less than 36 billion rupiah
34	Papua	Rp 15.758.964.362.330	Rp 81.967.910.334	0,52	Sufficient

Source: Analysed from Local Governance Portal or SIPD (*Sistem Informasi Pemerintahan Daerah*), 2022

From the table, we can see that of 34 provinces in Indonesia, only ten of which, or 29,41 percent are allocating monitoring budget consistent with the Regulation of the Minister of Home Affairs Number 64 in 2020. Nevertheless, the allocation formula does not necessarily address the actual problem of monitoring activities. For instance, the formula put DKI Jakarta on the list of local governments with adequate monitoring budgets with

only 0,1% of the mandated 0,3% of its total budget. However, its monitoring budget of 129 billion rupiahs presumably, exceeds its actual budget need. On the contrary, others are struggling to engage in monitoring activities, especially those with an annual budget of fewer than 4 billion rupiahs. As such, the ratio approach for the mandated allocation of the monitoring budget should be reconsidered. We would suggest using an activity index subject to project value, based on the *Program Kerja Pengawasan Tahunan/PKPT* (Yearly Monitoring Workplan Program) and the need for capacity building of auditor or APIP (*Aparat Pengawasan Internal Pemerintah*). Each local government must report its annual expenditure plan for budget evaluation by governors and the Minister of Home Affairs. This approach would provide an adequate budget for their monitoring activities.

The incentive to pursue their interests over fulfilling the budgetary requirements is plausible because local governments can shift blame back to the central governments for the budget cut under the pandemic, thus limiting their governing resources. A similar blame game can be seen in Ahrens & Ferry's (2015) study that found the Newcastle City Council blaming the central government for the budget cut and the austerity politics of the British government resulting in an undesired outcome of accountability relationship with the grassroots.

Furthermore, there is also an issue of resource dependency in a principal and agent relationship. Resource dependency theory emphasizes the power asymmetry in the inter-organizational relationship as a result of the dependency of an organization on another for vital inputs (Damarin, 2015). Pfeffer & Salancik (1978) argue that pressures of such asymmetry profoundly shape organizational decisions. Due to the Indonesian direct election political system, local governments are incentivized to accommodate the interest of the board of local representatives and their campaign donors because they stand at the center of the political figures' efforts to run for office. Additionally, satisfying local representatives and campaign donors are instrumental to local government administration's stability, especially those running their first administration period.

On the other hand, vertical accountability, where citizens check the service delivery by the government through elected officials and their representatives in parliament (Schedler et al. 1999), is also insufficient in satisfying their need for better accountability. Goetz & Jenkins (2001) state that there is a decreasing level of public confidence towards horizontal accountability between government agencies alongside dissatisfaction with the limitation of vertical accountability through electoral choice and civil society pressure. They assert that "vertical accountability systems suffer from many shortcomings, among which is their tendency to blunt the impact of citizen 'voice'. Voting periodically for a party that will pursue policies across the full spectrum of public issues, which no individual citizen is likely to agree with across the board, is the classic example of this syndrome" (Goetz & Jenkins 2001, p. 364). Vertical accountability in Indonesia is a great example of such a syndrome. Considerable protests against government policies occur every year by groups of students, laborers, and civil society organizations, yet more often than not, they have no significant impact as policy changes subject to such civil disagreements are almost non-existent, especially amid a pandemic where the government needs to take full control of health and economic activities leaving civil societies little space of public engagement in policy decision making thus lowering their confidence in government accountability.

Therefore, a self-management approach is essential to maintain acceptable behavior or organizational accountability, and the three lines of defense model have been a desirable risk management model. Three lines of the defense model emphasize risk management involving functions that own and manage the risks, functions that oversee risks, and functions that provide quality assurance (The IIA, 2013). The IIA (2013) argues that “in a perfect world, perhaps only one line of defense would be needed to assure effective risk management. In the real world, however, a single line of defense often can prove inadequate.” However, the three lines of the defense model have their criticisms. Davies & Zhivitskaya (2018) argue that the three lines of defense might potentially reduce accountability due to the diffusion of responsibilities in managing risks. They also add that the internal auditor, as the third line of defense, performs the quality assurance often late in intervening risk crystallization (Davies & Zhivitskaya, 2018). Moreover, Zhivitskaya (2015), in her thesis, presents an interview with a board member of a corporation that sees the three lines of defense model as inefficient as it requires considerable resources, and potentially creates an unpleasant working environment due to check and recheck activities between employers.

Such conditions confirm the argument of Considine (2002) that traditional vertical and horizontal accountability with a top-down measure is insufficient to capture the whole culture of accountability. Considine (2002) further states that “Weak or strong accountability at the top is not a very good predictor of the level of perceived accountability at other levels (p. 37).

### **Diagonal Accountability as an Alternative**

Recognizing flaws in traditional accountability methods, scholars have been promoting an alternative to address such problems with a combination of the two into a hybrid mechanism of accountability known as “diagonal accountability”. Such proxy is significant because in the face of austerity and cut-back management, imperfect accountability and imperfect monitoring and financial reporting by the government official, in the economic sense, might result in a loss in consumer welfare (citizens’ right-to-know) (Mayston, 1993). Herron (2020) defines diagonal accountability, in terms of the relationship between citizens and governments, as cooperation between civil society actors in formal accountability processes. While they might not have held positions in formal accountability institutions, such actors can facilitate accountability by informing misdeeds and tailoring extra pressure for precautionary and corrective measures against public policies (Herron 2020). Governments need to engage with their citizens more intensively to enhance their accountability because they have been concentrating accountability in the hands of a single actor or institution and employing it as a restriction to the citizen’s right to know (Mulgan, 2003). Grant (1997) asserts that direct citizen involvement in government accountability is evident, especially in countries with well-established democracies and constitutional rights regimes conducive to accommodating citizens’ right-to-know”. Moreover, Bovens (2007b) conclusion of his study on new accountability and EU-Governance argues that whereas new forms of accountability may not

replace the popular control of the traditional forum, they might “enhance learning and provide formal and informal checks and balances” (p. 117).

In their study on the public sector oversight in India, Goetz & Jenkins (2001, pp. 367-368) provide an example where citizens involve in official accountability processes through Public Interest Litigation (PIL) which grew exponentially from the mid-'80s, utilizing the supreme court moral obligation to hold them responsive towards citizens' demand for investigative action on policies enacted by government bodies. The construction of the Narmada Dam Complex is an example of direct citizen involvement bridging the horizontal accountability between government institutions (Goetz & Jenkins, 2001). The citizen's engagement took form in official fact-finding, conveying highly scrutinized information on the government to base their decisions. Nevertheless, such engagement has its barriers, especially for poor people when they encounter a high cost and time-consuming case, let alone hostile sets of bureaucracy (Goetz & Jenkins, 2001).

Another tool significant to diagonal accountability is the freedom of speech. Gelber (2017) stated that freedom of political speech is instrumental as a mechanism by which citizens can exert their ability to check the government and practice democratic accountability. In her study on freedom of speech in Australia, she found at least three free speech limiting policies that undermine participatory accountability by Australian citizens from 2011 to 2016 (Gelber, 2017). Firstly, the counterterrorism policy where disclosure of certain information on terrorism is prohibited. While this was primarily objectivist to address the potential harm of terrorism, its effectiveness is debatable. Hence, the policy itself is considered to restrain freedom of speech with doubtful outcomes. Secondly, the asylum-seeker policy. Whereas the intention of the counterterrorism policy was clear, less justification is provided by the government for the asylum seeker policy that prohibits “entrusted persons' who work in detention centers from recording or disclosing protected information.” As such, there was a potential abuse of power and human rights violation unexposed on people in detention. Thirdly, the right to protest policy. This policy restricts people's right to protest by allowing large companies to sue the protestor and decapitalize conservation organizations (Gogarty, 2014). As such, Gelber (2017) concludes that such restrictions are hurting democratic practices and are unjustifiable in the sense of diagonal accountability.

Against such backdrops, implementing diagonal accountability requires institutional predicaments that might allow the diagonal accountability involving citizens to create fond institutionalized accountability. Goetz & Jenkins (2001, p. 369) suggest five characteristics that support diagonal accountability as follows “ (1) legal standing for non-governmental observers within institutions of public- sector oversight; (2) a continuous presence for these observers throughout the process of the agency's work; (3) well-defined procedures for the conduct of encounters between citizens and public-sector actors in meetings; (4) structured access to the flow of official documentary information; and (5) the right of observers to issue dissenting reports directly to legislative bodies. Bear in mind, however, that the increase of accountability is not an objective in itself, it must be measured alongside the cost and benefit in manufacturing the overall welfare of the principal (citizen) (Mayston, 1993). This means that increasing accountability through a diagonal accountability process must be carried out efficiently to avoid the loss of citizen welfare. Subdivide text into unnumbered sections, using short, meaningful

sub-headings. Please do not use numbered headings. Please limit heading use to three levels. Please use 12-point bold for first-level headings, 10-point bold for second-level headings, and 10-point italics for third-level headings with an initial capital letter for any proper nouns. Leave one blank line (1.5 times spaced) before and after each heading. (Exception: no blank line between consecutive headings.) Please margin all headings to the left.

## Conclusion

The COVID-19 pandemic has essentially deteriorated local governments' accountability from cut-back management and the new normal working culture. The traditional vertical and horizontal accountability are inadequate in providing a desirable level of accountability due to insufficient monitoring of budgets, agency problems, and resource dependency. As such, diagonal accountability with a supportive environment might serve as an alternative to enhance local government accountability. Citizen involvement must be channeled with a more direct engagement with public accountability processes to have an immediate and significant impact.

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## Public Sanitation Facilities and Water Quality of Dug Well in Sumur Bandung

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**Abstract:** This study intends to evaluate the chemical, physical, and microbiological properties of water from excavated wells in highly inhabited areas. The study site excavated a well that had been constructed by the government as a part of Bandung City's public hygiene programme. Water samples were tested in a laboratory with quality standard no.32 of 2017 by the Ministry of Health of the Republic of Indonesia. The population of this study is the residential district of Sumur Bandung has 37 Neighborhood Associations (RW) and 237 Neighborhood Units (RT). Sampling water in 4 RWs with a total of 32 respondents, and 10 water samples were obtained in 9 RTs from 10 dug well in public sanitation facilities. Logistic regressions described the results of the method, water samples were obtained on April 2021 until September 2021. The findings of this study suggest that indiscriminate disposal of home waste and seepage of river water are the main causes of contamination. As a result, household waste management and sanitation have an impact on the purity of groundwater.

**Keywords:** Dug Well, Water Quality, Sanitation.

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### Introduction

The Sustainable Development Goals (SDGs) were adopted by the United Nations General Assembly in September 2015 and comprise 169 targets and indicators aimed at achieving the 2030 target. Clean water and proper sanitation are basic human needs and are an important part of the SDGs. Globally, billions of people currently lack clean water, sanitation, and handwashing facilities (Sachs et al., 2019). With the existence of a fragmented policy system, the governance, funding, and sanitation services are often not yet adequate, requiring planning and action to ensure sustainable development of the implementation of the 2030 agenda. In the face of climate change each country must transform with the support of the government, civil society, scientific community and businesses by reaching SDGs. Globally, billions of people currently lack clean water, sanitation, and hand washing facilities.

Due to the fragmented nature of the policy system, it is frequently difficult to ensure sustainable development of the 2030 agenda's implementation through planning, funding, and sanitation services. Public sanitary facilities, particularly in densely populated residential areas, are crucial in Indonesia and must be sustainable in their upkeep and renovation in accordance with the SDGs (6). Urban planning, policy, and public facilities are supported by programs like the Community Based Total Sanitation Program (STBM) and Community Sanitation Program (SANIMAS).—Environmental sectors in more Indonesian cities must obtain acceptable, all-inclusive access to sanitary facilities and drinking water. Non-urban areas with sparse people are equally susceptible to clean water and sanitation issues, for which Bandung needs to focus on a number of root causes.

The COVID-19 pandemic is now being managed in part thanks to SDG 6 implementation. Because of the epidemic, frequent hand washing with soap has been encouraged to stop the transmission of disease. If clean water is available, this practise also offers other health benefits. The demand for clean water varies and occasionally rises quickly (Abubakari, 2019). Researchers (Grzybowski et al., 2019a) suggested that most quality watering dug well contain NaCl, ammonium, and E-coli, with quantitative data on the character. In the context of improving groundwater quality, Ian Gale, hydrologist co-founder of the International Association of Hydrogeologists (IAH) described the term Managed Aquifer Recharge (MAR) (Dillon et al., 2019) and the importance of groundwater flow system and efforts to maintain groundwater ecosystems from springs (Eröss et al., 2020). Poor waste management and inadequate protection of water source diminish the quality of water resources and pose a risk to our health and the sustainability of water suplay in the future.

In cities with large populations centralized waste management systems and treatment of drinking water, urban sewage is the main source of shallow groundwater contamination. The level of bacterial contamination in dug well water differ the rainy and dry season, and is influenced by the degree to which the well is maintained and the proximity of septic tanks (Ejechi et al., 2007), (Suhogusoff et al., 2013), (Gholami et al., 2015) added that the depth of the groundwater table and the type of formation aquifer are also important factors. Dug well water is used by residents for laundry, cleaning kitchen utensils and making food. Further, Severe water pollution can give rise to large numbers of bacterial organisms (Akoachere et al., 2013) maintaining acceptable water quality standards is very important and prevents harmful water contamination (Mohamed et al., 2014).

## Methodology

This research was conducted in a densely populated residential district of Sumur Bandung. Sumur Bandung sub district has 37 Neighborhood Associations (RW) and 237 Neighborhood Units (RT) with a population of 10.382 people/km population density level in 4 RWs with a total of 32 respondents, and 10 water samples were obtained in 9 RTs from 10 well in public sanitation facilities.

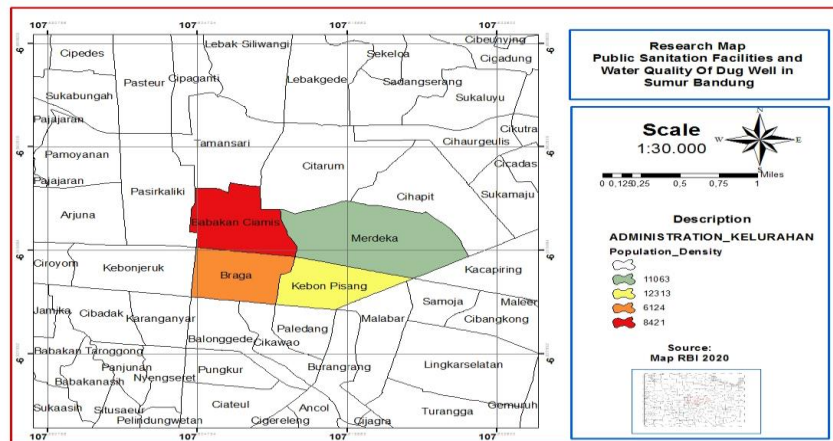


Figure 1. Location Research in Sumur Bandung

The local communities extract water from these dug well in the traditional way: manually and with a plastic bucket. The dug well was located in dense residential areas and were accessible to many residents. Water samples were obtained in April 2021 and the procedures of National Standardization Agency with the quality standard of the Ministry of Health RI no.32 of 2017 (Menteri Kesehatan Republik Indonesia). Sample size was based on the previous studies of (Sari et al., 2021). The methods results were described by logistic regression with data corresponding to the variables longing to each parameter and were quality standard(Grzybowski et al., 2019b) (Amenu et al., 2013) (Memon et al., 2011). The water quality was measured and analyzed in a university laboratory in the city of Bandung and included physical, chemical, and microbiological parameters.

## Results

### Analysis descriptive dug well quality

Dug well are made by digging by hand (Chandra, 2005) the dug wells at the research sites use conventional water extraction methods, namely manually and a bucket because the funds for electrical installations and other are not available. These community well facilities from the government's sanitation program, are spread out in sub districts in the city of Bandung because most of the city is not with in reach of any rivers. Permits for the groundwater extraction issued by the Regent/ Mayor are one of the tools for controlling groundwater management.



Figure 2. Dug Well with Dipper

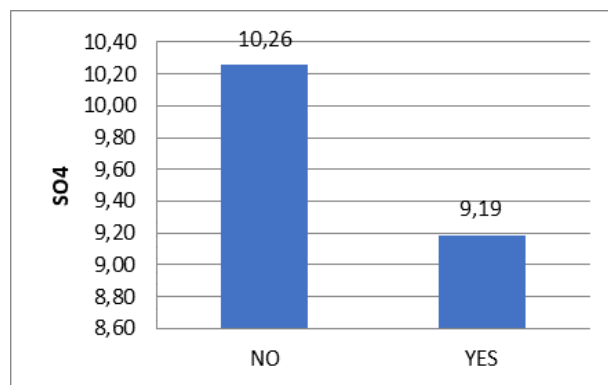


Figure 3. Dug Well (Yes) and other Well (No)

The average SO4 in water from dug well was 9.19, average SO4 content of water from other well was 11.64% higher than in dug well.

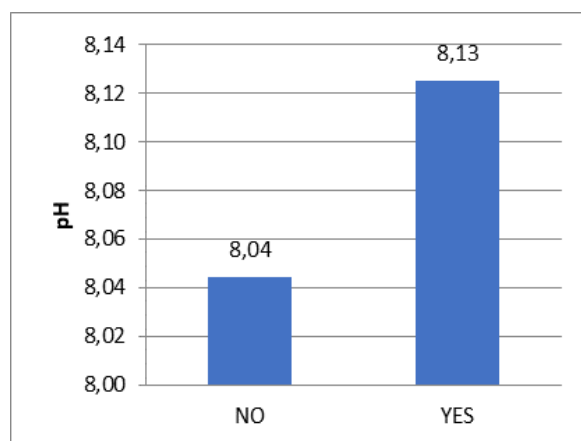


Figure 4. Average pH in Well Water from Dug Wells (Yes) and other Wells (No)

Figure 4 shows that the average pH of water from dug well was 8.13 while that of water from other wells was 8.04. The average pH of dug well water was greater than that of water from other wells.

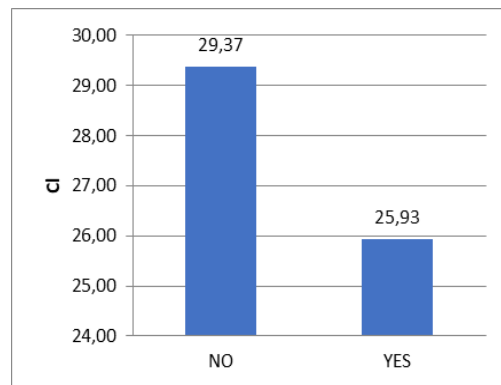


Figure 5. Average Cl in Well Water

Figure 5 shows that the average chlorine (Cl) content of dug well water was 25.93% while that of water from other wells was 29.37. The average cl content of water from other wells was greater than that from dug wells.

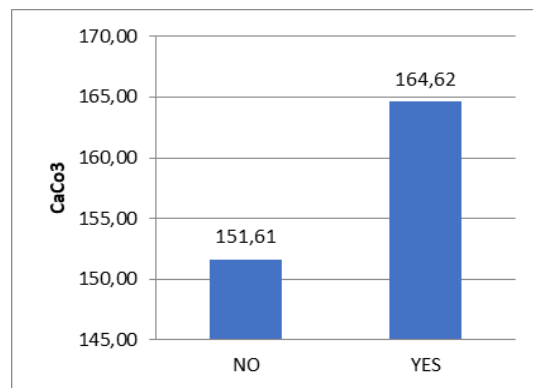


Figure 6. Average CaCO3

Figure 6 shows that the average CaCO3 content of dug well water was 164.62 that of water from other wells was 151.61 the average CaCO3 content of dug well water was greater than wells.

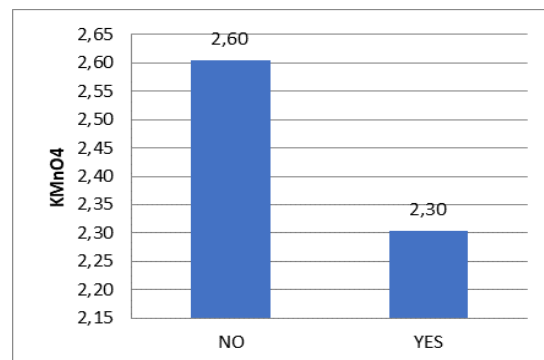


Figure 7. Average KMNO4 in Well Water

Figure 7 shows that the average KMnO4 content in dug well water was 2.30 while of water from other wells was 2.60.

2.60. The average  $KMnO_4$  content of water from other wells was greater than that from dug wells.

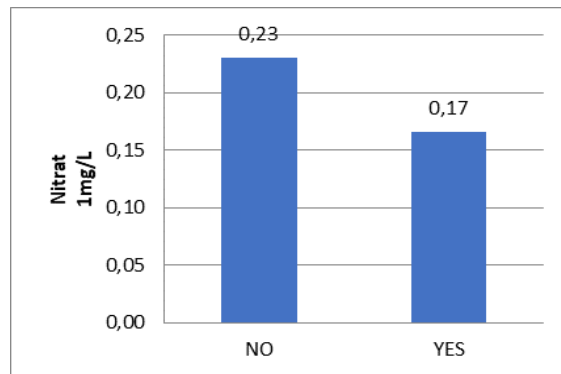


Figure 8. Average Nitrate in Well Water

Figure 8 shows that the average nitrate content in dug well water was 0.17 of water from other wells was 0,23. The average nitrate 1 mg/L content of water from other wells was higher than that from dug wells.

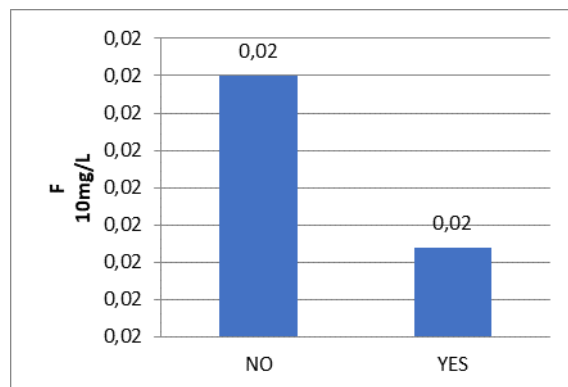


Figure 9. Average F in Well Water

Figure 9 shows that the average Fluorine (F) in water from dug well 0.02 while that of water from other wells was 0.02. The average F content of dug well water was the same as that of water from other wells.

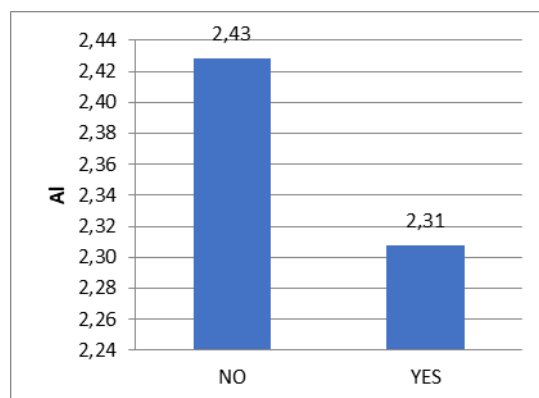


Figure 10. Average Al in Well Water

Figure 10 shows that the average Aluminum (Al) content of dug well water was 2.31 while that water from other wells was 2.43. The average Al of water from other wells was greater than that of water from dug wells.

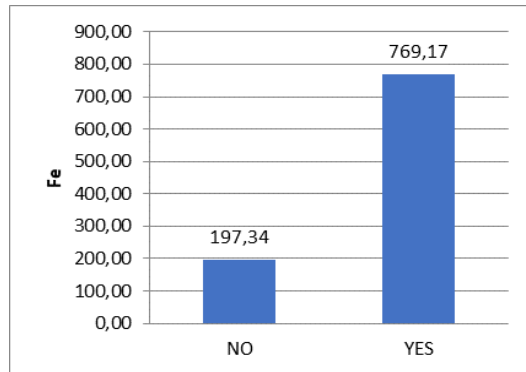


Figure 11. Average Fe in Well Water

Figure 11 shows that the average Fe content of dug well water was 769.17, while that of water from other wells was 197.34. The average Fe content of water from dug wells was greater than that of water from other wells.

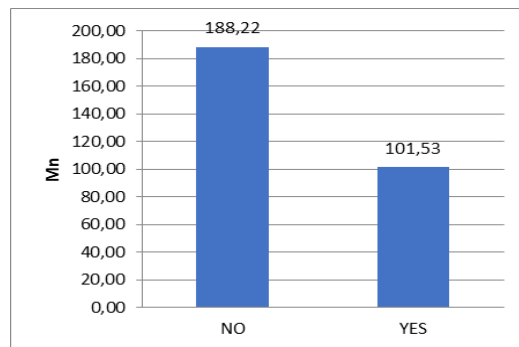


Figure 12. Average Mn in Well Water

Figure 12 shows that the average Mn content of dug well water was 101.53 while that of water from other wells was 188.22. The average Mn content of water from other wells was greater than that of water from dug wells.

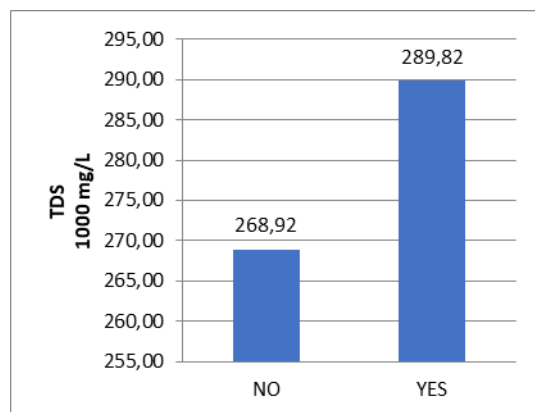


Figure 13. Average TDS in Well Water

Figure 13 shows that the average TDS content of dug well water was 289.82 while that of water from other wells was 268.92. The average TDS content of water from dug wells was greater than that from other wells.

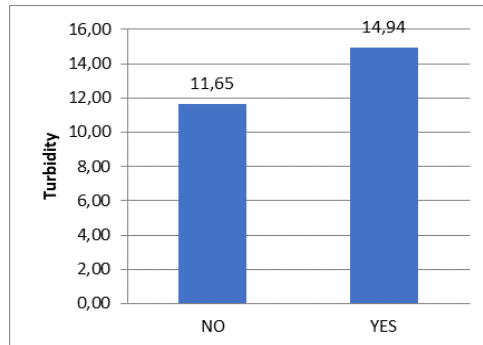


Figure 14. Average Turbidity in Well Water

Figure 14 shows that the average turbidity of dug well water was 14.94 while that of water from other wells was 11.65. The average turbidity of water from dug wells was greater than that of water from other wells.

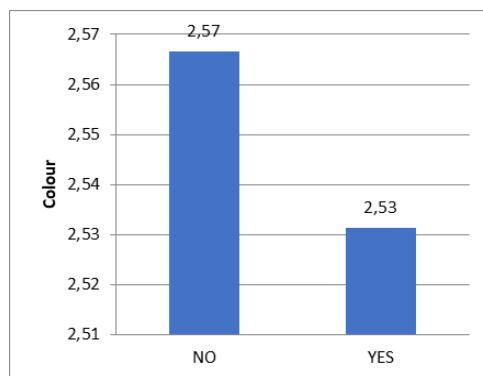


Figure 15. Average Color in Well Water

Figure 15 shows that the average of dug well water was 2.53 while that of water from other wells was 2.57. The average color of the water from other wells was greater than that of water from dug wells.

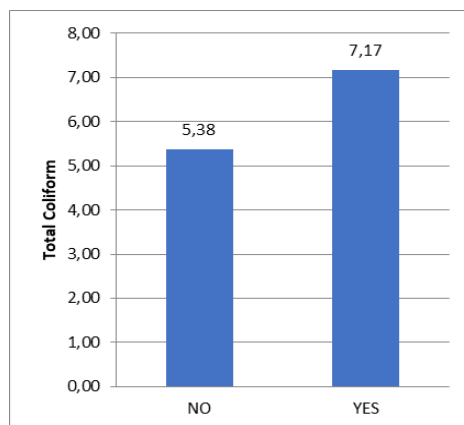


Figure 16. Average Total Coliform in Well Water



Figure 16 shows that the average total coliform of dug well water was 7.17 while that of water from other wells was 5.38. The average total total coliform of water from dug wells was greater than that of water from other wells.

Table 1. Logistic Regression Analysis

Variable	pH	SO4	Cl	CaCo3	KMnO4	Nitrat	F	Al	Fe	Mn	
TDS	$\beta$	-0,304	-0,006	-0,004	0,001	-0,01	-0,035	-28.800	-26.941	3,20E-03	1,21E-02
	SE	0,178	0,021	0,004	0,001	0,05	0,354	54.438	26.227	0	0
	p	0,122	0,791	0,384	0,28	0,849	0,923	0,61	0,331	0,922	0,888
	R <sup>2</sup>	0,792									
Turbidity	$\beta$	-0,809	0,06	-0,032	0,002	0,254	-1.073	218.480	81.955	0	0
	SE	0,806	0,093	0,018	0,003	0,224	1.600	245.748	118.398	0	0
	p	0,342	0,537	0,108	0,471	0,286	0,519	0,397	0,506	0,434	0,249
	R <sup>2</sup>	0,625									
Color	$\beta$	0,016	-0,001	-0,002	0	0,008	0,066	7.205	-7.069	5,51E-03	-3,36E-02
	SE	0,087	0,01	0,002	0	0,024	0,173	26.638	12.834	0	0
	p	0,863	0,948	0,373	0,72	0,735	0,713	0,793	0,595	0,732	0,431
	R <sup>2</sup>	0,78									
Total Coliform	$\beta$	-0,035	0,003	0,005	0	-0,032	-0,233	-151.412	-6.321	-2,20E-02	0
	SE	0,204	0,024	0,004	0,001	0,057	0,406	62.371	30.049	0	0
	p	0,869	0,888	0,34	0,555	0,59	0,581	0,038	0,838	0,562	0,177
	R <sup>2</sup>	0,767									

Table 1 demonstrates that almost none the variables have a significant effect on the dependent variable, namely variables TDS, turbidity, color, and total coliform. There was only one significant variable, namely variable F which had a significant effect on total coliform because of its p-value of  $0 < 0.05$ . TDS was the most influenced variables Ph, SO4, Cl, CaCO3, KMnO4, nitrate, F, Al, Fe, and Mn had an effect of 79.2% on TDS the remaining 20.8% was influenced by other variables not included in this study.

Table 2. Univariate Analysis

Variable	OR(CI <sub>95%</sub> )	p-value	R <sup>2</sup>
TDS	0,000(0,000- )	0,997	
Turbidity	0,024(0,000-14.400)	0,253	
Colour	0,000(0,000-6953772602.875)	0,536	0,652
Total Coliform	1029570.407(0,023-45733647584372.760)	0,123	

Table 2 shows that the TDS value is 0.000 (CI 95%:0.000) with a p-value of  $0.997 > 0.05$ . The OR turbidity value was 0.024 (CI 95%: 0.000-14.400) with a value of  $2.253 > 0.05$ . The OR color value was (CI 95%: 0.000-6953772602.875) with value of  $0.536 > 0.05$ . The OR value for total coliform is 1029570.407 (CI 95%:0.023-

45733647584372.760) with a p-value of  $0.123 > 0.05$ . These values mean the TDS, turbidity, color, and total coliform had no significant effect on the well. However, the  $R^2$  value was 0.625 meaning that the TDS, turbidity, color, and total coliform had an effect of 65.2% on the well, while the remaining 34.8% was influenced by other variables.

Based on law no. 7/2004 concerning water resources management is an effort to plan, implementation of water resources conservation, utilization of water resources, and control of water damage. The demand for water from communities varies according to their needs and the economy. Some use water from wells to fulfill their sanitation needs such as washing, bathing, and cooking. Dug well water is not often used for drinking because the facilities from the regional drinking water company (PDAM) can be used instead. In the area covered by the dense living spaces are located directly against the river. The river is polluted and has been neglected in terms of maintenance and preservation of the environment. People also actively

Use the river for household domestic waste disposal.

## Impact of Sanitation on Health

Sanitation is a basic human necessity that is especially important in metropolitan environments. Dirt, coloured and polluted water, and solid waste are the main contributors to environmental contaminants, which are dangerous to the public's health (Katukiza et al., 2010). In keeping with the transformation of urban regions into dense settlements and the rise in population density, numerous conservation and preservation programmes have been put into place and are now being used by the community. SDG (6)'s goal is to guarantee access to and effective management of water and sanitation systems for all (Farling et al., 2019). By ensuring that all populations, including in urban and rural regions, have access to appropriate sanitation, the Indonesian government wants to reach this target by 2030. A harmonic policy needs to be established in order to implement management in an integrated manner in a groundwater basin that spans more than one regency or municipal region. Because of this, the governor must first provide a technical recommendation before the regent or mayor issues a permission for groundwater extraction. The regional government supports the regency/city government and facilitates the implementation of administrative management in terms of technical issues. In terms of technical issues, the regional government supports the city/regent government and facilitates the implementation of administrative management.

## Discussion

The groundwater management amendments to the regional regulation of West Java Province No.5 of 2008 that apply to Bandung City are covered by regional regulation of West Java Province No.8 of 2012, which is broken down into activities for inventory, planning, utilization, concern, and rehabilitation as well as guidance, supervision, and controlling. The importance of clean water in achieving the goal of appropriate sanitation cannot be separated. A water source is the most important part of a supply system since it is necessary for densely

populated areas to use huge amounts of water, which can lead to water scarcity in some parts of a city and water quality degradation that could eventually impede economic growth and public health. Achieving the SDGs will need ongoing research and development in the fields of domestic waste management and groundwater resources (6).

## Conclusion

This study tested the quality of water from dug well in densely populated settlement based on chemical, physical and microbiological parameters samples from 10 locations, were obtained and tested in a university laboratory. Samples were compared and analyzed a logistic regression test, showed the variables TDS, turbidity, color, and total coliform had an effect of 65.2% on dug well water. While the remaining 34.8% was influenced by other variables. This environmental sanitation plays a significant role in well water pollution. Community efforts are needed to improve the quality and sustainability off well water.

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# Sparking Creativity in Entrepreneurship Courses: Investigating the Effect of Hybrid Brainstorming Sessions on Business Opportunity Identification Outcomes


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**Abstract:** Opportunity Identification (OI) is one of the key entrepreneurial capabilities targeted in most entrepreneurship education programs. The most frequently used technique for facilitating business OI in entrepreneurship courses is brainstorming. Previous findings indicated the positive effect of hybrid (individual and group) settings on overall brainstorming outcomes, i.e., quality and quantity of the generated ideas, compared to only individual or group settings. However, to date, no study has explored the effect of hybrid brainstorming sessions on individual idea-generation skills outside the group, a possibility labelled “group-to-individual transfer”. This study aims to fill this gap by conducting an experimental study with 33 bachelor’s and master’s students who attended an entrepreneurship course at a Dutch university. A repeated measurement study design is used to explore the effect of group idea generation on individual performance outside the group. Based on this design, students passed three phases, i.e., (1) individual, (2) group, and (3) individual idea generation, using an online platform, and the measurement was taken after the individual idea generation phases. The findings indicated that individual idea generation after the group work resulted in fewer comprehensible business ideas but with a higher rate of concrete ideas that were more innovative compared to ideas generated before the group work.

**Keywords:** Opportunity Identification, Business Idea Generation, Hybrid Brainstorming

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## Introduction

Opportunity Identification (OI) is one of the key entrepreneurial capabilities of any successful entrepreneur or entrepreneurial citizen (e.g., Ardichvili et al., 2003; Baggen et al., 2015). From the cognitive psychology perspective, scholars described the OI process as a multi-step creative process (Dimov, 2007) that includes at least two underlying phases, i.e., idea generation and idea evaluation (Vogel, 2017), essential for identifying potential business opportunities (Lans et al., 2018). According to McMullen and Kier (2017), individuals' business idea generation and evaluation can be facilitated by respectively stimulating their divergent and convergent thinking skills. In this regard, the most frequently used technique for stimulating divergent thinking skills is brainstorming (Farrokhnia et al., 2022; Linsey et al., 2011; Litchfield et al., 2011; Ritter & Mostert, 2017).

The brainstorming technique was initially developed by Osborn (1957) based on the premise that generating more ideas increases the likelihood of coming up with a higher-quality idea (Clapham, 2003; Simonton, 1990). Brainstorming has been used in different individual and/or group settings. However, scholars believe that the most effective brainstorming sessions involve an alternation of individual and group idea-generation sessions (Brown & Paulus, 2002; Paulus et al., 2018), known as "hybrid brainstorming" (Korde & Paulus, 2017). In this regard, some scholars explored the effect of different hybrid settings such as individual-to-group (e.g., Ritter & Mostert, 2018), group-to-individual (e.g., Baruah & Paulus, 2008), and group-individual-group and individual-group-individual (e.g., Korde & Paulus, 2017) on *overall* brainstorming outcomes, i.e., the quality and quantity of the generated ideas. Their findings have clearly indicated the superiority of hybrid settings over only individual or group works in brainstorming sessions.

According to scholars, the interpersonal interactions among group members create collaborative "zones of proximal development" (see Vygotsky, 1987) that can also facilitate the development of individual task-related skills (Farrokhnia et al., 2019; Gholami et al., 2020; Hassanzadeh et al., 2016; Hatami et al., 2016; Noroozi, 2022; Noroozi et al., 2012, 2016), such as decision-making (e.g., Curseu et al., 2015), problem-solving (e.g., Laughlin et al., 2008; Noroozi et al., 2013), and judgment (e.g., Schultze et al., 2012) outside the group - a possibility that has been called as "*group-to-individual transfer*" (Laughlin & Barth, 1981). Although many studies explored the effect of hybrid brainstorming sessions on the overall outcomes, to date, no study has explored whether experience in a group idea generation in hybrid brainstorming sessions would aid ex-members to perform better in individual idea generation afterwards, especially in the entrepreneurship context. In this

regard, the primary purpose of this study is to investigate the effects of group business idea generation in hybrid brainstorming sessions on individual business idea generation skills outside the group in terms of the quantity and quality of generated ideas.

## Method

### Participants

The sample of this study consists of 33 higher education students (16 female and 17 male) at Wageningen University & Research (WUR), randomly assigned into 11 groups with three members. The students participated in an entrepreneurship course to orient themselves to an entrepreneurial career by actively exploring the initial steps of the entrepreneurial process. Table 1 shows the participants' demographic information.

Table 1. The Participants' Demographic Information

		Frequency	Percentage
Gender	Female	15	45 %
	Male	18	55 %
Educational level	Bachelor	11	33 %
	Master	22	67 %
Program	Food Technology	16	48.5 %
	Biotechnology	6	18.2 %
	Environmental science	4	12.1 %
	Nutrition and Health	2	6.1 %
	Forest and Nature Conservation	1	3 %
	Consumer studies	1	3 %
	Molecular Life Sciences	1	3 %
	Organic agriculture	1	3 %
	Plant Sciences	1	3 %
		<b>Mean</b>	<b>Std. Error</b>
Age	All	24.1	.61
	Females	24.7	1.17
	Males	23.6	.58

### Study Design and Procedure

A repeated measurement study design is used to explore the effect of group idea generation on individual performance outside the group. This design aligns well with the procedures used in the group-to-individual transfer of learning research (e.g., Schultze et al., 2012). Based on this design, the students participated in a

workshop using an online platform (i.e., <https://ideationhub.nl>) that could guide them to pass through three idea generation phases, i.e., (1) individual, (2) group, and (3) individual idea generation. The measurement was taken after the individual idea generation phases (See figure 1).

The workshop was conducted in an entrepreneurship course with prior permission from the lecturer. For the sake of anonymity, each student was randomly provided with a username and password for logging into the online platform and participating in the workshop. Moreover, at the beginning of the workshop, informed consent was obtained from the participants. In particular, they were notified that their idea-generation outcomes would only be used for research purposes and that they were allowed to quit the research study; however, no participants declined participation.

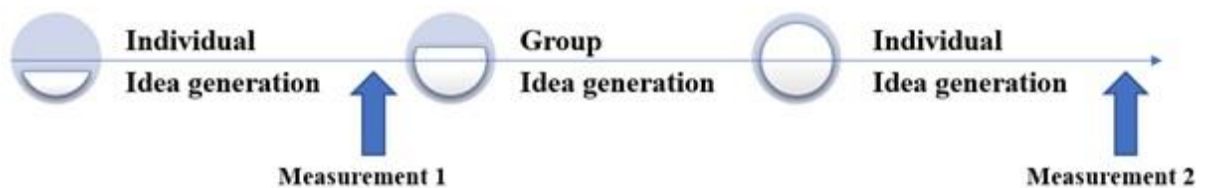


Figure 1. The Study Design

Table 2 shows an overview of the workshop. The online platform used in this study could provide participants with information about the task they were required to accomplish in each phase, control the time they had for completing the tasks, and inform them about the rules they needed to consider while brainstorming in individual and group settings.

Table 2. An Overview of the Workshop

Phases	Tasks	Time
(1) Individual idea generation	Reading the problem case	5 min
	Reading individual brainstorming rules	2 min
	Individual idea generation	10 min
(2) Group Idea generation	Reading group brainstorming rules	2 min
	Group idea generation	30 min
(3) Individual idea generation	Idea generation	10 min

Sustainable development was chosen as the problem case for generating business, defined as development that “meets the needs of the present without compromising the ability of future generations to meet their own needs” (UN, 1987, p. 6). The reason for choosing this problem case is that it is a broad topic familiar to many people (Baggen et al., 2017). Moreover, this problem case is in line with the recommendation to increase awareness



amongst WUR students about sustainable development goals by including and/or discussing them in courses (see WUR, 2019).

At the beginning of the workshop, an explanation was provided of what sustainable development is about, and several specific examples were given, such as energy, climate change, and education. The participants were then asked to imagine: “you are asked to give input for business ideas for new start-ups in the area of sustainable development. These business ideas can concern people, the planet and/or profit and may lead to social, environmental and/or economic gains. What ideas for new start-ups come up in your mind?”. In addition, before each idea generation task, the participants had *two* minutes to read the rules they needed to consider for having fruitful individual or group brainstorming, adopted from Paulus et al. (2006).

### Measurement Approach

Students’ idea generation skills were assessed by evaluating the quantity and the quality of their individually generated ideas before and after the group phase based on the criteria adopted from Baggen et al. (2017). In particular, the ideas were scored for:

- (1) *comprehensibility* (1 = comprehensible, 0 = incomprehensible). For instance, ideas such as “wearing an extra sweater” or “turning down the heating” were scored as incomprehensible as they were more general recommendations to address sustainability-related issues than an idea for a start-up business. Incomprehensible ideas were excluded from further analysis.
- (2) *concreteness*, i.e., whether or not it was possible to visualise or apply the idea (1 = concrete, 0 = not concrete). For instance, “recycling used water for other purposes” could be considered a comprehensible business idea to address a sustainability issue, but since it does not provide enough information, it is hard to visualise and apply the ideas; thus, it was scored as a non-concrete business idea. In addition, the proportion of concrete ideas per participant was also calculated: the percentage of comprehensible ideas that were concrete.
- (3) *flexibility*, i.e., the extent to which participants generated ideas in different categories. The categories were based on the examples of sustainable development in the problem case. Each idea was scored into one category, i.e., (1) affordable and adequate food supply, (2) decent housing, (3) energy, (4) climate change, (5) education, and (6) personal health and safety.

In addition, the ideas’ *innovativeness* was determined using DeTienne and Chandler’s (2004) 6-point scale based upon the following categories: (1) No apparent innovation or not enough information to make a determination; (2) A product or service identical to an existing product/service offered to an underserved market; (3) A new application for an existing product/service, with little/no modification or a minor change to an existing product; (4) A significant improvement to an existing product/service; (5) A combination of two or more existing

products/services into one unique or new product/service; and (6) A new-to-the world product/service, a pure invention or creation.

## Results

The descriptive statistics revealed that participants generated more comprehensible ideas before the group work ( $M = 5.36$ ,  $SD = 3.19$ ) than after the group work ( $M = 4.63$ ,  $SD = 2.45$ ). However, a high portion of comprehensible ideas was concrete after the group idea generation (86 %) compared to before the group work (62 %). On average, the participants generated ideas in almost the same number of categories before ( $M = 2.78$ ,  $SD = 1.15$ ) and after ( $M = 2.71$ ,  $SD = 1.22$ ) the group idea generation. In addition, the descriptive results showed that the participants generated more innovative ideas after ( $M = 2.53$ ,  $SD = .45$ ) than before ( $M = 3.03$ ,  $SD = .52$ ) the group work.

Table 3 shows the descriptive analysis of the individual idea generation outcomes before and after the group idea generation.

Table 3. The Descriptive Statistics of The Individual Idea Generation Outcomes

	<i>Before the group work</i>		<i>After the group work</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Number of ideas generated	7.57	4.53	5.66	2.91
Number of comprehensible ideas	5.36	3.19	4.63	2.45
Number of concrete ideas	3.34	2.11	4.06	1.81
Number of categories	2.78	1.15	2.71	1.22
Innovativeness	2.53	.45	3.03	.52

## Discussion, Conclusion, and Future Studies

The current study's findings indicated that the group-to-individual transfer of business idea generation skills could be facilitated in the hybrid brainstorming sessions. In particular, the findings revealed that the participants could generate fewer comprehensible business ideas after a group idea generation in a hybrid brainstorming session; however, the higher portion of the generated ideas was concrete compared to the individual idea generation before the group work. More importantly, the business ideas generated in the individual phase after group work was more innovative. The reason for these positive findings could be that the group phase of hybrid settings helps individuals reach synergy through peer learning (Al-Samarraie & Hurmuzan, 2018), enabling them to improve their knowledge repertoires and cognitive skills by interacting with more competent group members (John-Steiner & Mahn, 1996; Noroozi et al., 2018). Moreover, the social interactions within groups can be significant sources of knowledge (Johannisson, 1990; Khalifeh et al., 2020) and new ideas and viewpoints (Christensen & Peterson, 1990; Puhakka, 2006) that are essential drivers for idea generation (Gruber et al., 2013).

Synthesizing these disparate ideas and views by individuals after the group work would increase the richness of their available information (MA et al., 2011), further enhancing the positive effect of divergent thinking on their idea-generation skills (Banihashem, Farokhi Tirandaz, et al., 2014; Banihashem, Rezaei, et al., 2014; Gielnik et al., 2012; Kermani et al., 2020; Shahali Zadeh et al., 2016).

The current study's findings indicated that group-to-individual transfer could happen in a hybrid brainstorming session in terms of the average performance of all participants. However, group work does not necessarily improve all the participants' individual idea generation outcomes outside the group. Group members may employ strategies that enhance their group product, but this is not necessarily reflected in their individual performance after group work (Akhteh et al., 2022; Noroozi et al., 2013). For instance, in a group where more active or knowledgeable members complete the task on behalf of the group, less active or knowledgeable members (i.e., free riders) may fail to enhance their individual performance (Prichard et al., 2006).

Moreover, previous research indicated that individuals who were part of a successful group performed significantly better in a subsequent similar task than individuals who were part of an unsuccessful group (Barron, 2003). In this regard, Curseu et al. (2015) referred to group synergy as a significant factor in the group-to-individual transfer that can happen in hybrid settings. The concept of group synergy captures the effectiveness of the collective induction processes in that groups that exceed their average or their best member are those in which generative learning was most effective (McNeese, 2000). In this regard, Curseu et al. (2015) reported that members of synergetic groups better develop their decision competencies through group interaction processes, and members of strong synergy groups obtain the highest cognitive benefits. In this regard, future studies could go more in-depth by identifying the collective synergetic qualities of successful groups that could help their ex-members perform better after the group work.

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## Learning Biochemical Biomolecule's Structure and Nomenclature by Using Words Games


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**Abstract:** Games are fully accepted by students, as they stimulate memory, activate reasoning capacities in brain, improve the knowledge and keep out the stress. Our innovation teaching group is interested in using games for teaching Biochemistry of the Chemistry degree. Most of the individual games found in Internet are classified in numerical games (sudoku, calculation games, a grid to paint black squares depending on the file and column numbers, ...) and word games (anagrams, crossword puzzles, word search puzzles, connecting dots, mazes, labyrinths, matching two sets, amidakuji, logic games, or knight's tour games). Biochemistry books often contain glossaries and word index, and usually students must learn many difficult words, including biomolecules. In Chemical degree, it is important that students also know the structure of these biomolecules. In this work, we present some examples of chained-words games. Some of these games can be difficult to prepare, as most of the biomolecules end in -ose (most carbohydrates), -ase (most enzymes), whereas not many biomolecules begin with e-. Thus, domino games can be a good option to learn two aspects of biomolecules: structure and nomenclature. Dominoes tiles contain two zones (one with a structure of a molecule, and the other with the name of another molecule). Student must fit the structure of one molecule with its name, thus learning both structure and name. Depending on the dominoes, this game can be played individually or in groups of students. The game was very appreciated by all our students.

**Keywords:** Games, Biomolecules, Biochemistry

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## Introduction

One of the difficulties in Biochemistry lessons consists in the nomenclature of the numerous molecules that the students must know, to understand metabolism and remember intermediate's names. Thus, several Biochemistry books contain a glossary of words (and often also of authors), needed to understand the texts [Stryer, 2015; Nelson and Cox, 2018]. These words include the nomenclature of cellular structures, biomolecules, or metabolic intermediates. Students should know these words to understand explanations of metabolic reactions, and of protein functions, being catalysators, transporters, or receptors are the main ones. To learn Biochemistry, in addition to theory classes, other activities such as numeric problems [Dawes, 1980] or laboratory practices [Lozano-Teruel and Tudela, 1988] are usually performed, and these lessons are evaluated mainly using problem resolution and a choice of questions tests [Fernandez and Ruiz, 2018]. Problem classes are based on the resolution of numerical questions, usually distributed to students with paper sheets containing problem statements with their results. Students can solve these problems and obtain a satisfaction in observing that their results fit with the solutions shown in the sheets. Although problems can be sometimes considered by students as games, it is not possible to prepare problems in each topic of Biochemistry. For this reason, learning based on gamification [Mirás-Calvo and Sánchez-Rodríguez, 2008; Marín et al., 2021; Moreno and Centelles, 2021] or through the analysis of practical cases [Ñique-Carbajal, 2020] could be an alternative for those lessons without numeric problems. Games, as problems, could be also enjoyable for students, and could be an alternative to learn. This is known as learning based in problems resolution.

Some of the word related games allow players to increase their vocabulary and understand better Biochemistry. Among these games, the most used to entertain children and that allow them to increase their vocabulary are the enchainned games (or linked words), the hangman game, the game of synonyms and antonyms, and the stop game (based in writing the largest number of words that begin with a certain letter). After analyzing these word games and their use, we wanted to apply them to the Biochemistry students of the Chemistry degree, in order that they could learn the nomenclature of biomolecules and other words related to cellular structures. In our previous works, we classified word games into 4 groups depending on their essential characteristics. These groups were: 1. words lacking a syllable or a group of letters, 2. anagrams and labyrinths, 3. codes to translate words, and 4. dominoes and other enchainned words games. In this work we focus our study on the search for several games based on dominoes and other enchainned words games.

## Method

From the glossaries of several Biochemistry books [Stryer, 2015; Nelson and Cox, 2018], we first collected the most important words that Biochemistry's students should know and classified them into several groups, in which we included biomolecules (carbohydrates, amino acids, proteins, lipids and other nitrogenous compounds) and cells (subcellular organelles, metabolic pathways, methodologies). These words were analyzed to find common aspects between them, to prepare word games.

The conceptual framework of this work consists in the preparation of games, to be used by the students for self-learning. In the Chemistry Degree at the University of Barcelona, Biochemistry was taught during the fourth semester of the degree, but this subject changed in the last year to the seventh semester. Due to this change of semester, the number of students was very low, and although it seems that they liked the games, it was not possible to obtain enough responses to analyze data and to get a robust opinion. Games found on the Internet and adapted to Biochemistry were classified into the 4 groups previously explained in the Introduction section. In this work we classify the games of group 4 (dominoes and other enchainned words games) into several subgroups. In the following sections, some of these subgroups are discussed.

### **Games with Chained Words using Letters**

In Catalan language it is easier to prepare games where the chained word begins with the same syllable as the previous word [JuegosJuegos, 2021], although in Biochemistry many words end in –na or –sa and few words begin with na– or sa–. Nevertheless, English syllables contain more letters than Catalan syllables, and therefore it is even more difficult to construct a game with these characteristics. Thus, games were constructed in English chaining only the last letter of each word with the first letter of the following word. This game, using only the last letter of the word, was also used in Catalan language, but depending on the words, sometimes the game allowed several solutions.

### **Games with Chained Words using Codes**

In this game, words are chained if they begin with a letter in a certain position of each of the words, which does not have to be the last one. This letter can be the same for all the words (constant code), or it is possible to give a numerical code in which each word will have a different letter position depending on the order of each word in the solution (variable code). In the second case, the code is more difficult to solve, as if the word is in a different position, it can be followed by another word beginning with a different letter.

### **Games Organizing Biomolecules from a List considering a Property**

These games can show a list of words of biomolecules, that should be ordered depending on a known characteristic of the molecule. In Biochemistry, it is possible to list several biomolecules and ask the student to order them depending on one characteristic, that should be known by the student. This characteristic could be their molecular weight, the length of the carbon chain, or other structural aspects. Thus, the student not only learns the name of the biomolecule, but also its structure and properties.

### **Games Organizing Words from their Definitions**

This game is related with the previous one, but the list of words can be omitted in the game. Words should be ordered depending on an ordered list of definitions, as it happens with crosswords. When the list of words is

omitted, the game could be more difficult to solve, and it may be better to define the number of letters that the word contains so that the definition would be more unique. The game could also be transformed in a crossword game, giving either definitions or a list of the words, that should fill the crossword grid.

### Games using Dominoes

Dominoes is a board game for up to four players using 28 rectangular tiles with one face divided into two equal squares marked with one to six black dots or none. Each player has seven tokens and in turns place one token on the table after another, where the free square of the first token has identical dots as the second token placed. The player who finishes his token first is the winner. To play with the words of Biochemistry, the token should have two different aspects in each square, in order that they can be chained one after the other in an ordered way.

#### *Domino Games with a Single Solution*

In this game, the two different squares of tokens contain two different sets of the same number of elements, and a relationship allows to pass from one set to the other one, in a unique way. Among these types of games, it could be considered:

- a) Molecules names and their chemical structures (glycine and  $\text{NH}_2\text{-CH}_2\text{-COOH}$ ).
- b) Fatty acids names and their abbreviated biological nomenclature (palmitic and C16:0).
- c) Amino acid names and their three-letter abbreviation (glycine and Gly).

#### *Domino Games with Several Solutions*

This game is based on rectangular tiles divided into two equal squares, presenting in each of these squares two different sets with different numbers of elements in each one, and a relationship that allows to pass from a set with more elements to the other with fewer elements, so that several elements of the first set are related to a single element of the second set. Among these types of games, it could be considered:

- a) Molecules names and biomolecules' families (palmitic and lipids).
- b) Carbohydrates names and carbons that contain (glucose and hexoses).
- c) Carbohydrates names and functional group families (glucose and aldoses).
- d) Amino acids names and isoelectric point (glycine and neutral).
- e) Amino acids names and ketogenic/glucogenic (alanine and glucogenic).
- f) Fatty acids names and saturated/unsaturated (palmitic and unsaturated).

## Results

This section shows some examples of the chained word games, that could be applied to the study of Biochemistry in the Chemistry degree of the University of Barcelona, in order that students can learn by playing the

nomenclature and other aspects of the main biomolecules. These games will be used, in the future, by the students for self-studying the nomenclature and structure of biomolecules, and some of them could be placed in an Escape-room for a better enjoy of the students. The chained games were classified into 5 subgroups: 1. Games with chained words using letters; 2. Games with chained words using codes; 3. Games organizing biomolecules from a list considering a property; 4. Games organizing words from their definitions; 5. Games using dominoes. In this paper some examples are presented for each subgroup.

### Games with Chained Words using Letters

In Biochemistry, it is very difficult to chain words using syllables, although easier in Catalan or Spanish compared to English. Thus, in English it is easier to chain words using only the last letter of each word. Hereby, an example is given of a game with chained words using letters.

*Example game 1.-* Chain the following words, so that a word that ends with a letter is chained with the following word that begins with the same letter:

Words:

ADENOSINE, CHOLESTEROL, CITRIC, DNA, ENZYME, EXON, HEXOSE, LIPID, NADH, NUCLEIC

Possible solutions:

NADH–HEXOSE–EXON–NUCLEIC–CITRIC–CHOLESTEROL–LIPID–DNA–ADENOSINE–ENZYME

NADH–HEXOSE–ENZYME–EXON–NUCLEIC–CITRIC–CHOLESTEROL–LIPID–DNA–ADENOSINE

### Games with Chained Words using Codes

Words can also be chained using codes. In games, the code should be given in order that students can use it to chain the words. The code can be constant or variable. In this section, two different types of games, using a constant or a variable code, are shown:

*Example game 2.-* Chain the following list of words considering that, one word is linked with the next one, if the third letter of the first word is the same as the first letter of the second word (code = 3):

Words:

CYSTEINE, DOPAMINE, GLUCOSE, INOSITOL, LYSINE, NADH, ORNITHINE, PALMITATE, SUCROSE, URIDINE

Solution:

GLUCOSE–URIDINE–INOSITOL–ORNITHINE–NADH–DOPAMINE–PALMITATE–LYSINE–SUCROSE–CYSTEINE

*Example game 3.-* Chain the following words, regarding amino acids names, considering that one word is chained with the next one, if in the given word the letter located at the code 647452334 coincides with the first letter of the following word, that is, the sixth letter of the first word matches the first letter of the second word and so on:

Words:

ALANINE, ASPARTATE, CYSTEINE, PHENYLALANINE, ISOLEUCINE, LEUCINE, LYSINE, PROLINE, SARCOSINE, TYROSINE

Solution:

PHENYLALANINE(6)–LYSINE(4)–ISOLEUCINE(7)–CYSTEINE(4)–TYROSINE(5)–SARCOSINE(2)–ALANINE(3)–ASPARTATE(3)–PROLINE(4)–LEUCINE

### Games Organizing Biomolecules From a List considering a Property

Another type of game is that related not only to the biomolecule's nomenclature, but also to the biomolecule's structure. Thus, this kind of game gives more information about the molecule and considers a characteristic of the compound. Hereby, we present two possible properties to order biomolecules: molecular weight or the length of the carbon chain.

*Example game 4.-* Order the following amino acids, considering their molecular weight:

Amino acids:

ALANINE, GLYCINE, HISTIDINE, ISOLEUCINE, LEUCINE, PHENYLALANINE, SERINE, TRYPTOPHAN, VALINE

Solution:

GLYCINE (75) < ALANINE (89) < SERINE (105) < VALINE (117) < ISOLEUCINE (131) = LEUCINE (131) < HISTIDINE (155) < PHENYLALANINE (165) < TRYPTOPHAN (204)

*Example game 5.-* Order the following unsaturated fatty acids according to their carbon chain length:

Fatty acids:

ARACHIDIC, BEHENIC, CAPRIC, LAURIC, LIGNOCERIC, MYRISTIC, PALMITIC, STEARIC

Solution:

CAPRIC (C10:0) < LAURIC (C12:0) < MYRISTIC (C14:0) < PALMITIC (C16:0) < STEARIC (C18:0) < ARACHIDIC (C20:0) < BEHENIC (C22:0) < LIGNOCERIC (C24:0)

### Games Organizing Words from their Definitions

This game could be represented also as a crosswords game, looking the common letters of the words, and constructing a crossword grid. Students should order the position of each of the elements depending on the order given by the definitions. Games can be reduced to a single type of biomolecule or to all biomolecules. It is also possible that the game presents some words to choose or that the words are not given in the game. If words are given, the game results easier to solve, but if words are not given, clues should be shown to complete the game. Some clues could be the number of letters on each word.

*Example game 6.-* Order the following compounds, considering the definitions indicated below:

Compounds:

ALANINE, ARGININE, ASPARTATE, CYSTEINE, GLYCINE, LEUCINE, PHENYLALANINE, PROLINE, SERINE, THREONINE

Definitions:

- 1.- Amino acid, that has a hydroxyl group on a primary carbon.
- 2.- Amino acid, that is abbreviated as A.
- 3.- Achiral amino acid.
- 4.- Branched chain amino acid, that is isomer of isoleucine.
- 5.- Nonpolar aromatic amino acid.
- 6.- Acidic amino acid, that contains 4 carbon atoms.
- 7.- Amino acid, that has a hydroxyl group on a secondary carbon
- 8.- Amino acid, that contains a mercapto group.
- 9.- Basic amino acid, that contains a guanidine group.
- 10.- Cyclic aliphatic amino acid.

Solution:

SERINE – ALANINE – GLYCINE – LEUCINE – PHENYLALANINE – ASPARTATE – THREONINE –  
CYSTEINE – ARGININE – PROLINE

*Example game 7.-* From the definitions, find the names of the molecules to which it refers and order them according to the numbering:

Definitions:

- 1.- Abbreviation for deoxyribonucleic acid (3 letters).
- 2.- Abbreviation of the reduced form of nicotinamide adenine dinucleotide (4 letters).
- 3.- Amino acid, that is abbreviated as A (7 letters).
- 4.- Disaccharide present in milk, whose hydrolysis yields glucose and galactose (7 letters).

- 5.- Salt of the glycolytic metabolic intermediate, which is transported to mitochondria to fill the Krebs cycle (8 letters).
- 6.- Basic amino acid, that in addition to belonging to proteins, participates as an intermediate in the urea cycle (8 letters).
- 7.- Amino acid belonging to proteins, that contains a mercapto group (8 letters).
- 8.- Monosaccharide present in fruits (8 letters).
- 9.- Salt of the most frequent fatty acid in humans, called in systematic nomenclature hexadecanoate (9 letters).

Solution:

DNA – NADH – ALANINE – LACTOSE – PYRUVATE – ARGININE – CYSTEINE – FRUCTOSE – PALMITATE

**Games using Dominoes**

In this kind of games, tokens can be used to organize the game. It could be played individually or in groups (as in the typical domino game).

*Example game 8.-* Place the dominoes one after the other, so that the systematic nomenclature of each biomolecule is next to the chemical structure of this biomolecule. Which molecule is not an amino acid?

Dominoes:

1)	$\begin{array}{c} \text{H}_2\text{N}-\text{CH}-\text{COOH} \\   \\ \text{CH}-\text{OH} \\   \\ \text{CH}_3 \end{array}$	•	GLYCINE	2)	$\begin{array}{c} \text{H}_2\text{N}-\text{CH}-\text{COOH} \\   \\ \text{CH}_2 \\   \\ \text{OH} \end{array}$	•	LEUCINE
3)	$\begin{array}{c} \text{H}_2\text{N}-\text{CH}-\text{COOH} \\   \\ \text{CH}_2 \\   \\ \text{CONH}_2 \end{array}$	•	ALANINE	4)	$\begin{array}{c} \text{H}_2\text{N}-\text{CH}-\text{COOH} \\   \\ \text{CH}_2 \\   \\ \text{SH} \end{array}$	•	RIBOSE
5)	$\begin{array}{c} \text{H}_2\text{N}-\text{CH}-\text{COOH} \\   \\ \text{CH}-\text{CH}_3 \\   \\ \text{CH}_3 \end{array}$	•	SERINE	6)	$\begin{array}{c} \text{CHO} \\   \\ \text{H}-\text{C}-\text{OH} \\   \\ \text{H}-\text{C}-\text{OH} \\   \\ \text{H}-\text{C}-\text{OH} \\   \\ \text{CH}_2\text{OH} \end{array}$	•	PHENYLALANINE
7)	$\begin{array}{c} \text{H}_2\text{N}-\text{CH}-\text{COOH} \\   \\ \text{CH}_3 \end{array}$	•	CYSTEINE	8)	$\text{H}_2\text{N}-\text{CH}_2-\text{COOH}$	•	ASPARAGINE
9)	$\begin{array}{c} \text{H}_2\text{N}-\text{CH}-\text{COOH} \\   \\ \text{CH}_2 \\   \\ \text{CH}_3-\text{CH}_2-\text{CH}_3 \end{array}$	•	THREONINE	10)	$\begin{array}{c} \text{H}_2\text{N}-\text{CH}-\text{COOH} \\   \\ \text{CH}_2 \\   \\ \text{C}_6\text{H}_5 \end{array}$	•	VALINE

Solution:

1 – 8 – 3 – 7 – 4 – 6 – 10 – 5 – 2 – 9 – 1

RIBOSE is a carbohydrate. It is not an amino acid.

*Example game 9.-* Place all the dominoes one after the other, so that each biomolecule is next to its family.

Dominoes:

1)	GUANOSINE	•	Amino acid	2)	VALINE	•	Nucleoside
3)	CYSTEINE	•	Carbohydrate	4)	RIBOSE	•	Lipid
5)	CHOLESTEROL	•	Lipid	6)	GLUCOSE	•	Carbohydrate
7)	ADENOSINE	•	Amino acid	8)	OLEIC ACID	•	Carbohydrate
9)	ALANINE	•	Amino acid	10)	GALACTOSE	•	Nucleoside

Possible solutions:

1-2-7-9-3-6-4-5-8-10-1

1-2-7-9-3-4-5-8-6-10-1

1-9-2-7-3-6-4-5-8-10-1

1-9-2-7-3-4-5-8-6-10-1

1-3-6-4-5-8-10-7-9-2-1

1-3-4-5-8-6-10-7-9-2-1

1-9-3-6-4-5-8-10-7-2-1

1-9-3-4-5-8-6-10-7-2-1

## Discussion

In previous works of our consolidated innovation teaching group (GINDOC-UB/180), we carried out a search for games to be used to self-study Biochemistry's biomolecule names and structures. These games were based on the grammar games used to learn languages. We classify the games into four main groups: 1. words lacking a syllable or a group of letters, 2. anagrams and labyrinths, 3. codes to translate words, and 4. dominoes and other enchainned games. Since the games were first used during the COVID19 pandemic lockdown and it was not possible to hold a competition between different players, they were thought for individual students for self-studying. Later, these games were also applied to find a key word that could be used to continue an Escape-room game. In this work, we focus on the games of group 4 (dominoes and other games enchainned games). We classified this group of games into 5 subgroups: 1. Games with chained words using letters; 2. Games with chained words using codes; 3. Games organizing biomolecules from a list considering a property; 4. Games organizing words from their definitions; 5 Games using dominoes. Our goal was to apply them in a shortly future for the self-study of Biochemistry students, and thus were evaluated by the students, although there were few students in the class.



Games with chained words using syllables are the most frequent in Catalonia within the chain games [JuegosJuegos, 2021]. However, in Biochemistry there are numerous words that end in -ose or -ase (carbohydrates or enzymes), -ic (acids), -ate (salts), or -ine (amino acids), and it is difficult to find words beginning with those syllables. In English, as ending syllables use frequently more than 2 letters, it is even more difficult. Thus, another possibility was to chain the words using only the last letter (games of subgroup 1). It was easier in Biochemistry to find words that started only with one letter. This game must include the words to be chained, and it is a simple game to be solved.

Games of subgroup 2 (games with chained words using codes) are more difficult to solve, especially those with a variable code, which depends on the position of the word. In the easier game using a constant code, a specific letter position can be defined to chain the next word (see example game 2). Solving this constant code game is like solving subgroup 1 games. In subgroup 1, the letter used as initial for the second word is the last one, whereas in constant code subgroup 2, the letter occupying a constant position inside the word. When all the words are ordered with a letter that is in the same position (example game 3), it is possible to mark this letter in all the words and easily see the possibilities of words beginning with this letter. More complex is the game using a variable code as that shown in example game 4, where the initial letter from the next word is not always in the same position. The code can be as complex as wished (for example, different numbers in different positions, as 142857) or the same code repeated periodically (for example, 272727). Variable codes can be given as a number (as before) or as a fraction (for example,  $1/7 = 0.142857$ ; or  $3/11 = 0.272727$ ).

Sorting games are another type of game that, despite not chaining words, the words are included in a list, as if they were lists of chained words. These types of games include games that order words in a list (subgroup 3) and games that chain words from their definitions (subgroup 4). For games of subgroup 3, a characteristic that allows ordering the words is necessary, so words should be regarding the same family of biomolecules. Among biomolecule's characteristics, the structure can be considered. Biomolecules can be ordered depending on their molecular weight, length of the carbon chain, etc. It is difficult to look for differential characteristics for some molecules that have the same chain length or similar molecular weight (as in the case of carbohydrates).

Easier to prepare are subgroup 4 games, in which a common characteristic is not needed, but only a clear definition of the word. Thus, in subgroup 4 games it is not necessary that words refer to biomolecules. In this subgroup, the game is simplified if the words are included within the game, only deciding which word corresponds to each of the definitions. It is more difficult to solve the game if words are not included in the game. In this second case, it is better to provide some additional data about the resulting words (such as, for example, the number of letters that the word contains, or a letter that is in a determined position of the word as if it were a crosswords game).

Finally, subgroup 5 games (games using dominoes) are the most difficult to solve, as students must know biomolecule's names and structures. These games could be played individually (for games with only one solution) or in a group (for games that could have more solutions). A simple game that can be played by a single

player is like that shown in example game 8, that contains two sets with the same number of elements (name of the biomolecule and its chemical structure). It is also possible to relate the names of amino acids with its 3-letter abbreviation. As only one sequence is possible in both cases, game should be played individually. However, it is also possible to complicate the game, and even propose it for two or more players, by relating the names of biomolecules to the type of biomolecule (carbohydrate, lipid, amino acid, nucleotides) as in the case of example game 9, or names of carbohydrates and their structural characteristics (aldoses or ketoses) or their length of the carbon chain (hexoses or pentoses). These examples allow several solutions, although in our example, the path that includes all the tokens was requested. However, due to the double tokens, it is possible to obtain several solutions in which all tokens can be used.

## Conclusion

Games with chained words using letters are easy to solve, and sometimes can also have several solutions.

Games with chained words using codes can contain constant or a variable code. When the code is constant, games are like those of subgroup 1 (easy to solve and to prepare). When the code is variable, games are more difficult to solve, as word chaining depends on the position of the word in the solution.

Games of subgroups 3 and 4 allow an additional learning, as the students learn also about the property of biomolecule, or the definition of the word. Subgroup 4 games are like crosswords.

Games using dominoes are also complete games, as students can learn about structure and nomenclature of biomolecules.

## Notes

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## Morphosyntactic Peculiarities of The Speech of Children with Down's Syndrome

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**Abstract:** The article, "morphosyntactic peculiarities of the speech of children with Down's syndrome", treats, important aspects of the study of two adjacent branches of linguistics, namely, psycholinguistics and neurolinguistics-Language development of the child accompanied by speech disorders, on the other hand, those morphosyntactic features that are specific to the Georgian language system, also appearing at the initial stage of the child's speech. Since communication disorders cover a wide spectrum, only children with Down's syndrome were selected for the study, because the genetic factor causing their speech disorder, unlike other disorders, is clearly known, and the systemic features of speech are defined in such a way that the results can be generalized, unlike other types of speech disorders, which have a more specific character. The research is related to the speech development of Georgian children with Down's syndrome, and the purpose of the research is to reveal the main patterns of the morphosyntactic features that are observable in the speech of children with Down's syndrome. Based on the specifics of the disorders, 9- and 10-years old children were selected for this research. Psychological observations have shown that the speech of a 10-year-old child with Down's syndrome corresponds to the speech of a child without a disorder, approximately 4-5 years old, the period when conscious speech begins. The main method of studying psychology is Observation. The most favorable material for studying a child's behaviour is given when it occurs in natural conditions. Thus, we will conduct the experiment in direct field conditions by using the "natural experiment" method. This way, can avoid us the bias of answers.

I conducted research, with questionnaires and game-like interactive experimental tasks. I use the method used by Piaget called the "*clinical method*" (Piaget 1994). Questions and experimental tasks are designed to stimulate childrens responses in a direction that is in with the scope of my interest. The result of the research showed the morphosyntactic features characterising the speech of children with Down's syndrome. In particular, their speech is characterized by:

- *Very short sentences. As a rule, they perceive more than they express;*
- *The development of speech is directly related to the development of fine motor skills of the hand;*
- *their speech is characterized by focusing on one specific moment;*
- *As a result of the research, the advantage of their visual memory was confirmed;*
- *The phenomenon observed during the production of the past tense forms of the verb was hyperregulation;*
- *They have a problem with understanding time and space in general;*
- *The stages of their speech development correspond to the stages of cognitive development, of those children without impairment;*
- *Through experiments, it was determined that all children with Down's syndrome made typical mistakes.*

This fact will help psychologists and language therapists working with them to develop certain strategies, which will be focused on improving children's speech, and this, in turn, will help to improve their socialization.

**Keywords:** Psycholinguistics, Neurolinguistics, language disorders, Morphosyntactic features, Child's speech.

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## Introduction

Learning language is thought to be a congenital ability to make abstract grammar structures and rules, which is grasped step by step. As far as learning language is a congenital process, it denotes actualizing the knowledge. Consequently, language development in a child is defined from "inside". Speech is not only a tool to master a language and communicate but it also defines child's psychic development. During the process of discovering life, nature or things around them, child's intelligence expands and progresses. Speech develops and the aesthetic approach to reality is formed. A language is the first system which determines his/her social life.

We got interested in two contiguous fields of linguistics, they are very imperative aspects of psycholinguistics and neurolinguistics, on the one hand, language development of a child and its subsequent process, speech disorder and on the other hand, the morphosyntactic peculiarities, characteristic to Georgian language system. This phenomenon becomes noticeable at the very first stage of speech. In the process of observing such facts, speech disorders were detected with children who have speech impediments. As the latter has a wide spectrum, for the research we selected the children with down syndrome, because the precipitating because of their speech impediment is a Genetic factor, unlike other disorders and its speech idiosyncrasies are clear, speech peculiarities are manifested in the way which allows to take a broad view on the subject.

In each case the syndrome is revealed in a different way. Working with down syndrome children requires special approaches and strategies. Despite the fact that each of them has dissimilar abilities and skills, their speech development process can be characterized with analogies. Analyzing these points, the research theme has become defined – speech development in Georgian Down Syndrome children and research target has become apparent - indicators of main models of morphosyntactic idiosyncrasies and their manifestation in the speech of Down Syndrome children.

Generally, the best method to define the way how a child's psychic development processes are progressing, is observation. Material based on the study of behavior should be collected in the natural conditions. The experiment consequently was held in the field setting, communicating directly with research participants using the method of "**natural experiment**". That way we avoided foreknowledge of answers, which often occurs in the artificial environment and hinders collecting individual and naturally actualized material.

The research was done on the basis of specially composed questionnaire and interactive experimental tasks

related to the research topic. We used the method which was called “**clinical method**” by Jean Piaget. During the learning process we asked questions to the informants, who articulated certain sentences or phrases. The questions and experiment tasks were compiled in the way which stimulated children’s answers to the direction we were interested in.

During the research we also used the method of structured interview which considers making special questionnaires based on the research topic, it is a good method not only to save time but to match and compare, organize – arrange and interpret, also to analyze the received answers.

The methods we used in the research are in compliance with acknowledged criteria, validity and credibility. To prove the credibility of the results, the research outcome was ascertained later. To meet the criterion of validity, its internal and external validity was protected. We observed whether the factors different from our hypothesis, affected the speech of our participants and to what degree it is probable to generalize the research outcomes.

In order to comply with acknowledged social values, on the basis of generalization the statistical analysis of children’s answers, the criterion by Piaget’s recommendations were considered. (Piaget, ... Cook, M.T. The origins of intelligence in children 1952).

*Surveying the similar age children;*

*Surveying the children who had similar level of development and disorder;*

*To prove the achieved outcome after a certain period had passed;*

The age group was formed of 8 children who were 9-10-year-old. Why all of the same age and not preschool children?! as speech development does occur in preschool time. As our research issue refers to children with peculiarities, this very age group was chosen. In the school period speech, verbal development is a continuous process, at the same time, mastering the reading and writing skills also contribute the progress in this direction. Down syndrome is followed by intelligence and adaptive personality disorders which affects their performance in the learning and communication processes. Correction/adjustment of these factors starts in the early childhood and In primary school time, 3rd - 4th classes is the right time, as they unlike their peers, learn to adopt these skills not earlier than this age. They learn much slower in comparison with other children. Their speech ability trails behind their mental development. Their verbal progress goes through the same phases, as their peers but much slower. Psychological observation showed that 10-year-old down syndrome child speech corresponds with a 4-5-year-old, with no disorders. In other words, according to mental development, physical age is halved. This is why 9-10-year-old children were selected and not preschool pupils. This is the age when the research can be the most effective to find out about their grammar peculiarities.

To achieve the relevant results, severe forms of mental delay were excluded from the experiment as well as light forms or mosaicism cases. Adolescents with trisomy and translocation also took part in the research, because these kinds of disorders are not different with its external forms and have similar indicators/signs. The children chosen, were of the same nationality to avoid different parental language codes. The native language, in our case

Georgian, should have been the same to accomplish the target of the research. Among many problems, down syndrome children have, the hardest is speech impediment. When working with them we should remember to differ two types from each other.

The first: hearing problem. Very often down syndrome sickness is followed by different level of disorder. As a consequence, arise hearing, speech development and articulation problems.

The second: when there is no problem with hearing.

When speech development disorder is connected with hearing problem or with central nervous system disorder, we are incapable to solve the problem by linguistic approach and medical intervention is inevitable.

As for the second variant with speech disorder, it is a problem but resolvable. This is a severe psychological problem, connected with peculiarities of physical and mental development. None of our participants has a hearing problem.

L. Vigotsky considers that hearing problem has a structural system. It can be primary or secondary. Primary is connected with biological factors of anomalous development. Genetic disorders also belong to it. As for secondary, it is caused by anomalous development of the primary dysfunction. Speech disorder in down syndrome people in our experiment is partially connected with genetic dysfunction, particularly with disorder of central nervous system, which is not proved yet, though modern studies showed that in the given case the surface of the right and left temples are symmetric, while within the normal range, it should be asymmetric. As we have already mentioned above, although the speech impediment is partly connected with genetic disorder, it is proved, that early response – rehabilitation can be successful. Our target is analogous: with the help of description the speech impediment peculiarities and identifying specific problems, we make a little contribution and help specialists who work with down syndrome children, to improve patients' speaking capacity and develop their intellect.

Speech impediment spectrum is quite diverse, the origin and the character of each case is different, however in every one of them, the communication with environment is incomplete. Generally, there are three types of disorder:

Expressive language disorder

Receptive language disorder

Mixed disorder

In case of Expressive language disorder, we come across difficulty in expressing opinions and feelings. Disorder like this is mostly revealed when the vocabulary is poor, which later causes using short sentences while speaking, making incorrect sentence structure, also morphosyntactic grammar mistakes: omitting pronouns and prepositions, incorrect verb or noun case and conjugation forms. The process is often followed by articulation

problems.

As for receptive speech order, the problem is to perceive and understand the speech of others. People with such disorders do not respond to others' speech not because they cannot understand but, they have receptive speech disorder. Such kind of impediment mostly is followed by expressive speech order. That is logical, as hearing a word and understanding it is the precondition of speech.

In case of mixed disorder, both types of problems are present at the same time.

With down syndrome children's speech, two types of disorders are detected simultaneously. In other words, mixed type of disorder is manifested typically in them. What is the reason?!

Down syndrome children have speech which is hardly intelligible, because of muscular dystrophy. Unintelligible speech may have different reasons. They are:

Difficult sounds to articulate;

Low tone of face muscles;

Phonological problems (e.g. omission of ending sounds);

As we have already noted, right development of speech is obstructed by hearing and articulation problems., caused by anatomic-physiological peculiarities related to down syndrome (hypotonia, decreased muscle tone, high palate mouth, difficulty in breathing). Visual memory is their strong side. In a very short time they can remember large amount of information, but they have "imagery" memory and not photographic (so called Eidetic memory).

How the disorder is assessed?

There are several means, they are:

Interview;

Observation;

Standardized tests to examine speech;

For speech impediment assessment the following five language aspects are recommended. They are:

Phonology;

Morphology;

Syntax;

Semantics;

Pragmatics;



Morphology – using prefixes and suffixes. Number of nouns, verb tense conjugation, formation and usage of proper nouns in a speech. To recognize the speech delay, children are asked to end the sentence.

Syntax involves understanding grammar constructions and structures. Perceptive syntax Assessment comprises picture selection. Among the read texts, the participants of the experiment should choose the relevant picture. Expressive syntax means an ability to pronounce grammatically correct sentence. Generally, it is examined through repeating sentences correctly but as repetition does not mean forming structurally correct sentence, more sensible way is to observe child's speech in the natural environment and gather spontaneously articulated phrases.

Semantics - difficulties in this direction are revealed in the poor vocabulary a child has. He has a dilemma to understand the different meanings of words and to recollect them. Such kind of observations are based on the tests composed according to dictionaries. Also, the tests centered on the word explanations, analogues and working out relations between words.

Pragmatics means language usage in the social context. Troubles arise in the social context, in the concrete situation, when gestures and language are required. Mainly it happens during story telling or during situational dialogues. Language usage is different for every individual, according to his pragmatic skills.

Many year research and studies confirmed that down syndrome children adopt language levels differently. They can study quite a large number of words and use them in interactive – social situations. It can be said that semantics and pragmatics are their comparatively strong side. Less developed is morphosyntax. Many disorders and difficulties are met namely in this filed. Especially forming grammar tenses, using prefixes and suffixes. Short sentences they practice, does not convey reality. As usual they perceive much more than they express.

We tried to hold pilot or feasibility research and find out the problems in speech and grammar usage, common in Georgian Down syndrome children.

We considered Piaget's third recommendation to confirm/prove the same result/outcome after a period of time and between main experiments was inserted an additional task, they should have told their favorite animation. This task apart from relaxation and attention distraction allowed us to receive more material and deduce what kind of morphosyntactic mistakes they make during a long talk.

Through the first task expressive syntax knowledge has been checked. They were given 9 pictures with relevant 9 sentences. Sentences were in different tenses and they had to match to what they hear, In order to simplify the task, moving picture were given. (so called GIF).

Samples of experimental tasks:

*A child is going to the kindergarten;*



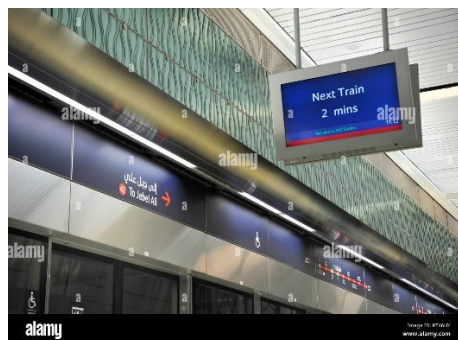
*A girl is dancing;*



*It is raining;*



*The train will arrive in 2 minutes;*



*He will eat a cake;*



*He will play football;*



*A cup has been broken;*



*Grandmother knitted a cap;*



*She cut his hair;*



After selecting a picture, he should repeat the sentences, which examines the peculiarities of his perceptive syntax. At first the verbs are given in consecutively: 3 in the past tenses, 3 in the present and 3 in the future tenses. After some time, they are given the same pictures, at this time not in a consecutive order but in a jumbled way. Again 3 in the past, 3 in the present and 3 in the future tenses.

Second experiment task involves the following, to use a tense correctly in the already formed sentences. In order to receive the answers, we need, we resort to popular provocative method of getting records. It means we give the participants already arranged sentences, to ease the given task the sentences had time adverbs and they only had to put them in a relevant form.

*Yesterday, I was at school or I will go?*

*The day after tomorrow I am going to the kindergarten or I was there?*

*Tomorrow, I went to the cinema or I will go?*

*Today I painted a picture or I will paint a picture?*

*Last year I was seven years old or I am now?*

*Next year I was 8 years old or I will be?*

From the point of perceptive syntax, in order to receive more convincible material, we considered that making a matching between pictures and sentences, was not enough and added third experimental task. To make it natural, we created the stimulating environment for speech. During the experiment we asked additional indicative questions. E.g., What would you do in the place of a protagonist, what would you do? When others were answering, they also spontaneously desired to participate in the conversation.

The fourth experimental task was to use grammatical tense forms correctly by the participants. During a long talk they were talking about their favorite film or about their impressions. What were you doing yesterday? Where are you going at the weekend? With this kind of approach, it is possible to observe how successfully they deal with the challenge.

After the research the morphosyntactic peculiarities characterized to down syndrome children speech, became clear.

The children dealt with the first experimental task successfully, but they could not convey the information the pictures had and the things or events were described nominally.

Material received from the second experimental task, turned out to be interesting in the sense of usage certain tense forms. In particular, with past tense adverbial forms, they use present tense forms, instead of expected past verbal forms. The same took place concerning present and future tense forms. In the cases when future tense adverb required the verb in the future tense form, the participants, at any rate used the present tense forms. So they were focused on the time period when the experiment task has been taking place and could not generalize. When we asked them “please, say what do you see?” Their answer was merely in the present tense, although the action in the picture had already been completed. But when the question was put in another way, -what did you see? – They were able to use the relevant past tense form. The same occurred at the usage of future tense. Instead of paying attention to the future action, happening in the picture, again their answer was in the present. As for the question put in the future, tell me please, what the girl will do? They managed to form the verb in the relevant tense and use it.

The fourth task was aimed at distraction or relaxation of the children. We asked them to tell us a story or a fairy tale, some history or an animation, familiar for them. It turned out the most interesting and entertaining and they could handle the task successfully. However strange was that they confused several animations and fairy tale characters. E.g., While talking about *Cinderella*, at the end of the story, *Spiderman* appeared. The fact can be explained by imitation each other. Also, it can be determined by the fact that it was very hard for them to focus on one fact, one event and they were incapable to tell a story in a consecutive way.

The fifth task involved to draw a picture – a child is going to the kindergarten and then to describe it. It was also very enjoyable for them and very informative for us. One and the same picture has been described absolutely differently by each of them, though the description was short, broken into fragments and without ending...

After Observing and analyzing the results received from the experiment tasks performed by Down syndrome children, the outcomes can be generalized and formed in the following conclusion:

- *Down syndrome children make short sentences. Usually, they perceive more and express less. They almost accurately drew the picture which they had seen before. The colors were the same, the environment also, the road and the flowers. Quite the contrary happened when they were asked what was in the picture. The answer was minimalist: “a child is going” ... any other impressions were expressed in one or two words.*
- *Speech progress is closely related to the small hand motor development. Among experiment participants who could hold a pencil, sharpen it, color the drawing, cut paper or stick it, these had a better developed speech than those, with less developed motor functions.*
- *Their speech can be characterized with a focus on just one specific moment.*

- *Generally cognitive development of a person has a before surgery phase, which embraces period from 2-7 years, in our experiment it is 9-10 age period. This very phase mostly depends on visualization, not on the rules or concept. At this age thinking process is connected with concentration, reflected on the speech. Down syndrome children mainly made mistakes in using past and future tense forms. They comprehended what was clear, evident and obvious analogies were easily understood. They have difficulties to perceive and understand structures associated with space and time in sequence, using the experience in different situations.*
- *The research proved that they have the visual memory advantage. When they were given experimental handouts, a lot of mistakes were spotted concerning grammar tense usage. But after seeing pictures or watching videos, the result was dramatically different, eight participants' description was grammatically correct, they used the tense forms without any mistakes.*
- *Something interesting was detected when they had to conjugate past forms of a verb, it was hyper regulation, particularly two of them (with some exceptions) could not conjugate ergative verb case.*
- *They have a problem in understanding time and space categories, which is the reason they cannot form the verbs in different tenses.*
- *Receptive speech disorder is not detected, it means they understand negative and question forms.*
- *Their strong side, having substantial vocabulary, was demonstrated during long talk when they were describing a picture and main focus was made on expressing their own emotions and feelings, what they were thinking and what they would do in different situations.*
- *Their speech development phases (levels) correspond to their cognitive development stages, like children without any disorders.*
- *Research results basically prove the existence of problems generally acknowledged with down syndrome patients and also specific difficulties characteristic to Georgian language grammar system.*
- *The experiment showed that every Down syndrome child made typical mistakes. This fact will help the psychologists and language therapists to work out certain strategy oriented on the improvement of children's speech development. It will contribute their socializing process.*


School assists Down syndrome children to develop their intelligence abilities, relationships with their peers help them to socialize, which later benefits their speech development. The studies proved that Down syndrome children gain comprehensive education when they study together with healthy children and speech progress is achieved in the environment where they feel equal to others.

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## Analysis of Postgraduate Theses on the Concept of “Information Literacy” in Turkey

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**Abstract:** This research examines the postgraduate theses on the concept of information literacy from various perspectives. In this study, which was conducted within the framework of a qualitative research approach, document analysis was used for data collection. Within the scope of the study, “information literacy” was written as a keyword in the database of the Council of Higher Education (YÖK) National Thesis Center and scanned electronically and (f=33) postgraduate theses published in Turkey with “information literacy” in their titles were reached. In the study, theses were analyzed by content analysis in terms of type, year, language, university, affiliated institute, department, research method/approach, study group/participants, and thesis advisor titles. Because of the research, it has been determined that there are more master's theses than doctoral theses and that master's theses are mostly done in state universities. It has been determined that the number of postgraduate theses in 2019 is higher than in other years, the most common title for faculty members who are thesis managers is “professor doctor,” according to gender, women have prepared (f=21) theses, and men have prepared (f=12) theses. It has been determined that most of the “survey method” studies are conducted in postgraduate studies, most studies are conducted with “students” and most studies are conducted in “Hacettepe University.” Additionally, it has been determined that since 2018, the number of postgraduate theses using the concept of “information literacy” has increased, most of the research is done in the “institutes of educational sciences” of universities, and most of the postgraduate theses are prepared in the “Information and Document Management Department.” It has been determined that the language of the theses is Turkish except for 1 (one) study. According to the results of the research, it was determined that the “survey method/quantitative studies” method was used the most.

**Keywords:** Turkey, Information Literacy, Postgraduate Theses, Analysis

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### Introduction



Today, rapid development in information and communication technologies has caused an information explosion. For this reason, in our age that we call the “information age,” societies that act according to the requirements of the age are called “information societies.” While knowledge production gives birth to new technologies, it also provides easy and rapid sharing of these technologies. This cycle is accepted as an indicator of a level of development in which knowledge is at the center of individuals and societies (Polat&Odabaş, 2008). “Information literacy” is defined by the Association of University and Research Libraries as “the set of skills required to find, retrieve, analyze and use information” (As cited in. Julien, 2005). Information literacy is “acquiring the skills to find, evaluate, use and transmit information that requires effective use of information resources and information centers” (Kurbanoğlu & Akkoyunlu, 2002: 20).

In today's world, which we call the “age of technology,” “information literacy” is defined as the ability to access and use information, and rapid change and emerging information societies need individuals with lifelong learning skills (Kurbanoğlu, 2001). Information literacy is the set of knowledge and skills that allow us to find, evaluate, and use the information we need, as well as filter out information we don't need. Information literacy skills are critical as they are tools that help us to successfully search and find information in the current and future information environments (Eisenberg, 2008: 39). Being successful in the age we live in requires consuming information well, and finding and using information. Information societies need individuals with lifelong learning skills. For this reason, it is critical to gain information literacy, which is the basis of lifelong learning, at an early age. Information literacy should be seen as a part of education programs in parallel with the increase in the amount of information at all levels of education (Kurbanoğlu&Akkoyunlu, 2002:20).

Citizens of a particular nation must know how to find information, how to distinguish it, and how to arrive at conclusions. Today, access to information becomes directly related to access to technology. Therefore, the stack of information can be overwhelming in some places, and scarce and one-sided in others. At this point, information literacy emerges as a functional skill that includes important functions. In particular, ways of accessing information, the framework of finding information, identifying information effectively and responsibly, and using and evaluating information can be achieved with information literacy. In this context, it can enable people to become knowledgeable, critical-thinking citizens by cognitively empowering them at the point of educating through information literacy education (Grassian & Kaplowitz, 2001). Information literacy is central to a knowledge-based society (Sasikala & Dhanraju, 2010). As can be understood from the definitions, the use, evaluation, and personalization of information or making it “private” can be considered as important as access to information. Providing the opportunity to contribute to the individual after accessing the information provides a rich resource at the point of developing creative thinking. Different perspectives will provide richness in meeting the needs and will pave the way for the dissemination of knowledge. Therefore, “the use, evaluation, and personalization of information” is as important as access to information. Today, with the effect of technology, access to information becomes easier, and it ensures that information is well understood and used by assimilation. For this reason, “information literate” is defined as those who can find, absorb, use, interpret and produce results in the fastest way. Additionally, this situation brings with it the concept of information age people (Akdağ&

Karahan, 2004: 20). Technological changes and developments have also affected the structure and functions of educational institutions. In this context, different perspectives have emerged in the understanding of education. When the effects of changes on individuals are examined, individuals must be trained as information literate who can constantly update themselves, adapt to changes easily, and not only follow the developments and produce the information they receive but also how to do it. This is among the important discussions (Ata, 2011:1). Along with these discussions, it is necessary to conduct some scientific studies within the framework of the concept of “information literacy” in the literature. It is seen that there are various scientific studies on “information literacy” apart from the postgraduate theses that are the subject of examination in the literature. Some of the main topics studied on “information literacy” in the literature are as follows; “Perceptions of information literacy and computer self-efficacy of teacher candidates”(Akkoyunlu&Kurbanoglu,2003); “information literacy of primary school teacher candidates” (Başaran, 2005); “Comparison of information literacy self-efficacy of teacher candidates and teachers” (Usluel Koçak, 2006); “information literacy and internet usage levels of teacher candidates” (Kaya&Durmuş, 2008); “The level of difficulty in information literacy skills of teacher candidates”(Gömlüksiz&Öner, 2011); Information literacy levels of postgraduate students studying in the field of Turkish education (İşcan et al., 2012); “Pre-service teachers' views on information literacy” (Gömlüksiz et al., 2013); “Information literacy of Turkish teacher candidates”(Özbay&Benzer,2013); “Information literacy and media literacy levels of science and technology teacher candidates”(Güven, 2014); “information literacy levels of social studies teacher candidates”(Ünal&Er, 2015); “Lifelong learning competencies and information literacy self-efficacy of teacher candidates” (Özgür, 2016); “Information literacy and teacher education” (Baysen et al., 2017); “pre-service teachers' information literacy self-efficacy and attitudes towards the profession” (Tuncer&Dikmen,2018); “Information literacy, collective teacher efficacy and effective school: Structural equation modeling”(Uğurlu et al., 2018); “Leaders of information literacy and internet self-efficacy perceptions of teacher candidates”(Ayyıldız, 2021); “National policies in media and information literacy education in Finland”(Özel, 2022); “How do postgraduate information and records management students design information resources? multimodal information literacy perspective (Ayık & Canatar, 2022), etc. topics appear to have been made.

## The Purpose of Research

This research contributes to the literature and studies on this subject by examining the postgraduate theses on “information literacy” in terms of content. In line with the purpose of the study, answers to the following research questions were sought:

1. What is the distribution of the theses that are the subject of the research according to the postgraduate levels?
2. What is the distribution of thesis authors by gender?
3. What is the distribution of postgraduate theses in information literacy by years?
4. What is the distribution of postgraduate theses according to state and foundation universities?

5. In which language or languages are the postgraduate theses written?
6. What is the distribution of the postgraduate theses, which are the subject of the research, according to the institutes?
7. What is the distribution of the postgraduate theses, which are the subject of the research, according to the departments in which they are conducted?
8. How is the distribution of postgraduate theses according to the universities?
9. What is the distribution of the supervisors who conduct the postgraduate theses according to their titles?
10. How is the distribution of postgraduate theses related to the research subject according to the research method/approach?
11. What is the distribution of the selected samples/participants/study groups in the postgraduate theses?

In today's world, which we call “the age of technology/the age of information,” where rapid change, development, and transformation based on technology is experienced, individuals in order to the problem; information literacy, which means raising individuals who can search and find the information they need, have a certain consciousness about research&development, and have high decision-making skills in evaluating and using information, has an undeniable importance in the 21st century. Information literacy is an important skill today. Therefore, it is thought that it will contribute to the studies conducted on this subject in terms of shedding light and guiding the researchers. Additionally, the fact that no study has been conducted on the content analysis of postgraduate theses on information literacy increases the importance of the study.

## **Method**

### **Research design**

This research is qualitative research and was prepared in the scanning model. “Scanning models are research models that detect a past or present situation as it exists. The event, person, or object that is the subject of the research is tried to be defined in its own conditions and as it is. No attempt is made to modify or influence them in any way. There is something to be known, and it is there. The important thing is to “observe” it correctly (Karasar, 2020:109). In this study, document analysis, one of the qualitative research techniques, was used. The data obtained from document review were analyzed by percentage (%) and frequency (f) analysis methods. Document analysis is the analysis of written materials containing information about the facts and events that are aimed to be investigated (Yıldırım and Şimşek, 2013:217). Document review includes the analysis of written materials such as official publications, reports, records, and open-ended responses to surveys (Patton, 2002). In the study, the documents that are the subject of the examination and the postgraduate theses on “information literacy” in the database of the Council of Higher Education (YÖK) National Thesis Center were examined.

### **Data Collection Tools**

The data were collected with the “Postgraduate Thesis Review Form,” which was created by the researchers by taking the opinions of two field experts. The theses stated in the form were analyzed by content analysis in terms of their descriptive characteristics (thesis type/type by gender, year, language, university, institute, department, research method/approach, sample/study group/participants, thesis advisors). The theses obtained because of scanning in the database of the Council of Higher Education (YÖK) National Thesis Center were first transferred to the “Postgraduate Thesis Review Form.” Each thesis was read once by the researchers. Then, the “Postgraduate Thesis Review Form” was read a second time to be filled.

During the second reading, the required fields on the form were filled and recorded in the computer environment. Evaluations after the second reading were compared and analyzed, and consistency between raters was calculated. Miles&Huberman (2015) percentage of agreement formula was used to calculate the consistency. The participation rate of the researchers who made the evaluation was 90%. A compliance percentage above 70% is considered reliable (Miles & Huberman, 2015). Because of the high percentage of compliance, reliability in data analysis was ensured and ethical issues that had to be followed in the research were meticulously complied with.

### **Sample/study groups**

The sample of this research consists of postgraduate theses with the keyword “information literacy” in the title and which are in the database of the Council of Higher Education (YÖK) National Thesis Center as of October 2022. A total of (f=33) postgraduate theses, 24 masters and 9 doctoral theses on this subject have been reached. This research has some limitations. The most fundamental limitation of the research is that the thesis titles include “information literacy” as a keyword and that all emerging, accessible and accessible theses are included in the research.

### **Analysis of data**

The data obtained with the “Postgraduate Thesis Review Form” were coded in the computer environment and transferred to the researchers. Numerical data are presented in a table by making frequency (f) and percentage (%) statistics in a computer environment. The data obtained were analyzed by the content analysis technique. The main purpose in contentofanalysis is to reach concepts and connections that can make sense of the data. The data obtained in the content analysis are examined in more detail (Yıldırım and Şimşek, 2013, p. 259).

### **Research ethics**

Ethical principles were followed at every stage of this study. The data in the postgraduate theses, which are the subject of the study, were taken ethically, and the sources used were given in the “references” section of the study according to the APA citation method. Ethics committee permission is not required for this study.

### **Findings**

This research examines the postgraduate theses on “information literacy” in Turkey. Data on 33 postgraduate theses, 24 of which are masters and 9 are doctoral theses, are given below in table order.

Table 1. Findings Regarding the Type of Postgraduate Theses

<i>Type of thesis</i>	<i>f</i>	<i>%</i>
Master's	24	72,72
Doctoral	9	27,27
<b>Total</b>	<b>33</b>	<b>100</b>

When Table 1 is examined, it is seen that 72,72% of the current postgraduate theses on information literacy consist of master's theses. The rate of theses in the doctoral theses is 27,27%.

Table 2. Findings Regarding the Gender of the Authors of the Postgraduate Theses

<i>Type of thesis</i>	<u><i>Female</i></u>		<u><i>Male</i></u>		<u><b>The overall total</b></u>	
	<i>f</i>	<i>%</i>	<i>f</i>	<i>%</i>	<i>f</i>	<i>%</i>
Master's	16	66,6	8	33,3	24	100
Doctoral	5	55,5	4	44,4	9	100

Table 2 in postgraduate theses in master's theses; (f=16/66,6%) females, (f=8/33,3%) males. In the doctoral program, it was determined that this ratio was (f=5/55,5%) female and (f=4/44,4%) male. It is seen that the number of female researchers is higher in both postgraduate thesis studies.

Table 3. Findings Regarding the Distribution of Theses by Years

<i>Publication Year of Theses</i>	<i>Master's theses</i>		<i>Doctoral theses</i>		<i>Total</i>	
	<i>f</i>	<i>%</i>	<i>f</i>	<i>%</i>	<i>f</i>	<i>%</i>
2004	1	3,03	-	-	1	3,03
2005	-	-	1	3,03	1	3,03
2007	2	6,06	-	-	2	6,06
2008	2	6,06	-	-	2	6,06
2011	2	6,06	-	-	2	6,06
2013	1	3,03	1	3,03	2	6,06
2016	3	9,09	-	-	3	9,09
2017	1	3,03	1	3,03	2	6,06
2018	3	9,09	2	6,06	5	15,15
2019	5	15,15	1	3,03	6	18,18

<i>Publication Year of Theses</i>	<i>Master's theses</i>		<i>Doctoral theses</i>		<i>Total</i>	
	<i>f</i>	<i>%</i>	<i>f</i>	<i>%</i>	<i>f</i>	<i>%</i>
2021	2	6,06	1	3,03	3	9,09
2022	2	6,06	2	6,06	2	6,06
<b>Total</b>	<b>24</b>	<b>72,8</b>	<b>9</b>	<b>27,2</b>	<b>33</b>	<b>100</b>

When Table 3 is examined, it is seen that the most postgraduate studies (f=6/18,18%) were conducted in 2019. It can be seen that the studies were conducted in 2018 (f=5/15,15%) and 2021 (f=2/6,06%). It is seen that the least number of studies (f=1/3,03%) were conducted in 2004 and 2005. This rate was realized in 2007, 2008, 2011, 2013, 2017, 2022 (as of October) (f=2/6,06%).

Table 4. Findings regarding the distribution of postgraduate theses by public and foundation universities

<i>University</i>	<i>f</i>		<i>%</i>	
	<i>Master's theses</i>	<i>Doctoral theses</i>	<i>Master's theses</i>	<i>Doctoral theses</i>
<b>State Universities</b>	23	9	96,96	100
<b>Foundation Universities</b>	1	-	3,03	-
<b>Total</b>	<b>24</b>	<b>9</b>	<b>100</b>	<b>100</b>

When Table 4 is examined, it is seen that state universities publish theses at a rate of (f=32/96, 96%) when considering the types of universities where theses are written. It is seen that only (f=1/3,03%) theses are produced in foundation universities.

Table 5. Findings on the Distribution of the Language in which Postgraduate Theses are Written

<i>Language</i>	<i>f</i>		<i>Total (f)</i>	<i>Total (%)</i>
	<i>Master's theses</i>	<i>Doctoral theses</i>		
Turkish	23	9	32	96,96
English	1	-	1	3,03
<b>Total</b>	<b>24</b>	<b>9</b>	<b>33</b>	<b>100</b>

Considering the language distribution of postgraduate theses on “information literacy” in Table 5, 23 master’s theses and 9 doctoral theses are in “Turkish” (f=96,96%); One master’s theses (3,03%) was prepared in “English”

Table 6. Findings regarding the Institute Distribution of Postgraduate Theses

Distribution of Postgraduate Theses by Postgraduate Schools	<i>Master's theses</i>		<i>Doctoral theses</i>	
	<i>f</i>	<i>%</i>	<i>f</i>	<i>%</i>
Institute of Educational Sciences	9	37,44	-	-
Institute of Social Sciences	6	24,96	9	100
Institute of Turkish Studies	5	20,83	-	-
Postgraduate School of Natural and Applied Sciences	3	12,48	-	-
Institute of Health Sciences	1	4,16	-	-
<b>Total</b>		<b>100</b>	<b>9</b>	<b>100</b>

When Table 6 is examined, it is seen that postgraduate theses on “information literacy” (f=9/37,24%) are mostly made in educational science institutes. It is seen that postgraduate theses (f=6/24,96%) were made at the institute of social sciences. It was determined that it was done at the Institute of Turkish Studies (f= 5/20, 83%) and the Institute of Science (f=3/12, 48%). It is seen that the least number of studies (f=1/4,16%) are in the health sciences institute.

Table 7. Findings related to the Distribution of the Departments of Postgraduate Theses

Distribution of Postgraduate Theses by Major Departments	<i>Master's theses</i>		<i>Doctoral theses</i>	
	<i>f</i>	<i>%</i>	<i>f</i>	<i>%</i>
Department of Information and Records Management	8	33,33	5	55,50
Department of Computer and Instructional Technologies	4	16,66	-	-
Department of Educational Sciences	2	8,32	-	-
Public Relations and Promotion	2	8,32	1	11,11
Department of Mathematics and Science Education	1	4,16	-	-
Department of Turkish and Social Sciences Education	1	4,16	2	22,22
Department of Educational Administration	1	4,16	-	-
Strategy Science Department	1	4,16	-	-
Department of Lifelong Learning	1	4,16	-	-

Distribution of Postgraduate Theses by Major Departments	<i>Master's theses</i>		<i>Doctoral theses</i>	
	<i>f</i>	<i>%</i>	<i>f</i>	<i>%</i>
Interior Architecture Department	1	4,16	-	-
Department of Nursing	1	4,16	-	-
Department of Philosophy and Religious Sciences	1	4,16	1	11,11
<b>Total</b>	<b>24</b>	<b>100</b>	<b>9</b>	<b>100</b>

When Table 7 is examined, there is diversity in the departments. Doctoral theses in the field of “information and records management” (f=5/55,50%); “Turkish and social sciences education” department (f=2/22,22%); in the “public relations and promotion” (f=1/ 11, 11%); it is seen that it was prepared in the “philosophy and religious sciences” section (f=1/11,11%). Among the postgraduate theses, in the “information and document management” section of the master's theses (f=8/33,33%), in the “computer and instructional technologies” section (f=4/16, 66); in “educational sciences” (f=2/8,32%); it is also seen that it was prepared in the “public relations and promotion” section (f=2/8,32%). (f=1/4,16%) It is seen that postgraduate theses have were prepared in the departments of mathematics and science education, Turkish and social science education, educational administration, strategy science, lifelong learning, interior architecture, nursing department, philosophy and religious sciences.

Table 8. Findings regarding the Distribution of Universities where Postgraduate Theses are made

Universities	<i>Postgraduate Type of Thesis</i>			
	<i>Master's theses</i>		<i>Doctoral theses</i>	
	<i>f</i>	<i>%</i>	<i>f</i>	<i>%</i>
Hacettepe University	2	8,32	5	55,55
Gazi University	3	12,48	1	11,11
Marmara University	4	16,64	-	-
Çankırı Karatekin University	3	12,18	-	-
Bolu Abant İzzet Baysal University	1	4,16	1	11,11
Necmettin Erbakan University	1	4,16	1	11,11
Ankara University	-	-	1	11,11
Atatürk University	1	4,16	-	-
Bartın University	1	4,16	-	-
Dokuz Eylül University	1	4,16	-	-
Gebze Technical University	1	4,16	-	-



Universities	<i>Postgraduate Type of Thesis</i>			
	<i>Master's theses</i>		<i>Doctoral theses</i>	
	<i>f</i>	<i>%</i>	<i>f</i>	<i>%</i>
Istanbul Bilim University	1	4,16	-	-
Istanbul University	1	4,16	-	-
Karadeniz Technical University	1	4,16	-	-
Selçuk University	1	4,16	-	-
Yıldız Technical University	1	4,16	-	-
Zonguldak Bülent Ecevit University	1	4,16	-	-
<b>Total</b>	<b>24</b>	<b>100</b>	<b>9</b>	<b>100</b>

When Table 8 is examined, the master's theses on “information literacy” were found in Hacettepe University (f=2/8,32%); doctoral theses (f=5/55,5%) at Hacettepe University; Master's theses at Marmara University (f=4/16,6%); at Gazi University (f=3/12,48%); it was determined that it was done in Çankırı Karatekin University (f=3/12,48%). It is seen that Marmara University ranks first among postgraduate theses, and Hacettepe University ranks first in doctoral theses.

Table 9. Distribution of Postgraduate Thesis Advisors by Titles

Postgraduate Thesis Advisors (Titles)	<i>Master's theses</i>		<i>Doctoral theses</i>	
	<i>f</i>	<i>%</i>	<i>f</i>	<i>%</i>
Professor	7	29,16	8	88,88
Associate Professor	8	33,33	1	11,11
Dr. Instructor Member	2	8,33	-	-
Assist Prof.Dr.	7	29,16	-	-
<b>Total</b>	<b>24</b>	<b>100</b>	<b>9</b>	<b>100</b>

When Table 9 is analyzed, it can be seen that 33 theses were made at the “doctoral theses” (f=9) and “master's theses” (f=24) levels. In the distribution of consultant titles according to the “master's theses” level; it is seen that faculty members with the title of “assistant professor,” which was removed in 2017, only had a thesis at the “master's theses” level and the rate was (f=7/29,2%). It is seen that the master's theses is prepared under the supervision of faculty members with the title of “Dr. Instructor Member” (f=2/8,33%). It is seen that the master's theses is prepared under the supervision of faculty members holding the title of “Associate Professor” (f=8/33,33%). It is observed that (f=7/29,16%) master's theses was prepared under the supervision of faculty members holding the title of “professor doctor.” In the distribution of postgraduate theses prepared at the “doctoral theses” level, it is seen that the theses are prepared under the supervision of faculty members holding the title of “professor doctor” at a rate of (f=8/88,88%). It is seen that 1 (one) thesis was prepared under the supervision of faculty members holding the title of “associate professor” at a rate of (f=1/11,11%). It has been

determined that faculty members holding the titles of “Dr. Instructor Member” and “Associate Professor” do not provide consultancy for “Doctoral theses” theses.

Table 10. Distribution of Research Approaches/Methods Used in Postgraduate Theses

Approach/Methods	<i>Master's theses</i>		<i>Doctoral theses</i>	
	<i>f</i>	<i>%</i>	<i>f</i>	<i>%</i>
Qualitative	1	4,16	1	11,1
Quantitative	5	20,83	2	22,2
Mixed	-	-	1	11,1
Survey	17	70,83	5	55,5
Method not specified	1	4,16	-	-

When Table 10 is examined, it is seen that the most used research method/approach at the “master’s theses” level is the “survey method” ( $f=17/70,83\%$ ). It is seen that ( $f=5/20,83\%$ ) of the master’s theses were made with the “quantitative research method.” It is understood that ( $f=1/11,11$ ) of the master’s theses were made with the “qualitative research method,” and “method was not specified” in ( $f=1/11,11\%$ ). The most frequently used research method/approach at the “doctoral theses” level is the “descriptive method” ( $f=5/55,55\%$ ), and in the “doctoral theses” theses ( $f=2/2,22\%$ ), “quantitative research method”; it is understood that ( $f=1/11,11\%$ ) was done with the “qualitative research method,” and ( $f=1/11,11\%$ ) with the “mixed method.”

Table 11. Distribution of Sample/Participants/Study Groups Used in Postgraduate Theses

Sample of the study/participants/ study group	<i>Master's theses</i>		<i>Doctoral theses</i>	
	<i>f</i>	<i>%</i>	<i>f</i>	<i>%</i>
Student	12	50,00	3	33,3
Pre-service teacher	3	12,50	1	11,1
Teacher	3	12,50	-	-
Student-teacher -	-	-	1	11,1
Instructor	-	-	1	11,1
Other	6	25,00	3	33,3

When Table 11 is examined, it is seen that “students” were selected in the sample of “master's theses” ( $f=12/50,00\%$ ). At the rate of ( $f=6/25,00\%$ ), different samples/working groups/participants were selected, especially printed and written materials, which were called “other.” It is understood that “teacher candidates” were selected in the sample of ( $f = 3/ 12,50\%$ ) and “teachers” were selected in the sample of the same percentage ( $f =3/12,50\%$ ). It was determined that “students” were selected in the sample of “doctoral theses” level theses ( $f=3/33,33\%$ ). At the rate of ( $f=3/33,33\%$ ), different samples/working groups/participants were selected, primarily printed and written materials, which were called “other.” It is understood that “pre-service teachers”

were selected in the sample of ( $f=1/11,11\%$ ) and “students and teachers” were selected in the sample of the same percentage ( $f=1/11,11\%$ ). It can be seen that “instructors” were chosen at the same rate ( $f=1/11,11\%$ ).

## Discussion and Conclusion

“Information literacy” as the keyword in the title of the Council of Higher Education (YÖK) National Thesis Center database between the years 2004–2022 was examined and a content analysis was conducted. Because of the study, in terms of the type of thesis; it has been determined that most master's theses (15.15%) were prepared in 2019, most doctoral theses ( $f=2/6,06$ ) was prepared in 2018, and ( $f=2/6,06$ ) in 2022. Based on these data, it can be said that there has been an interest in studies on “information literacy” recently.

It was determined that women ( $f=16/66,6\%$ ) prepared significantly more postgraduate theses by gender in postgraduate theses. It occurred at a rate of ( $f=8/33,30\%$ ) in men. It was determined that women prepared more theses in doctoral theses. It is in the form of women ( $f=5/55,55\%$ ) and men ( $f=4/44,44\%$ ). In particular, it is striking that the number of female researchers is higher in the two postgraduate thesis types.

In the distribution of postgraduate theses according to public foundation universities ( $f=23+9=32/96,96\%$ ), it was determined that these were prepared in state universities. It was determined that one thesis ( $f=1/3,03\%$ ) prepared as a master's theses among the postgraduate theses was prepared in a foundation university in Turkey. Almost all the theses on “information literacy” were prepared in state universities.

In the distribution of the language in which the postgraduate theses were written, “Turkish” was written at a rate of ( $f=23+9=32/96,96\%$ ). The postgraduate thesis was written in “English” at a rate of ( $f=1/3,03\%$ ) from postgraduate theses. It is seen that Turkish is used extensively and is preferred as the language of science.

In the distribution of postgraduate theses by institutes, it is seen that most postgraduate theses were prepared by the institute of educational sciences ( $f=9/37,24\%$ ). It is followed by the institute of social sciences ( $f=6/24,96\%$ ). It was determined that it was a health sciences institute with at least a master's theses ( $f=1/4,06\%$ ). All of the doctoral theses ( $f=9/100\%$ ) were prepared within the social sciences institute. In this sense, it is seen that a high percentage of postgraduate theses ( $f=6+9=15$ ) are prepared by the social sciences institute.

In the distribution of master's theses according to department, it is seen that master's theses are the discipline of information and records management ( $f=8/33,33\%$ ). In doctoral theses, it is seen that most theses are prepared ( $f=5/55,50\%$ ) in the information and document management department. Since it is a knowledge-based department, it is seen that the concept of “information literacy” is discussed intensively in the thesis studies in this department.

In universities where postgraduate theses are made, the highest number of master's theses are respectively; Marmara University ( $f=4$ ), Gazi University ( $f=3$ ), and Hacettepe University ( $f=2$ ) are seen. It has been determined that the highest number of studies ( $f=5/55,55\%$ ) in doctoral theses were prepared by

Hacettepe University. Hacettepe University is the university that produces the most theses with (f=2+5) studies in the number of postgraduate theses on the concept of “information literacy.”

In the data regarding the titles of the postgraduate thesis advisors, in the master's theses (f=24); Prof. Dr. (f=7), Assoc. Doctor (f=8), Assist. Assoc. doctor (f=7), Dr. It was determined that he was a faculty member (f=2). In his doctoral thesis, Prof. Dr. (f=8), Assoc. doctor (f = 1). Almost all of the doctoral the dissertations and an important part of the master's theses were written by Prof. Dr. (f=7+8=15).

In the method/approaches used in the theses prepared on the concept of “information literacy,” in the master's theses (f=24); the most used method was the “survey method” (f=17/70,83%). It was followed by the “quantitative research method” with a rate of (f=5/20,83%). No method/approach was specified in 1 (one) master’s theses. As in master's theses, the “survey method” was mostly preferred in doctoral theses (f=5/55,55%). It is seen that the “survey method” is preferred in the number of postgraduate theses (f=17+5=22). It is seen that qualitative and mixed research methods are preferred once.

In the data regarding the sample of the postgraduate theses, it is seen that the most sample/participant/study group (f=12/50%) in the master's theses is “students.” It is seen that the sample/participant/study group (f=3/33,33%) is “students” in doctoral theses. Because of the research; it is seen that the most thesis is the master’s theses (f=24). It was determined that the people who prepared the master’s theses were mostly women in terms of gender. Most of the advisor faculty members who prepared the postgraduate thesis “Prof. Dr.” It has been determined that they have the title of “social sciences institute” (f=6+9=15) the most. The university where the most theses were prepared (f=2+5=7) is “Hacettepe University.” The branch of science with the most studies is “information and document management.” “Survey method” (f=17+5=22) is the most used method in the research method. The most used and preferred sample is “students.”

As a result, it is seen that the concept of “information literacy” has recently attracted attention not only for postgraduate theses but also for many types of research, especially articles, due to the “information age/technology age.” These studies in the literature; (İpek&Tavukçuoğlu,2020), (Ayık&Ayık, 2021), (Mandıracı&Zan,2021), (Ayyıldız, 2021), (Özel, 2022), (Ayık&Canatar, 2022), (Ünal&Furat, 2022) are some studies on information literacy.

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## Contradiction of the Women's Image in the Roman Bumi Manusia

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**Abstract:** This paper aims to describe the contrasting images of two women in Pramoedya Ananta Toer's Roman Bumi Manusia, namely Nyai Ontosoroh and her daughter, Annelis. The description of the contradictory self-images of Nyai Ontosoroh and Annelis is interesting to discuss considering the differences in racial background, social class, education, and the relationship between these characters and Minke, which is the storyteller's point of view in this novel. This research on Roman Bumi Manusia by Pramoedya Ananta Toer uses a feminist literary criticism approach. Roman Bumi Manusia has been widely studied through a feminist approach by emphasizing the character of Nyai Ontosoroh as a figure with the qualities of a feminist, but fails to see that the character of Annelis is depicted as the exact opposite of her mother. Annelis' character is depicted through the ideal and normative female self-image, as the other who depends on her mother and Minke's character who later becomes her partner. Annelis is described as an inferior and bound character, a depiction of a woman's self-image that is very far from feminist qualities.

**Keywords:** Bumi Manusia, Contradiction, Women's Image, Nyai Ontosoroh, Annelis.

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## Introduction

Fiction is one of the means by which a social problem is conveyed to the reader. In her writing entitled *Ideology and Literature*, Gülrah (2016) describes the relationship between fiction (literacy) and reality. According to him, novelists transform reality into something that is sometimes more/less than the original object. Novel is a genre that has dualism, namely imagination on the one hand and a social protest against the real life of a society on the other. Although the writer/novelist writes his work in a very imaginative, poetic, and without ideological drive, the novel pushes the author in a confrontation with the routine activities that occur in real life. Moreover, compared to other forms of literacy, the novel is a genre whose task is to reveal the most resistant things, the worst things that happened, a secret, intolerable things and shameful things. Therefore, the novel is considered as a special literacy that has the quality in stating a truth. The novel is considered ambiguous because on the one hand it appears as a perpetuation of the culture of the highest social class, but on the other hand it seems as a resistance to the same culture.

*Bumi Manusia* is the first part of the Roman work of Pulau Buru tetralogy consisting of *Bumi Manusia* (1980), *Children of All Nations* (1980), *Footsteps and the Greenhouse*. This novel has been widely read and translated into more than 33 languages, including Dutch, Japanese, German, Russian, and English (Susanti, 2013). The background of the time during the Dutch colonial period in Indonesia caused this novel to be widely read and loved in the Netherlands, more than in Indonesia itself. *Bumi Manusia* is a novel that describes the differences in social class, race (Indigenous, Indo, Totok Dutch), educational background, and culture. Set in the Dutch colonial era in the early 20th century in Indonesia, this novel describes the social life of the people of East Java by emphasizing the story of Minke, Nyai Ontosoroh and their daughter Annelis. In *Bumi Manusia*, Javanese feudal culture is contrasted with Western culture which is considered more advanced and civilized from the perspective of Minke's character. Although at the end of the story, there is a change in the mindset of Minke's character on European culture which he admires, caused by arbitrariness and excessive domination of the natives, including himself and the character Nyai Ontosoroh.

In *Bumi Manusia*, one of the things that needs to be considered is the depiction of the image of the female characters. Pramoedya describes various self-images of women ranging from indigenous women, mixed Indonesian-European (Indo) descent, other Asian women such as from Japan and China, and white women who live (temporarily) in the Dutch East Indies. Vyomakesisri (2017) mentions that literature is evidence of the evolution of women and their role over time. The literature also reflects the perception and behavior of society towards women. Pramoedya Ananta Toer's *Bumi Manusia* is a testament to women and their role in Indonesia in the early 20th century. This novel describes the problems and issues that befell women in the Dutch East Indies society. This novel describes the position, status, perception, and behavior of society towards women who come from various racial and social class backgrounds. This novel was widely reviewed through its depiction of the feminist qualities of the character Nyai Ontosoroh despite her background in race, social class, and the lowest educational status in society at that time. The depiction of the feminist self-image of the character Nyai

Ontosoroh is also an important element that attracts readers and researchers, in addition to the reputation of Pramoedya Ananta Toer.

However, apart from the figure of Nyai Ontosoroh, Pramoedya also presents several images of women that are far from feminist in quality. On the contrary, they are depicted as other and inferior with all the qualities of an ideal female image. Moreover, the depiction of a woman's very contrasting self-image is shown through the character Nyai Ontosoroh and her daughter, Annelis. Based on the arguments of Gülrah (2016) and Vyomakesisri (2017) that the novel has two sides, namely imagination and reality and a reflection of society, *Bumi Manusia* can also be considered as a picture of the lives of Indonesian women at that time. Reviewing the Earth of Mankind through only Nyai Ontosoroh's self-image is a failure in seeing the reality of women's social life. The figure of Nyai Ontosoroh is an anomaly in the reality of Indonesian women during the Dutch colonial period. Moreover, *Bumi Manusia* is widely considered to be ambivalent in describing the characters in it, so that the depiction of women's self-image cannot be seen from one particular point of view. Nyai Ontosoroh, Annelis, and the female characters in *Bumi Manusia* each have a dominant and different self-image, but it doesn't stay steady from the beginning to the end of the whole story. This can be considered as the author's goal in describing the various self-images of women that were different from the stereotypes inherent in Dutch society and literature about Indonesian women at that time (Hellwig, 1993). The stereotypes of "Nyai" (concubine) who are always considered lowly and Indo women who are always considered to be trying to attract the attention of white men in Roman *Bumi Manusia* are represented differently.

## Research Methods

This research is research with qualitative descriptive method. Qualitative research method is a method that produces interpretive and descriptive data. Data is obtained through the process of collecting, describing, classifying, and analyzing data, and then compiling a conclusion. Pramoedya Ananta Toer's *Roman Earth of Man*, published by Hasta Mitra, the third edition of 353 pages, is the primary data for this research. Other alternative data is obtained by collecting information related to *Roman Earth of Mankind*, including articles, criticisms/reviews, books, or from other forms of literacy. The data collection technique was carried out by the process of reading novels repeatedly, marking important words, sentences, and paragraphs related to the research theme, classifying data, making conclusions from research results and formulating suggestions obtained after conducting research.

This study uses a feminist literary criticism approach. Feminist literacy critique is a critical analysis of an article using feminist perspectives, theories, and politics (Guo, 2018). Feminist literacy critique tries to find a narrative about the domination of men (patriarchy) over women (bodies) in economic, social, political, and psychological aspects, in a literature. The depiction of female characters, the language used, and the relationship between the characters are some of the things that can be considered in the feminist literacy critique approach. The feminist literacy criticism approach implements woman as a reader, namely how women respond differently to

text/literature. Hellwig (1993) who also uses a feminist literacy critique approach, states that through novels and short stories, it is possible to understand the roles and positions of women as well as understanding gender ideology. According to Hellwig (1993), all interpretations made in feminist literacy criticism are political. Literature cannot be separated from sites that represent women and how texts relate to the relationship between gender and sexual differences. In the literature, the description of men and women is narrated and should the reader believe in or against the cultural norms that exist in society. Women must resist the internalization of norms made by men, and rely entirely on experiences as women when reading a text/literature. With a feminist literary criticism approach, this paper aims to describe the image of women in *Roman Bumi Manusia*, and how that depiction represents Indonesian women and their problems in the early 20th century. Through a feminist literary criticism approach, it can be explained that there were stereotypes attached to women in Indonesia from different social classes, races, and educational backgrounds at that time.

## Results and Discussion

Romance of *Bumi Manusia* has been widely reviewed and studied by writers and researchers both from within and outside the country. This is certainly related to the popularity of the novel and the reputation of the author, Pramoedya Ananta Toer. The Romance of *Bumi Manusia*, especially the first part of the *Buru Island Tetralogy*, has been widely reviewed with regard to the character of Nyai Ontosoroh. Nyai Ontosoroh is a fictional character who is described as a woman with feminist qualities. However, Nyai Ontosoroh is not the only interesting female character to be discussed in this novel. Romance *Bumi Manusia* presents several images of other female characters, one of which is Annelis who is the daughter of Nyai Ontosoroh's character. According to Rodgers (2005), the characters of Minke and Annelis describe an imaginative life that occurred during the Dutch colonial period in Indonesia. The story of Minke, who is an H.B.S student with a Javanese background, and Annelis, a mixed blood, bound in city life, school, science, national debate, and colonial bureaucracy. This indicates that every female character in the *Roman Earth of Mankind* is interesting to be reviewed in writing. The review of female characters in *Roman Bumi Manusia* in this paper focuses on the contrast between Annelis and Nyai Ontosoroh's self-images. The self-images of Nyai Ontosoroh and Annelis contradict each other and are different from the stereotypes attached to women from their social class and race at that time.

The contradiction in the female character's self-image is clearly depicted in the second part of this novel, namely during the first meeting between Minke's character and Nyai Ontosoroh and Annelis. The depiction of Annelis' character from Minke's point of view begins and is dominated by images of her face, body, skin color and beauty. Annelis character is described as a beautiful woman compared to the stars, pearls, beauty and luxury that appear in the house of the richest family in Wonokromo. The depiction that emphasizes on physical appearance marks the sexual attraction of Minke (male) to Annelis.

A new atmosphere took its place: in front of us stood a girl of white skin, smooth, European face, hair and eyes of a native. And those eyes, those sparkling eyes like a pair of mornings: and his smiling lips

destroy faith (Earth of Man: 12)

Her beauty is mesmerizing. In the midst of this luxury he appears majestic, a part that transcends all that is beautiful and luxurious (Earth of Man: 13)

The beauty of the Annelis character is described as a natural beauty obtained from heredity, as an Indo who inherits white (caucasian) genes. According to Rhode (2016), in the 19th century to the beginning of the 20th century, beauty and honor were two interrelated things. At that time, women who used makeup and tried to improve their appearance were considered immoral because beauty must seem natural, even or especially, when it can only be accomplished through considerable unnatural effort (Rhode, 2016). Dressing up excessively with the aim of beautifying oneself is considered immoral. In those days, women were humiliated if they were not beautiful, but they were also humiliated if they tried to be beautiful. In the early 20th century, the discourses of self-expression, women's freedom, rights and emancipation were voiced by feminists, opposed to the construction of femininity and physical appearance. Women and feminism themselves have long been faced with differences of opinion about beauty. On the one hand, beautifying oneself is seen as a right and self-expression, while on the other hand, it is seen as a perpetuation of what men want from women. The natural beauty of Annelis character is directly assessed by Minke as a high quality that deserves to be admired. However, Minke's admiration for Annelis made this female character only judged by the quality of her beauty and physical appearance. This is because Annelis in the Roman Earth of Mankind is then depicted continuously only as a beautiful woman and the sexual object of men. As according to Hooks (2000), that is a sexist thought if the value of women is only in appearance, especially when it is decided that a woman is attractive or not, by men. Emphasis on beauty deprives women of credibility and shifts attention that should be paid to other abilities and work achievements (Rhode, 2016).

Her teeth were sparkling, looking more beautiful than pearls I had never seen (Earth of Mankind, 14)

Annelis' self-image depiction in Roman Bumi Manusia reflects the perception of Indonesian society at the beginning of the 20th century on women whose value is valued through beauty and physical appearance. In the story, Minke is described as highly appreciating the character of Annelis but for readers, the character of Annelis is then reduced to nothing more than just a beautiful woman and male sexual object. Loughnan & Pacilli (2014) review sexual objectification by citing Langton's thought that women are considered and treated as sexual objects when their personal values are dwarfed only by their body and physical appearance. The depiction of Annelis characterizes the idea that beauty and physical appearance are considered the most superior qualities that women must possess, compared to other qualities as human beings. The purpose of women's physical appearance and beauty is nothing but to be attractive to men.

Ann. Keep that in mind. And every bad thing is never interesting. A woman who cannot take care of her own beauty, if I were a man, I would say to my friends: don't marry such a woman; he can't do anything, he can't even take care of his own skin (Earth of Man: 83)

Nyai Ontosoroh's words towards Annelis mark a thought that women are objects of men's views. As Berger (1972) thinks in his book *Ways of Seeing*, women are aware of men's views on them. Women, then have to examine everything about themselves because how women appear to men is an important thing that marks the normal assumption of success in life. Women's self-esteem is assessed through the awards given by other people, in this context, men. For Annelis, beauty is an assessment of her and Minke is an eye that judges and gives a price to that beauty. Annelis is described as a woman who should be proud of her beauty and physical appearance because that is what makes people appreciate the character of Annelis. Nyai Ontosoroh's statement towards Annelis also marks a sexual objectification of women from other women. This statement implies that women are worthless if they have an ugly physical appearance and fail to achieve normative beauty. In this statement, women are dwarfed as sexual objects, which it is imperative for them to be sexually attractive for men to be respected.

Annelis' self-description is what Bordo (1993) describes that women must manage and discipline their bodies in order to pursue the relentless pursuit of ideal femininity. Discipline and normalization of women's bodies for Bordo are a form of oppression against women of any age, social class, race, sexual orientation, becoming a social control on women. Bordo (1993) and Bartky (1997) review Michel Foucault's idea of the docile body, that there are institutions/institutions and regulations that discipline the body to comply with social norms. Bartky (1997) argues that femininity causes women's bodies to be more obedient (docile) than men's. Foucault uses Jeremy Bentham's prison model as the panopticon in formulating the formation of a disciplined society and how power operates automatically. Everyone then is on the assumption of permanent surveillance and vision of him. For Bartky (1997) then it is considered as a reference that everyone can be a panopticon for women. Nyai Ontosoroh's statement to Annelis regarding the importance for women to maintain their beauty and physical appearance shows how women are panopticons to other women. In the context of the relationship between Nyai Ontosoroh and Annelis, a mother becomes the panopticon for her daughter. Women then undergo disciplinary practices that require and produce a feminine body. In the *Romance of Bumi Manusia*, being feminine is about being beautiful and taking care of one's physical appearance. Bartky (1997) quotes Judith Butler, that femininity is an achievement because if a woman fails to be feminine, she fails to become a woman. Nyai Ontosoroh's statement implements that being a woman is the same as being successful in attracting men.

If it was this girl that Suurhof meant, he was right: not only rivaling but also surpassing the Queen  
(*Earth of Man*: 12)

"Have you seen the picture of the Queen?"

"Of course. Incredibly beautiful!"

"Yes. You're not wrong."

"Why?"

"You are more than him"

He stopped walking, just to look at me, and:

"Te-ri-ma-ka-sih, Minke" he answered blushing (*Earth of Mankind*: 16).



The comparison of Annelis to Queen Wilhemwina marks a comparison to the race that was considered the most superior at the time, namely the Caucasian race or European descent. Hellwig (1993) explains that in Dutch literature, Indonesian women are generally represented by cunning characters who try to attract white men. White women are represented as protagonists, whereas natives and Indos are generally represented as antagonists. In the Roman Earth of Mankind, on the other hand, Annelis, who is an Indo, is represented as a woman who is gentle and far from cunning. Annelis is different from the Indonesian women in Dutch literature, not being attracted to white men but to an indigenous named Minke, who incidentally was considered the lowest in the strata of social class and race at that time. Minke, who admires the beauty of European women is described as having no sexual attraction to white women like Magda Peters or Sarah and Miriam de la Croix. Minke's disinterest in the white women he meets is directly related to the social status between himself and these women. Magda Peters is a literature teacher who is respected by Minke, who enjoys writing and reading, while Miriam and Sarah are the daughters of Mr. Assistant Resident Herbert de la Croix. Minke's relationship with these white women is filled with narratives and debates about science. There is no description of the physical appearance of the white women that Minke met because they were not sexual objects like Annelis.

An indo, for the people of Indonesia is a representation of "close to white", which in the Romance of Bumi Manusia is represented by the figure of Annelis. In some parts of the story, Minke, who admires all about European civilization and culture, also admires the beauty of white women represented by the character of Queen Wilhemwina. Minke's interest in the character of Annelis is a manifestation of the thought that the ideal beauty is represented by "white skin". Indos are not white because this race inherits half of its genes from races other than whites, but they are the closest race to the white race for Indonesians. If you borrow the opinion of Priyatna (2013) in his book *Becoming White*, that indo can be interpreted as "white but not quite white" (not quite white). Minke's interest in Annelis marks an interest in female beauty represented by white (indo) skin. The manifestation of Indo beauty (of mixed race descent) in Indonesia then continued in the post-colonial period. Indos, in post-colonial society in Indonesia later became a celebrity and adorned visual media such as television, advertisements, magazines/tabloids and discoursed on Indonesian women's beauty standards to this day. The comparison of Annelis with Queen Wilhemwina who is a beautiful white woman indicates that the character of Annelis for Minke is the embodiment of the figure of a white woman who can be achieved with the status of an indigenous man.

Unlike the character of Annelis who is constantly portrayed through her beauty, the physical appearance of Nyai Ontosoroh, who is also a beautiful native, is described by Minke's character only at a glance. This is because the character of Nyai Ontosoroh is described through other qualities than only through her physical appearance. The depiction of Nyai Ontosoroh's self-image that does not emphasize physical appearance, although at first glance it is explained that this character is a beautiful woman, marks a different relationship with Minke. For Minke, Nyai Ontosoroh is not a sexual object. In several local news pages, Pramoedya is said to have used the figure of his biological mother as inspiration in creating the character of Nyai Ontosoroh. The relationship between Minke and Nyai Ontosoroh in *Roman Bumi Manusia* is different from that of Annelis, so the description of Nyai Ontosoroh's physical appearance is not widely narrated. This indicates that the discourse of women's ideal beauty

is discussed in relation to men's judgments, both in reality and in the literature.

And soon an Indigenous woman appeared, clothed, in a white kebaya adorned with expensive lace, probably made by Naarden as E.L.S. taught. before. He wore black velvet sandals embroidered with silver thread. Her appearance was so impressive because of her neat makeup, her clear face, her motherly smile, and her makeup that was too simple. He looks human and young, fair skinned (Earth of Man: 16).

Minke saw other qualities of Nyai Ontosoroh's character besides female beauty. The description of Nyai Ontosoroh's self-image is filled with more diverse definitions such as intelligence (language), knowledge and love of reading, attitude (wisdom) and forward thinking, and the ability to work in companies and offices. In contrast to the character of Annelis, who is always compared to beautiful and luxurious objects, the character of Nyai Ontosoroh, on the other hand, is compared to the figure of a teacher or a genuine European woman, whom she considers to be an advanced woman.

I'm still fascinated to see a native woman not only speak Dutch well, more so because she doesn't have a complex with male guests. Where else can a woman like her be found? What was the school before? And why only a nyai. a mistress? Who had educated her to be so free as a European woman? (Human Earth: 17)

And I can't say he's stupid. His Dutch language is quite fluent, kind and civilized; his attitude towards his children was gentle, and wise, and open, unlike native mothers; (Human Earth: 19)

He reads European books, this one Nyai! (Human Earth: 20)

Nyai eats quietly like a real European woman who graduated from a British boarding school (Earth of Man: 22)

It turned out that my knowledge of it was meaningless. He knows a lot of European terms that I don't know. Sometimes he even explains like a teacher. And he can explain! What is this Nyai beside me? (Human Earth: 33)

What school graduate does he appear to be so educated, intelligent and able to serve several people at once with different attitudes? (Earth of Man: 39).

The depiction of Nyai Ontosoroh's self-image is an anomaly considering that her character is a Nyai (concubine). Hellwig (1993) explains that generally, a Nyai in Dutch literary works is described as a woman who has no self-respect and is cunning, indicating a bias between white and male people. Nyai characters are generally portrayed as lowly women who try to raise their status through relationships with white men. Dutch literature fantasizes "nyai" as mysterious oriental women, who use magic to attract white men. Nyai are depicted as characters who use their sexuality to achieve economic gain. However, unlike Dutch literature written by white men, Pramoedya Ananta Toer's *Roman Earth of Man* depicts a much different Nyai character. Linda (2009) mentions that in contrast to literature written by white men who tend to describe "nyai" into one general representation, namely evil women, Malay literature written by natives presents a more diverse representation of "nyai".

In one passage, Pramoedya writes that Nyai is a position in society that is considered low and is seen as only thinking about sexual desire, confirming that such a stereotype existed in society at that time. However, by presenting the character of Nyai Ontosoroh, it is as if Pramoedya is trying to resist stereotypes against Nyai. As Hellwig (1993) mentions that all depictions of Nyai's self-image are the result of men's writings depicting them from a biased and fantasy-filled point of view. These women cannot voice their opinions, personal experiences, either in personal documents or works of fiction so that no one knows what their real life is like. The stereotypes for "Nyai" in society and in Dutch literature do not represent every experience of indigenous women in Java, Sumatra, or other parts of Indonesia who were illegally married to white men at that time. Ming (1983) in his writing entitled *Barrack-Concubinage in The Indies, 1887-1920* explained that having "nyai" was commonplace in Indo-European society at that time. Starting from soldiers, generals, office / government employees, governors, and residents (residents) have "nyai" if their status is not/unmarried so the number of women who become "nyai" is not small at that time. The depiction of Nyai Ontosoroh's self-image is different from the stereotypes of the Dutch East Indies society and the generalizations found in Dutch literature that describe "nyai" as women who tend to be immoral. Nyai Ontosoroh is a daughter who was sold by her parents for economic gain and promotion. It is not possible to generalize the experiences of many women to one experience. Negative generalizations and stereotypes are products of gender bias, demeaning and objectifying women. Moreover, the "question" in Dutch East Indies society at that time was in the interest of white men. The Dutch were ambivalent towards "nyai" by considering them as lowly women but allowing the practice of "questioning" to fulfill the interests of white men who had to live in the Dutch East Indies at that time. The debate about "pernyaian" by religious people in the Netherlands then reduced this practice, by then increasing white women who lived in the Dutch East Indies to accompany their husbands/partners who had to work/task. This shows that colonialism had more impact on women, both in the colonized and the colonizer. Both indigenous women who became "nyai" and white women became victims in fulfilling men's interests and colonialism.

Nyai Ontosoroh, who is always described as a feminist figure with other qualities such as intelligence and ability to work, is also described as a person who prioritizes beauty. Even as has been explained that the character of Nyai Ontosoroh actually has sexist thoughts by looking at beauty as the main asset of women. However, the sexist thoughts of the character Nyai Ontosoroh constitute a small portion of the depiction of her self-image. Nyai Ontosoroh is described as a woman who is well developed in attitude and way of thinking. Nyai Ontosoroh realized that a woman needed other qualities than just beauty. This motivates her to study and work. The character of Nyai Ontosoroh is described as a person who realizes that beauty and other qualities of women have the same importance. Her position and status as an illegitimate wife (concubine) makes Nyai Ontosoroh not economically and psychologically dependent on her husband, but on the contrary, this character is described as independent and assumes work responsibilities and acts as the head of the family. ally married to white men at that time.

When the factory stops working and the employees and workers go home, I often see people coming from inside the house and looking at our house. Of course. The female guests who visit always praise

me as a beautiful girl, the Tulangan flower, the Sidoarjo flower. If I look in the mirror, there is no other reason than to justify their flattery.

The ability to work and other qualities in Annelis are not important to be narrated from Minke's point of view, indicating once again that this woman is only a sexual object in relation to men. The ability to work and other activities carried out by Annelis is not widely narrated because this character is mostly discussed through her relationship with Minke. Annelis is actually a character who since childhood has learned the trade and helps her mother with the work. This girl is respected by both male and female workers/subordinates, and she is a much more responsible figure than the men in the family such as Mr. Mellema and Robert Mellema. However, this positive picture of Annelis is only told in a small portion, contrary to the picture of her mother.

That's the first time I know, this beautiful childish girl turned out to be a supervisor that must be heeded by workers, men and women (Earth of Man: 23)

This childish girl who had never finished elementary school suddenly appeared before me as an extraordinary girl: not only could manage so many jobs, but also a horseman, could blush more than all the milkers (Earth of Man: 26)

The contradiction in the self-image of Annelis and Nyai Ontosoroh from Minke's point of view is an irony. Nyai Ontosoroh is a native and has a poor family background, is a mistress of Mr. Mellema, and has never attended school. On the other hand, Annelis is an Indo who at that time was considered a superior race than the natives, had attended school, and was born into a wealthy family since childhood. The depiction of Nyai Ontosoroh's self-image as a strong and powerful woman, while Annelis as a weak woman is further explained through the relationship between the two characters and Minke. Nyai Ontosoroh who is Tuan Mellema's mistress makes her status even lower by the natives. However, from the perspective of Minke, who is a descendant of priyayi and a student of H.B.S, Nyai Ontosoroh is described as equal and even more dominant than him. Nyai Ontosoroh is described as a figure who provides learning and can be an example. Nyai Ontosoroh is depicted through the feminist and positive qualities that exist in humans.

It's not just any song. He confronted me, H.B.S. without feeling inferior. He had the courage to express his opinion. And he is conscious of his personal power (Earth of Man: 62-63)

I was really surprised to hear that answer. Never said that by any of my teachers (Earth of Man: 64)

I see it from another angle: from all that he is capable of doing, from all that he speaks (Earth of Man: 64).

The contradictory self-images of the characters of Nyai Ontosoroh and Annelis are also depicted through their relationship with men. Nyai Ontosoroh who is the illegitimate wife of a white man, Mr. Melleme, is described as an independent woman. Nyai Ontosoroh realized her position as a concubine and prepared herself if Mr. Mellema later returned to the Netherlands. Nyai Ontosoroh prepares both economically and psychologically, there is not the slightest picture of women who depend on men. Nyai Ontosoroh is not a woman described by Friedan (1963)

in the feminine mystique that when she becomes a wife, a woman then devotes herself to her husband. When married, women construct false values to find personal achievement and identity through devoting themselves to their husbands and children. This can be understood because Nyai Ontosoroh is not legally married and is not recognized by the constitution as a wife so that the character of this woman is described as building other positive qualities that can be useful for herself. However, the character of Nyai Ontosoroh shows the attitude of a woman who has ambition for her personal life after marriage.

That's how I began to understand, in fact Mama did not depend on Mr. Mellema at all. Instead, he's the one who depends on me. So Mama then took a stand to decide everything. Master never refuses. He never forced me except in studying. In this respect he is a strict but good teacher, I am an obedient and good student. Mama knows that everything she teaches will someday be useful to me and my children when you return to the Netherlands.

On the other hand, Annelis is depicted as a woman who depends excessively on Minke. Annelis' character is described as psychologically dependent on Minke's character as a man who becomes her partner. Annelis and Minke's relationship cannot be seen as a relationship between social classes and races, namely indigenous and indo, but simply as a relationship between men and women. In relation to Minke, Annelis is what Beauvoir (1949) mentions in *The Second Sex* that women are the other. According to Beauvoir, women never make themselves into the essential or as a subject but as an other. Women do not transform themselves into qualities other than what men/partners are attracted to. The dependence of women on men according to Beauvoir is something that makes women the other. However, the dependence of the Annelis character on Minke is not in the relationship that this man is more powerful socially and economically but psychologically. Annelis is a character with a higher racial background and better economic standing than Minke. The depiction of Annelis' character who is psychologically dependent on men shows the inferiority of women. A very clear contradiction between the self-image of Nyai Ontosoroh and Annelis, in their relationship with men.

I am beyond happy that Annelis and I, Sinyo, have come. Look, Nyo, he's back to work again, getting his original agility. Sinyo's arrival was not only to help the smooth running of the company, especially for Annelis' own interests. He loves Sinyo. He needs your attention (*Earth of Man*: 61)

Sorry for this kid. He can't face violence. He dreams of someone who loves, loves him sincerely. He felt that he lived alone, unprotected, ignorant of the world. He hangs all his hopes on the Lord (*Earth of Mankind*, 197)

This girl's heart is too soft, too soft, unable to bear it really, must always be cuddled, guarded, caressed, protected. His personality seems to have been taken from him (*Bumi Manusia*: 198).

In the story, Nyai Ontosoroh expressed her wish that Annelis would have a different way of life from hers, namely marrying of her own will and choice. Nyai Ontosoroh views her status as a "nyai" as shameful and immoral. For him, when a woman becomes a "nyai", she has no power over her own body, a human being without rights and a voice. But ironically, the status of "nyai" which makes Nyai Ontosoroh considered immoral

to society, does not make this woman inferior in relation to men. On the other hand, Annelis builds her own inferiority despite having a higher social class, race, and economic status than Minke. Annelis' self-image is described as obsessed with getting attention from men. Annelis is described as a woman who is weak, spoiled, easy to cry, sick and jealous. Annelis is attached to all the typical traits that mark the inferiority of women.

Absolutely unavoidable. She cries. Cry like a child.

Why are you crying? Just a week, Ann, just a week. After that I will definitely come. Is that so, Darsam?  
(Earth of Man: 149)

Nyai is worried that her child will fall ill. He increasingly saw the emergence of symptoms of irregularities in his son. (Earth of Man: 153)

He doesn't intervene. Only his eyes seemed to reach more and more into the distance. Annelis is jealous  
(Earth of Man: 218)

If Nyai Ontosoroh is described as fond of reading and attracts admiration from Minke and the literature teacher from H.B.S, namely Magda Peters, Annelis is on the other hand described as liking Minke more than books. The Mellema family's house is filled with books and the character Nyai Ontosoroh's passion for reading does not affect Annelis to love reading.

On nights like recent nights I sit at the table in Annelis' room. He was reading the Dutch translation of Defoe Robinson Crosoe, which divides each page into two columns. I have compiled a list of books he must read. All youth books: Dumas and Stevenson. It should be completed in one month. And beside it lay an old dictionary that Mama uses every day (Earth of Man: 213)

In one part, it is told that Annelis is a victim of sexual violence and the rape of her own brother, Robert Mellema. The disclosure of sexual violence and rape against Annelis was when Minke found out that the woman was no longer a virgin. It is said that Annelis hid the sexual violence that happened to her because of fear and shame. Socially, it is considered that virginity is a symbol of the honor of the family or group in which the woman lives. The concept of virginity can be seen in various contexts but the story of Annelis' loss of virginity in Roman Man is a picture of the loss of the sacred nature of a woman, which is always emphasized in patriarchal society. As according to Beauvoir that virginity is a proper gift that exists in girls (1949). When he found out that Annelis was no longer a virgin, Minke was told to feel disappointed and his first assumption was not that Annelis was a rape victim, but whether the woman of his dreams had been in a relationship with a man other than herself. The problem of women's virginity in the Romance of Bumi Manusia is a reflection of society that considers virginity a necessity for unmarried girls. For Beauvoir, men's desire for the virginity of women/partners marks the notion that women are property. Women are only valued through their bodies, and what makes virginity valuable is because it is a form of male domination over women. Losing virginity like what happened to Annelis is considered a shame. According to Beauvoir, women who have lost their virginity are likened to used goods, goods that have been used so that they are no longer sexually attractive (1949).

We were silent for a while again. It was then that I became skeptical of Doctor Martinet's message. He's quite mature. He knows how to defend himself even if he fails. He knows the meaning of death and belief (Earth of Man: 238)

Until the end of the story, the character of Annelis is described as a figure who has no power over him. Annelis was required to leave her mother, husband and place of residence to return to the Netherlands. During the long process of struggling to maintain Annelis, her character is depicted as an object that must be preserved or must be taken back by its original owner. On the other hand, Minke and Nyai Ontosoroh are depicted as warriors who defend their property. Nyai Ontosoroh, who has no rights as a native and the illegitimate wife of Mr. Mellema, is described as being against the constitution and daring to voice her opinion. At the end of the Romance of Bumi Manusia, the character of Nyai Ontosoroh is described as a "commander" who is fighting to defend his rights, while Annelis is a "puppet" waiting for a decision against him. Both the characters of Nyai Ontosoroh and Annelis are figures who are powerless and disadvantaged before the constitution but both are described as reacting differently to domination and oppression.

"Against, Mama, against. We fight"

"If you can make Annelis get up to fight, she will not fall back and forth in pain and disability" (Earth of Man: 327)

"We lost, Mom," I whispered.

"We have fought, son, Nyo, to the best of our ability, with all due respect" (Earth of Mankind: 353).

Pramoedya presents a unique depiction of two female characters namely Nyai Ontosoroh and Annelis in Roman Bumi Manusia. Nyai Ontosoroh who is a native and a concubine is a character with the lowest strata in terms of social class, race, and education level. In fact, his status as a "nyai" was considered religiously and constitutionally immoral at that time. However, the character of Nyai Ontosoroh is the protagonist and central character in Roman Bumi Manusia, with a depiction of a woman who is filled with all positive qualities. Nyai Ontosoroh is depicted through the self-image of a woman who is independent, hardworking, thoughtful and wise, intelligent and courageous in expressing opinions, and taking a firm stand. The depiction of the self-image of the character Nyai Ontosoroh is different from the discourse in Dutch literature written by white men. Likewise with the depiction of the self-image of Annelis, who is an Indo. Dutch literature generalizes Indonesian women as people who want the status and position of white women. Indos and natives are depicted as pursuing economic and social improvement through relationships with white (totok Dutch) men. On the other hand, Annelis is described as an Indo woman who likes natives. Despite having a higher social class, race, and economic status than Minke, Annelis is portrayed as not more powerful but on the other hand and inferior. Annelis is described as a woman who likes to depend, helpless, and weak, to men. Pramoedya presents a picture of women's self-image that contrasts not only with each other, but also contrasts with the stereotypes that exist in society and other literatures. Besides Nyai Ontosoroh and Annelis, Romance of Bumi Manusia also depicts other characters such as Acehnese women who are warriors who eventually fall in love and give birth to the daughter of a company soldier. Women from China or Japan who worked for prostitution owners in the Dutch East Indies at that time were also presented in this novel. Pramoedya also presents images of white women such as Magda Peters who is

a literature teacher at H.B.S and someone who is considered a liberal because she dares to voice class and racial equality. Miriam and Sarah de la Croix are two white women who like to argue and intimidate but actually have a noble heart and hope for the advancement of thinking and status for the natives. If literature is the other side of reality, then Pramoedya has presented various images and social problems which women [in] Indonesia have gone through at the beginning of the 20th century.

## Conclusion

Nyai Ontosoroh and Annelis are two portraits of women in the early 20th century in Indonesia, which were repressed by patriarchy and colonialism. Nyai Ontosoroh is a poor native who is a victim of human trafficking by her own parents and becomes a “nyai” for the benefit of men and the colonial party. This woman then has no legal status as a wife and has no right to her husband and children. Likewise, Annelis, who is a picture of a beautiful Indonesian woman who is always judged by her physical appearance so that her role is dwarfed only as a male object of view and sexuality. Annelis is a victim of sexual violence and rape (rape) by her own sister. As an Indo, Annelis has an ambiguous status because she is not native but also not white. This character is an outsider and insider figure both in indigenous society and for the white race. Her status as Indo and female, made Annelis not have voting rights and power over herself. Nyai Ontosoroh and Annelis are two female figures of different races and social classes described by Pramoedya through Roman Earth Manusia. Pramoedya presents a picture of women's self-image with different experiences but produces the same conclusion, that the patriarchal system and colonialism oppress women, whether they are indigenous, Indo, or white.

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## Language in Dictatorship as A Tool for The Manipulation of Thinking and The Free Expression of The Individual (The Case of Albania)

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**Abstract:** Living in a communist dictatorship for 50 years is a challenge for society, its development and more over for the relationship with thinking and self-expression. A dictatorship attaches great importance to language and this goes beyond a superficial attention, since it is very clear the strong connection that exists between thinking and language, it tries to enter the thinking process of the individual in order to program them according to its principles. The politicization of language and the intervention of the dictatorship in it is the opportunity that the dictatorship has to manipulate people's minds, to condition even thinking, the only opportunity that individuals had in the dictatorship to "speak", since freedom of expression was completely denied. Each dictatorship has its own specifics, so in this paper we will stop concretely and study the case of Albania, a country that for 50 years has experienced among the most savage communist dictatorships, as it went as far as completely denying God and punishing anyone who said otherwise. After a long study in this field, we will identify the path followed by the dictatorship to manipulate people's minds through language in Albania.

**Keywords:** Language, Thought, Dictatorship, Manipulation, Individual.

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### Introduction

The connection between language, the individual and the regime on the one hand and the way in which the regime uses language as a tool to rule over the individual and society on the other hand, are topics that have attracted interest. Living in a communist dictatorship for 50 years is a challenge for society, its development and more over for the relationship of the individual with thinking and self-expression. A dictatorship attaches great importance to language and this goes beyond a superficial attention. Since the strong connection that exists between thought and language is very clear, it tries to enter the thinking process of the individual in order to program them according to its principles.

The politicization of language and the intervention of the dictatorship in it is the means that the dictatorship has to manipulate people's minds, to condition their thinking, the only opportunity that individuals in dictatorship had

to "speak", since freedom of expression was completely denied. Each dictatorship has its own specifics, so in this paper we will concentrate on the case of Albania, a country that for 50 years experienced one of the most savage communist dictatorships the world has ever known.

In this paper we will treat this argument, but focusing our attention on the Albanian case during the period of the communist regime (1944-1990). We will identify the path followed by the dictatorship to manipulate the people's minds through language in Albania.

Our hypothesis is as follows: **Language is used in dictatorship for the manipulation of thought and free expression of the individual. Does language dominate thought?**

The method we have followed:

- analogy with the novel "1984" George Orwell
- the identification of theoretical thought relating to language, the individual, power, ideology, politics and the relations which exist between them (publications from different authors)
- analysis of the Albanian reality in the period of the communist dictatorship
- the identification of problems that speakers have

The dictatorship in Albania is considered as one of the most brutal ones in the world, therefore the pressure it exerted on language has some peculiarities.

### "1984" George Orwell

When analyzing the relationship between language and politics and the way that a dictatorship tries to manipulate its citizens through language, George Orwell's idea of newspeak comes to mind.

What is the newspeak that George Orwell presents?

The main goal of the English Socialist Party (ENGSOZ) is the construction of newspeak. The regime is aware of the role of language, and it takes for granted the connection between language and thought. So, to alter the mind of the individual, the regime chooses one method: the alteration of the language. It goes even as far as to create a new language. The principles of "new language" (Orwell,1984;299)

- The complete removal from use of the old way of speaking was meant to destroy the last connection with the past. History had already been rewritten, badly censored of course.
- The translation of materials from the old language to the new language was something impossible, except for technical issues. No book written before the 1960s could be translated in its entirety
- 3-The literature of the pre-revolution could only be transmitted by being subjected to ideological translation - which means: change of meaning and language

- a person who would grow up with only one language would never learn the new language. For example, once upon a time, the word "equality" also had the second meaning "equal politically", or the word free had the meaning intellectually free. Someone who does not know chess does not know the second meanings of the words queen and rook
- there would be many crimes and mistakes that man would not be possible to commit just because they would be nameless and therefore unimaginable.
- The vocabulary would be progressively reduced. When the old language was forgotten, so would the heretical opinions.
- the members of the party were inclined to use words and grammatical forms of the new language
- 8-The new language aimed to make other ways of thinking impossible. It was planned to reduce thinking by reducing words.

## Theoretical Overview

Theoretical overview of the approach that recent studies have shown about the connection that exists between language and its users, language and thought.

We will briefly dwell on two theories that contradict each other:

Language as instinct and linguistic relativism.

If we believe that the government influences the language of its citizens by creating a new language and therefore can influence the thought of individuals, we must conclude that language creates thought. What does this statement mean?

While elaborating on language and thought, Pinker in his book "The language instinct" (1996: 53) in the third chapter stops and analyzes George Orwell's novel 1984 and his idea of newspeak. According to Orwell, if language is interfered with, if words disappear, then it is possible to interfere with the individual's thought.

According to Pinker, if we agree with this idea, we would agree that language precedes thought, so we have a conditional ability to think, depending on the language we use.

It is precisely this idea that Pinker opposes by arguing the opposite. The objection begins with a statement by Orwell himself.

Pinker starts his analysis with the condition Orwell himself asserts "at least so far as thought is dependent on words." (1996: 53) According to Pinker, thinking that language precedes thought is an idea that does not hold water. For this, he gives as examples:

- when after writing a sentence, we realize that in fact we had a somewhat different idea in our minds.
- or after reading a material or listening to it, we don't remember it word for word, but we remember it as a whole idea, so we have an area "where we think without words".
- Babies don't think in words, as they haven't learned them yet.
- Visual thoughts are not made up by language but by a mental graphic system

He insists that thoughts are not dependent from words. It is precisely the instinct of language that leads to this conclusion according to Pinker.

Unlike Pinker, Edward Sapir and Benjamin Lee Whorf support the theory of linguistic relativity.

Theory of Linguistic Relativity. According to this theory (2022, Jan 14):

- Our language limits our thought processes.
- Our language shapes our reality.
- The language we use shapes the way we think and the way we see the world.
- The use of our language shapes our perspective on the world. People who speak different languages have different views of the world.
- The words and structures of a language influence the way its speaker behaves, feels about the world and ultimately the culture itself.
- One individual sees the world differently from another individual who speaks a different language because of the specific language they speak.

The Sapir-Whorf hypothesis has to do with linguistic relativity: speakers are required to pay attention to aspects of the world that are grammatically marked (verb tense)

As with linguistic determinism: it is claimed that our cognitive processes are affected by the differences found in language. (2022, Jan 14)

Today's linguistic relativity researchers continue to challenge these ideas. John, A. Lucy asserts "If the natural process is to think in accordance with our own language, then what we take as neutral reality may in fact be a projection of the emphases of our own language. And what we take to be the meaning of a category in another language may be partly a product of our own semantic accent" (Lucy 2005; 308)

### **Faced with these Two Theories, we return to the Historical and Linguistic Facts**

Communist countries in particular have been very careful about language and how to manipulate it to serve their purpose. Philosophers and linguists, while serving the dictatorial powers, made language policies in favor of ideologizing the language. Dictatorships have strongly believed in the influence of language over the individual.

In Albania the communist dictatorship lived for 50 years. What specifically happened in Albania?

The same logic was followed as in other communist countries, but in Albania, the will to create a new language and the new man was even greater than in most communist countries.

### **Reality in communist Albania (1944-1990)**

The north of Albania did not surrender to the communist policies of the regime, so from the beginning it opposed this regime, either with armed organizations or with political and cultural movements. It is for this reason that the communist government, which came to power in 1944 drew up strategies to fight the reactionary north and destroy its "political opponents". The regime's fight against the northern opposition was in several fields:

- 1- The war against religion and those who represented it: we were the only atheist country in the world. Albania has three religious 'beliefs: Muslim, Catholic and Orthodox. This war was harsher in the North

of Albania (an area with a larger percentage of Catholic believers in relation to the rest of Albania). They were shot and imprisoned. Priests were represented in socialist realist literature, historical books or even films by depicting them with qualities such as: contempt, envy, fraud, evil, etc. For the new man, who was already being created and equipped with the new language, religious people were equated with evil. The priests or imams are usually found as negative characters in a novel, film, documentary, but also in schoolbooks. The new man was overwhelmed not only linguistically but also visually by this propaganda, he grew up with it and consequently created the corresponding stereotypes skewed according to the goals of the dictatorship. The image of evil was easily equated with religious people.

- 2- The war against intellectuals: it was ordered to destroy the works of northern authors who were mostly either clerics or religiously educated (users of the geg dialect). The communist regime launched a direct attack on them by blocking the circulation of books by northern authors. For the dictatorship, there was no regret that by eliminating this literature, in fact, we were also ripping out the stem from which it was created. Only a small part of them escaped this censorship, but even they were truncated. After the fall of the dictatorship, we are suffering the consequences of this war. Even though it's been 30 years since the fall of the dictatorship, the authors of the north have not taken the place they should have, despite the efforts made to include them in textbooks. Northern authors are far from today's readers because of the language, the "new language".

3- Establishing the Albanian standard. The Albanian standard was not decided by applying the laws of language, but politics. Even though the Geg variant was the dialect with the largest number of speakers, it was the basis of the written culture of the Albanian language, it was not decided as the basis of the Standard, since geg Albanian was the language of the "enemies of the dictatorship", the language of the reactionaries. According to Ledi Shamku, in the case of Albanian, we have the dictates of politics over the standard.

In this paper, we do not want to equate between the Albanian standard and the "newspeak", but we want to affirm that the same instincts for the control of language, which led to newspeak, created the Albanian standard. The standard's originators themselves believed that language influences thought.

To get into the linguistic situation in Albania, we will first make a brief description of the dialect-standard relationship in the Albanian language.

In order to properly understand the linguistic situation in Albania, we should firstly describe the dialect-standard relationship in the Albanian language. (Draçini: 2014, fq1870)

Albania is found in the Balkans. It has more than 3 million residents and two main dialects: Geg and Tosk. As in every other language, the Albanian dialects are characterised by various common and different linguistic elements.

The Albanian language was standardized lately because of many historical problems. It's development belongs to an early era, the XIX-th century national renaissance. Until the second world war both dialects were freely used, while in official documents the Geg or north dialect was used.

With the arrival of communism, a change occurred. The standard was constructed based on the Tosk or south dialect since this dialect represented the time's political class.

In 1967, with the publication of "The Rules of Albanian orthography" by the "The Linguistic and History Institute" the change was made clear. The changes on the standard were accepted by Kosovo (part of Albania which speaks the Geg (north) dialect, with a population 2 million people which at that period of time was part of Yugoslavia). In 1968, "The linguistic council of Pristine" was held. Lead by the principle "one standard language for one country", the council decided that as soon it was completed in Albania, the new standard would also be in Kosovo. The council approved the new standard because they wanted to keep as much as possible relations with Albania. They feared that different standards, the political separation and the lack of communication would eventually lead to a final breakup between the two countries.

The orthography congress, held in Tirana in 1972, left a mark on the history of Albanian language as the congress which unified the national standard language. Even though the relation between the standard and Tosk (south) dialect was already clear the time's political structures insisted that Geg (north) dialect was also included. Constrained by the dictatorship, no researcher dared to oppose. The only oppositions came from outside of Albania, Arshi Pipa (imprisoned by the dictatorship, in 1957 he escaped and developed his academic carrier in America) which continuously wrote about this case and Janet Byron who very clearly expressed the relationship between the standard and the political structure of Albania in her study (Janet Byron: 1976).

The interference of politics in the standardization process brought up many problems which directly affected the language users. The political leaders of that time became role models, as their language was closer to Tosk dialect.

The new standard, which was based on the tosk (south) dialect provoked the reaction of the northern population of Albania, speaker of the geg (north) dialect, for some reasons:

- 1- The intellectual circles were conservatives when it came to cultural heritage, for the oldest Albanian writers where geg speakers.
- 2- The geg tradition of writing was very rich
- 3- There was a silent political disobedience towards a political decision they didn't support (the north of Albania was considered to be against the dictatorship: backlashes, demonstrations and executions were made in this zone)
- 4- There was no immigration towards the south or the capital city.

Based on these undeniable facts we conclude that in the north the standard was very little or not at all used while the geg dialect was the commonly used linguistic communication code.

As the geg speakers were being judged for using their northern dialect, the tosk speakers continued to use their dialect freely even though it was different from standard and all this because a relationship between the standard and the tosk dialect was created in every Albanians mind. After downfall of the dictatorship, in the beginning of 1990 (which began in Shkoder, the center of the north (geg) dialect) the usage of the geg dialect spread widely by highlighting the fundamental differences between the geg and tosk dialects. However, now in the modern world, where ideas can be expressed freely, it is widely accepted that the basis of the standard is indeed the south dialect. "It is an undeniable fact that the standard albanian language is founded basing on the phonology and phonetics of the tosk variant" (Jorgji Gjinari, 2003). But this can also be seen in morphology, where the infinitiv form (a specific feature of geg dialect), is not at all included in the standard language because it is not found in the tosk dialect. Many debates were held in order to change the standard, debates that still continue in the intellectual circles and where the presence of extremists is obvious on both sides. This situation confronted the individuals with their linguistic codes: the Tosks or the standard speakers and the Geg dialect speakers.

*--Maybe here we should stop and think why was it difficult to create the new man and the "new language" in the north of Albania.*

Almost 2/3 of Albanian speakers are users of the Gege dialect.

The researcher Ardian Vehbiu has analyzed the Albanian language during the period of the dictatorship in the years 1945-1990 in his book "Totalitarian Albanian". Vehbiu asserts (2007: 58) that "the totalitarian discourse in Albania was a code embodied in the code of official discourse, with its own rules and features relatively independent from the rules and features of Albanian discourse in general."

To become a citizen of the totalitarian state also meant acquiring the ability to express oneself and generally to communicate in public in accordance with the rules of the totalitarian discourse, which was especially important for all those who aimed for a career. Fluency in totalitarian Albanian was the key condition for social and professional success. Currently, spoken and written Albanian continues to have traces of linguistic politicization. The researcher Ardian Vehbiu sees this intervention in the impoverishment of the lexicon, the greatest influence of totalitarianism on the public use of Albanian.

- Semantic manipulation was one of the most subtle ways in which the totalitarian ideology modified the key words of political legislation. Ardian Vehbiu makes the connection between the Albanian linguistic reality and Orwell's new language (Vehbiu 2007:156). To concretize this, we will highlight some examples of lexical corruption: the forced work of school students in construction or agriculture would be called voluntary work, the word dictatorship was used as the dictatorship of the proletariat, and today's Albanian Dictionary (1984) defines the dictatorship of the proletariat as "the highest kind of democracy".
- The totalitarian state spoke to the public through a system of ideological speech that included the press. The goal was to educate the new man by offering him models of thinking and public awareness, but also to give the new man ready-made linguistic models. (Vehbiu 2007:184)
- The use of typical clichés to form public speech



The impoverishment of language in totalitarianism is accepted by many researchers.

## Conclusion

At the end of this work we can try to answer to the question we asked at the beginning: is language able to direct thought? Would Orwell's idea "to create a new language" which controls thought be successful in real life, or will it remain only part of a novel?

Once again, we end up citing Orwell "**at least so far as thought is dependent on words.**" This influence goes up to a certain point without achieving full success, since thought is related to the language but at the same time it isn't completely encompassed by it. The case of the Albanian language is evidence for this. But maybe in order to reach a more accurate conclusion, we need to analyze a period of time of the usage of newspeak which is much longer than the case of the Albanian language.

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## The Roles and Problems of NGOs in Development of Youth Entrepreneurship

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**Abstract:** The role of Non-Governmental Organizations (NGOs), as a stakeholder of the entrepreneurship ecosystem, is gaining more and more importance in the development and dissemination of youth entrepreneurship. However, there is a lack of research in both national and international literature on the role of NGOs in entrepreneurship in general and youth entrepreneurship in particular. In this direction, this study has been prepared to determine the roles and problems of various institutions, especially NGOs, working in support and dissemination of young entrepreneurship. A quantitative research method was adopted in the study and a questionnaire form was developed using the literature. The questionnaire form was applied to the representatives of different institutions working on youth entrepreneurship in Turkey. For this, snowball sampling method was used and a sample group of 100 people was reached. The results of the study confirm the problems both in the execution of activities and in cooperation. However, it has been determined that the willingness and ability to offer suggestions for solving these problems is high. In particular, the need for platforms to harmonize the young entrepreneurship activities of institutions and to act as an umbrella/roof on this issue was particularly emphasized.

**Keywords:** NGOs, Youth Entrepreneurship, Entrepreneurship Ecosystem

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### Introduction

Entrepreneurship can be defined as a process in which opportunities are explored, analyzed and implemented to create new products and services (Shane, 2000). Entrepreneurship allows people to do what they want, to follow their passions and allow self-actualization. Entrepreneurship is not just important to the business itself. It plays a major role in a country's economy by supporting economic growth. First, it creates new business opportunities. Second it creates employment. And one of the most important aspects is undoubtedly that entrepreneurship helps bring new products and ideas to the market. Without the creative ideas of entrepreneurs, our world would not be as advanced in culture, science and technology as it is today.

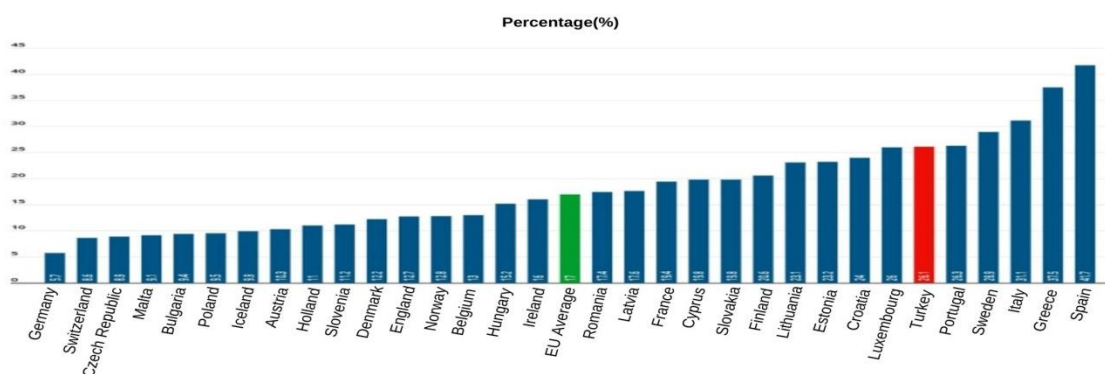
On the other hand, young people are the future of the society they live in and they are the heirs of the future of the world. The more educated, productive, creative and innovative the young population in a country is, the more potential the country has for development and progress. Entrepreneurship is an indicator of progress in any society. Today's need is to provide opportunities for young people to think and dream big and to support their entrepreneurial intentions. In some countries, youth entrepreneurship is recognized as a promising solution to the unemployment problem and is actively encouraged by various institutions, especially the governments (Chigunta, 2017). With such an approach, youth entrepreneurship will contribute to the sustainability of growing economies and enable the integration of young people into the workforce.

The role of Non-Governmental Organizations (NGOs), as a stakeholder of the entrepreneurship ecosystem, is gaining more and more importance in the development and dissemination of entrepreneurship (Nandan & Kushwaha, 2017). However, there is a lack of research in both national and international literature on the role of NGOs in entrepreneurship in general and youth entrepreneurship in particular. To address this gap, this study aims to identify the roles and problems of NGOs and various insitutions that work for supporting and disseminating young entrepreneurship.

## Youth Unemployment

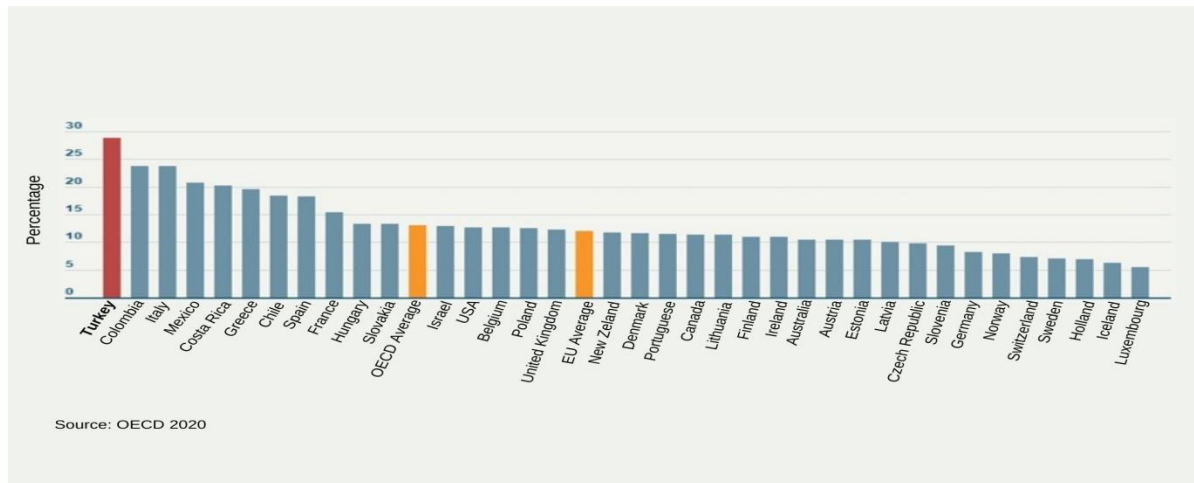
Today, the global youth population has reached the highest level in history. The share of youth not in employment, education or training (NEET) in 2020 rose to 23.3 per cent, an increase of 1.5 percentage points from the previous year and a level not seen in at least 15 years. The total global number of unemployed youths is estimated to reach 73 million in 2022 (ILO, 2022). With the COVID 19 pandemic, the young population has an important place in the recently increasing unemployment rates in Europe and Turkey as well (ILO, 2022).

Eurostat (2020) data shows that while the general unemployment rate in the European Union is 7.2%, this rate rises to 17% for the people under 25 years old group. In Turkey, according to TUIK (2020) data, the general unemployment rate is 13.4%, while it is 26.1% for young people under the age of 25. In other words, youth unemployment rates in Turkey are above the EU average.



Source: Eurostat-July-June  
figures TUIK 2020

The OECD's “Education at a Glance 2020” report points to a similar picture. According to the report, the rate of young people between the ages of 15-29 who neither go to school nor work is 28.8%. The EU average is 12% and the OECD average is 13%.



## Youth Entrepreneurship

Youth unemployment data shows the need for solutions to eliminate youth unemployment. From this point of view, the importance of entrepreneurial activities also emerges spontaneously. There are many definitions of entrepreneurship in the literature. For the purposes of this report on youth entrepreneurship, the definition of Chigunta (2017) as “the practical application of entrepreneurial characteristics such as initiative, innovation, creativity, risk-taking and the use of appropriate skills necessary for success in the ecosystem in entrepreneurial activities of young people between the ages of 15-29 has been adopted”.

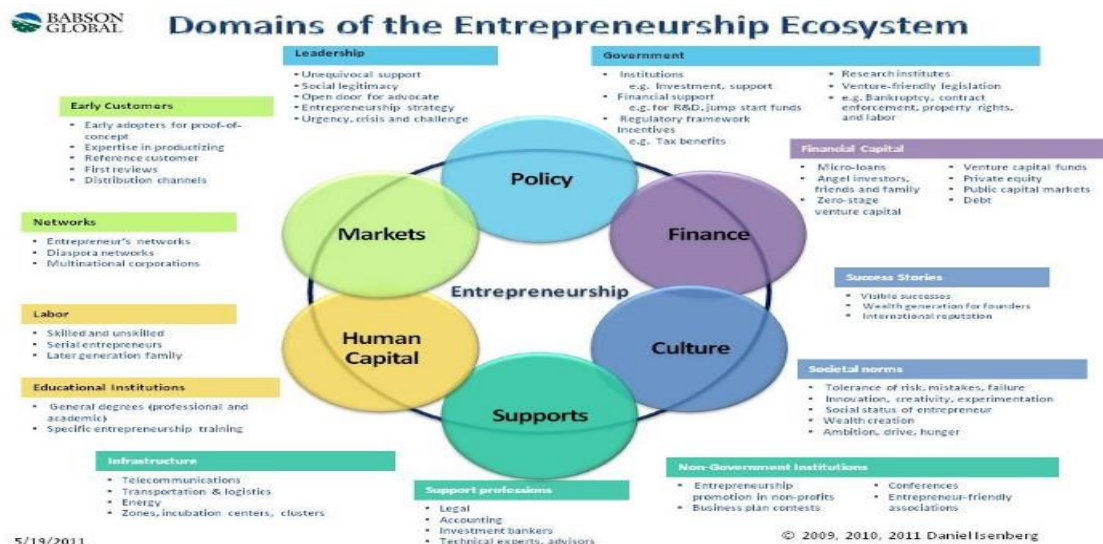
In recent years, entrepreneurship and specifically youth entrepreneurship have been identified as strategic areas in economic and social development in the world (Xheneti, 2006). Entrepreneurship is increasingly becoming an important tool and useful alternative for generating income for young people. As barriers to traditional career paths increase, youth entrepreneurship has begun to be seen as an additional way to integrate young people into the labor market and fight poverty (Lafuente & Gomez Araujo, 2016). Given the global demographic trends, it has become important to recognize the social and economic contributions of my young entrepreneurs. Entrepreneurship can unlock the economic potential of young people. Moreover, the natural tendency of young people towards innovation and change makes the entrepreneurship a very suitable career path for young people and it is important to give the right support to the society in order to remove the obstacles in front of them.

In the "Youth Strategy" of the European Union, which was adopted in 2009 and valid between 2010-2018, youth entrepreneurship has been accepted as one of the eight main action areas along with youth employment (COM, 2009). The strategy outlines the European cooperation in the youth field and is outlined around the main

objectives of providing opportunities for young people in education and the labor market and supporting the active participation of young people in society. There are many European Union programs and entrepreneurship network projects that provide resources and opportunities by encouraging young people to entrepreneurship. For example, European Confederation of Junior Enterprises-JADE) and the European Confederation of Young Entrepreneurs are the two main organizations that aim to encourage young people to participate in economic and political life (Alan, 2020). Moreover, Erasmus for Young Entrepreneurs program which is a cross-border programme facilitating the exchange of entrepreneurial and management experience aims at developing the capacity of young entrepreneurs. On the other hand, youth entrepreneurship has taken its place as one of the strategic priorities in Turkey's entrepreneurship strategy and action plan (2015-2018).

## The Role of Non-Governmental Organizations (NGOs) in the Entrepreneurship Ecosystem

The issue of supporting entrepreneurship is accepted as the basic element of economic development of both countries and cities and regions all over the world. For this reason, the discourses of "entrepreneurship" and "entrepreneurship ecosystem" have become a buzzword in the language of everyone who has an entrepreneurship problem in recent years. The concept of ecosystem, as a concept from biology, refers to the interactions of living organisms with the physical environment. Ecosystem, as used in the economic context, tells that entrepreneurship does not exist alone in a vacuum and cannot be considered separately from environmental conditions.



Source: Isenberg, 2010

Entrepreneurs exist in an environment with many interacting elements. Working in the field of entrepreneurship at Babson University in the USA and analyzing the entrepreneurial ecosystem in his article titled "How to Start the Entrepreneurship Revolution" published in Harvard Business Review in 2010, Prof. Daniel Isenberg identified the social and economic environmental factors that affect entrepreneurship as Culture, Human Capital,

Markets, Legal Framework and Policies, Finance, Supporting Institutions. The individuals and organizations that represent these elements are entrepreneurship stakeholders. For example, the state, universities, entrepreneurs, large enterprises, investors, banks, social leaders, non-governmental organizations, public institutions, local media are among the stakeholders that play a role in the emergence of new ventures. The strength of each of these stakeholders and the cooperation between them provide the facilitating ground needed for successful entrepreneurship to occur.

One of the important stakeholders of the entrepreneurship ecosystem is Non-Governmental Organizations. In the last decade, the role of Non-Governmental Organizations (NGOs) in development has been widely recognized (Auplat 2006). NGOs play a catalytic role in mobilizing local human and physical resources, creating a favorable entrepreneurial environment and generating new opportunities. This contribution to the micro business sector has prompted states to seek the support of NGOs to accelerate the economic development process (Mukherjee, 2009). The role of NGOs in the field of Development of Youth Entrepreneurship is also gaining more and more importance. NGOs have a greater role in promoting and nurturing the entrepreneurial spirit among young people. A holistic approach is required to make the youth entrepreneurship movement successful.

Non-Governmental Organizations (NGOs) act as a bridge in the implementation of various development programs of governments (Lindberg et al., 2012). They can support unprepared entrepreneurs in developing their business by training and helping them. In addition, NGOs have an important role as collaborative platforms for young people as entrepreneurs. They can be arenas for non-hierarchical networking and business collaborations between individuals, projects, and firms. The main functions of NGOs are; complementarity, knowledge transfer, preparing and realizing projects that will ensure the survival of young entrepreneurs.

## **Research Methodology**

In this study, it is aimed to identify the roles of various institutions, especially NGOs, in developing and disseminating youth entrepreneurship, the needs and the problems they experience in cooperation. In this direction, answers to two research questions were sought. These are;

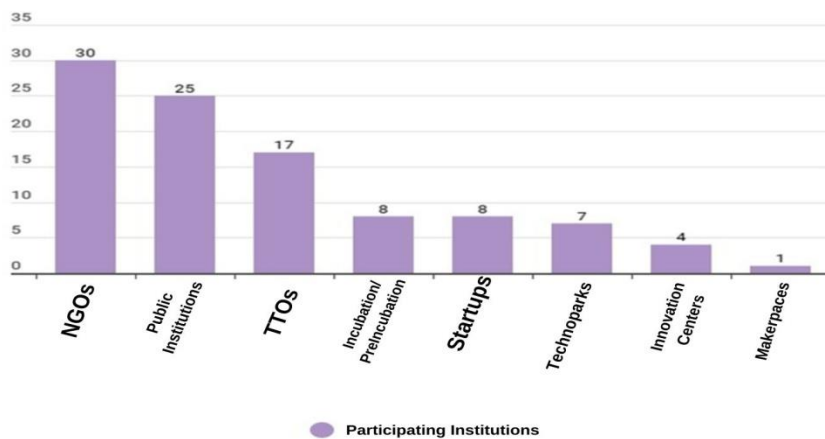
1. What are the roles and problems of NGOs and other relevant institutions in the development and dissemination of young entrepreneurship?
2. How can inter-institutional cooperation be developed?

A quantitative research method was adopted in the study and a questionnaire form was developed using the literature. The questionnaire form consists of two parts. Demographic questions were included in the first part, and multiple-choice and open-ended questions were included in the second part.

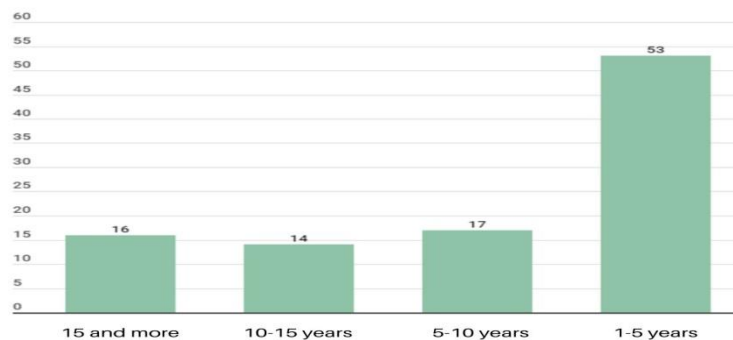
The questionnaire form was applied to the representatives of different institutions working on youth entrepreneurship in our country. For this, snowball sampling method was used and a sample group of 100 people was reached.

## Findings

Of all the participants 30 of them are NGOs, 25 are public institutions, 17 are technology transfer offices (TTOs), 8 are incubators and pre-incubations, 7 are technoparks and the rest of the other centers operating in the field of entrepreneurship.



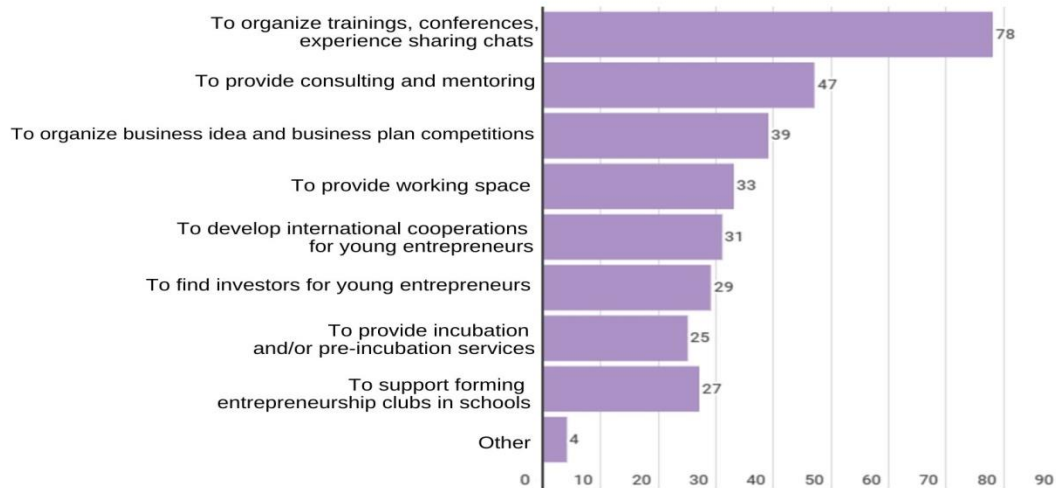
When the activity periods of the participating institutions are examined, it has been determined that 16 institutions have been operating for 15 years or more, 14 institutions have been operating between 10 and 15 years, 17 institutions have been operating between 5 and 10 years, and 53 institutions have been operating for more than 1 year and less than 5 years. As of establishment, 54% of these institutions carry out their activities on a national basis, 32% on an international basis and 12% on a local basis.



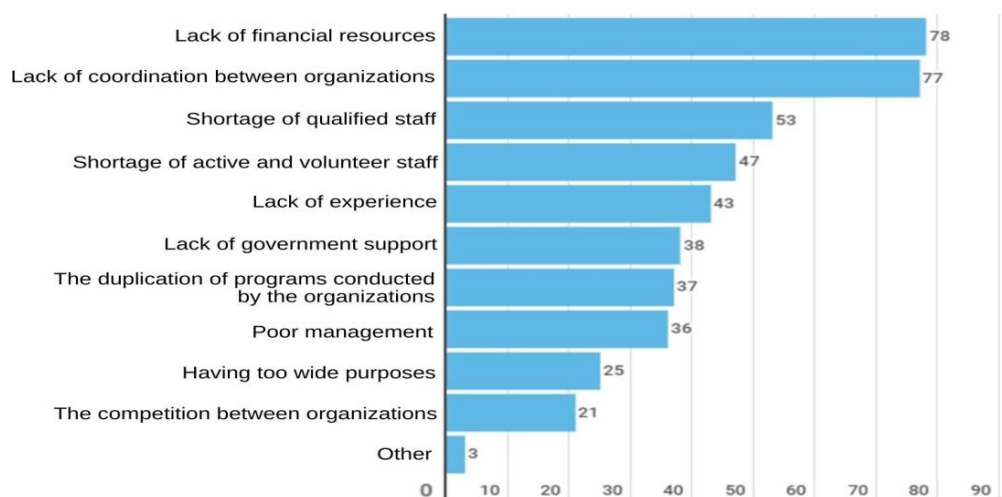
Considering the answers given to the question of what kind of activities do you carry out? 78% of the institutions organize trainings, experience sharing meetings and conferences to improve entrepreneurship skills of young



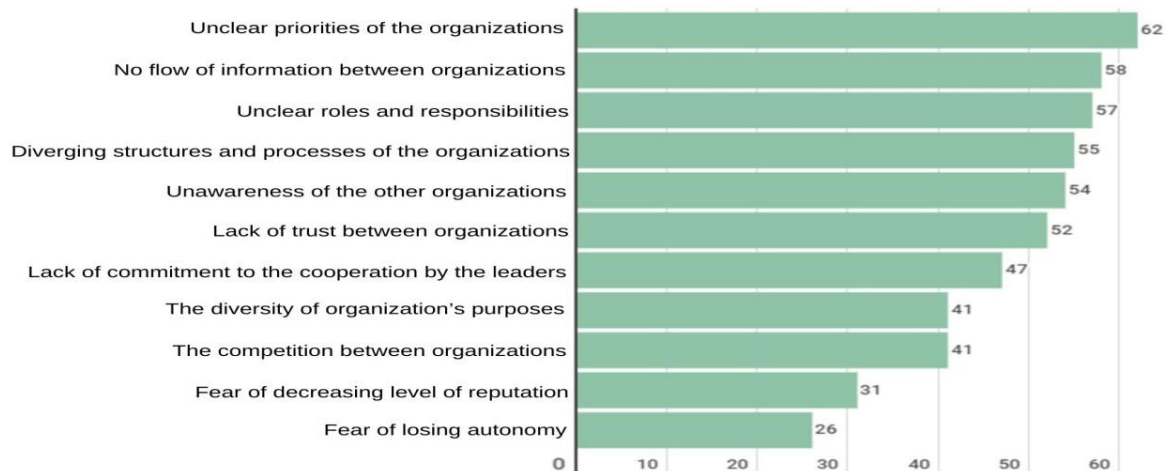
people, 47% provide mentoring services, and 37% have business idea/business plan competitions, 33% provide working area, 31% establish international cooperation, and 29% help to find investors, 27% establish entrepreneurship clubs in schools and provide support, 25% provide incubation and preincubation services.



The institutions participating in the research ranked the problems and difficulties they experienced within the scope of their work on youth entrepreneurship from the highest level of importance to the lowest. Among the problems experienced, the inadequacy of financial resources took the first place with a rate of 78%. They agreed on the lack of coordination among institutions with a rate of 77% in the second place and the lack of qualified personnel trained in the field of entrepreneurship with a rate of 53% in the third place. In addition to these, the inadequacy of the number of active and volunteer employees (47%), lack of experience (43%) and lack of government support (38%) are other remarkable problems. In addition, it has been determined that there are problems such as administrative problems, repetition of the same programs, having broad goals and competition between institutions.



On the other hand, the participants were also asked what kind of problems could be experienced in terms of cooperation of institutions operating to develop and disseminate youth entrepreneurship.



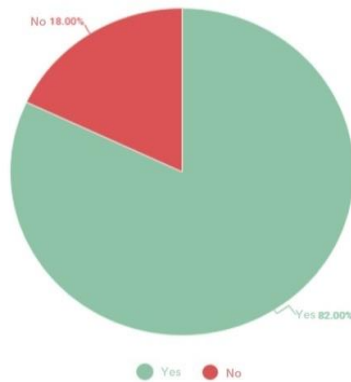
The opinions of the participants can be summarized as follows: “Uncertainty of the priorities of institutions” with 62%, “lack of information flow between institutions” with 58% and “unclear roles and responsibilities between institutions in case of cooperation” with a rate of 57%, “diverging structures and processes” with 55%, “unawareness of each other” with 54%, “lack of trust” with 52%, “lack of commitment by the leaders” with 47%, “the diversity of purposes and the competition issues” with %41. Other problems that are reported to be slightly less common are “fear of losing reputation (31%) and “fea of losing autonomy (26%).

One of the open-ended questions of the study was about how cooperation between institutions could be improved. Three basic patterns of answers to this question are:

- The need for inter-agency coordination mechanisms
- The need for multi-stakeholder common intelligence platforms
- The need for continuous communication, joint meetings and networking activities.

It shows that institutions emphasize the need to come together and carry out more comprehensive multi-stakeholder activities instead of individual activities.

Another question directed to the representatives of the institutions participating in the research was “Is there a Collaboration with Public and Private Institutions in the European Union”. 22 institutions answered “yes” to this question and stated that they had cooperation, while 78 institutions answered “no” and stated that they did not have any cooperation. It seems that the cooperation with institutions in the European Union has remained relatively low for the field of cooperation, which has a high degree of importance in creating the activities and opportunities provided for entrepreneurs.



Institutions that develop cooperation with public and private institutions in the European Union stated that they mostly cooperate in the form of partnerships in EU projects, organizing conversations, conferences and training programs, technology transfer, finding investors and funds, partnering with the Erasmus+ project, organizing incubation programs and bootcamps and providing commercial services. Institutions that stated that they could not develop cooperation stated that the most common reasons for this were the lack of information, communication and funds, the lack of experience due to the newness of their institutions, the inadequacy of human resources in terms of both number and quality, and the fact that international cooperation is not among the objectives of their institutions. Most of them stated that they have to develop the competence of international cooperation.

## Conclusion

This study focuses on the roles and problems of various institutions, especially NGOs, working towards the support and dissemination of young entrepreneurship. According to the findings of the study, it is seen that the most common activity among institutions is to organize trainings, experience sharing meeting and conferences to improve entrepreneurship skills of young people. The results of the study confirm the, problems both in the execution of activities and in cooperation. However, it has been determined that the willingness and ability to offer suggestions for solving these problems is high. In particular, the need for platforms to harmonize the young entrepreneurship activities of institutions and to act as an umbrella/roof on this issue was particularly emphasized. In addition, since this study is one of the first quantitative studies on the subject, it is hoped that with the publication of its results, it will contribute to both the literature and the practitioners in the field.

## Acknowledgement

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## The Relationship Between Academic Engagement in Moocs and Self-Regulation Learning Strategies

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**Abstract:** Massive Open Online Course (MOOC) is among the innovations in online learning environments that attract a significant interest among students but they have a high drop rate. Due to MOOC's high attrition rates, this study investigated the relationship between academic engagement in MOOCs and self-regulation learning strategies. The correlation method was used for this research. Questionnaires of academic engagement (Reeve and Tseng, 2011) and self-regulated learning strategies (Pentrich and De Groot, 1990) were used. An online survey was embedded at the end of MOOCs with enrollments asking for learners' voluntary participation in the study. The survey results from 295 participants indicated that there is a positive and meaningful relationship between cognitive, metacognitive strategies, and motivational beliefs with academic engagement in MOOCs. In addition, Self-regulated learning strategies and motivational beliefs were able to explain 41% of the changes in academic engagement. The findings highlight the critical need to enhance self-regulation learning strategies in MOOCs. This study should be extended to investigate practical ways to encourage MOOC learners to adopt learning strategies.

**Keywords:** Academic Engagement, Moocs, Self-Regulation Learning Strategies, Moocs Completion Rate.

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### Introduction

With the advent of the Internet and rapidly developing information and communication technology, learners and practitioners of education found applicable grounds equipped with advanced and new learning environments to conquer complex issues and conditions (Noroozi et al., 2018). MOOCs stand for Massive Open Online Courses

and are accounted for a state-of-the-art form of ICT use in education that permits hundreds of thousands of students to access online courses anywhere around the world and typically free of charge (Jung & Lee, 2018). Yuan & Powell (2013) described that the core purpose of these courses is to provide opportunities for public instruction and free access to the academic training of all instruction-seeking applicants. MOOCs as courses with barely difficult, unlimited and no-cost requirements. MOOCs create unhackneyed opportunities for innovation in education that not only will champion institutions to configure and implement the core values of academic education, but rather can shift the focus from traditional lectures to inclusive-oriented learning in education; therefore, it can be more effective if one considers the instructional quality and principles of these emerging courses (Badali et al, 2020).

A review of research shows that many MOOCs still do not adhere to pedagogical principles and that students' learning experiences are suboptimal (Mackness et al, 2010; Milligan et al. 2013). Margaryan et al (2015) state that there is still not much empirical evidence to confirm the effectiveness of MOOCs on learning, as well as the reason for the low quality of the educational design of these courses, but there can be various arguments; For example, MOOCs designers and instructors may lack the knowledge of educational design principles and contemporary learning theories, or maybe they try to implement the same common methods of teaching face-to-face classes in the MOOCs platform. Some studies have shown that the principles of educational design are not paid enough attention to (badali et la, 2018; Margaryan et al, 2015). In addition, the most important problem of MOOCs is the low completion rate of the course (Badali et al, 2022).

Over the past years, millions of internet users have been taking online classes offered by MOOC platforms (Nurhudatiana & Caesarion, 2020). Despite the high number of enrollments in MOOCs, over %90 percent of enrollees never finish the course (Narayanasamy & Elçi, 2020). From 2016 onwards, the issue of attrition rate and retention in MOOCs has become a major research trend in online education (Zhu, Sari, & Lee, 2018). Dalipi, Imran, and Kastrati (2018) found that three main factors predict learners' dropout in MOOCs including (1) learner-related factors (e.g. lack of motivation, lack of time, Insufficient background knowledge and skills), (2) MOOC-related factors (e.g. course design, feelings of isolation and the lack of interactivity, hidden cost), and (3) other factors (e.g. casual enrollment, peer review) Goopio and Cheung (2020) in a systematic review stated that various factors such as vague course design, lack of interaction, learner experience, time management, and mastery of MOOC course language affect the persistence in MOOC.

Academic engagement can have a direct relationship with MOOCS completion rates (Guajardo et al, 2019). Academic engagement includes behavioral, emotional and cognitive dimensions (Linnenbrink & Pintrich, 2003). The Behavioral dimension refers to observable academic behaviors, such as effort and persistence when facing problems while doing homework and asking for help from professors or peers to learn and understand the course material. The emotional dimension of conflict refers to the student's emotional reactions in the course. emotional engagement includes internal an interest in the content and homework, valuing the content, the presence of positive emotions and the absence of negative emotions such as frustration, anxiety, and anger when doing homework and learning (farhadi, 2016). Cognitive engagement includes all kinds of processing processes that

students use to learn and consists of cognitive and metacognitive strategies (Saber & Sharifi, 2013). Recently, academic engagement has attracted the attention of researchers and educators due to its comprehensiveness in describing students' motivation and learning, and also as a strong predictor of student's performance, progress, and success (Lam et al, 2016). In both traditional and online learning, student engagement is a crucial aspect of learning (Khalil et al., 2017). Archambault et al (2009) identified that student engagement can be used as a forecasting element for dropout in schools. In MOOCs, researchers and educators consider academic engagement as the main theoretical foundation to intervene and understand possible dropouts, improve positive performance, and encourage the completion of an educational goal (Joksimovic et al., 2018).

One of the variables that can be related to academic engagement is self-regulation learning (SRL) strategies (Sun & Ruedam 2012; Merino-Tejedo et al, 2016). SRL is the meta-cognitive, motivational and behavioral involvement of students in their learning process. SRL means the capacity of a person to adjust his behavior according to the conditions and changes of the external and internal environment, and it includes the ability of a person to organize and self-manage his behavior to achieve various learning goals, and it consists of two components: motivational strategies and learning strategies (Zimmerman, 1990). Students can actively control the learning process by using SRL strategies such as planning learning activities, self-motivation, organizing, repeating, self-monitoring, and evaluating their learning (Artino & Stephens, 2009). The relationship between self-regulated learning and academic engagement has been theorized under the social cognitive view that self-regulated learning is acquired through a triadic interaction between three important characteristics: a) self-observation (monitoring one's actions) seen as the most important of these processes; b) self-judgment (evaluation of one's performance), and c) self-reactions (one's response to performance outcomes; Zimmerman, 1989). More importantly, this view postulates that learning is not merely a fixed trait, but can be influenced and improved to achieve successful academic outcomes (Zimmerman, 1989). Students may use a variety of cognitive and metacognitive strategies as part of their behavior (Broadbent & Poon, 2015).

Many studies show a low completion rate of the course (badali et al, 2022, Goopio & Cheung, 2021; khan et al, 2021) this problem can be improved by increasing academic involvement (Guajardo Leal et al, 2019), paying attention to SRL has been emphasized by many studies (Reparaz et al, 2020; Guo et al, 2022). However, there is a research gap in the field of the relationship between academic engagement and SRL. Therefore, to fill this research gap, this research was conducted with to determine The relationship between academic engagement in MOOCs and SRL.

## Methods

This study was conducted on the ATA MOOCs platform and "teaching skills" course. According to the purpose of this research, it was an applied study, and in terms of data collection and analysis, descriptive and correlational methods were used. To achieve the purpose of this research, data was collected by distributing a set of questionnaires related to two variables.

First, the research questionnaires were designed on the Google Docs platform and the link was provided to the participants in the teaching skills MOOC. After reviewing the questionnaires, out of 412 participants in the MOOC, 278 were included in the analysis as the final participants. Before answering the questions of the questionnaires, the participants were asked to write their personal information such as name, gender, age and level of degree (The information in Table 1). In addition, these teachers were told that their information will remain confidential and will only be used for this research. Table 1 shows the demographic information of the samples.

Table 1. Characteristics of the Participants

Items	Categories	Number	Percentage
<b>Gender</b>	Female	174	58.98
	Male	121	41.01
<b>Age in years</b>	<25	47	15.93
	25-30	115	38.98
	30-35	105	35.59
	>35	28	9.49
<b>Level of degree</b>	Undergraduate	143	48.47
	Master	119	40.33
	Ph.D	33	11.18

## Measures

**Academic Engagement :**The academic engagement questionnaire was designed by Reeve and Tseng's (2011), which has 22 items and four components of agency engagement (Items 1 to 5), behavioral engagement (Items 6 to 10), emotional engagement (Items 11 to 14), and cognitive engagement (Items 15 to 22). Agentic engagement is defined as 'students' constructive contribution to the flow of the instruction they receive' (Reeve & Tseng, 2011, p. 258). This subscale comprises 5 items related to students' contributions during the teaching and learning process. behavioral engagement (5 items) measures students' attempts to learn and participate in activities (Mameli & Passini, 2017). The emotional engagement is made up of 4 items that estimate students' desire and like to learn and involvement in-class activities.

The cognitive engagement includes eight items and investigates 'students' use of significant information-processing strategies in learning' (Mameli & Passini, 2017, p. 532). The scoring of this scale is on a 5-point Likert scale from 1 (completely disagree) to completely agree (5). Reeve and Tseng's (2011) used Cronbach's alpha coefficient to check the reliability of this tool and it was 0.82 for agency engagement, 0.94 for behavioral engagement, 0.78 for emotional engagement and 0.88 for cognitive engagement. in the present study, the scale's reliability was also measured by the alpha coefficient formula and showed to be strong (alpha = 0.91).



**Self-regulation strategies** :To measure the amount of SRL, the MSLQ self-regulated learning scale prepared by Pentrich and De Groot (1990) was used. The scale has 47 items and is arranged into three main components: motivational beliefs (25 Items), cognitive strategies (13 Items), and metacognitive strategies (9 Items). The items of this questionnaire are five-point Likert tests, including (I completely disagree, I disagree, I have no opinion, I agree, and I completely agree) and points 1, 2, 3, 4, 5 were considered for each option. Pintrich and DeGroot (1990) used the factor analysis method to check the validity of the tool and used Cronbach's alpha for reliability, and the results showed that their reliability is between 74 and 83. In the present study, Cronbach's alpha for motivational beliefs, and cognitive and metacognitive strategies were obtained in the order of .91, .89 and .94 which showed strong reliability.

### Data Analysis

In this research, the data were analyzed using SPSS-23 software at a significance level of 0.05. to analyze the research data, Pearson correlation and regression methods were used.

### Findings

The results of Table 2 show that there is a direct and significant relationship between self-regulated learning strategies and academic involvement in MOOCs. The results show that the total score of SRL has the highest correlation with academic engagement ( $r=0/53$ ), then the components of metacognitive strategies ( $r=0/44$ ), cognitive strategies ( $r=0/40$ ) and motivational beliefs ( $r=0/38$ ), in the order of their relationship with academic engagement, are significant and direct. To predict academic engagement based on SRL, multiple regression analysis was used in a step-by-step method (see Table 3).

Table 2. The Correlation Coefficient between Research Variables

Row	Variables	1	2	3	4	5
1	academic engagement	1				
2	motivational beliefs	0/38**	1			
3	cognitive strategies	0/40**	0/55**	1		
4	metacognitive strategies	0/44**	0/60**	0/66**	1	
5	SRL (total)	0/53**	0/61**	0/65**	0/66**	1

The results show that all components of SLR significantly predict academic engagement in MOOCs. The result of examining the coefficient of determination showed that a total of 41% of academic engagement in MOOCs can be predicted through SLR.

Table 3. Multiple Regression Coefficients for Predicting Academic Engagement in MOOCs

Variables	$\beta$	t	Sig
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Fixed coefficient	-	9/67	0/001
motivational beliefs	0/32	10/11	0/001
cognitive strategies	0/34	10/67	0/001
metacognitive strategies	0/39	12/21	0/001
SRL (total)	0/47	14/32	0/001

## Conclusion

This research was done with to determine relationship between academic engagement in MOOCs and SLR. The results of the research showed that there is a positive and significant relationship between SLR and academic engagement in MOOCs, and it is possible to predict the academic engagement of learners in MOOCs based on SLR. This result is in line with the previous findings (Sun & Ruedam 2012; Merino-Tejedo et al, 2016; Yu et al, 2016) indicating that self-regulation as an active process can increase academic engagement. Self-regulation is an active and organized process in which learners choose goals for their learning and try to regulate and control their cognition, motivation, and behavior (Cole et al, 2011). A self-regulating student is a person who uses cognitive and metacognitive strategies and a sense of self-efficacy to achieve the goal in the best way, in harmony with his talents and abilities. Such a person shows high enthusiasm in different emotional, cognitive and behavioral fields and as a result can increase academic involvement in MOOCs. In MOOCs, where the most important problem is the low rate of course completion (Badali et al. 2022), SLR can also affect the course completion rate by increasing academic involvement in MOOCs.

The limitation of this research was not using the mediator variable and carrying out the structural equation model. Therefore, it is suggested to develop a structural equation model in future research using the role of a mediator variable to predict academic engagement in high school. Based on the results of the research, to the officials and those interested in the implementation of MOOCs, it is suggested to pay attention to SLR to optimize the effect of MOOCs by increasing the completion rate of the course.

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## Exploring the Impact of Project-Based Learning on Entrepreneurship Education for Engineering School Students in Mongolia - A Case Study of NUM Startup 2.0

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**Abstract:** Entrepreneurship is still young and developing in Mongolia, yet it is the main driver of the Mongolian economy. According to The National Statistics Office of Mongolia, small and medium businesses create 52.5% of all jobs in Mongolia. To ensure more qualified entrepreneurs join the labor market, educators and instructors can help with resources for their students that will enable them to create successful businesses. Entrepreneurship education can play an essential role in providing a qualified and skilled supply of entrepreneurs for the Mongolian economy. This paper will examine how project-based learning impacts engineering students' entrepreneurial mindset at Mongolia's university. The study will try to create awareness of the importance of entrepreneurship education and a project-based learning (PBL) approach for students with any engineering background. As a case study, this research will take "NUM Startup 2.0", a five-month program in that students can team up with their professors to build a startup company from the beginning. A qualitative research methodology will be used to conduct interviews with participants of NUM Startup 2.0. This research will use homogenous sampling to select students with similar backgrounds, and for a semi-structured in-depth interview, collected data will be analyzed using the thematic analysis method. Moreover, this research may provide valuable feedback to universities in Mongolia to develop more well-structured courses for students.

**Keywords:** Project-Based Learning (PBL), Entrepreneurship, Entrepreneurial Mindset, Engineering School, Mongolia

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### Introduction

Entrepreneurs has been known for its role in value creation, creating jobs, increasing economic growth. Global Entrepreneurship Monitor (GEM) surveyed 65 different economics worldwide and, there are around 582 million entrepreneurs by 2017. Small business has created 10.5 million jobs from 2000 to 2019, compared to large corporate organizations its nearly twice. Figure 1.1 shows the percentage of adults in each economy who personally know someone who has started a company in the last two years.

In 2020, adults (ages 18-64) from 43 countries participated in GEM’s Adult Population Survey(APS), and more than 40 percent knew who stopped business in 2020 due to COVID-19, on the other hand 25 percent knew who started a business amid a pandemic.(Bosma et al., 2021).

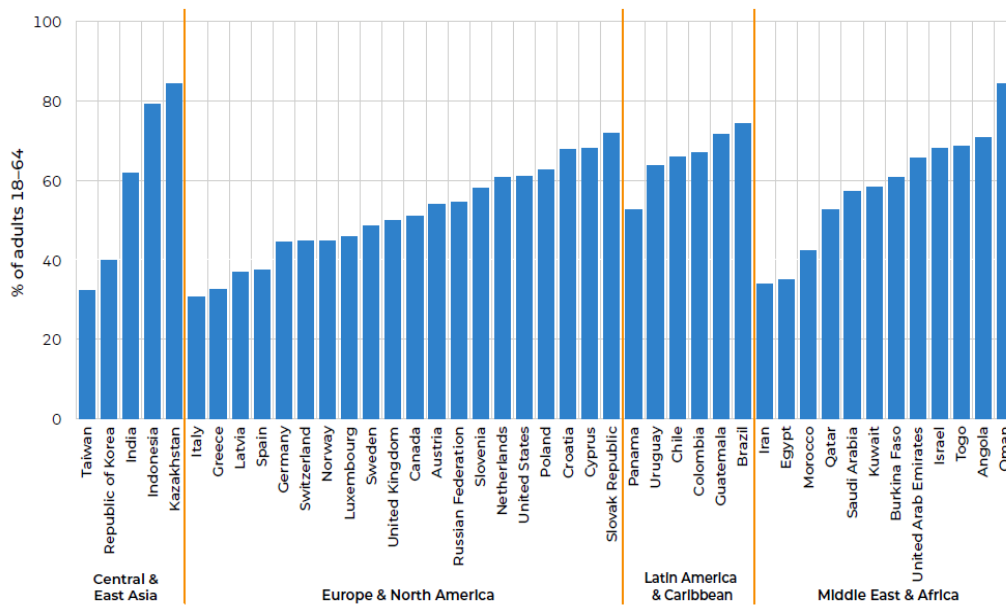


Figure 5. Percentage Of People Who Know Someone Created Business in Last Two Years

Source:(Global Entrepreneurship Monitor (2021)

(The GUESSS Project Global University Entrepreneurial Spirit Students' Survey) has been conducting surveys around the globe since 2003. The latest survey (2021) conducted in 58 countries with more than 267’000 students, “all-time high record for GUESSS”. As shown in Figure 1.2 below, around 32 percent of the students wants to pursue entrepreneur career five years after their studies. In the other hand some (in total 32.6 percent) prefer to join medium-sized and large business organizations directly after studies (Sieger et al., 2021).

### Research Motivation

The COVID-19 pandemic heavily impacted global economy and workforces. During the COVID-19, there has been a massive surge in amount of start-up businesses in United States. According to (Djankov & Zhang, 2020) study found that Americans started 4.4 million businesses in 2020. That is a 24 percent increase compared to 2019. Since the lockdown everyone was trapped at home, many businesses were set up online and people’s screen time increased over the last years. In this digital age, the businesses have changed from physical into online. Entrepreneurs who are opportunities seekers (Shane & Venkataraman, 2000) sees pandemic as an opportunity. Without the cost of running a shop on street or having a stall at a market, having business online can be overall more cost-efficient. In 21 centuries, people can turn their creative ideas into business much easier than before. Through an increase in risk, time, creativity and online growth, businesses and entrepreneurship are clearly on the rise.

Many countries around the world are focusing their capital and resources on improving their national competitiveness through the development of a knowledge economy, advanced and high technology based on scientific and technological achievements. The experience of developed countries shows that universities, especially research-based universities, play a key role in creating an effective national innovation system that is the basis for the development of the knowledge economy.

In the case of Mongolia, the Government Action Plan 2016-2020 "... create conditions for the implementation of research-based university development policy and planning", the issue needs to be implemented within the framework of the national program. According to the article 3.3 of "National Research-Based University Development Program 2016-2020"

1. To support universities in establishing start-up companies and raising funds for research funding by owning shares in the charter capital of business organizations.
2. To support the university's innovation activities and create optimal methods of investment and financing for start-up business development.

Although the main goal of universities is become research-based university now, the next step is to build an entrepreneurial university. This research tries to study early stage of entrepreneurship education in Mongolia and explore students' perspectives of entrepreneurship education.

### **Research Objective and Questions**

The aim of this research is to explore impact of project-based learning (PBL) on entrepreneurship. The focus will be to how project-based learning pedagogy influence student's entrepreneurial mindset. The main research objectives are as follows:

#### **Objectives**

1. To identify the development of entrepreneurship education and its related educational policy in Mongolia
2. To analyze project-based learning and their impacts on entrepreneurship education
3. To explore how the project-based learning of "NUM Startup 2.0" project influence entrepreneurship education for engineering school in Mongolia

To answer research objectives, following research questions raised

#### **Questions**

1. What is the current educational policy and evolution in Mongolia?
2. What is the current development of entrepreneurship education in Mongolia?
3. What is project-based learning in educational design?
4. How does project-based learning possibly influence the new entrepreneurship education in Mongolia?



5. What is “NUM Startup 2.0” project and how does it apply to project-based learning on entrepreneurship education?
6. How does project-based learning of “NUM Startup 2.0” project impact entrepreneurship education for engineering school and how can it be improved in Mongolia?

## Literature Review

### Current Challenges of Entrepreneurship Education in Mongolia

In today’s technological centric world, science, technology, and innovation are regarded as one of the top contributors to the economic growth of the states (Science, Technology and Innovation in Mongolia, 2019). (Science, Technology and Innovation in Mongolia, 2019) claims that countries aligning STI with their social and economic priorities over the long term and integrating them into overall policy decision-making is a great way to boost economic growth. However, Mongolia has failed to follow this education plan.

The main challenge for Mongolian education system and its students currently is that the government is not ready to invest in the sector of entrepreneurship. Studies such as (Delgernasan M., 2015) and (Oyuntsetseg L. & Batkhurel G., 2015) have pointed out the same issue. Apart from that, (Oyuntsetseg L. & Batkhurel G., 2015) discovered that the universities in Mongolia are not having the technological infrastructure and socio-economic resources that are required to invest in STI to enhance entrepreneurship learning. Universities are now conducting mixed activities of teaching-research-entrepreneurship in order to develop the tendency of innovation so that they could be included in the list of entrepreneurial university in Mongolia (Oyuntsetseg L. & Batkhurel G., 2015).

### Concept of Entrepreneurship

Entrepreneurship term doesn’t come to any specific definitions. It is hard to define the term under one condition because the term appears in various fields. As economics, sociology, political science, and psychology use the term entrepreneurship or refer to it in some way (Mokaya et al., 2012). As (Taylor, 1947) said there is no absolute best way to define it. (Kouakou et al., 2019) studied different scholars’ perspectives of entrepreneurship or entrepreneur and observed seven similar components.

The author regrouped these elements into three-level shown in Figure 2, each level shows the importance of components while studying a definition of entrepreneurship. Based on (Kouakou et al., 2019) study the most repeated component was opportunity recognition. Therefore (Shane & Venkataraman, 2000) definition is still significant. Scholars agree on opportunity recognition and exploration of entrepreneurial opportunity are the heart of entrepreneurship (Kouakou et al., 2019) (Shane & Venkataraman, 2000) definition of entrepreneurship “Entrepreneurship is an activity that involves the discovery, evaluation, and exploitation of opportunities to introduce new goods and services, ways of organizing, markets, process, and raw materials through organizing efforts that previously had not existed”.

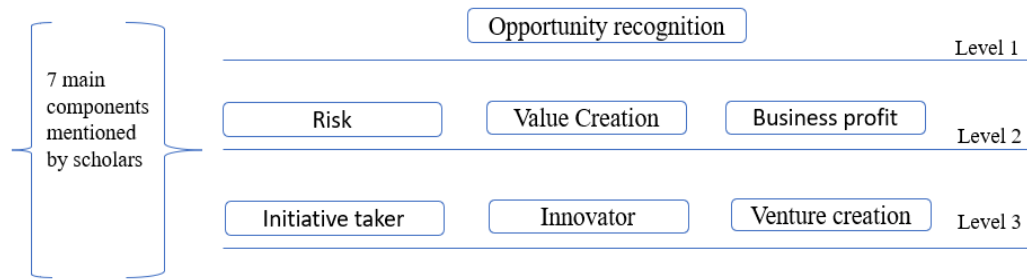


Figure 6. Elements Cited in the Definition of Entrepreneurship

Source: Adapted from (Kouakou et al., 2019)

### Entrepreneurship Education

(Drucker, 1985) mentioned in his book “*Most of what you hear about entrepreneurship is all wrong, it's not magic; it's not mysterious; and it has nothing to do with genes. It's a discipline and, like any discipline, it can be learned.*” Peter Drucker defined entrepreneurship as a “discipline”.

Jamieson (1984) introduced three themes for entrepreneurship education: teaching “about”, “for” and “through” entrepreneurship (Chaker & Jarraya, 2021). Courses and programs that focus on teaching “about” entrepreneurship heavily rely on content of the subject, and their main goal is to develop students’ “skills” and increase their “awareness of entrepreneurship”. In this teaching pedagogy, students passively receive knowledge from educators and it is considered as “teacher-centered approach” (Chaker & Jarraya, 2021) (Alanazi, 2018). Second, teaching “for” entrepreneurship focuses on entrepreneurial intention and encourages students to become entrepreneurs in the future. By providing real environments that learners can practice real-world examples. Lastly, teaching “through” is similar to the previously mentioned method. Additionally, it uses “experiential approach” to engage students to create or contribute to business creation (Chaker & Jarraya, 2021). Both are “student-centered” pedagogy, in which the instructor of the course plays more of a facilitator.

### Entrepreneurial Personality and Mindset

Scholars from the area of entrepreneurship began to wonder whether entrepreneurs are born with some special traits that help individuals explore and recognize opportunities, or they grow their mindset during their lifetime. (Mathisen & Arnulf, 2013) mentioned that entrepreneurial mindset (EM) becomes individuals different from others, mindset grows and is influenced by individuals’ activities and environment. Since there are various definitions of entrepreneurial mindset, (Naumann, 2017) conducted a synthetic literature review on EM, used a comprehensive method to provide the latest of entrepreneurial mindset concept and its development. The author mentioned that definitions of existing EM literature are “more or less” to each other. According to the author, the definition of EM is fully connected with “thinking” and it is based on a “cognitive perspective”.

#### *Entrepreneurial Mindset Assessments*

As mentioned in previous section there is no correct definition of entrepreneurial mindset (EM) and its components. To measure or assess students EM is same as defining it. There is not only one assessment plan to use in every case. Depending on how each university define EM in their courses and programs, an assessment plan should be developed. (Lichtenstein & Monroe-White, 2017)

(Lichtenstein & Monroe-White, 2017) reviewed total of 22 assessment instruments mentioned in literature. The review cover literature from 1989 to 2016. Among all 22 instruments, there are total of 63 components were mentioned as a part of EM. Here are some examples shown in Table 1 below.

Table 6. Components of Entrepreneurial Mindset Assessment

achievement_orientation	attitude towards entrepreneurship	challenging Perspectives	confrontation tolerance done
networking	innovativeness	non-conformity	problem-solving
organizational leadership orientation	pro-activeness	risk-taking	self-efficacy
self-esteem, self confidence			

Source: Researcher (components chosen from (Lichtenstein & Monroe-White, 2017)

### Definition and Origin of Project-Based Learning

The root of project-based learning (PBL) started with (Dewey, 1938)'s theory of "learning by doing" and (Kolb, 1984)'s "experiential learning". From (Dewey, 1938)'s educational point of view, students must interact with their environment in order to adapt and learn. In 1984, (Kolb) introduced his four stage experimental learning cycle and it is inspired by Dewey's educational model of "learning by doing". Kolb noted that "*Learning is the process whereby knowledge is created through the transformation of experience*" (Kolb, 1984, p. 38). Project-based learning is teaching model that students learning from and "around projects".(Thomas, 2000). Traditional classroom projects are extra to the curriculum, but PBL projects are central. With PBL approach students only focuses on one big project through the whole semester. Differences between traditional and PBL projects are students take ownership of the project, teachers play facilitator role, and PBL focuses on student centered learning. (Botha, 2010). According to (Thomas, 2000) definition of projects in PBL is "complex tasks that involve students in design, problem solving, decision making, and other investigative activities. PBL gives students the opportunity to work relatively autonomously over extended periods of time, and the students' work generally culminates in realistic products or presentations." (Thomas, 2000) addressed five criteria for PBL projects as "centrality", "driving question", "constructive investigations", "autonomy", and "realism" Figure 3.

Criteria for Project-based learning	Centrality	PBL projects are central, not peripheral to the curriculum.
	Driving questions	PBL projects are focused on questions or problems that "drive" students to encounter (and struggle with) the central concepts and principles of a discipline.
	Constructive investigation	Projects involve students in a constructive investigation.
	Autonomy	Projects are student-driven to some significant degree.
	Realism	Projects are realistic, not school-like

Figure 7. Five Criteria for PBL Projects

Source: Adapted from (Thomas, 2000)

### Concept and Principles of Project-Based Learning

Universities have been trying to offer students technical skills and “soft skills” such as team working, networking and communication, and “problem-solving” skills. However, these skills are not easy to achieve by current teacher-centered pedagogy. In order to change this situation, universities should give an opportunity to students to practice their technical skills in a real-world problem (Guo et al., 2020). Project-Based Learning (PBL) is a student-centered pedagogy that students can apply their prior academic knowledge to a real-world problem. (Botha, 2010) adopted PBL framework developed by Law and Chuah (2004). The framework applied successfully to teach entrepreneurship in South African University. As shown in Figure 4 below, (Botha, 2010) demonstrated necessary PBL main components. Projects in PBL approach primarily “student directed”, which means that students take ownership of the project, and instructors need play role as “facilitator and coaches”. Students work as team to solve real world problem in extended period, preferably outside of classroom(Botha, 2010).

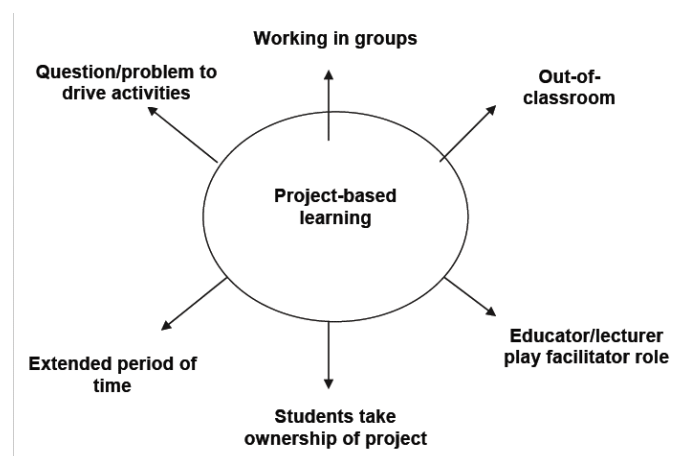


Figure 8. Components of Project-Based Learning (PBL)

Source: (Botha,2010)

## Method

### Research Design

This research aims to explore the impact of project-based learning (PBL) on entrepreneurship education of engineering students in Mongolia and to explore a change of students' entrepreneurial mindset. The research framework is illustrated below (Figure 5). To explore the change of engineering students' mindset within PBL, a qualitative research method will be conducted. As shown in Figure 5 below, this research divided into three phases. Literature review is to identify the development of entrepreneurship education its related educational policy and concept of project-based learning.

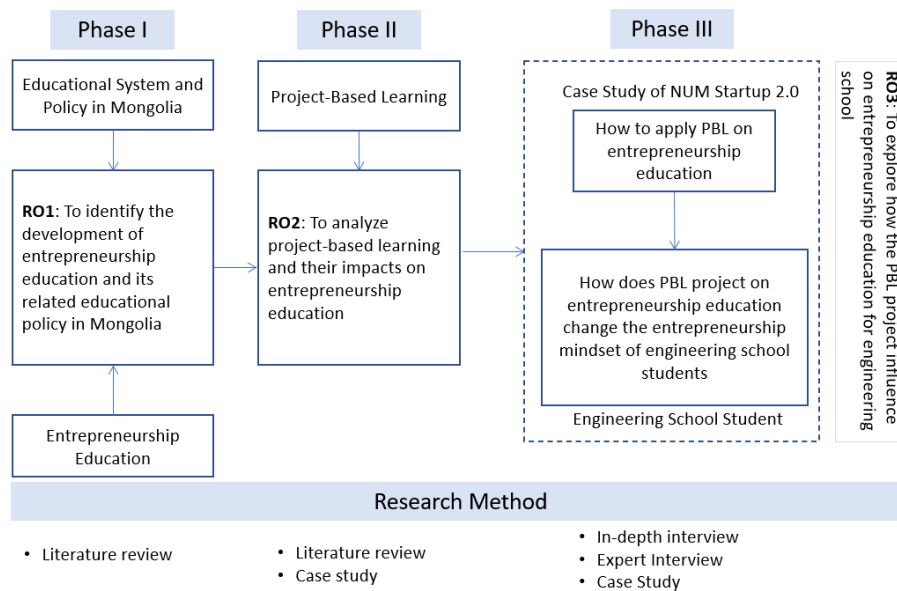


Figure 9. Research framework

Source: Researcher

## Case Introduction

### Criteria of Case Selection

There are five criteria that had to meet in order to collect correct and reliable data to explore students' entrepreneurial mindset and the impact on project-based learning. As the researcher mentioned earlier in this paper about PBL components based. These criteria are based on Figure 4 Components of project-based learning (PBL).

1. "Work in groups"
2. "Out-of-classroom"
3. "Educator/lecturer plays a facilitator role"
4. "Students take ownership of a project"
5. "Extended period of time"

### Case Background

MIT Global Startup Labs (GSL) program helps developing countries to establish startup for university students. GSL trains science and technology background undergraduate and graduate students to teach their knowledge to other universities students. Every year GLS partner with regional best universities to offer intensive eight weeks bootcamp program. In 2016, GLS partnered with National University of Mongolia (NUM) and Mongolian University of Science and Technology (MUST) to help students to develop their business ideas into action. In 2017, NUM decided to launch own startup intensive program under the name of NUM Startup 1.0. The focus was to provide NUM students theoretical and practical knowledge of starting a business and to promote the startup business movement (NUM, 2017). NUM Startup 1.0 duration was three weeks and includes a series of classes such as entrepreneurial thinking and skills, “Business model”, Things to consider when building a team (NUM, 2017). In 2018 NUM Startup 1.0 changed its program name to NUM Startup 2.0. The main feature of the change was students must team up with their professors to participate for the program. Next big change was the program duration dramatically increased from three weeks to five months with five phases.

## Results and Discussion

### Pilot Study Interviews

The researcher made an assumption that a teaching method of NUM Startup 2.0 is project-based learning (PBL). To ensure that and explore more about NUM Startup 2.0, the researcher conducted a pilot study. The researcher has conducted two interviews with students participated in NUM Startup 2.0 in 2019 and 2020. (See Table 2). The researcher adopted components of project-based learning (see Figure 4) based on literature review to develop further interview questions. The semi structured interview questions divided into four different parts

1. Overall experience
2. Teaching style
3. Team startup project
4. Stimulation of entrepreneurship

Table 7. Pilot Study Interviews

Interview	Major	Interview Form	Time Duration	Participated year
Interviewee A	Electronic Engineering	Online	1 hour	2020
Interviewee B	Bio-Technology Engineering/IT engineering	Online	1 hour	2019

Source: Researcher

### Findings from the Pilot Study Interviews

*The Pedagogy of NUM Startup 2.0 is Project-based Learning*

1) *Educators’ Role in NUM Startup 2.0 are as Facilitators*

Based on the findings, the criteria from literature review meets the findings. When the researcher given questions to the interviews on reviewing previous experiences, both interviewees agreed on most of the factors. One of the criteria is that educators must play facilitators role in the project or course. Both interviewees emphasized that working with educator was easy going and had a good atmosphere (see Figure 6).

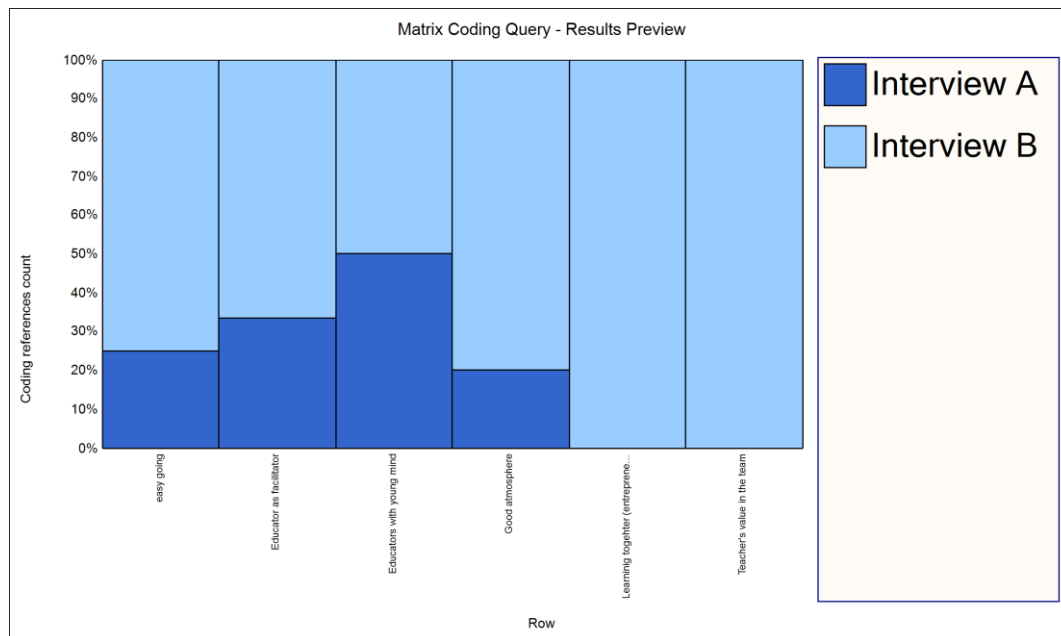


Figure 10. Educators role in NUM Startup 2.0

Source: Researcher

As a matter of fact, students working closely with educators helps them to achieve more greater results on their projects. They both think without a teacher the projects can not go through:

*“I think since our project is related to bio engineer.... basically we can not do anything without a teacher help” (Interviewee B, 2022)*

## 2) Outside of Classroom

NUM Startup 2.0 is five months long summer project. Students joined the projects end of their spring semester and it ended around mid of fall semester. The project goal is every team participated must show a working product in the end of the project. Therefore, students need to spend more time together in the lab or outside of the school. The interviewees said that throughout the whole project they only went to the classroom for the lectures held by business mentors and teachers (see Figure 7). Both interviewees mentioned working outside of the classroom was a success:

*“The school held ... two or three a whole day workshop from morning to evening in countryside... Which was really good experience for me and my teammates to communicate other teachers easily”... (Interviewee B, 2022)*

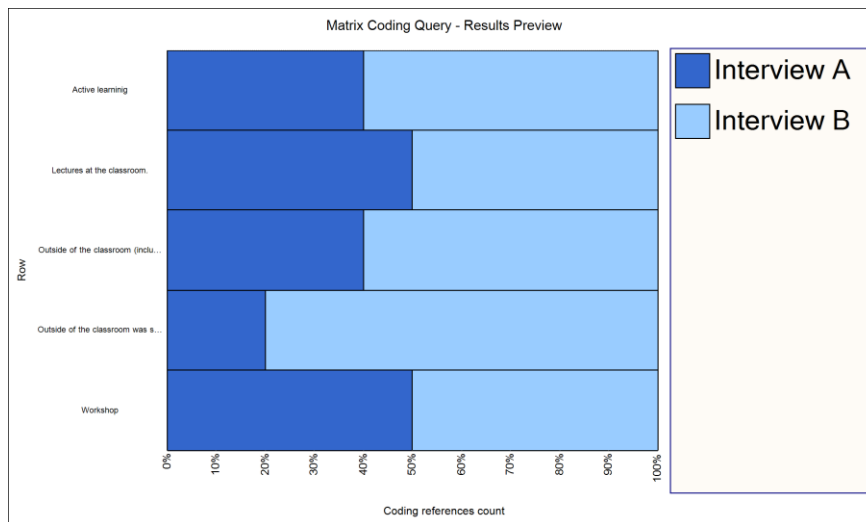


Figure 11 Working outside of the classroom NUM Startup 2.0

Source: Researcher

### 3) Work in Groups/Team Working

Based on the findings both interviewees strongly agreed that they could not finish the projects without a good team communication, trusting each other and getting motivated by work (see Figure 8). As a team coming up with brilliant idea was easy for the interviewees. But executing that idea into project was the most challenging part for the participants due to unexpected error and incidents may happen. To successfully finish their project team working was the most crucial part of the project:

*Since I am the leader of our project I was responsible for everything... Because it was so long project some of our teammates almost gave up. But I was there for cheering them up... After that we participated the biggest Information and Communications Technology (ICT) expo. And we were so proud of ourselves (Interviewer A, 2022)*

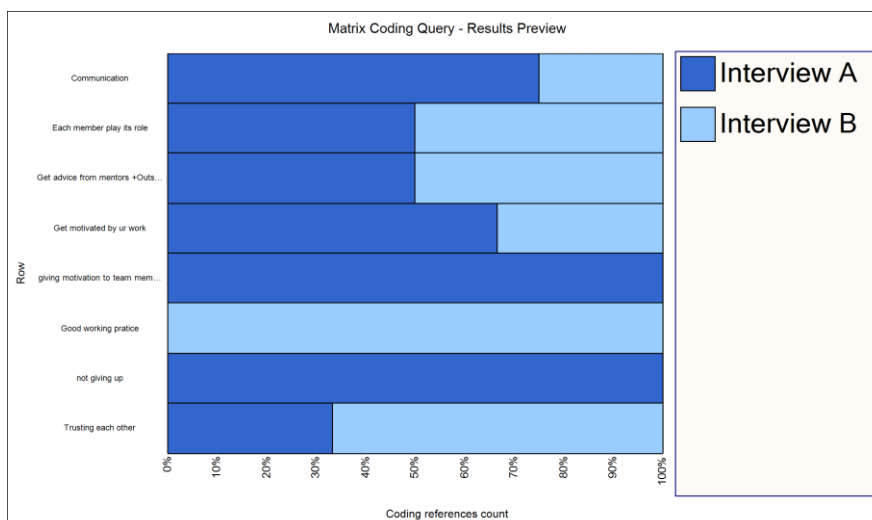


Figure 12 Team working NUM Startup 2.0

Source: Researcher



## Conclusion

This research is still ongoing. Case study with semi-structured interview will be conducted with participants of NUM Startup 2022. Based on the pilot study findings further in-depth interview questions will be developed. Thematic analysis will be used as qualitative approach to develop further findings. Based on the findings the researcher will develop another semi-structured interview questions for industry experts or teachers to validate the findings. How engineering student's entrepreneurial mindset changed after attend NUM Startup 2.0 is the expected outcome of this research. Hence contribute theoretically to teachers, educators, and experts to develop more well-structured courses for students.

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## Extracting Keywords from Images Using Deep Learning for the Visually Challenged

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**Abstract:** Assistive technologies can in many ways facilitate the normal day-to-day lives of the disabled. As part of the ongoing research on assistive technologies at UTAS, Oman, that deals with augmenting and finding multimodal aspects of applications for the disabled, this paper aspires to investigate the role of deep learning in the field of image interpretation. Images are one of the most important mediums of conveying information among humans. Visually impaired persons especially with low cognitive abilities face insurmountable difficulties in understanding cues through images. This challenge is met by filtering words from image captions to facilitate understanding of the key notion conveyed by an image. This work utilizes the image captioning technique using deep learning frameworks such as convolution neural networks (CNN) and recurrent neural networks (RNN) to generate captions. These captions are fed to Rake, an NLP library that identifies keywords in the caption. The entire process is automated and uses transfer learning techniques for caption generation from images. This process is then further integrated with our main project, Finger Movement Multimodal Assistive System (FMAS) thereby incorporating text cues for interpreting images for the visually impaired.

**Keywords:** Finger Movement Multimodal Assistive System (FMAS), Visually impaired, Convolution neural networks (CNN)

**Citation:** Jaboob, S., Chauhan, M.S., Dhanasekaran, B., & Natarajan, S.K. (2022). Extracting Keywords from Images Using Deep Learning for the Visually Challenged. In A. Ben Attou, M. L. Ciddi, & M. Unal (Eds.), *Proceedings of ICSES 2022-- International Conference on Studies in Education and Social Sciences* (pp.554-561), Antalya, Türkiye. ISTES Organization.

## Introduction

The disabled especially those with visual impairments, have a hard time understanding and interpreting images. This inability to comprehend images leads to the shrinking of a vast segment of visual cognitive abilities that otherwise would have been avoidable. Furthermore, some of the visually challenged also have prior cognitive impairments that further accentuate their handicap. This will also adversely affect their kinesis and response to particular situations in day-to-day life. Cognitive limitations among the visually impaired are seen equally among children as well as old people, especially those suffering from Parkinson's disease [1,2]. Various methodologies have been tried but explaining images has been for a long a logical challenge despite the availability of the latest technologies.

Image captioning is the process of generating a text description of a given image. This can be suitable modified for the visually incapacitated people with limited or no agility/ perceptibility, and thus can play a major role for them in dealing with the external world using our FMAS system. Image captioning lies at the confluence of computer vision, deep learning, and natural language processing. The FMAS is powered by GPU hardware which runs deep learning algorithms and possess inbuilt functionality to provide feedback to the FMAS via cloud. A recent work [3] uses a generative model [4] and RNN (recurrent neural network) [5] to generate captions. This allows for automatic caption generation with an accuracy of BLEU-1 score of 59 taken on the experiments on the Pascal dataset. Since the research work is ongoing we expect more robust and accurate models for image captioning in the near future. One of the limitations of such models is that they have to be trained on large image datasets which adds to the training time. Inherently, these models employ object detection and image segmentation to identify key contents in an image.

Keyword extraction is studied generally to summarize texts or emails to identify the specific category to which the text purports to. Keyword extraction mainly involves removing stop words ("is", "the", etc.) from a given text. Further, words are statistically chosen based on an information retrieval tool *tf-idf* that calculates the significance of a word based on its importance in a chosen corpus.

The focus of this work is on the keyword extraction which is an important component of the FMAS. The other FMAS system components include GSM and Bluetooth connectivity that sends images to the GPU backend hardware further processing. The final results are communicated to differently abled persons using the semi-automated devices like wheelchair or through output devices such as speaker or monitor.

## The Proposed Method

The proposed solution is based on the utilization of image captioning based on transfer learning. The CNN model is trained on the ImageNet dataset and thus is capable of identifying specific objects in various types of images seen in daily life. Our image captioning model is a type of encoder-decoder model based on visual-space

methodology instead of using modal representations as in some other cases. The architecture of the model is a CNN-RNN combination [6] as shown in Figure 1.

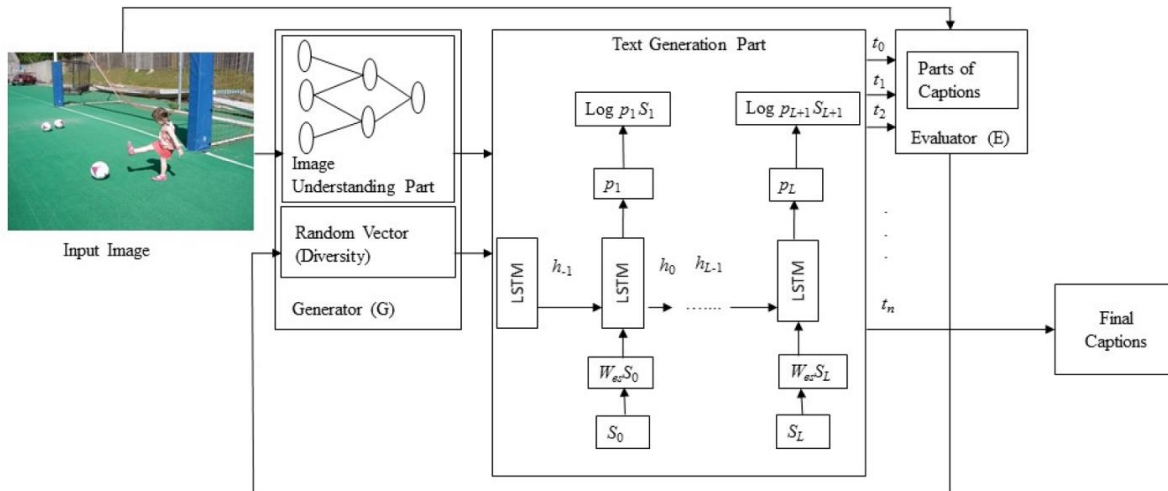


Figure 1. A CNN-RNN Paired Model for Image Captioning [6]

The second stage of the proposed network uses LSTM (Long Short-Term Memory) RNN model for generating captions using Glove word embeddings. This allows for the generation of captions. The method for generating caption is not very robust but in most cases, it helps in identifying key objects in an image which is sufficient in our case. We further input our generated captions to an existing NLP library, Rake, which further zeroes in on the prominent keywords. Our overall model is depicted in Figure 2.

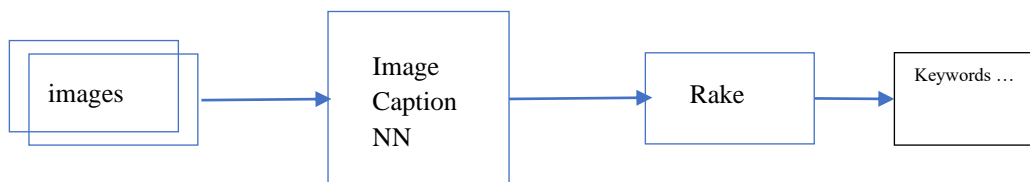


Figure 2. Keyword Generator NN from Images

Our image captioning CNN model is based on transfer learning. We train our model on a pre-trained InceptionV3 CNN model [7] trained on the ImageNet dataset. We slice the top layer of the model in order to customize it and fit our RNN (LSTM) model. The main idea is to capture the latent representation [8] of image features and pass it on to the next RNN network.

Our captions are sourced from a vocabulary provided by GloVe encodings [9]. This allows for access to a pretrained unsupervised learning algorithm that represents words in terms of vectors. These vectors are calculated

based on the nearest neighbours principle thus words with similar meanings are closer in terms of Euclidean distance (using vectors) than those which are not. We limit our embedding dimensions to 200 for the sake of fast convergence. The RNN network that deals with word embeddings is described in Figure 3.

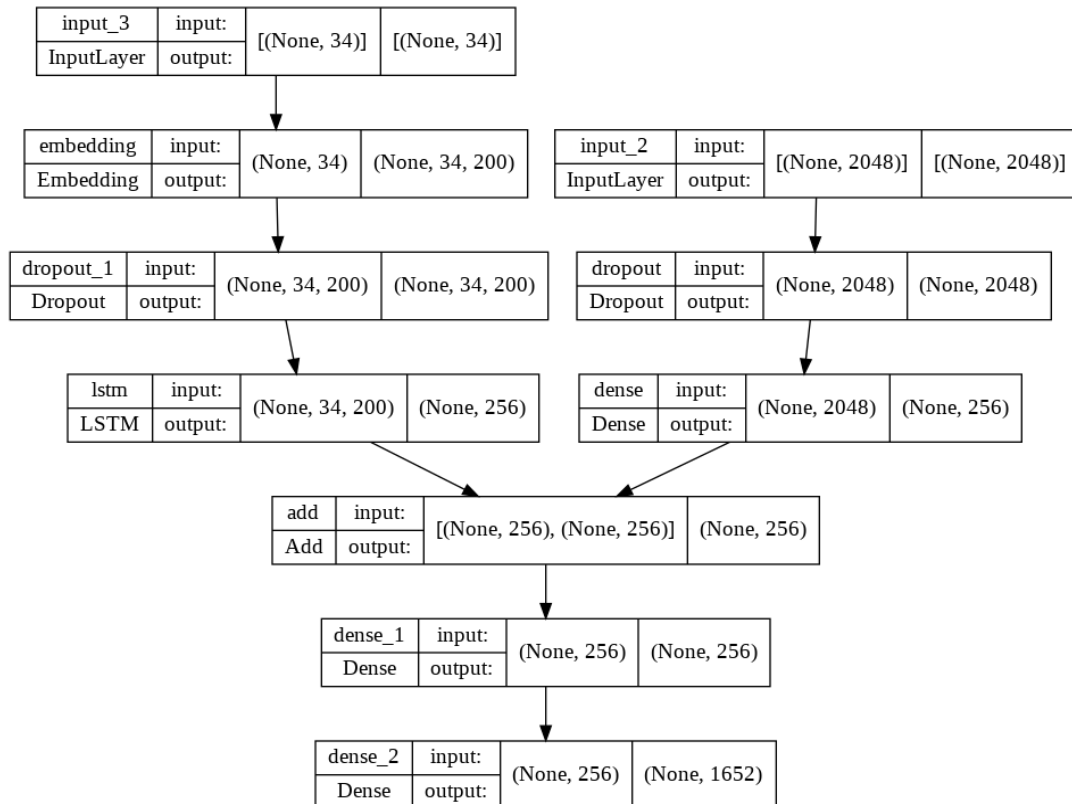


Figure 3. The Caption Generator RNN Model

Some of the outputs of the generated captions are shown in Figure 4.

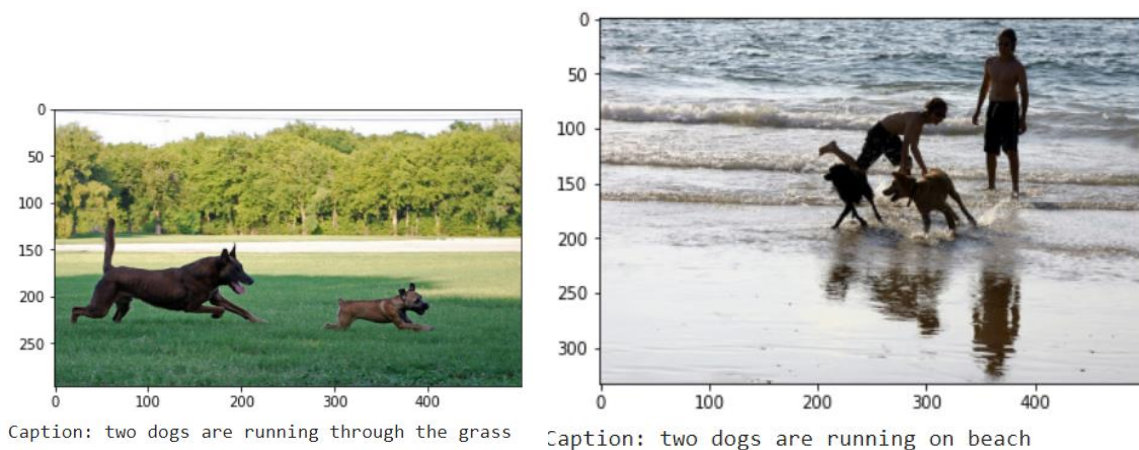


Figure 4: Generated Captions

The captions generated are then fed to the NLP Rake library which outputs the critical keywords. As mentioned before, the visually challenged with some sort of cognitive limitations can fathom quite easily an image about its context and meaning. Figure 5 provides the keywords generated from a given image.



(1, 2048)

Caption: man and woman sitting at table in front of computer

[('woman sitting', 4.0), ('man', 1.0), ('table', 1.0), ('front', 1.0)]

**Figure 5.** Caption with Accompanying Keywords Generated by Rake

## Performance

We use BLEU (Bilingual Evaluation Understudy) metric [10] for comparing the generated captions with given training labels. As each training image is provided with 5 descriptions, we analyze our BLEU score with our generated caption. BLEU score varies between 0 and 1, where 1 is considered the optimal match and 0 is a complete mismatch. The score uses various sizes of n-grams and then summarizes the score using a geometric mean.

The general formula of the BEU score calculations is given as under:

$$\exp \left( 1 - \frac{\text{length of reference}}{\text{length of hypothesis}} \right)$$

Figure 6 shows the BLEU score for each generated caption for some samples. It is clearly seen that our model

provides on average 70% accuracy in most cases when sampled over the training and test data. In actual use, the efficiency may fall to 20% on average.

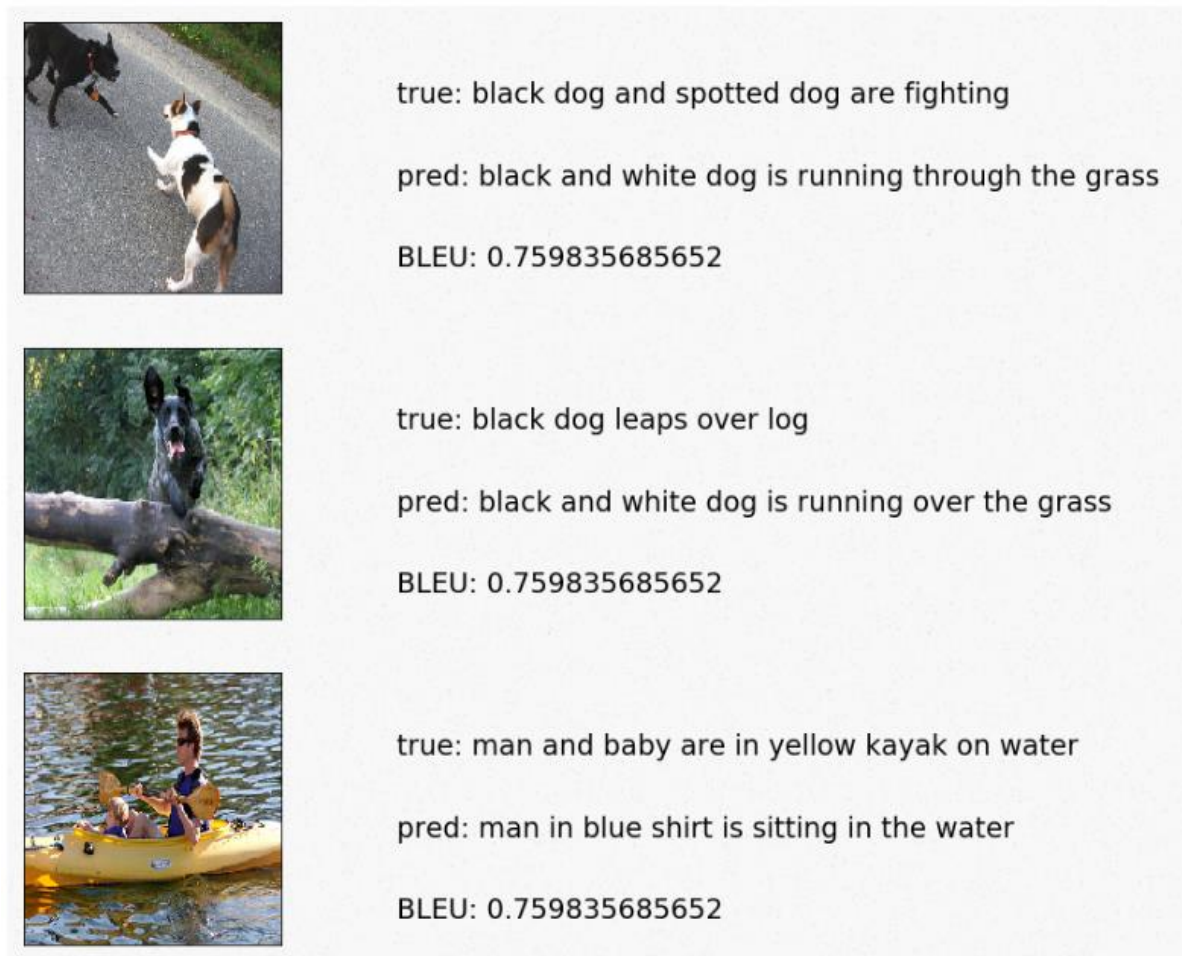


Figure 6. Examples with Captions and Corresponding BLEU Scores

## Conclusion

We show empirically how an image's content can be isolated and displayed as a keyword, especially for visually challenged persons. The process uses various technologies, computer vision, transfer learning, convolution networks, recurrent neural networks, and unsupervised NLP-based algorithms for keyword generation. The system still does not provide accurate contents in an image and hence needs to be further fine-tuned. The main aim of providing keywords is still met and as such can be of immediate relevance to the visually impaired community at large.

The efficiency of our model depends on various factors, such as the volume of training data, the CNN model used, and also the quality of the images used for prediction. The proposed key extraction work will be fused with the existing FMAS project that uses cloud and the GSM system connected with the Raspberry Pi. The system



aims to make the communication effortless and can be individually personalized using suitable data using our deep learning component. The system efficacy can be further enhanced with the help of an eye tracker device. The system is then integrated with the Google Mini device thus allowing multifaceted Google functionalities in different aspects of usages for the disabled.

## Acknowledgment

This work is wholly supported by the project titled “Finger-Movement Multimodal Assistive System (FMAS) for Smart People, including People with Special Needs” funded by the Ministry of Higher Education, Research and Innovation, Sultanate of Oman bearing Project ID BFP/RGP/ICT/19/152 under the Research Grant (RG) program.

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## Appendix

The implementation code can be accessed at the following Google Colab link.

<https://tinyurl.com/2p8848ab>

## Role of Media Literacy in Confronting Hate Speech among Jordanian Society Components: A Quantitative Analytical Study

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**Abstract:** This study aims at analyzing the role of media literacy in confronting hate speech among Jordanian society components. For that, the researcher adopted the descriptive as well as the analytical approaches. The study investigates the direct role of media literacy with its four capabilities (Access, Understanding, Evaluating & analyzing, and Interacting capabilities) in confronting hate speech among the components of Jordanian society. The study sample consisted of 3000 Jordanian individuals from all Jordanian governorates, and various social, cultural, and economic levels. A questionnaire was developed as a tool for data collection. The study concluded that the third variable (media literacy evaluating and analyzing capabilities) came with the highest percentage of (87%); reflecting that the evaluating and analyzing capabilities are the cornerstone of understanding the media content and the media discourse concerning exposure to hate speech. Data also show that there are statistically significant influences at the level of significance ( $\alpha \leq 0.05$ ) of media literacy (access, understanding, evaluating and analyzing, and interacting capabilities) in confronting hate speech among the components of Jordanian society.

**Keywords:** Media Literacy; Hate Speech; Society; Jordan; Quantitative.

**Citation:** Jarrar, A. (2022). Role of Media Literacy in Confronting Hate Speech among Jordanian Society Components: A Quantitative Analytical Study. In A. Ben Attou, M. L. Ciddi, & M. Unal (Eds.), *Proceedings of ICSES 2022-- International Conference on Studies in Education and Social Sciences* (pp.562-574), Antalya, Türkiye. ISTES Organization.

### Introduction

Media, in its mission, is a social process by which information, opinions, and ideas are exchanged between individuals or groups within the society, and between different cultures, to achieve certain goals. Over the years, the issue of media literacy has gained growing importance, especially with the increase of fake news and rumors, and with the society's loss of complete confidence in its media, and with citizen's loss of the spirit of criticism and the ability to analyze the information needed to make decisions related to life and societal issues; media literacy today has become a priority challenge in the society in which the use of modern information and communication technologies has become an integral part of our daily use, especially for youth, as it plays a dominant role in building their societal and economic models of thinking in all countries (Bulger & Davison, 2018).

The urgent need to merge “media literacy” in the educational systems in the Arab world, through which individuals will learn how to deal with the media, and will learn how to understand the media and the mechanisms of news making, besides learning how to evaluate, criticize and ask the right questions about news and its sources, as well as participating in the production of the media content and interacting with it (Tornero & Varis, 2010).

The role of media literacy appears in achieving psychological and intellectual security, and forming societal immunity; to confront attempts that could disturb the security, stability, and the safety of the society, through building a media culture that contributes to forming individuals' awareness and develop their sense of national belonging. It is clear that the widespread of media and communication as an open space has become a haven for practicing various forms of discrimination and producing hate speech, which is primarily invested by the political actors, and this is what is also noted through the Arabic content on the Internet, whether it is related to citizen journalism or microblogging from within the social media, as that networking plays a fundamental role in the spread of hate speech in its various types. This is why it is imperative to establish a culture of dialogue and accept the counter-opinion in our media, which will lead to tolerance as a societal principle that helps to develop the concepts that will reject violence which leads to hatred (Mondal, Silva & Benevenuto, 2017).

The study carried out by "Akeed Observatory" of the Jordan Media Institute, in cooperation with the Ethical Journalism Network, entitled "Monitoring hate speech in the Jordanian media" showed that "hate speech" is on the rise in Jordan, although it is still not considered a phenomenon in Jordan in terms of its size, spread, nature, topics, sources, or the parties it targets (Akeed Observatory, 2019).

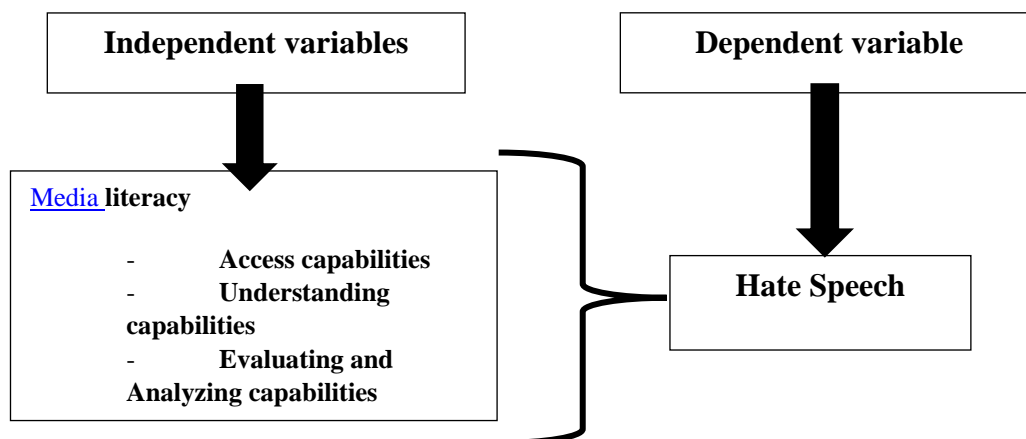
There is no doubt that media has an important role in people's lives, as it is responsible for shaping their collective opinion and their cultures, and with a role that is not limited to transmitting news only, but rather in educating, directing, and creating opinion; which by that is carrying a very critical social responsibility. And nowadays, the traditional media has expanded to join social media; which has become an integral part of the media system, and with this, the volume of media content has increased exponentially (Siddiqui & Singh, 2016).

## **Problem Statement**

The Jordanian society is an independent entity, and its distinguished personality resulted from the ancient and modern intermarriage and mixing between many races and groups of various origins that settled on the Jordanian land. Jordan today is developing educationally, and the Jordanian society is opened up to the whole world, internally and externally (Bani Salameh & El-Edwan, 2016). When talking about media literacy, the issue is related to the set of competencies that aim to enable people to develop conscious practices within society, these practices are characterized by controlled communication processes, which will lead to creating active citizens, informed and aware of their rights. There is no doubt that the media revolution or the media technology that the world is witnessing has turned all the scales, and that media has become a basic pillar in building the components

of societies. Media institutions are required to develop their structure under the political developments; and this will not happen except through the development of their systems, programs, and policies under these developments by employing mechanisms that contribute to finding solutions to reduce hate speech among the components of Jordanian society. Hence, this study calls for a consideration of the implications of media literacy and its role in limiting and combating the phenomenon of hate speech in the context of diagnosing and understanding the context of the current situation in Jordan and in the context of the current societal conditions that Jordan is going through by trying to answer the following question: What is the role of media literacy within its four capabilities (Access, Understanding, Evaluating and analyzing and Interacting capabilities) in confronting hate speech among the components of Jordanian society?

### Study Model



### Study Hypotheses

Based on the study question, and based on the study model; the researcher has adopted the following four (NULL) hypotheses:

H01: There are no statistically significant influences at the level of significance ( $\alpha \leq 0.05$ ) of media literacy access capabilities in confronting hate speech among the components of Jordanian society.

H02: There are no statistically significant influences at the level of significance ( $\alpha \leq 0.05$ ) of media literacy understanding capabilities in confronting hate speech among the components of Jordanian society.

H03: There are no statistically significant influences at the level of significance ( $\alpha \leq 0.05$ ) of media literacy evaluating and analyzing capabilities in confronting hate speech among the components of Jordanian society.

H04: There are no statistically significant influences at the level of significance ( $\alpha \leq 0.05$ ) of media literacy interacting capabilities in confronting hate speech among the components of Jordanian society.

## Literature Review

All countries are engulfed by what has been termed "hate speech", as societies witness a widespread of this phenomenon, and most countries are facing complex levels of intolerance that target not only individuals but also groups. Abdel Fattah's study (2014) aimed at demonstrating the multiple physicals, symbolic, verbal, and rhetorical patterns of violence, which is an integral part of the political, religious, ideological, social, and cultural systems. Social, national, linguistic, religious, sectarian, ethnic, and regional exclusions result in the accumulation of frustrations, and a sense of injustice and hatred (Abdel Fattah, 2014).

Hate is usually formed, nourished, and directed by specific individuals or groups against individuals and other groups that are different in ethnicity, language, or religion, and this is often for political reasons (Waldron, 2009). There are many reasons for the emergence of hate speech, most notably: the wrong image of the other, fear of competition, the perception that the other is the enemy, as well as the wrong reading of history. The causes of hate speech lie in two things (Mabreeh, 2019):

- Politicians influence over media to meet their interests.
- Media professionals' poor understanding of the potential impact of some immoral words and images that encourage hatred and incite violence.

Al-Rahmaneh (2019) conducted a study aimed at defining the concept of hate speech and its forms circulating through social media networks and its repercussions on the Jordanian society, as well as determining the effects of the spread of hate speech. The results of the study showed that the concepts of hate speech have differed among respondents. It is no longer hidden from anyone how important and dangerous that the media plays in various fields of life, whether in the educational, cultural, economic, or security aspects, as most studies have unanimously agreed that media has become one of the most prominent features of the modern era, and an effective mean informing the consciousness of people and societies. Media literacy represents an urgent knowledge need for individuals regardless of their specializations and educational levels, and highlighting the importance of including courses in media literacy targeting all Jordanian society components, given that, the media content they are exposed to, some of which contain false news and hate speech.

The importance of developing critical thinking skills, which are the focus and the essence of media literacy, as the development of people's critical thinking is the basis for their participation in the media influence processes by directing them to create useful and responsible media content. Critical thinking skills promoted by media literacy have a role in the process of influence, resulting from receiving information, pointing out that media literacy has a strong role in alerting people to the mechanisms of dealing with malicious media messages with

great caution and avoiding sharing or interacting with the hate speech embedded in the content. Therefore, the importance of media literacy and its role in developing society and maintaining its stability lies in its role in fighting rumors, lies, and poisons broadcast by the hostile parties targeting the unity and the cohesion of the society (Cappello, 2017).

Freedom is the basis of responsibility, and a free press is the only one that deserves to bear the responsibility of the word, and the burden of directing public opinion on real foundations. The citizen's right to knowledge is the essence and purpose of journalistic work (Coddington, 2015). Media is a message of dialogue and participation, and journalists have to preserve the principles and etiquette of this dialogue and take into account the right of observers to comment, respond, and correct, and the right of the general population to the inviolability of their private life and their human dignity (Curran & Seaton, 2018).

It must be emphasized first that there is no clear concept of hate speech, as it takes many descriptions that can be summed up in verbal violence, clear hatred, intellectual intolerance, racial discrimination, expressive excesses, and the arrogant view in the discourse accompanied by exclusion. Consequently, talking about hate speech as a societal phenomenon becomes a problem that has spread with the spread of the media and social communication in particular, and with reference to the laws framing freedom of opinion and expression through the international legal arsenal, we find that hate speech, and based on the description we presented, has taken many forms that go beyond laws. Consequently, these transgressions, in the view of some, become a normal matter within the framework of freedom of opinion and expression; while the truth confirms that it is hatred expressed in various descriptions and expressions.

The difference in the intellectual and cultural load clearly confirms the growing phenomenon of hate speech, as it has become present in various media outlets. As we follow the verbal dictionary used, we find that the speech of intolerance has become a "culture". Consequently, the exclusionary discourse has become an expression for many social groups with their various inclinations and ideological orientations, and society has often tended towards an education fed by the media first, then education, secondly, and third social phenomena. The increasing importance of media as being, on one hand, the vital place for establishing a diverse social and political dialogue, and on the other hand, the place where intellectual and cultural currents and social transformations of all kinds intersect with the various opinions they bear, including the peaceful discourse based on the values of citizenship and human rights, and the violent nature discourse that poses a threat to civil peace and coexistence among the components of society.

## **Methods and Procedures**

### **Study Methodology**

The study adopts both descriptive as well as analytical approaches for carrying out the research results. The study investigates the direct role of media literacy with its four capabilities (Access, Understanding, Evaluating and

analyzing, and Interacting capabilities) in confronting hate speech among the components of Jordanian society. The study is an analytical study in a way because it analyses the relationships between the variables proposed.

### Data Collection Tool

A questionnaire was the data collection tool considered for this study. The data was collected using a self-administrated questionnaire after reviewing the studies related to the subject, which was developed by the researcher by keeping the literature as the reference. The questionnaire was administered through both online as well as offline methods.

#### *Questionnaire Validity*

For ensuring the validity of the study tool, the questionnaire is reviewed by several faculty members in the same field of the research. Therefore, for identifying the suitability of the questionnaire for the goals to be achieved, and by retrieving all suggestions, all the necessary adjustments on the paragraphs of the questionnaires were made, by deleting, adding some paragraphs, and by rephrasing others.

#### *Questionnaire Reliability*

For ensuring the reliability of the study tool, the researcher used the internal consistency coefficient ( $\alpha$ ) according to the alpha Cronbach's equation, and the value of ( $\alpha$ ) 76.9%, as shown in table (1), which is high when compared with the minimum acceptable of 60%.

Table 1. Results of the Alpha Cronbach's Reliability for the Dependent and Independent Variables

Variables	Reliability Coefficient	Rate
Independent variables		
Access capabilities	81.4	Good
Understanding capabilities	77.5	Good
Evaluating and analyzing capabilities	72.9	Good
Interacting capabilities	73.2	Good
Dependent variable		
Hate speech	79.7	Good
Total average	76.9	Good

### The Study Sample

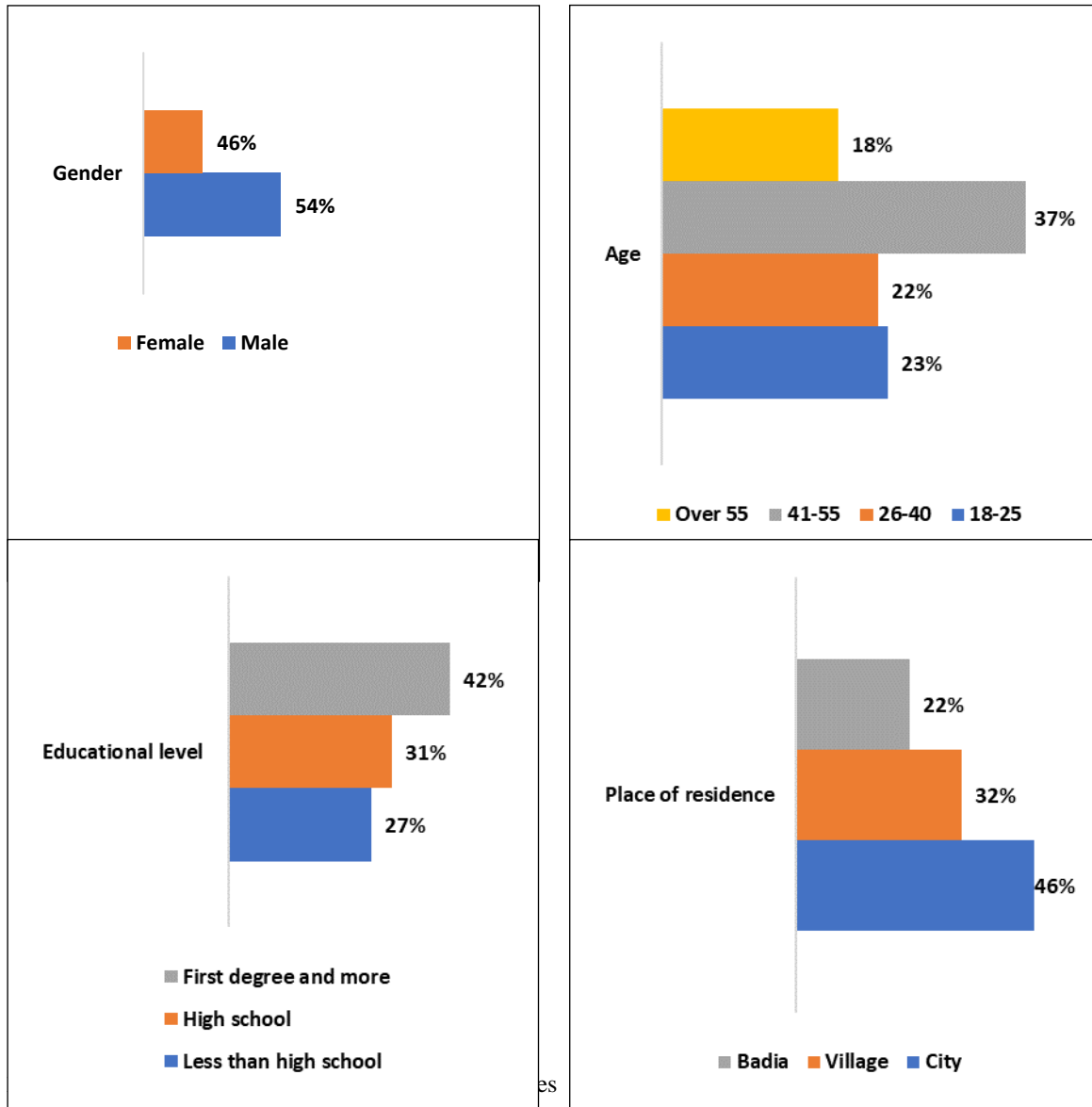
The study sample consisted of 3000 Jordanian individuals from all Jordanian governorates, and various social, cultural, and economic levels.



## Data Analysis and Dissection

### Characteristics of the Study Sample

Data in the following figures show the characteristics of the study sample on gender, age, educational level, and place of residence.



### *Respondents' Attitudes toward Media Literacy Access Capabilities*

The following data shows the percentages of the respondents' attitudes toward media literacy access capabilities for the three asked questions as illustrated in table (2)

Table 2. Percentages of the Respondents' Attitudes toward Media Literacy Access Capabilities for the Three Asked Questions for The First Variable

Questions		Agree	NA	Disagree
1	Being able to access more media news increases exposure to hate speech	33%	12%	55%
2	Being able to access more media news decreases exposure to hate speech	51%	11%	38%
3	Being able to access more media news is one way to confront hate speech	81%	3%	16%

Data in table (2) show that 81% agree that being able to access more media news is one way to confront hate speech, while 16% disagree.

*Respondents' Attitudes toward Media Literacy Understanding Capabilities*

The following data shows the percentages of the respondents' attitudes toward media literacy understanding capabilities for the three asked questions as illustrated in table (3)

Table 3. Percentages of the Respondents' Attitudes Toward Media Literacy Understanding Capabilities for the Three Asked Questions for the Second Variable

Questions		Agree	NA	Disagree
1	Being able to understand more media news increases exposure to hate speech	27%	6%	67%
2	Being able to understand more media news decreases exposure to hate speech	60%	9%	31%
3	Being able to understand more media news is one way to confront hate speech	83%	5%	12%

Data in table (3) show that 83% agree that being able to understand more media news is one way to confront hate speech, while 12% disagree.

*Respondents' Attitudes toward Media Literacy Evaluating and Analyzing Capabilities*

The following data shows the percentages of the respondents' attitudes toward media literacy evaluating and analyzing capabilities for the three asked questions as illustrated in table (4)

Table 4. Percentages of the Respondents' Attitudes toward Media Literacy Evaluating and Analyzing Capabilities for the Three Asked Questions for the Third Variable

	Questions	Agree	NA	Disagree
1	Being able to evaluate and analyze more media news increases exposure to hate speech	22%	9%	69%
2	Being able to evaluate and analyze more media news decreases exposure to hate speech	59%	11%	30%
3	Being able to evaluate and analyze more media news is one way to confront hate speech	87%	4%	9%

Data in table (4) show that 87% agree that being able to evaluate and analyze more media news is one way to confront hate speech, while 9% disagree.

#### *Respondents' Attitudes toward Media Literacy Interacting Capabilities*

The following data shows the percentages of the respondents' attitudes toward media literacy interacting capabilities for the three asked questions as illustrated in table (5)

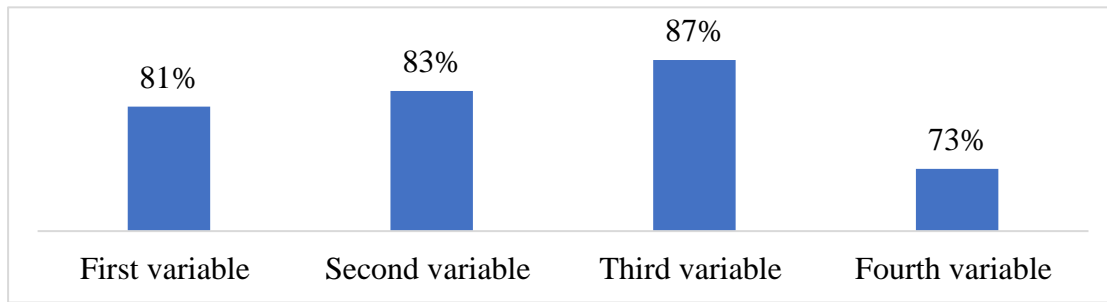
Table 5. Percentages of the Respondents' Attitudes toward Media Literacy Interacting Capabilities for the Three Asked Questions for the Fourth Variable

	Questions	Agree	NA	Disagree
1	Being able to interact with more media news increases exposure to hate speech	20%	14%	66%
2	Being able to interact with more media news decreases exposure to hate speech	57%	15%	28%
3	Being able to interact with more media news is one way to confront hate speech	73%	12%	15%

Data in table (5) show that 73% agree that being able to interact with more media news is one way to confront hate speech, while 15% disagree.

#### *Respondents' Attitudes toward the Third Question of Each Variable*

Data in the following figure show the correlations of the respondents' attitudes toward the third question of each variable, as the data show that the highest approval rate is for the third variable (media literacy evaluating and analyzing capabilities) with a percentage of (87%), followed by the second variable (media literacy understanding capabilities) with the percentage of (83%), and the lowest is for the fourth variable (media literacy interacting capabilities) with the percentage of (73%).



### Testing the Study Hypothesis

H01: There are no statistically significant influences at the level of significance ( $\alpha \leq 0.05$ ) of media literacy access capabilities in confronting hate speech among the components of Jordanian society. Table (6) shows the Chi-square value, the level of significance, and the degree of freedom for the influence of media literacy access capabilities in confronting hate speech among the components of Jordanian society.

Table 6. Chi-Square Test for Testing the Significant Influences of Media Literacy Access Capabilities in Confronting Hate Speech Among the Components of Jordanian Society

The first hypothesis	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	153.114 <sup>a</sup>	3	0.000
Likelihood Ratio	142.328	3	0.000
Linear-by-Linear Association	71.236	1	0.000
N of Valid Cases	3000		

Data in table (6) show that the value of Pearson Chi-Square is (153.114), and the P-value is less than (0.000) and the degree of freedom is (3); this means that the null hypothesis will be rejected and the alternative hypothesis will be accepted as follows:

Hypothesis	Decision
There are no statistically significant influences at the level of significance ( $\alpha \leq 0.05$ ) of media literacy access capabilities in confronting hate speech among the components of Jordanian society.	Rejected
There are statistically significant influences at the level of significance ( $\alpha \leq 0.05$ ) of media literacy access capabilities in confronting hate speech among the components of Jordanian society.	Accepted

H02: There are no statistically significant influences at the level of significance ( $\alpha \leq 0.05$ ) of media literacy understanding capabilities in confronting hate speech among the components of Jordanian society. Table (7) shows the Chi-square value, the level of significance, and the degree of freedom for the influence of media literacy understanding capabilities in confronting hate speech among the components of Jordanian society.

Table 7. Chi-Square Test for Testing the Significant Influences of Media Literacy Understanding Capabilities in Confronting Hate Speech Among the Components of Jordanian Society

The second hypothesis	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	312.667 <sup>a</sup>	3	0.001
Likelihood Ratio	225.154	3	0.001
Linear-by-Linear Association	124.786	1	0.001
N of Valid Cases	3000		

Data in table (7) show that the value of Pearson Chi-Square is (312.667), and the P-value is less than (0.001) and the degree of freedom is (3); this means that the null hypothesis will be rejected and the alternative hypothesis will be accepted as follows:

Hypothesis	Decision
There are no statistically significant influences at the level of significance ( $\alpha \leq 0.05$ ) of media literacy understanding capabilities in confronting hate speech among the components of Jordanian society.	Rejected
There are statistically significant influences at the level of significance ( $\alpha \leq 0.05$ ) of media literacy understanding capabilities in confronting hate speech among the components of Jordanian society.	Accepted

H03: There are no statistically significant influences at the level of significance ( $\alpha \leq 0.05$ ) of media literacy evaluating and analyzing capabilities in confronting hate speech among the components of Jordanian society. Table (8) shows the Chi-square value, the level of significance, and the degree of freedom for the influences of media literacy evaluating and analyzing capabilities in confronting hate speech among the components of Jordanian society.

Table 8. Chi-Square Test for Testing the Significant Influences of Media Literacy Evaluating and Analyzing Capabilities in Confronting Hate Speech Among the Components of Jordanian Society

The third sub-hypothesis	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	88.289 <sup>a</sup>	3	0.000
Likelihood Ratio	76.481	3	0.000
Linear-by-Linear Association	13.564	1	0.000
N of Valid Cases	3000		

Data in table (8) show that the value of Pearson Chi-Square is (88.289), and the P-value is less than (0.000) and the degree of freedom is (3); this means that the null hypothesis will be rejected and the alternative hypothesis will be accepted as follows:

Hypothesis	Decision
There are no statistically significant influences at the level of significance ( $\alpha \leq 0.05$ ) of media literacy evaluating and analyzing capabilities in confronting hate speech among the components of Jordanian society.	Rejected
There are statistically significant influences at the level of significance ( $\alpha \leq 0.05$ ) of media literacy evaluating and analyzing capabilities in confronting hate speech among the components of Jordanian society.	Accepted

H04: There are no statistically significant influences at the level of significance ( $\alpha \leq 0.05$ ) of media literacy interacting capabilities in confronting hate speech among the components of Jordanian society. Table (9) shows the Chi-square value, the level of significance, and the degree of freedom for the influences of media literacy interacting capabilities in confronting hate speech among the components of Jordanian society.

Table 9. Chi-Square Test for Testing the Significant Influences of Media Literacy Interacting Capabilities in Confronting Hate Speech Among the Components of Jordanian Society

The forth sub-hypothesis	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	91.119 <sup>a</sup>	3	0.000
Likelihood Ratio	69.356	3	0.000
Linear-by-Linear Association	16.56	1	0.000
N of Valid Cases	3000		

Data in table (9) show that the value of Pearson Chi-Square is (91.119), and the P-value is less than (0.000) and the degree of freedom is (3); this means that the null hypothesis will be rejected and the alternative hypothesis will be accepted as follows:

Hypothesis	Decision
There are no statistically significant influences at the level of significance ( $\alpha \leq 0.05$ ) of media literacy interacting capabilities in confronting hate speech among the components of Jordanian society.	Rejected
There are statistically significant influences at the level of significance ( $\alpha \leq 0.05$ ) of media literacy interacting capabilities in confronting hate speech among the components of Jordanian society.	Accepted

## Conclusions

Data of the respondents' attitudes toward the third question of each variable show that the highest approval rate is for the third variable (media literacy evaluating and analyzing capabilities) with the percentage of (87%); reflecting that the evaluating and analyzing capabilities are the cornerstone of understanding the media content

and the media discourse concerning exposure to hate speech. And being followed by the second variable (media literacy understanding capabilities) with the percentage of (83%); reflects that the capabilities of understanding are important to understand the media content and the media discourse regarding the exposure to the hate speech to confront it. And of course, being the lowest in the fourth variable (media literacy interacting capabilities) with the percentage of (73%) reflects the weak interaction capabilities of citizens with the media content and the media discourse in Jordan. Data also show that there are statistically significant influences at the level of significance ( $\alpha \leq 0.05$ ) of media literacy (access, understanding, evaluating and analyzing, and interacting capabilities) in confronting hate speech among the components of Jordanian society.

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## Communication Patterns of Cultural Heritage Conservationists in Bandung City

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**Abstract:** The city of Bandung is one of the big cities in Indonesia. There are many beautiful, unique and rare heritage buildings in Bandung. Since the Dutch colonial era, this city has been carefully planned and designed to be a comfortable and pleasant city to live in. The famous Dutch architects have designed the lay out and built the city with various styles and models of building constructions, so that the city of Bandung has the nickname as the most complete architectural laboratory in the world. The presence of these cultural heritage buildings, have been witness for long journey of the city formation, with many important events that occurred in these historical buildings. These cultural heritage buildings have many valuable scientific importance, such as: science, history and culture. All of these have motivated the birth of conservation movements carried out by cultural heritage lovers. In this paper, we present the results of our study of communication patterns among cultural heritage conservationists through qualitative research method with observations, interviews and literature survey, as well as documentation studies. We found that a number of cultural heritage conservationist organizations have carried out efforts to preserve historical buildings by applying different communication patterns, with the same main goal to keep these valuable assets, so that they remain preserved as the proud icons of the city.

**Keywords:** Bandung City, City of Heritage, Conservationist, Cultural Heritage

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### Introduction

The city of Bandung has long been recognized to have a well-known name or designation that has made Indonesian people proud of. Various terms have been used to describe the beauty of Bandung at that time. Based on the references that the author reads, apart from its natural beauty which is naturally owned, the city of Bandung also has a well-prepared urban planning concept. The people who built the city of Bandung at the beginning of its development, had a very good design by paying attention to the balance of the surrounding natural environment.

Not surprisingly, the city of Bandung has received many nicknames because of its beauty and comfort,



including: Paradise in Exile (1750s), Bandung Excelcior (1856), The Sleeping Beauty (1884), De Bloem der Indische Bergsteden (1896) Parijs Van java (1920), The Garden of Allah (1921), Intellectuale Centrum van Indie (1921), Staatskundig Centrum van Indie (1923), Europe in de Tropen (1930), City of Pensioners (1936), City of Beauty (1950), City of Flowers (1950s), City of Conference, City of Education and Capital of Asia-Africa (1955).” (Katam and Abadi, 2005:7)

Some nicknames for Bandung City which are still very well known to the public are "Bandung City of Flowers", "Parijs van Java" and "City of Heritage". These nicknames were born referring to the reality that exists and occurs in Bandung. “Bandung City of Flowers”, for example, today may be just a beautiful slogan, but that was not the case in the past. This nickname arose because in ancient times this city was considered very beautiful with many trees and flowers that grew and was very neatly arranged.

Now, many movements are carried out by communities and organizations that love the Bandung City. They organize various activities to preserve the greatness name of Bandung City, as an architectural laboratory in the world, although they often face many obstacles from various parties. Cultural heritage conservationists state that the most important thing that must continue to be pursued is to give value and respect to the heritage that still exists today. Various movements and communications continue to be carried out, so that current and future generations can still appreciate the cultural heritage of their nation. A great nation is a nation that can appreciate its history, and in the cultural heritage building, there are many events that should not be forgotten. So, carrying out the process of conservation, revitalization, and inheritance to the next generation is a necessity.

## Method

The methodology used in this research is a qualitative approach. According to Crasswell (1994: 145), a qualitative approach has several assumptions, namely 1). Qualitative researchers pay more attention to the process than the results. 2). Qualitative researchers pay more attention to meaning/interpretation. 3). Qualitative researchers are the main tool in collecting data and conducting data analysis so researchers need participatory observations in the field. 4). Researchers are involved in the research process, interpretation of data and achievement of understanding through words/pictures. 5) qualitative research is descriptive where researchers pay more attention to the process, meaning and understanding obtained by words or pictures. 6). The qualitative research process is inductive, where researchers are expected to be able to make concepts, hypotheses and theories based on data obtained in the field and then continue to develop them.

The qualitative approach used in this study is a descriptive design because it is based on the following:

- 1 Have a theoretical interest in the process of human interpretation.
- 2 Focuses attention on the study of human action and socially situated artefacts.
- 3 Using humans as the main research instrument.
- 4 Relies primarily on narrative forms to encode data and write texts for presentation to audiences

## Result and Discussion

### Bandung The City of “Parijs Van Java” and “City of Heritage”

"Parijs van Java" is another nickname that is strongly attached to the city of Bandung. The nickname arose because this city has a wealth of cultural heritage in the form of a variety of unique, beautiful and abundant buildings and an enchanting urban park arrangement. The style of cultural heritage buildings owned by Bandung are mostly Dutch colonial heritage architecture, ranging from the Indische Empire style (1860-1890s), Neo-Classical (1890-1910s), to Art Deco (1920- 30s). Even the Art Deco style is quite dominant, so that Bandung occupies the 9th position among the 10 World's Great Cities of Art Deco. Bandung's position is only one level below the French city which is known as one of the Art Deco centers in the world. This phenomenon has made Bandung to be known as an "architectural museum" and an "architectural laboratory in Indonesia".



Figure 1. Gedung Sate, one of the icons of Bandung City

In 1918, “Gemeente-werken Bandung with the command of Ir. F.J.L. Ghijsels built 750 modern buildings, in preparation for moving the capital city of the nation from Batavia,” so that in Bandung, a national and international architectural movement was born during that period of time. “The national and international architectural movement is an effort to find the identity of Dutch Colonial architecture in Indonesia with references to archipelagic (Javanese) architecture. The search for architecture that is responsive to local climatic and geographical conditions has motivated to develop new art of building constructions, called Indian architecture. This hybrid architecture has resulted in an acculturation of western and eastern cultures in Bandung, indicating a perfect engineering architecture, in that a graceful western building tries to respond to local conditions.” The wealth of cultural heritage buildings in the city of Bandung is closely related to the history of the city. The historical evidence in the form of cultural heritage is a silent witness to the long journey of Bandung from a small city in the mountain areas to a bustling and big metropolitan city. It is undeniable that this long journey can be traced through historical records of the struggle of people, geological conditions and through cultural heritage buildings from the colonial era.

The beauty of “Parijs van Java”, cannot be separated from the process of urban development, which began to be

organized as modern city in 1915. "For the first time, urban planning was formulated in the design concept of the "Master Plan Gemeente Bandoeng 1918-1923". Some Dutch architects were present in Indonesia, namely: Ir. P. A. J. Moojen, Ir. F. J. L. Ghijsels, Col. Genie V. L. Slors and First Lieutenant Genie M. T. van Staveren." (Kunto, 1996:37).

In around 1920, Bandung was then flooded with architects from Europe following the 1st world war (1914-1918), which by that time the colonial government's discourse to build this "Priangan capital" of Bandung became the capital of the Dutch East Indies (Nusantara). It is recorded that for two decades (1920-1940), approximately 70 famous architects have arrived in Bandung, including: Ir. Maclaine Pont (ITB campus designer), Ir. J. Gerber (Architect of Gedung Sate), Ir. G. Hendriks and Ir. E. H. de Roo (architect of City Hall, Slaughterhouse, Dwiwarna Building, Pandu's Grave, Park in Bandung), Ir. Thomas Karsten (City of Bandung designer, architect of public housing), Bureau of architects "Bel, Piso en Kok (architect of shops in Braga and Pasar Baru), J. Bennink (architect of Rumah Vila), E. H. G. H. Cuypers (architect of Bank Indonesia Braga, Borromeus hospital, churches in Bandung), A. F. Aalbers (architect of Hotel Homan, Bank Pembangunan Daerah Braga Building, several modern villas), and a number of other well-known Dutch architects." (Kunto, 1996:37).

Among these Dutch architects, the most prominent and most famous ones in Bandung were Ir. Richard L. A. Schoemaker and his brother, Prof. Ir. C. P. Schoemaker. Richard Schoemaker was the architect of the complex and the Siliwangi Division Command Staff Building located on Jl. Aceh. While the architectural works by C.P. Schoemaker include: Jaarbeur Building, Renovation of Merdeka Building, Cathedral Church, Bethel Church, Binoculars Star Building, Villa Isola, Cipaganti Mosque, and others. Because of the many works of Schoemakers, therefore Bandung is known by architects as "Schoemaker's City"

"Parijs van Java" is an icon of Bandung, with all the uniqueness of its historical buildings, so that conservation efforts are a necessity to name it. Support and implementation of conservation from various circles must be done so that people can still see the real beauty and comfort of the city. Information on the beauty of Bandung does not only come from descriptions of history books or illustrations of our authors/predecessors but directly with the physical evidence. The concept of urban planning came from the colonial government, but the struggle to realize a city was carried out by the sweat and sacrifices of the Indonesian people at that time.

The historical events that occurred cannot be separated from the struggles of the people in the past. Values contained in the people struggles are very meaningful as lessons which reflects spirits to gain the independence from colonialization, which has been conducted in those buildings for many years. Although the initial concept of the building designs came from the Dutch colonial government, the people who built them were Indonesian. History showed that the sufferings and struggles of the Indonesian people have been deeply engraved there. Referring to a "besluit" issued by the Dutch East Indies Government on September 25, 1810 which declared Bandung City as the capital of Bandung Regency, now in 2022 the city of Bandung has entered a mature age. So, the age of the city of Bandung is now 212 years.



(a). Merdeka Building (the site of the 1955 Asia-Africa conference)



(b) Unique heritage building style

Figure 2. Examples of Historical Heritage Buildings in Bandung

### Organization/Community of Cultural Conservationist in Bandung City

Currently, in Bandung, there are several social organizations that are very serious about paying attention to the richness of cultural heritage, namely: Bandung Society for Heritage Conservation, Aleut Community, Indies Architecture Community, Kota Kita and the Bandung Trails Community. These organizations have a similar goal, namely to strive by communicating the existence of the cultural heritage of Bandung and inviting the community to carry out conservation activities through various useful programs.

#### 1. Bandung Society for Heritage Conservation

This organization is a pioneer association of heritage lovers in Bandung, established in 1987. Its members agree to jointly preserve various cultural heritages and natural environment that surrounds it. The three initial studies that became the main concern of this organization are : 1) Sundanese culture, 2) environmental issues and 3) historical buildings. For further development, the main activities focus on cultural heritage buildings.

Currently, more than 500 sympathizers and participants have joined together to carry out the Bandung City asset rescue program. The management and members of the organization are active on various occasions with the enthusiasm of trying to remind each other who care about the valuable assets of the Bandung City. This is stated in its motto which reads "SAVE OUR HERITAGE", "Love! It is not coercion that protects this cultural heritage from destruction". This motto is reinforced by the statement "The Association believes that Bandung's identity, derived from its distinctive culture, is the city's most valuable possession and therefore needs to be strengthened."

#### 2. Aleut Community

The Aleut Community creates a routine agenda of learning together to recognize history in a "Ngaleut" way, which means going hand in hand. They made up the jargon "Ngaleut: it's cool to know Bandoeng". Aleut in Sundanese language, means a group of people walking side by side. The Aleut Community was founded in May 2006. Each trip carried out by this community has various themes, depending on the agreement and the path of the

journey they will take. The most important thing from the purpose of the trip is to know its history and culture and can enrich their literacy about the valuable assets of the city where they live.

### 3. Community of "Sahabat Kota"

Community of "Sahabat Kota" was formed in 2007 by 6 inspiring youths from Bandung. A very good concept to provide space and take advantage of the children's vacation time to use it in various positive activities. They designed a program for children to have an adventurous experience exploring the city of Bandung in a fun way. Children are invited to think critically in taking an active role to create a friendly environment for them. Some forms of Community Friends of the city activities that are routinely carried out; Come Out and Play, which actively invites children to learn and play in the city spaces with the main programs, namely Kidsventure Club, Alun Ulin and Sahabat Kota Summer Camp.

### 4. Bandung Trails Community

The Bandung Trails community was first established in 2003, this community was founded by a lover of historical buildings named Teguh Amor Patria. Teguh has a tourism education background and he wanted to share and transmit his interest in cultural heritage buildings to the people of Bandung. This organization aims at introducing the historical and cultural heritage sites of Bandung City and can be followed by all history and cultural heritage enthusiasts from various circles.

### 5. Friends of Indonesian Heritage

The birth of this community was originally came from the interaction of fellow heritage lovers who found a common vision through social media facebook. The idea came from Ryzki Wiryawan, a teacher and history activist, to hold a meeting to realize the real action of this organization. The hope is that in every city there is a "Friend Heritage" so that they have a network and wherever they go there will be someone who guides them to introduce heritage in every city they visit.

## **The Style of Conservationist Communication in Spreading the Spirit of Cultural Heritage Conservation in Bandung City**

The fact shows that the culture which exists in society is not static but always follows cultural changes. This is stated by Sutrisno and Putranto, which is cited from the ancient Latin proverb "Tempus mutantur, et nos mutamur in illud". Times change, and we change in them too. Times change and the ways in which humans express themselves, others and themselves with others (society) also change. The context of the times is changing, people with natural thoughts and feelings, initiatives and creativities, needs and challenges are changing, and culture is changing too. (2005:7).

Inheritance is something that is preserved by previous generations (tangible and intangible) and handed over to the current generation to be passed on to future generations." (Uzzel in Harastoeti, 2011: 23). Cultural heritage can strengthen the identity of a nation. "The identity of a nation, in various possible scales, is something that is

simultaneously determined by two things: a) Cultural heritage in the form of the results of creation in the past. b) The results of creativity in the present that are encouraged, stimulated, or made possible by the challenges and actual conditions of the present era. The part in the form of the legacy of the past, among others, are materials for archaeological studies, philology, and historical studies in various aspects” (Sedyawati, 2006: 37).

Miller (2001: 5) suggests: "Communication is a process... A process-oriented conceptualization of communication suggests that it is continuous and complex and cannot be arbitrarily isolated." Katherine Miller's explanation of the concept of communication reinforces the thoughts of David K. Berlo, which have been popular since 40 years ago, namely: "If we accept the concept of process, we view events and relationships as a dynamic, on-going, ever-changing, continues. When we label something as a process we also mean that it does not have a beginning and an end, a fixed sequence of events. It is not static, at rest. It is moving. The ingredients within a process interact: each effects all others". (Berlo in Miller, 2001: 5).

Regarding the communication pattern implemented by the cultural heritage conservationists in the City of Bandung, we can see that they do the following:

1. Creating a core figure of the organization/community as a conservation communicator
2. Creating thematic conservation messages in the conservation newsletter
3. Build a good self-concept as cultural heritage conservationists
4. Creating common interests, spirit, and motivation
5. Maintain a positive image of the organization
6. Build multidimensional, adaptive, collaborative and integrated communication patterns

The realization of the organization in communicating what has been targeted, they package it in various forms of activities. Some of the communication activities carried out include:

1. Conduct intensive communication with the government and provide a number of recommendations in the preparation of Regional Regulations on the Management of Cultural Heritage Buildings.
2. Conducting a number of seminars related to themes that are currently attracting public attention.
3. Organizing workshops, such as photography targeting heritage, writing historical tourism adventure, and others.
4. Communicating with a number of cultural heritage building owners who will renovate their cultural heritage buildings.
5. Give awards to the owners of cultural heritage buildings who have consistently carried out maintenance and maintain the authenticity of cultural heritage buildings.
6. Take a virtual heritage tour.
7. Explore while discussing along heritage routes.
8. Providing knowledge insight to schools.

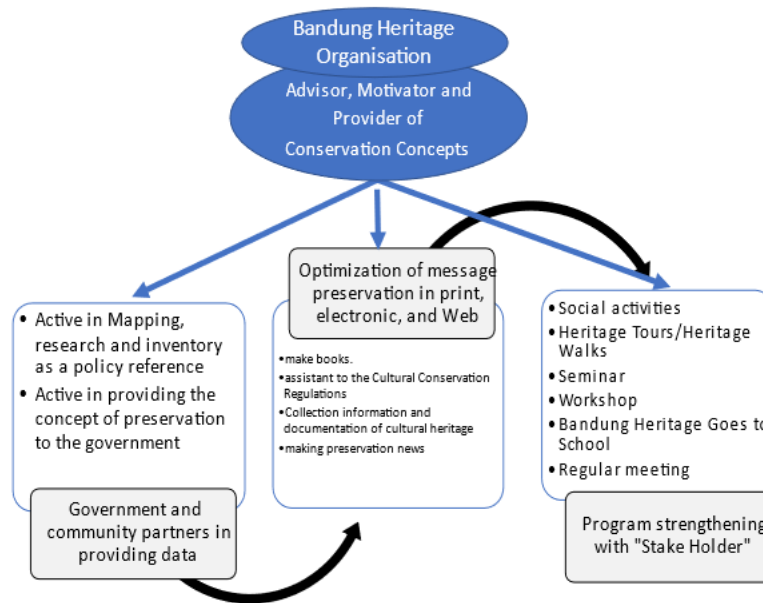


Figure 3. The Model of Communication Bandung heritage Conservation

From the example of the model implemented by "Bandung Heritage Conservation", it can be seen that this community organization has shown a real contribution to the process of preserving historic buildings in the city of Bandung. The steps are done quite neatly. They have established communication with various parties, such as: government, academics, historians, tourism, and owners of cultural heritage buildings. The idealism of cultural heritage conservationists in Bandung is expected to be well maintained. The first President of Indonesia, Soekarno once expressed his wise words: "Don't look to the future with blind eyes. The past is more useful as a big glass than the future." Another expression was put forward by the historian of the City of Bandung, Hayono Kunto: In the present there is the past, in the present there is the future.

## Conclusion

Communication and culture are two things that cannot be separated. Culture still exists today because there is a continuous communication process carried out by the previous generation to the next generation. The lovers of cultural heritage in Bandung are very aware of the importance of proper communication to carry out the preservation process. The communication style that has been carried out by cultural heritage conservationists in Bandung applies various methods, techniques and strategies. The main goal to be achieved is, how to keep the valuable assets owned by the City of Bandung well maintained. People now and in the future can ideally continue to witness the beauty of their city and inherit the valuable values in it, namely: value of science, history, and culture. Times may change, but what is the historical record of a nation must be preserved. A great nation is able to appreciate its history and cultural heritage.

## Recommendations

Organizing international seminars that bring together researchers from various countries is an interesting and high-value event. Authors and researchers can share their findings in various perspectives and methods. The implementation can be designed to be more interactive, so that the participants can actively discuss and the presentation does not take place like one-way communication. Thank You

## Acknowledgements

I would like to thank the various parties who have helped, namely:

1. Institute of Indonesian Arts and Cultural, Bandung, which has given the author the opportunity to conduct research;
2. Social organizations in the field of cultural heritage preservation which have assisted in collecting research data;
3. The Ministry of Education and Culture of the Republic of Indonesia which has provided research funding for lecturers in Indonesia;
4. Organizers from ICSES, who have given the opportunity to the author to present papers and meet with various authors from different countries..

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## Indoor Human Tracking System Based on Simple Electronic Mobile Network

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**Abstract:** One of the important and difficult issues in indoor location detection utilizing global navigation systems is position estimate and approximation. This work is concerned with the indoor human tracking system based on the power contained in a received radio signal which is known as received signal strength indicator (RSSI). The real practical model handles a maze consists of seven rooms with different dimensions in single floor. Node MCU ESP8266 Microcontroller, serial communication, lithium-ion battery, OLED display, micro USB charger, and HC-05 Bluetooth model are among the hardware components utilized, which are compact in size, low in power, cheap in cost, and provide a high-speed response. Wi-Fi is used to collect software data, which is then communicated over Bluetooth. The system works with the information offline to acquire site information and then online to identify the location during system operation. The speed of the proposed indoor positioning system is fast with high accuracy.

**Keywords:** Human tracking system, Mobile network, Wi-Fi, RSSI, Node MCU ESP8266.

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### Introduction

The evaluation of a person's or a specific target's location inside a building is known as indoor localization or placement. The challenge in this situation could be figuring out your position inside the buildings from the outside. Uncontrollable scattering, attenuation, distortion, and shadowing are effects of signal transmission. The significance of these issues has grown as technology and the use of smart gadgets have developed. Due to the wide range of shapes and sizes, as well as the presence or absence of both fixed and moving objects, indoor localization is challenging. A Received-Signal-Strength-Indicator (RSSI), Time of Arrival (ToA), Time-

Difference-of-Arrival (TDoA), and Angle-of-Arrival (AoA) have all been studied as indoor localization approaches. For the majority of indoor localization systems, calculating the position of an unknown target requires at least three known nodes. These methods have several flaws, such as significant technical complexity, a narrow range of accuracy, and unreliability [5]. Due to these factors, several eminent academics have made an effort to offer indoor positioning services in a number of methods that are based on the principles of various technologies [6–8]. Providing an overview and practical application of a Wi-Fi-based indoor localization system is the main objective of the study.

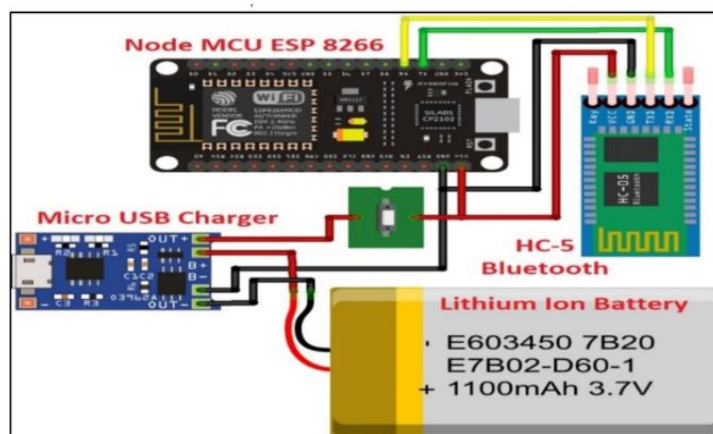
### Setup and Design of System Hardware

Two peers, the Wi-Fi station node circuit and the tracking node circuit, are included in the proposed tracking system, as follows:

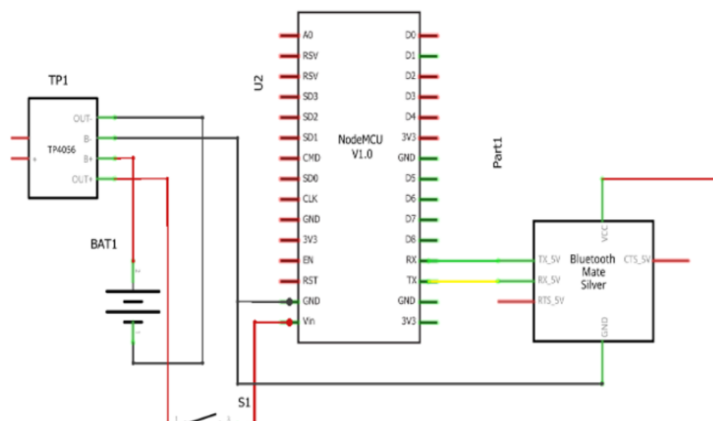
#### WIFI Tracking Station Node with Bluetooth Electronic Circuit

Figure 1.a displays the block layout of the Wi-Fi end station, which employs the HC-05 Bluetooth Module [19] to track and transmit the room identification to the main station, as well as Figure 1.b which represents the schematic diagram and Figure 1.c. for the final hardware circuit.

a



b



C

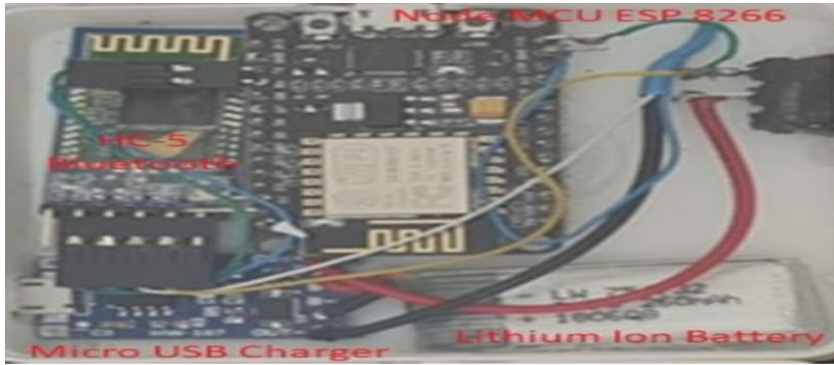
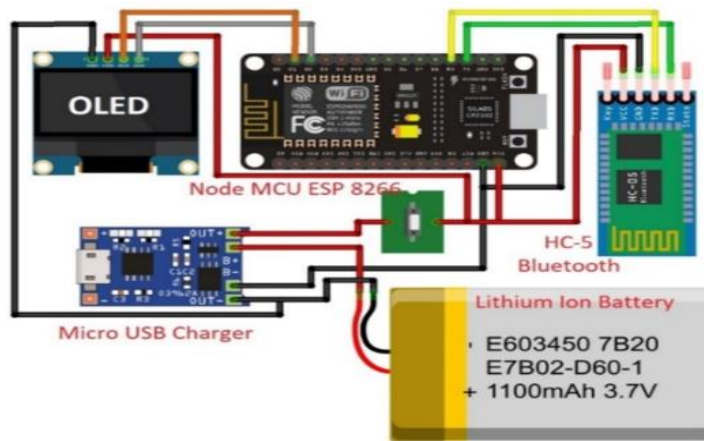


Figure 13. Tracking Point With Bluetooth Station: A) Block Diagram, B) Schematic Diagram and C) Hardware System Board

Monitoring Station Circuit

Figure 2 depicts the main station circuit used to track user nodes. Signals are gathered through Bluetooth from the actual tracking device, then sorted and the current condition is shown based on analysis and assessment. The node's block design, which includes a Bluetooth module and an OLED display is shown in Figure 2.a, the functional layout is shown in Figure 2.b, and the actual hardware circuit is shown in Figure 2.c.

a



b

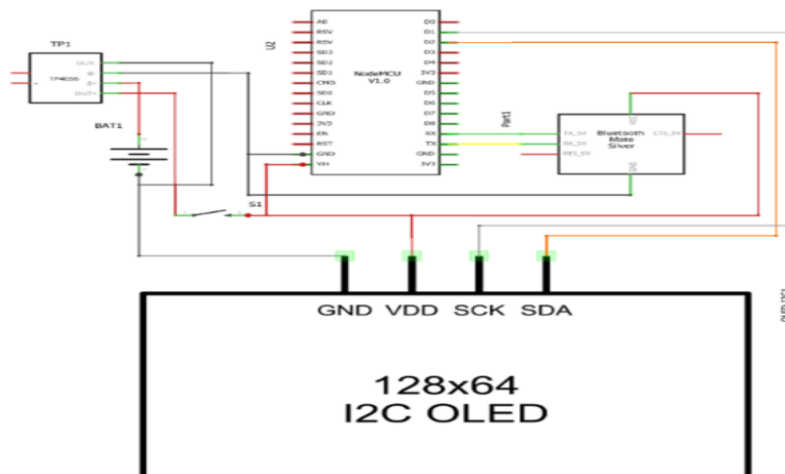




Figure 14. Monitoring Station: A) Block Diagram, B) Schematic Diagram and C) Hardware System Board

### The Proposed Techniques Analysis

Data collection, and model training are steps involved in the work process. The model collects all RSSI input values and uses them to estimate location. The ESP8266 [10] is a low-cost IC device with a microcontroller and Node MCU, but it is unable to run a model that is so systematic that it can predict places or be taught to understand. So that the ESP8266 could be utilized to create an indoor positioning system, software coding was employed to program the model through a PC.

The model must be trained in the second stage, which involves analyzing the data gathered. The powers and coordinates collected from various places within a certain region are among the data presented here. The signal strength of the MCUs, which serve as Wi-Fi routers and each of which represents a node, determines the data. This project makes use of several nodes or Wi-Fi routers dispersed around the predetermined territory. The ESP8266 divides the structure of the building into several fictitious points, each of which corresponds to a distinct location. Based on the exact location it occupies on the LCD that was mounted on the breadboard, the model predicts the position when it stands in any of those locations.

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## Map and Model of the Indoor Tracking System

Initially, the measurements of the home and its rooms are plotted on a digital map. The ground floor of the home selected for this project was divided into seven enclosed sections based on the existing rooms, as shown in Figure 3. In order to make the system more complicated and more like reality, the room sizes are not identical. Then, Wi-Fi Nodes were scattered around these rooms (one for each room). A software code is used to detect the Wi-Fi nodes, switch them all on, and do a thorough scan of each region. The MCU node will watch and use RSS data broadcast by a series of Wi-Fi networks to verify the network model and determine the ultimate position. In order to evaluate the performance of the proposed positioning system, a range of reference points are used in its development. In 7 rooms with a combined dimension of 4 by 15 meters, Wi-Fi connection points were installed. To create radio maps from access points that have already been established, the position information is periodically transferred to the server.

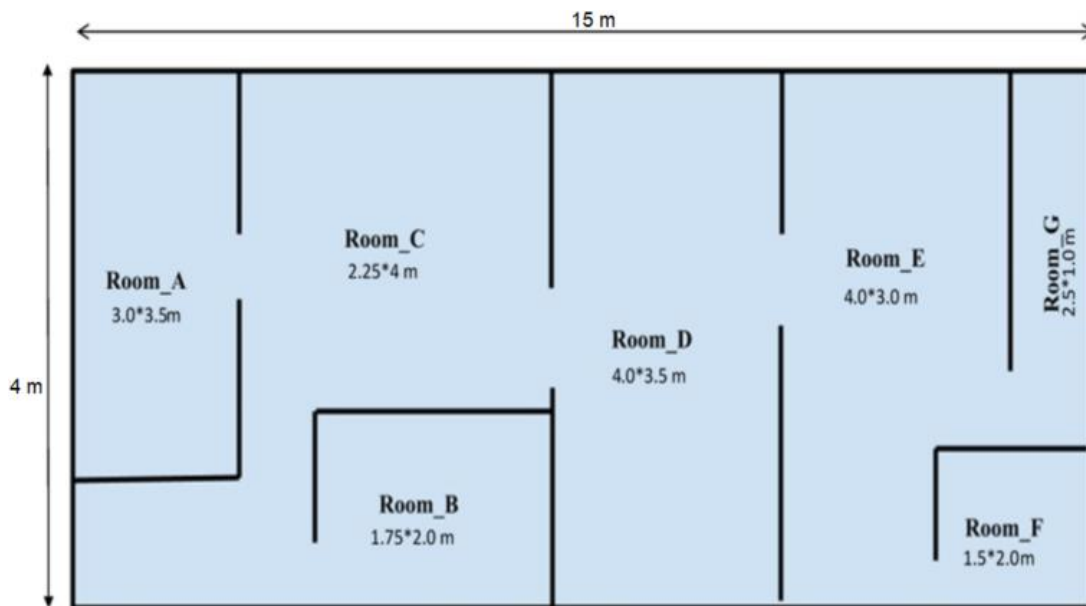


Figure 3 Floor Map for Indoor Tracking System

The central unit's recorded data is made up of up to 200 10 rows, each row representing one of the parameters listed below: "POS\_X POS\_Y RSSI\_A RSSI\_B RSSI\_C RSSI\_D RSSI\_E RSSI\_F RSSI\_G Room".

The node in the building whose X and Y coordinates are determined by the room measurements is shown in the first two columns. Radio signal strength identification serves as a representation of each node's strength in the system (RSSI). The last column shows the class, with a different class for the power node installed in each room. According to the amount of rooms, the system has seven classes. During the offline training phase, basic RSS data from access points is collected. The operation of the system is shown in Figure 4. For remote tracking and surveillance of people within the building, the data is transferred to the main station. To enhance the decision result, the main station may additionally use its categorization algorithm.

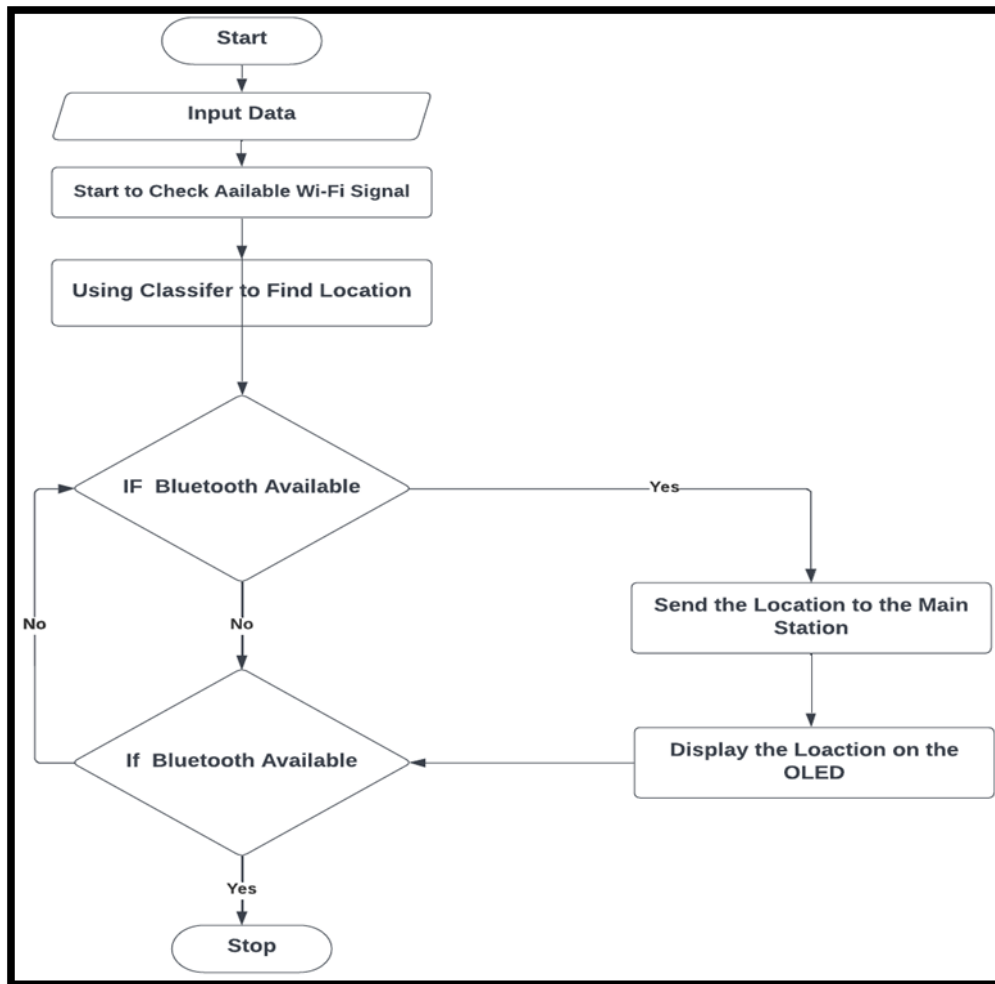
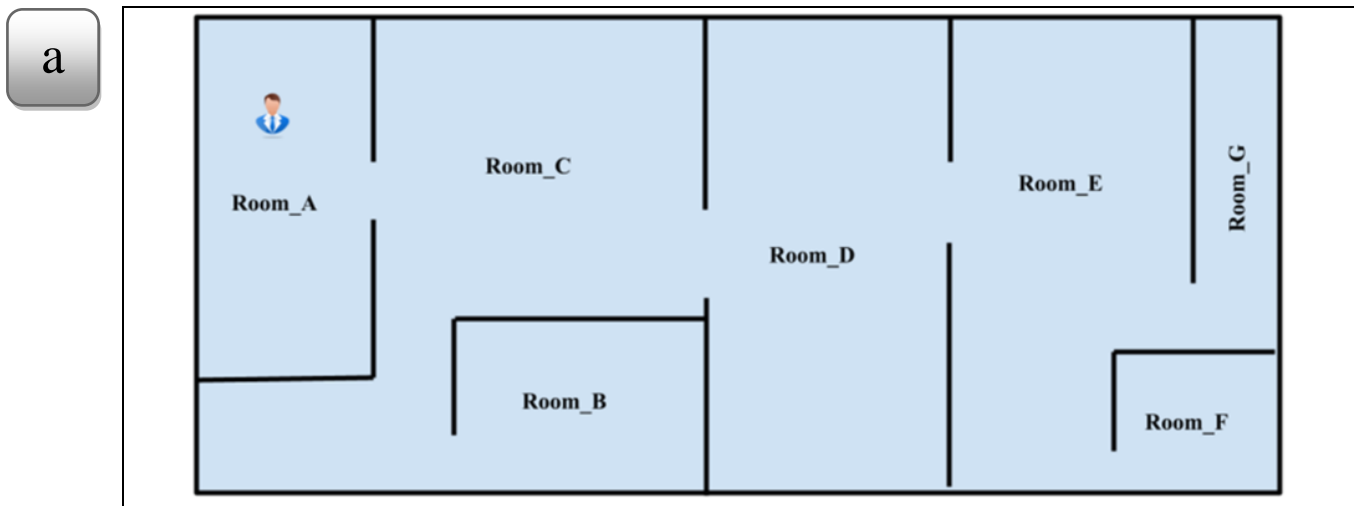


Figure 4. The System Flowchart for The End Node with Tracking

Figure 5.a virtually portrays the person's location in Room A, whereas Figure 5.b displays the OLED's display of the location of the individual.



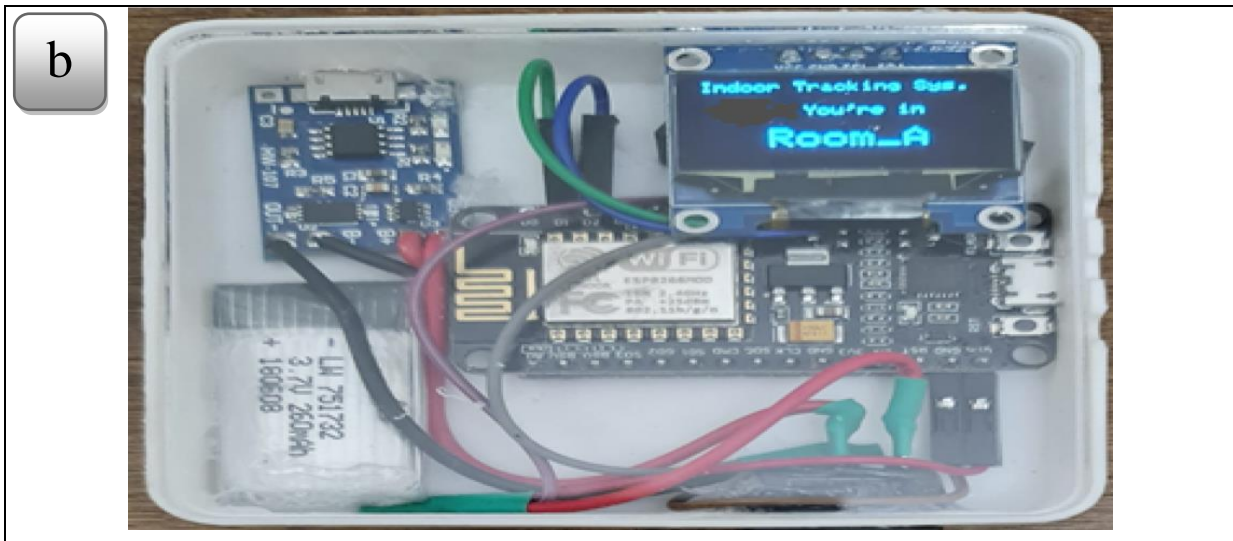


Figure 5. System Results for A Person in Room A. A) Virtual Map B) OLED Results

## Conclusion and Future Work

Numerous technologies have been developed to improve the performance, dependability, and accuracy of location estimate systems in response to the expanding requirement for global communication networks in both indoor and outdoor contexts. Standard Wi-Fi-based locating systems are vulnerable to wireless channel jamming, obstacles, and range restrictions due to the complexity of interior surroundings. This study recommends a human indoor identifying locating system using straightforward and affordable electrical devices. It uses a simple hardware design, a signal intensity mechanism, and a media for exchanging and displaying locations. The basis for the system was a ground level with seven rooms of various sizes. It specifically focuses on locating the model's position using pre-programmed settings, model training, and Wi-Fi signal strength. It made use of hardware that was compact, inexpensive, and consumed little power, such as the ESP8266 NodeMCU. Additionally, the detecting speed is quick and accurate. It may provide effective machine learning recommendations for the next work to forecast and support online categorization processes.

## Acknowledgements

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## Psychological Testing at Entrance Exam at “Dunarea de Jos” University of Galati, Romania

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**Abstract:** The university admission test comes after the high school graduation exam - the baccalaureate. The baccalaureate results of each candidate must be known by the university admissions committee. They provide information on the degree of intelligence, the skills acquired up to this date, but also the presence of inclinations and skills indispensable to the fulfillment of professional aspirations. The university entrance exam should not be focused only on quantity and quality of knowledge. Besides that, one of the objectives of this exam must be to test the interest in completing the studies through the university level for which he opts, but also the candidate's skills that “offer” him the productive and satisfying course of the entire cycle of higher education, even the perspective of future achievements. To realize that three psychological investigation tools of candidates (tests) can be used, necessary to highlight: - personality profile of the candidate; - interest profile, motivational; - aptitude profile. The paper proposes a new admission methodology: the data collected through the proposed tests and correlated with the high school graduation data can accept the candidates, as admitted to the profile they opted for, or can redirect them to choose the right path.

**Keywords:** Aptitudes profile, Early school leaving, Interest profile, Personality profile, University entrance.

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### Introduction

In recent years, “Dunarea de Jos” University of Galati, from Romania, has faced a high early school leaving rate. This problem was identified also in Europe (Ross & Leathwood, 2013, Brunello & Paola, 2014) and in Africa or Asia (Momo et al., 2019). There are many factors that influenced the early school leaving: family, single parent-household, parents education, region of residence (Momo et al., 2019), the teachers, the colleagues, the school

(González-Rodríguez et al., 2019), motivational factors or student abilities (Fan & Wolters, 2014). In Romanian universities various projects have been implemented to reduce this dropout rate. These included some tutoring activities for students at risk of early school leaving, but also various extracurricular activities, for example visits to prominent companies in our country. The main objective was as students to have a direct contact with the economic environment and to make an idea of the place of work after graduation (ROSE). However, the rate was very little reduced.

Among the reasons cited by the students, one was the wrong choice of field at the university entrance exam, because in their first year of study they realized that their future job does not suit them. This is an important factor because it is a strong relation between career and life satisfaction (Hagmaier et al., 2018). In Figure 1 are presented some factors that influence the life satisfaction (Hyo Sung Cha & Mi Young Kwon, 2022), (Yoo & Lee, 2022), (Gulzar & Iqbal 2022), (Schmitt & Pulakos, 1985), (Huebner, 2004). So, scientific researches in the psychological field demonstrate that the level of satisfaction in life is determined by a conglomerate of interconnected aspects between the personal life and professional one. Therefore, satisfaction in the professional life is a component of the wellbeing that we all are seeking in our lives.



Figure 1. Life Satisfaction Factors

In Romania, now, most students choose their field of study based on the level of the job's remuneration and/or based on the level of demand on the labor market for the respective profession. But a decision taken on such considerations is not always the right one. This creates a series of problems related to the student's involvement and commitment during the educational act, related to the successful completion of their studies.

The present paper proposes a new university admission methodology: in addition to domain knowledge, the candidate will be psychologically tested for personality profile, interest profile and aptitude profile. In this way the changes of a wrong choice are reduced, the early school leaving rate is reduced and of course the life satisfaction level is increased. The direction and height of the aspiration for those admitted determines the interest for the

activity carried out for their professional benefit, the motivation to learn and research in more detail in the chosen field, a certain balance between their intellectual structure and the demands that the activity profile raises towards heads, as well as a certain satisfaction. Otherwise, they will feel an inner conflict, in fact, between each person's being, the possibilities of achieving the aspiration and the future job, a conflict triggering some known inappropriate behaviors, a negative stamp on the potential of the faculty, in general, on university teaching staff, especially.

## Higher Education Admission Methods

In general, the universities select their students based on their high school knowledge (Silva et al., 2020). In some European countries, an important weight in the admission exam is given to aspects related to the student's personality – motivational essay, recommendations letters from high school teachers in France for example, or extracurricular interests, volunteering activities in London etc. We believe that the entrance exam should not look once again at the quantity and quality of knowledge, as is currently practiced at some faculties. In Romania, in 2022, for example at the faculty of medicine and pharmacy, the candidates are tested at biology (60 questions) and organic chemistry (40 questions).

The respective faculty does not take into account the psychological aspects of the candidates' personality necessary to complete the school course and then the professional one. Some faculties (Biology, Physics, Chemistry, etc.) understood this aspect, renouncing the written tests, and proceeded accordingly to the application-based competition, where only the baccalaureate score counts for 100%. Others, also based on the files, practice the system composed of 50% national exam score + 50% multi-year score. But there is also the situation when these values from certain tests of this exam are taken into account. There are also faculties, especially those with a vocational profile, which give appreciation to the skills targeted by that profile: motor skills in the case of the physical education and sports faculty, artistic skills in the case of the arts faculties, socio-human skills in the case of the Orthodox theological faculty, the pastoral section, or pedagogical skills in the case of those who embrace a teaching career.

In Table 1 are summarized the admission procedure in Romanian faculties.

Table 1. Criteria Taken into Account in The Admission Procedure in Romanian Faculties

Admission Procedure	Medicine	Architecture	Engineering
		Arts Physical Education and Sport	Physics Chemistry
Knowledges examination	√	√	-
High School Diploma	-	-	√
Specific skills	-	√	-

## The New Proposed Admission Methodology

Since the professional and social future of a student depends on the quality and functions of the university admission exam, the measurement, precision of the data are the necessary coordinates to highlight the relationship between the level of professional aspirations and the real possibilities of achieving these desires. Thus, we believe that the main objective of this exam must be to test the interest in completing the studies through the university level for which he opts, but also the candidate skills that ensure the productive and satisfactory course of the entire cycle of higher education, even the perspective of achievements future. Another important aspect is the personality profile, thus more comprehensively defining the profile of each candidate. We propose a new university admission methodology represented schematic in Figure 2.

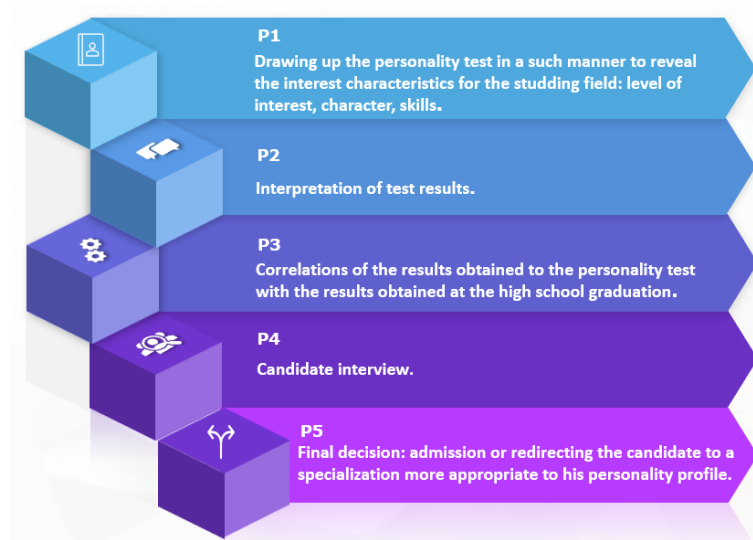


Figure 2. The New University Admission Methodology

In the above figure, the personality test is a generic term, because we consider three psychological investigation tools that would be used, necessary to highlight (von Humboldt et al., 2021):

- the personality profile of the candidate;
- the interest profile, motivational;
- the aptitude profile. (Stan, 2016)

Regarding the first aspect, the *personality profile*, the content of the test must highlight the native predispositions of the candidate, but also other dominant characteristics that give the personality type of the subject, together ensuring well-being during studies, implicitly during future job. These characteristics are placed in pairs: "extraversion and introversion", "sensory and intuitive function", "reflective and affective function", "judicial and perceptive function" (Hedges, 2013). After receiving a list of the specific traits of each pair of characteristics, placed on two columns, that is, four pairs of characteristics - eight columns of specific traits, the subject reads

them, feels that he finds himself or that he resonates with certain statements that for him are more strongly imprinted and, after a moment of self-talk, in silence, chooses a term from each pair, proceeding to underline, circle or rewrite it in the required space, as determined by the exam board or the test makers. Thus, out of the eight characteristics, the subject takes into account only four, the ones that actually define his individuality. These, taken together, give the exact personality type of each candidate.

Following the theories and research undertaken by C. G. Jung, Switzerland, Katharine Myers from the United States and Patricia Hedges from Great Britain resulted in a number of sixteen personality types: Extraverted-Intuitive-Affective-Judgmental; introverted-Intuitive-Affective-Judgmental; extraverted-intuitive-affective-perceptive; introverted-Intuitive-Affective-Perceptive; extraverted-Intuitive-Reflexive-Judgmental; introverted-Intuitive-Reflexive-Judgmental; Extraverted-Intuitive-Reflexive-Perceptive; introverted-Intuitive-Reflexive-Perceptive; Extraverted-Sensory-Reflexive-Judgmental; introverted-Sensory-Reflexive-Judgmental; introverted-Sensory-Affective-Judgmental; Extraverted-Sensory-Reflexive-Perceptive; introverted-Sensory-Reflexive-Perceptive; extraverted-Sensory-Affective-Perceptive; introverted-Sensory-Affective-Perceptive (Hedges, 2013). Considering these types of personality, the characterization of the chosen one is provided, and the candidate has the opportunity to confirm the authenticity of the made choice. After that, both the candidate and the examining teacher/psychologist consult the list of professions corresponding to the respective personality type. The candidate expresses his option for the future job. The examiner gives his consent or declares his disagreement for the selection of the candidate; in case of disagreement proceeding to reorient him to the profession that suits him; in the case of agreement, the subject receives a score that is added to the calculation of the admission score. Career guidance, as well as the tests application and the results evaluation, will be done by the members of the Career Counseling and Guidance Center from university center.

*The interest profile* must indicate the attraction that the candidate feels for the job he is aiming for, the pleasure in studying the subjects that ensure his qualification, the attention he is able and willing to give to solving the problems of any topics, especially the in-depth ones, as well as the achievement of a brilliant career, the ability to respond to a large request that is suitable for personal objectives, the passion for research in the field for which he opts, the innovative desire to bring improvements to the technological process or managerial quality (Di Fabio & Maree, 2013). We believe that the test to establish the interest profile must have the content of the items related to the work within the studies, but also within the future career, with short-term and long-term personal objectives, with personality traits, with the environment in which he will work after graduating from college. Consulting the list of occupations that they would have after the entire university course, as well as the specific activities of each occupation, is more than necessary to be able to clarify the agreement between interest, personality and the work that will be performed.

Enrollment of candidates in technical faculties partly highlights their interest profile. These people are especially attracted to the practical side of things, to the idea of knowing about the composition and operation of some

installations or machines, to the exploration of economic fields, but also to the preference of being a businessman. However, these things must be confirmed by the interest test. It is a necessity to know the interest and we believe that this aspect should be a criterion in the entrance exam because the selection of candidates will be more effective, for those admitted it is a stimulus in activating the will to learn and prepare more thoroughly for each course, laboratory, exam. It is also a reason to know as many of the secrets of the job for which he labors during the years of study. The quality of the expression of interest for the type of faculty and for the type of preferred activity will be quantified in some way, through a grade, qualification, score, measurement useful in determining the situation of success or failure, to be admitted or rejected.

The aptitude profile reveals the maximum behavior of a person, informing about the aptitudes that any candidate has (Stan, 2016). Identifying those skills that are indispensable in higher education, as well as in the career, is a difficult task for the university admission committee. In Romania there is the "Psychological Test Battery of Cognitive Aptitudes (BTPAG, 2003), developed by those experts in psychology and computer science included in the COGNITROM group (COGNITROM), which provides test models.

The special skills are each person qualities which favors his success in certain fields of activity. Some skills should candidates possess, especially in the profile of our faculty are summarized in Figure 3 (Hotca): learning aptitude, embodied by analytical reasoning, analogical transfer, flexibility of categorization, cognitive inhibition and short-term memory, working memory, cognitive interference, focused attention; numerical aptitude which concerns mathematical calculation and mathematical reasoning; shape perception ability with the elements shape constancy, detail perception, complex perceptual analysis; reaction speed ability highlighted by simple reaction time, choice reaction time, memory access reaction time, decision-making ability. Our faculty is a technical one. The evaluation of these tests ends with the grade, the score that highlights the level of these skills. Knowing the skills that the candidates have is, in our opinion, an imperative because they express the quality of human resources, the students, whose potential will be worked with throughout the years of study, effectively or ineffectively.

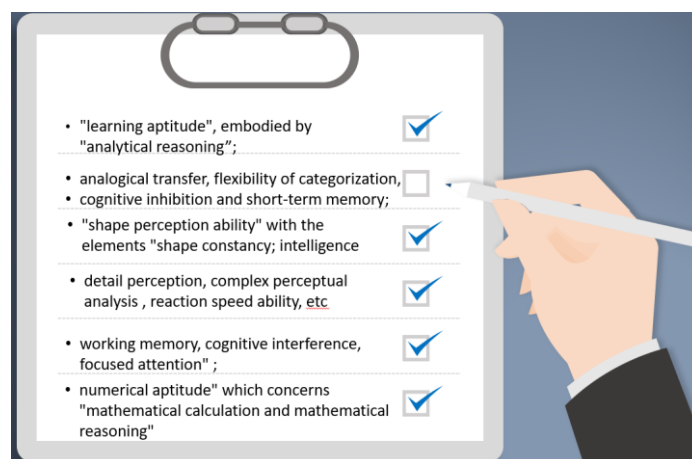


Figure 3. Skills That Candidates to Our Profile Have to Posses

The aptitude tests, like the other personality and interest tests, are constructed and applied by the members of the Career Counseling and Guidance Center together with the members of the examination board. This collaboration adds value to the exam session. The data collected through the proposed tests and correlated with the high school graduation scores, concretized in an average or admitted/rejected formula can accept the subjects, as admitted to the profile they opted for, or can redirect them to choose the right path. Here you can also see the correlation between the options for an occupation provided by the three tests or, on the contrary, the confusion in which the candidate finds himself.

## Conclusion

The paper proposes a new university admission methodology which involves psychological testing of students using 3 instruments: personality, aptitudes, and interest. The results from these will be correlated with the scores from the national exam and will guide the candidate towards a job that suits him and for which he has certain skills. In this way, the early school leaving is reduced, the student's life satisfaction is increased because they study and practice what they love. So, the direction and height of aspiration for those admitted candidates determines:

- a) love for the activity carried out for their professional benefit;
- b) motivation for learning and researching the chosen field in more detail;
- c) a certain balance between their intellectual structure, the possibilities of achievement and the demands raised by the activity profile towards which they are heading;
- d) as well as a certain satisfaction.

As a result, the faculty gains in the quality of the education process, in the ways of involvement in all kinds of research activities and in student competitions, in offering promotions of engineers capable of replacing generations of future retirees. Otherwise, they will feel an inner conflict, in fact between each person's being, the possibilities of achieving the aspiration and the future job, a conflict triggering known inappropriate behaviors (sporadic participation in classes, self-study or out of obligation towards parents, attitudes of rejection of information or disobedience to the education system, culminating in the abandonment of studies), a negative stamp on the potential of the faculty, in general, on university teaching staff, in particular. And why not, implicitly, to the family.

The student, the future engineer (in our case), also benefits, because he chooses exactly the path and service he wants, a professional life that suits him. He becomes aware of his qualities and more realistic with himself. And it is known that when what you do harmonizes with your predispositions and sensitivities, you achieve the desired well-being and performance, with a positive effect on spirit, health, work and the community in a wider sense.

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## Impact of CL4stem Project Mobile Communities of Practice on Science and Mathematics Teachers' Capacity Building Towards Piloting Curated Subject-Specific Oers in Nigerian Secondary Schools

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**Abstract:** Connected Learning for STEM (CL4STEM) is an innovative project aimed at teacher capacity building in science, technology, engineering, and mathematics involving communities of practice as its component to developing teachers' ability to adopt an innovative approach to science instruction and to implement a novel curriculum. Hence, this study investigated the impact of CL4STEM project mobile communities of practice on science and mathematics teachers' capacity towards piloting curated subject-specific OERs in Nigerian secondary schools and to enhancing subject matter knowledge, pedagogical knowledge and practice for achieving Higher-Order Thinking, Equity and Inclusion (HOTIE) in their classroom. The study adopted a survey research design involving documentary content analysis and a one-group pre-test-posttest design to collect qualitative and quantitative secondary data to achieve the objectives of the research. The population of the study involves all science; biology, chemistry, and physics teachers in senior secondary schools in selected states in Northern Nigeria. Purposive sampling was used to select one newly qualified biology, chemistry, physics and mathematics teacher per subject area from twenty sample schools in the population, thus a

sample size of 80 science and mathematics teachers, 20 each per subject but less due to attrition. Content analysis of the science teachers' participation in telegram social network communications was used to obtain qualitative data on their CoP practices. While the Pre-test and Post-test on the teachers' subject matter and pedagogical content knowledge was the instrument for quantitative data collection. The instruments were validated by science and mathematics education experts. Four research objectives and four corresponding research questions guided the study. Descriptive narrative, descriptive content analysis and descriptive statistics were used to analyze the data on teachers' participation in the online telegram platform to provide answers to research questions. The study revealed that online CoP has creditably impacted on teachers' subject matter and pedagogical content knowledge. The implications for continuous teacher professional development policy and teacher education curriculum in Nigeria were highlighted

**Keywords:** CL4STEM, OERs, Mobile/online CoP

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## Introduction

Weak initial teacher education programmes and ineffective professional development programmes leaving teachers with weak content and pedagogical knowledge and classroom skills (including instructional practices) have been found in the literature as a factor affecting teachers' quality and students' learning (CLIX, 2019). In Nigeria, the teaching of STM in all the nation's schools has been described as generally ineffective and the student's achievement in terms of knowledge and skills are yet to meet the expectation (Adedokun, 2018; Ayeni, 2021). Several literature has implicated the teacher, and how science is taught as part of the problems (Olawuwo, 2015; Ayeni, 2021). It is reported that many science and mathematics teachers are not familiar with those effective teaching strategies, nor could they demonstrate the knowledge and competencies required to use inquiry-based teaching in implementing the Nigeria STEM curriculum (Mustapha, 2013;). Also, a good number of teachers in the school system are far from being computer literate and are incapable of applying technology in teaching science (FMOE, 2013; Tukura, 2019). Researchers have also reported that most teacher education courses at the pre-service level do not provide meaningful contexts for applying ICT to enhance teaching and learning and that even though ICT is included in teacher education programme, teachers are not sufficiently trained to use ICT in instructional setting (Tayo, 2015) From this standpoint, it is obvious that newly qualified teachers (NQTs) and generally STEM teachers in Nigeria need to be provided with capacity building in new pedagogical practice and in the method of integrating ICT in teaching and learning. The connected learning for

STEM (CL4STEM), a project aimed at teacher capacity building in STEM offers the opportunity to address this gap.

The Connected Learning for STEM (CL4STEM) project is an offshoot of the connected learning initiative CLIX developed by TISS, India to strengthen secondary STEM learning, pedagogic content knowledge of science teachers and their practice at scale in four states in India with proven effectiveness and as the award of winning project of the UNESCO-King Hamad Prize for the use of ICTs in Education in 2018 and the OER award for Excellence in Collaboration-2019 (<https://clix.tiss.edu>, <https://clixoer.tiss.edu>). The CLIX project is now being scaled through a process of knowledge diffusion and adaptation as CL4STEM to a new country context based on a South-South collaboration among higher education institutions involving Nigeria, Bhutan, and Tanzania.

The CL4STEM project being piloted in selected Nigeria secondary schools involving newly qualified teachers (NQTs) who have been given orientation training for piloting curated OER modules and to develop new pedagogical practice and in the method of using ICT in implementing curated subject-specific OERs. CL4STEM is aimed at bringing about educational changes that improve teacher subject content and pedagogical knowledge and teaching. Online CoP is one of the component features of the CL4STEM. It harnesses ICT and online CoP to give academic support during the piloting phase of the project. In the context of the CL4STEM project CoP, the expert teacher educators provide academic and technical support for NQTs to take active pedagogy and UDL principles into STEM classrooms in piloting the subject modules.

The CoP is a model for continued professional development or training where teachers are engaged with one another and teacher educators to gain new knowledge and understanding of the new pedagogical practices. It enables teachers to create a network amongst themselves with a goal for collective learning.

Basically, the project adoption of online CoP is to enable teachers interact and share knowledge and experiences and, and to discuss their experiences and challenges and discuss solutions that could lead to more effective ways to pilot the innovative that will enable them implement an innovative subject based OERs modules. The interaction is believed would help the teachers to develop content knowledge, and inclusive pedagogical principle in their classroom practice. The CL4STEM online CoP model is represented as shown in fig. 1

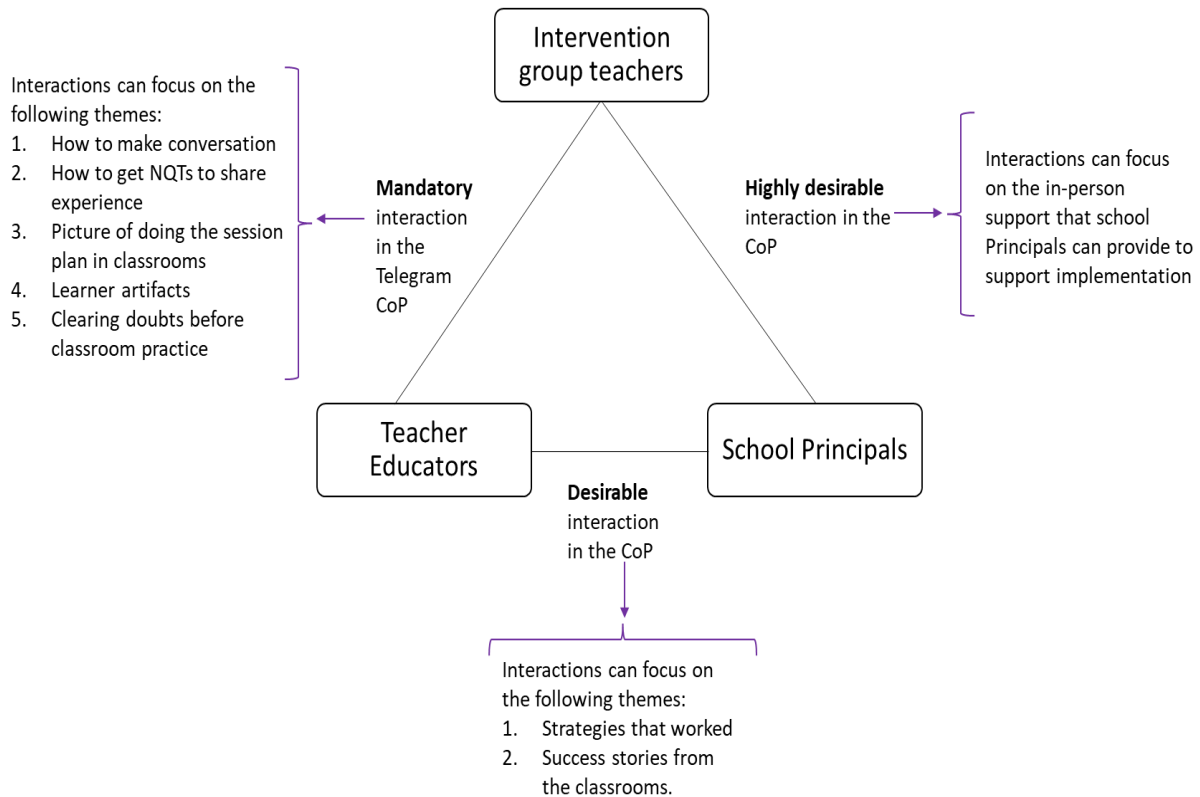
This study focuses on the NQTs and Teacher educators as the principal actors in the CoP

The teacher educators are expected to provide professional, administrative and possible technical support to the NQTs and to prepare a module level impact report. The NQTs are to actively participate in the Telegram CoP to share their practices and teaching/learning activities, seek support in the implementation of CL4STEM pedagogy in their classrooms and complete and post all module activities/assignment.

The objectives of CL4STEM online CoP are to;

- i. offer the NQTs the opportunity for professional development, to enhance and improve their content knowledge and pedagogical skills and practice,

- ii. empower the NQTs to using ICT (telegram/mobile technology) to link with each other and with expert teacher educators for collaborative learning activities, experience and knowledge sharing, clearing doubts and gaining understanding of different pedagogies, subject matter content of the modules.



## Purpose and Objectives of the Study

This study is aimed at finding out the impact of CL4STEM online CoP on newly qualified teachers on their subject matter and pedagogical content knowledge, and classroom practice for higher order thinking, inclusion, and equity (HOTIE). The specific objectives of this study are;

- Explore professional and academic activities/practices by newly qualified teacher's participation in CL4STEM online community of practice
- Explore how the participation of newly qualified teachers in CL4STEM community of practice has contributed to their professional development.
- Determine the impact of CL4STEM online community of practice on newly qualified teachers' subject matter and Pedagogical content knowledge and practice.
- Find out if the CL4STEM CoP impact differently on the NQTs subject groups

## Research Questions

To achieve the objectives of the study, the following research questions were stated to guide the study:

- What professional and academic activities/practices are carried out by the newly qualified teachers participating in CL4STEM online community of practice?
- Do the practices of newly qualified science and mathematics teachers provide evidence that CL4STEM CoP engagement contribute to their professional development?
- What is the impact of online CoP on the NQTs subject matter and pedagogical knowledge, and practice?
- Is there any perceived difference of the impact of online CoP among the NQTs subject groups?

## Literature Review

Many research studies have established that CoP is useful for teacher professional development (Qi and Wang, 2018, Wesley, 2013), and it is believed that online learning communities can improve instructors' professional development, especially with the growth and accessibility of the internet, thus, erasing time constraints and distance (Rosell-Aguilar, 2018). Qi and Wang (2018) reported that WeChat was effective in enhancing teachers' interaction with one another in both synchronous and asynchronous ways to work and reflect together and share experiences and ideas. COP inspires teacher inquiry and encourages teachers to develop their existing use of the innovation further, and work together and develop shared practices (Goodyear et al. 2014). Similarly, Wesley (2013) identified that CoP built on Twitter promoted activities for members to share ideas and practices.

The COP has the capacity to make certain tasks, activities, or a series of events easier, and alter users' social surroundings (Hoadley 2012). A CoP makes professional development to be more practical, adaptable, and capable of providing just-in-time support for participating teachers (Wang and Lu 2012). Sijia, Xiao, Xinli, & Jiangzhi, (2019) investigated building an online community of practice through WeChat for teacher professional learning. The finding shows positive perceptions about COP using WeChat were identified among participants on joining the teacher group. Moreover, their teaching practices were positively transformed. It also reported in the literature that Online CoPs allow greater flexibility than traditional, face-to-face mentoring, it also enhances members' professional growth through interactions with professional colleagues (Khalid, et al., 2014) Khalid, Joyes, Ellison, and Daud, (2014) investigated the factors influencing teachers' level of participation in online communities. The finding shows that the participating teachers view CoP participation as useful for getting new ideas and enhancing their pedagogical skills. Juandi, and Jupri, (2013) reported that CoP provides the opportunity for group members to share ideas and experiences, and assist each other in adopting innovative strategies and approaches that is more professional. The Cop also enhance the teachers' teaching competence and improve the students' learning outcome and the quality of education (Juandi, & Jupri, 2013).

## Methodology

The study adopted a survey research design involving documentary content analysis and a one-group pre-test-posttest design to collect qualitative and quantitative secondary data to achieve the objectives of the research. The population of the study involves all science; biology, chemistry, and physics teachers in senior secondary schools in 3 selected states in Northern Nigeria; Niger, Kaduna and Kano states. Purposive sampling was used to select one newly qualified biology, chemistry, physics and mathematics teacher per subject area from twenty sample schools in the population, thus a sample size of 80 science and mathematics teachers, 20 each per subject; biology, chemistry and physics and mathematics teachers provided the data for this study.

### **Data Collection Instrument**

The instruments for data collection are; Teacher educator's module implementation report from July to August, 2022, and the subject-specific pre-test and post-test designed based on the constructs of subject matter and pedagogical content knowledge contents of the curated OER subject modules; biology, chemistry, physics, and mathematics. Each of test instrument contains the specific number of objective test items on each of the constructs. The test instruments were adopted from CL4STEM, OER subject modules and the content was validated by science and mathematics education experts.

### **Data Collection**

Records of CoP teachers' communication/posts and performances in the module assignments were obtained from Cop moodle platform/telegram group and from Teacher Educators module impact reports (secondary sources). The pre-tests were administered to collect the baseline data at the commencement of the piloting of the subject modules. The post-tests were administered at the end of the 6 weeks of the first phase of the module piloting and teachers' participation in the CoP.

### **Findings**

The data were analysed using; descriptive content analysis and descriptive statistics to provide answers to research questions. The results are presented in the tables;

#### **Research Question 1**

What professional and academic activities/practices do newly qualified teachers (NQTs) participate in the CL4STEM online community of practice?

Table 1. Analysis Of Frequency and Types of Professional and Academic Posts

S/No,	Type of Post	Frequency	Percentage
1.	PCK	250	52.6
2.	UDL	130	27.3
3.	Technical	37	7.8
4.	Communication/administration	58	12.2
	Total	475	
	Mode of post		
1.	Text only	246	53.9
2.	Images	190	41.6
3.	External links	20	4.4
	Total	456	

Table 1 revealed the professional and academic posts of the teachers on the CoP platform using ICT (telegram/mobile technology) to link with each other and with expert teacher educators. Teachers posts on PCK (52.6%) UDL (27.3%), the use of text (53.9), and images (41.6) were most frequent professional activities for collaborative learning activities, experience, and knowledge sharing, clearing doubts and gaining an understanding of different pedagogies, subject matter content of the modules. Although, technical posts were less frequent (7.8%) the NQTs were faced with technical challenges due to unstable internet connectivity, module access, lack of skill in the use of telegram etc were mostly the content of the post.

## Research Question 2

- Do the practices of newly qualified science and mathematics teachers provide evidence that CL4STEM COP engagement contribute to their professional development?

Analysis of CL4STEM COP contributions to NQTs professional development relative to subject matter and pedagogical content knowledge for each of the subject group are given in the tables 3-5

Table 2. Cop Contributions to Knowledge and Practice: Subject Group 1

Criteria	Number of teachers				Total
	Novice	Emerging	Proficient	Accomplished	
<b>A. Subject Matter Knowledge</b>					
1. Knowledge of Subject Matter		2(18.18%)	<b>6(54.55%)</b>	3(27.27%)	11
2. Nature of Science/ Mathematics		1(9.09%)	6(54.55%)	4(36.36%)	11
<b>B. Pedagogical Content Knowledge</b>					



3. Instructional Strategies	5(45.45%)	6(54.55%)	11
4. Students' misconceptions & Learning Difficulties	4(36.36%)	7(63.64%)	11
5. Representation of the Content	3(27.27%)	8(72.73%)	11
6. Context for Learning	3(27.27%)	8(72.73%)	11
7. Curriculum knowledge	3(27.27%)	8(72.73%)	
<b>C. General Pedagogical Knowledge</b>			
8. Equity and Inclusion	3(27.27%)	8(72.73%)	
9. Classroom Management	2(18.18%)	<b>9(81.82%)</b>	11
10. Assessment	4(36.36%)	7(63.64%)	11
<b>Total</b>			

Table 3. Cop Contributions to Knowledge and Practice: Subject Group 2

Criteria	Number of teachers				Total
	Novice	Emerging	Proficient	Accomplished	
<b>A. Subject Matter Knowledge</b>					
1. Knowledge of Subject Matter		2 (10%)	<b>5(25%)</b>		7(35%)
2. Nature of Science/ Mathematics		1 (5%)	5(25%)		6(30%)
<b>B. Pedagogical Content Knowledge</b>					
3. Instructional Strategies			6 (30%)		6(30%)
4. Students' misconceptions & Learning Difficulties		6 (30%)			6(30%)
5. Representation of the Content		6(30%)			6(30%)

6. Context for Learning		5(25%)	1(5%)		6(30%)
7. Curriculum knowledge		1(5%)	2 (10%)	3 (15%)	6 (30%)
<b>C. General Pedagogical Knowledge</b>					
8. Equity and Inclusion	1 (5%)		5 (25%)		6 (30%)
9. Classroom Management	1 (5%)			5 (25%)	6 (30%)
10. Assessment		5 (25%)	1 (5%)		6(30%)
<b>Total</b>					

Table 4. Cop Contributions to Knowledge and Practice: Subject Group 3

Criteria	Number of teachers				Total
	Novice	Emerging	Proficient	Accomplished	
<b>A. Subject Matter Knowledge</b>					
1. Knowledge of Subject Matter		2(10%)	6(30%)	5(25%)	13
2. Nature of Science/ Mathematics		1(5%)	6(30%)	6(30%)	13
<b>B. Pedagogical Content Knowledge</b>					
3. Instructional Strategies		2(10%)	5(25%)	6(30%)	13
4. Students' misconceptions & Learning Difficulties			5(25%)	8(40%)	13
5. Representation of the Content			6(30%)	7(35%)	13
6. Context for Learning		1(5%)	5(25%)	7(35%)	13
7. Curriculum knowledge		1(5%)	4(20%)	8(40%)	11
<b>C. General Pedagogical Knowledge</b>					

8. Equity and Inclusion	2(10%)	5(25%)	6(30%)	11
9. Classroom Management	2(10%)	4(20%)	<b>7(35%)</b>	
10. Assessment		6(30%)	7(35%)	
<b>Total</b>	11	52	67	<b>130</b>

Tables 3-5 show the content analysis of Teacher Educators module implementation reports relative to lesson plans, subject matter knowledge, pedagogical content knowledge, and general pedagogical knowledge of the NQTs. revealing also the professional progression of the NQTs'. The analysis provides the data to answer research question 2

### Narrative of evidence from the TE reflections and reports

The lesson plans are generally activity and learner-centred, complemented with illustrations and integrated with the use of technologies, adoption of UDL principles with students to work in groups and promoting cooperative learning, adoption of different instructional strategies and use of variety of assessment modes that could prompt high order thinking and fostered development of Cognitive Skills, Inclusion, and Equity in the Classrooms. Teacher educators' reflections on the subject matter knowledge of the teachers and data generated from lesson plans indicate that the teachers understood the subject matter deeply and were able to develop students' conceptual knowledge and address misconceptions.

The data generated on General Pedagogical Knowledge of the teachers as reflected in the lesson plan indicate that classrooms space and time, equity and inclusion, the ability of the teacher to use multiple means of engagement, representation, action, and expression for creating learning experiences that met the needs of diverse learners were taken into consideration. The reflection on the teachers' pedagogical content knowledge, teacher educators indicated that the teachers could relate content to appropriate pedagogy and technology; videos, internet links and pictures, and online diagrams are evident in the instructional strategies employed by the teacher and as reflected in the structure of their lesson plans.

Further the following were revealed from the module report; improved technical knowledge and skills in use of telegram and the use of videos, pictures, illustration technology-mediated activities, using cultural context and local language to clarify difficult concepts and misconceptions, teachers have learned to use more online interactive videos.

All these are evidence that CLASTEM COP engagement contributes to the NQTs professional development and have enhanced their professional progressions

### Research Question 3

- What is the impact of online CoP on the NQTs subject matter and pedagogical knowledge, and practice?

On the Impact of CL4STEM COP engagement on the NQTs subject matter and pedagogical content knowledge are given for each of the subject group in Table 6-9

Table 6. Cop Impact Analysis: Subject Group 1: Mathematics

		<b>Post Test 10.25</b>			
<b>Number of teachers</b>		Novice	Emerging	Proficient	Accomplished
<b>Pre test</b> 6.95	0-25% Novice				1 (5%)
	26-50% Emerging		7 (35%)		1 (5%)
	51-75% Proficient			6 (30%)	1 (5%)
	76-100% Accomplished				3 (15%)

Table 7. Cop Impact Analysis: Subject Group 2: Chemistry

		<b>Post Test: 12.61</b>			
<b>Number of teachers</b>		Novice	Emerging	Proficient	Accomplished
<b>Pre test</b> 6.95	0-25% Novice	2(10.53%)			
	26-50% Emerging	8((42.11%)	1 (16.67%)		
	51-75% Proficient	8(42.11%)			
	76-100% Accomplished	1(5.26%)			5(83.33%)

Tables 6-8 all revealed the average total post-test score of each subject group to be higher than the pre-test score. This indicates NQTs gain in subject matter knowledge and pedagogical content knowledge and general pedagogical knowledge as a result of the engagement in the CL4STEM CoP. Consequently, the teachers have all transited from the greater majority of being a novice to higher statuses of proficient and accomplished except for

Table 7 subject group 2 where more of the NQTs are at the novice status, and only a few at the emerging status and none at the proficient and accomplished.

Table 8. Cop Impact Analysis: Subject Group 3: Biology

		<b>Post Test: 8.56</b>			
<b>Number of teachers</b>		Novice	Emerging	Proficient	Accomplished
<b>Pre test</b> 7.58	0-25% Novice			1	
	26-50% Emerging		1	4	1
	51-75% Proficient		1	9	
	76-100% Accomplished		1	1	

From the findings of this study, it is summarised that the teachers' participation in the online CoP platform using ICT (telegram/mobile technology has enhanced the teacher's engagement in professional and academic activities online and has also impacted remarkably on the NQTs' PCK in teaching science and mathematics and PK in enhancing professional practice and SMK to understanding the contents of the modules resulting on NQTs professional progression from novice to gradually becoming proficient and accomplished teachers. These findings are consistent with Qi and Wang (2018); and Rosell-Aguilar (2018) whose studies have established that CoP is useful for teacher professional development and that online learning communities can improve instructors' professional development,

## Conclusion

The findings have implications for continuous teacher professional development policy and teacher education curriculum in Nigeria discussed. It is therefore recommended that online CoP be adopted as an orientation framework for newly qualified teachers and as an approach to the implementation of new programme teaching, and for continuous teacher professional development. The finding also strongly suggests that teacher training institutions should adopt the online CoP into their pre-service teacher education teaching practice as the online CoP approach can be more beneficial in providing field support to pre-service teacher professional development (TPD) than the traditional training model of school visits teaching practice supervision model. The online Cop will help promote greater links and interactions between the teacher educator/supervisors and the teaching practice students thereby erasing constraints of time and distance.

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## Investigation of Digital Game Addiction in the Context of Smartphone Technologies


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**Abstract:** In recent years, rapid development in mobile technologies has led to the spread of games on mobile devices. Thanks to mobility, a feature that games did not have before, individuals have become able to play games not only at the computer but also while eating, traveling, and even walking. This situation, which allows individuals to spend more time with games, has brought some negativities such as losing control and spending too much time playing games. The most basic negative effects caused by the fact that games have started to take place so much in our lives can be stated as the deterioration of social relations and the negative effects on school and working life. If not taken under control, in the long term, the game turns into an addiction. It is thought that especially the widespread use of mobile games has dramatically increased the time allocated to games. In this direction, this research aims to examine game addiction in the context of smartphone technologies. In this study, in which quantitative research methods were used, the participants consisted of university students. The data were collected with the “Digital Game Addiction Scale for University Students” (DGASUS). Before the analysis, extreme values were checked, and these values were removed. Then, it was examined whether the data showed a normal distribution or not. The findings of the SPSS analyses were discussed by comparing them to similar studies, and some recommendations were made regarding the problem situation and the research.

**Keywords:** Digital Game Addiction, Smartphone, University Students

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### Introduction

The place of mobile technologies in our lives is getting wider every day. Especially with the advancement of new

generation wireless communication technology, mobile devices are one of the fastest growing sectors. (Choudrie et al., 2014; Kalba, 2008). These tools, which were firstly used as mobile phones for only communication purposes, have evolved into smartphones by including many features of an ordinary computer (Chen et al., 2011). Today's new generation smartphones have features that can perform many operations that any computer can (Ada & Tatlı, 2013). This development process of smartphones has also changed the routines of individuals. As a matter of fact, processes such as reading newspapers, following social media, watching videos, listening to music and performing banking transactions, which were previously performed with different tools and methods, can now be performed much easier and in a short time with smartphones.

The use of mobile devices, especially smartphones, is increasing day by day throughout the world. It is predicted that 14.91 billion mobile devices worldwide in 2021, will reach approximately 17 billion in 2022 and approximately 19 billion in 2025. (Laricchia, 2022). When these rates are analyzed in the context of smartphones, the number of smartphone users, which was approximately 6.25 billion in 2021, reached approximately 6.5 billion in 2022 (Figure 1).

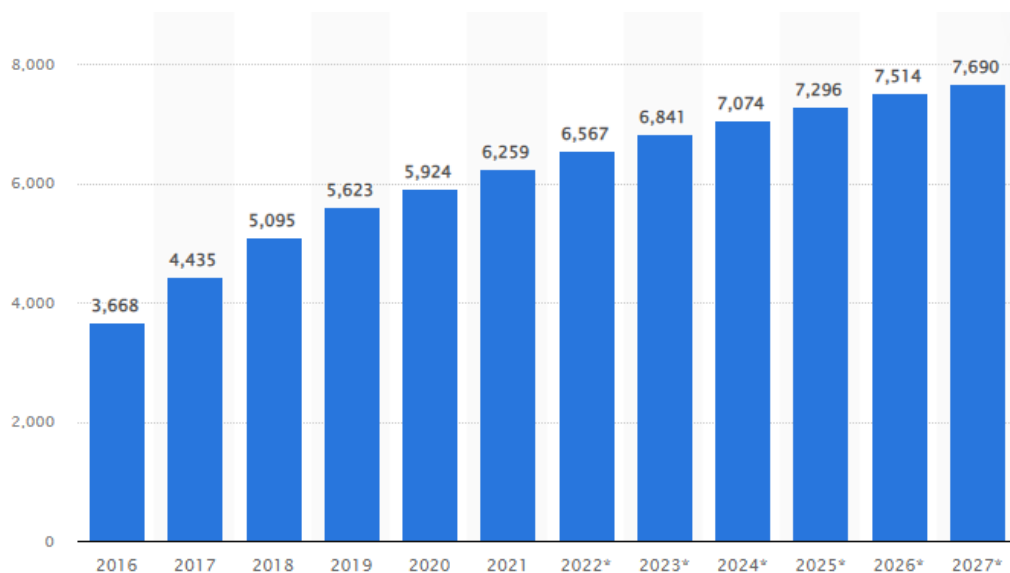


Figure 1. Smartphone Subscriptions Worldwide 2016-2021, with Forecasts from 2022 to 2027 (SRD, 2022)

The increasing use of technology has both positive and negative effects on human life (Johansson & Götestam, 2004; Hazar, 2016). Factors such as emotional problems, socialization and self-discovery make technology more attractive (Griffiths, 2001). In the Sağlam and Topsümer (2019) 's study, it was revealed that the most common reasons for individuals to play digital games are personal relaxation, satisfaction and providing social relations. Considering the factors such as lack of social skills, shyness and the need for social support are risk factors for technology addiction (Thatcher & Goolam, 2005), the increase in technology use also brings some problematic and pathological consumption (Savci & Aysan, 2017).

Many industries like health, education etc., around the world are undergoing digital transformation. It is seen that



traditional games have now transitioned to virtual environments and transformed into a structure that can be played on devices such as computers, game consoles and smart phones, taking names such as video games, computer games, console games, and mobile games. In this study, the “game” word will be used for all types of games played on different platforms. The games are specially developed software for various purposes, which are usually played with various hardware such as keyboard, mouse, and joystick. Games with audiences of all ages are intensely played by adolescents and young individuals. Games played by people of all ages were especially The games, which have an audience of people of all age levels, are especially played by adolescents and young individuals (Walsh et al., 2011). Some studies reveal that men play more games and are, therefore, more at risk (Çavuş et al., 2016; Lee et al., 2013; Turner et al., 2012).

When the literature is examined, it is seen that games, which are generally known as a source of entertainment, also have some positive effects. There are some studies showing the positive effects of the games like gaining computer literacy, hand-eye coordination, relaxation and calming, increasing imagination, creative and critical thinking, self-control, providing patience, concentration, interest, and attention, and increasing learning motivation, problem-solving skills, and self-care skills. (Anderson et al., 2012; Behnamnia et al., 2020; Bowman et al., 2015; Çavuş et al., 2016; Gentile & Gentile, 2008; Horzum, 2011; Kim & Smith, 2015 Lin & Hou, 2015; Wang & Chen, 2010). As in everything, uncontrolled and excessive use in games causes some negative effects such as the tendency to violence, a decrease in academic achievement, depression, loss of virtual reality perception, obesity, deformation in the skeletal and muscular systems, attention and communication problems (Chan & Rabinowitz, 2006; Greitemeyer & Mügge 2014; Gentile et al., 2012; Gentile, 2009; 2011; Griffiths & Davies, 2005; Grüsser et al., 2007; Mehroof & Griffiths, 2010).

Addiction is a state of uncontrolled craving for a particular substance that makes it habitual (Campbell, 2003). Some researchers have indicated that behavioral addictions may be similar to biological addictions, such as alcohol and drugs. (Bian & Leung, 2015; Stein et al, 1994). Game addiction in the behavioral addiction category is among the current issues attracting the attention of many researchers. One of the most dangerous negativities that arise from games is game addiction. Goswami and Singh (2016) stated that game addiction is such an important problem that it can be identified with substance addiction. Cavus et al. (2016) stated that one out of every five students carries the risk of game addiction. Similarly, when evaluated in terms of the basic components of addiction, Griffiths and Davies (2005) stated that game addiction is no different from substance addiction in young people. Game addiction is defined by Lemmens et al. (2009) as “a person’s excessive and compulsive use of the computer or video games, although it causes social and/or emotional problems, and the player’s inability to control excessive use” (Irmak & Erdoğan, 2016).

Game addiction, which was initially evaluated as technology addiction in a general framework, was divided into sub-dimensions such as internet addiction (Widyanto & Griffiths, 2006), smartphone addiction (Kwon, et al., 2013), and game addiction (Hebebcı, 2022). Young et al. (2009) considered game addiction as a sub-dimension of internet addiction. Griffiths (2002) described it as technology addiction. Although gaming addiction is not considered a disease by current diagnostic systems, when the Diagnostic and Statistical Book E-5 of Mental

Disorders (DSM 5) is examined, it is seen that gaming addiction is considered as internet gaming disorder (APA, 2013). Although it is not yet seen as a disease, many people apply to health institutions in this context (Griffiths & Meredith, 2009). Studies also show that excessive and uncontrolled gaming causes symptoms similar to substance addiction (Hsu et al., 2009; Mehroof & Griffiths 2010).

Kurtbeyoğlu (2018) and Taylan et al. (2018) found in their studies that individuals generally prefer the use of smartphones to play games. This situation is also seen in the Digital 2022 Global Overview Report (2022). The report shows that 68.1% of individuals play games with their smartphones (see Figure 2). This rate corresponds to approximately twice the rate of those who play games with a notebook or computer. Also, a study shows that smartphones are the most used devices for gaming worldwide (Clement, 2022a).

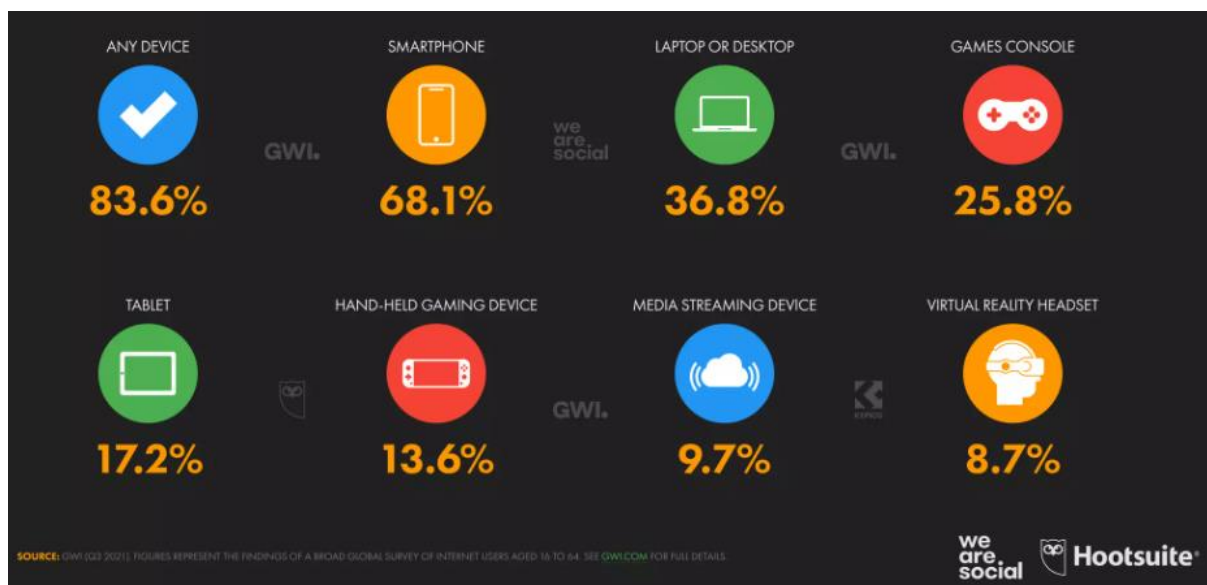


Figure 2. Devices used to play Video Games

For gaming platforms, the trend toward mobile devices has had some consequences. As a matter of fact, when the literature is examined, it is noteworthy that game addiction is seen more especially in games played via mobile devices (Etemel & Pektaş, 2018; Göldağ, 2018). Game addiction can have negative effects, especially on teenagers and adolescents, in vital areas such as learning and social relationships (Eskidimir & Tezel, 2019). Therefore, it is thought that it is important to examine students' game addictions in terms of mobile technologies. As a result, young individuals are in the risky group in terms of both excessive smartphone use and game addiction (Griffiths & Meredith, 2009). For this reason, it is critical to identify risk factors to avoid technology addiction in young people and to do research on preventative measures that may be implemented to reduce risk factors.

Examining the literature reveals that numerous research has been conducted in attempt to determine game addiction in the context of mobile technology. It is seen that Temiz et al. (2020) examined the game addictions of vocational high school students within the framework of smartphone and computer addictions. Similarly, Bülbül

and Tunç (2018) examined the relationship between playing games, the age of owning a phone, and game addiction. As a result of the studies, it was concluded that as the age of owning a phone decreases, the addiction increases, and the students are moderately addicted to games. In another study, it was seen that the game addiction average scores of students who have a smartphone are higher than those who do not have a smartphone (Göldağ, 2018).

As a matter of fact, Choudhary (2014) states that the so-called generation Y (those born between 1977-1994) and the generation Z (those born in 1995 and later) use smartphones more than other generations (Choliz, 2012). Games are also generally played by adolescents and younger people (Walsh et al., 2011). These findings suggest that adolescents and young people are at risk in the context of smartphone and game addiction. Additionally, there are limited studies in the literature evaluating gaming addiction in the context of smartphones. It is considered important to increase the number of studies in this field. In line with all these reasons, the aim of this study is to examine game addiction in the context of smartphone technologies. In line with this purpose, answers to the following research questions are sought:

1. What are the findings about students' smartphone usage?
2. What are the purposes and application preferences of students' smartphone usage?
3. What are the findings about students' playing games?
4. What are the game addiction levels of the students?
5. Is there a significant relationship between game addiction and gender, playing games, and the device played?

## Method

### The Pattern of the Research

This research was conducted with quantitative research methods. In accordance with the research purpose, descriptive survey model was used. The survey model describes a past or present situation as it exists (Karasar, 2006). Through this method, game addiction was examined in the context of smartphone technologies.

### Study Group

The study group of the research was determined by using the convenient sampling method, which is one of the non-random sampling techniques (Lune & Berg, 2017). In this direction, the research study group consists of university students studying in the 2021-2022 academic year. A total of 223 students participated in this research. The distribution of students by gender is shown in Figure 3.

When the gender distribution of the students participating in the research is examined, it can be said that the numbers are close to each other. Indeed, the number of male students is 103 (46%); the number of female students is 120 (54%).

## Data Collection Tools

The data obtained within the scope of the research were collected with two different measurement tools. These are “Personel Information Form” and “Digital Game Addiction Scale For University Students” (DGASUS).

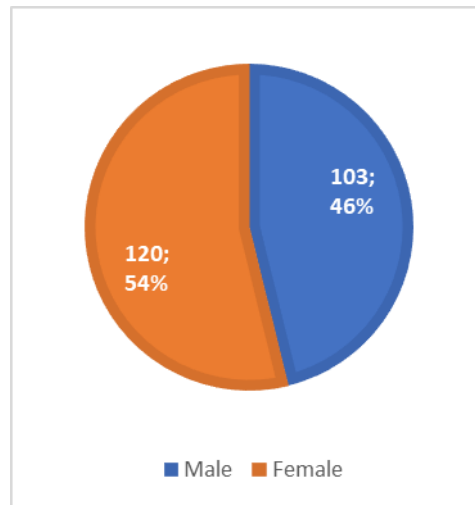


Figure 3: Distribution of Students by Gender

### *Personal Information Form*

A personal information form was developed by the researchers to learn the personal information of the students needed within the scope of the research. With this form, the participants were asked for information such as gender, the device on which the game was played, and the duration of the game.

### *Game Addiction Scale for University Students*

The game addiction scale (DGASUS) for university students, adapted by Hazar and Hazar (2019), consists of 21 items and three factors. It is a 5-point Likert-type scale consisting of “Strongly Disagree”, “Disagree”, “Undecided”, “Agree”, and “Strongly Agree” statements. The lowest score that can be obtained from the scale is 21 and the highest score is 105. For grading of the scale scoring; “1-21: Normal Group, 22-42: Low Risk Group, 43-63: Risky Group, 64-84: Addicted Group, 85-105: Higly Addicted Group” is used. The Cronbach Alpha coefficients of the scale and the factors were .93 for the first sub-factor, .88 for the second sub-factor, .75 for the third sub-factor, and .92 for the total scale.

## Collection of Data

At this stage, the questions in the personal information form and the items in DGASUS were created on “Google Forms” to be applied online. Then, the link of the measurement tool was shared with the students and the collection of the data was made.

## Analysis of Data

Firstly, it was checked whether the collected data showed a normal distribution. Parametric tests were used because of the normal distribution of the data because of the analysis. In the analysis and interpretation of the data, descriptive statistical data such as frequency, percentage arithmetic mean, and standard deviation, and independent samples t-test were used. Descriptive statistical data such as frequency and percentage were used in the analysis of students' smartphone usage purposes, application preferences, and smartphone usage situations. Additionally, independent groups t-test was used to determine whether game addiction differs according to gender, mobile game playing status, and the device playing games. The margin of error for significant differences between the groups was accepted as .01.

## Findings

### Smartphone Usage of the Students

Detailed information on the smartphone usage status of university students is shown in Table 1. In this context, the frequency and percentage values of the daily usage time, the number of daily checks, the operating system used, and the mobile device types owned were calculated.

Table 1. Smartphone Usage of the Students

Variables	Options	Female		Male		Total	
		f	%	f	%	f	%
Daily Usage Time	Less than 2 hours	5	2.2	20	9	25	11.2
	Between 3 and 5 hours	73	52.1	52	37.1	125	56.1
	More than 6 hours	42	61.8	31	45.6	73	32.7
Daily Checking Times	Less than 100 times	81	36.3	59	26.5	140	62.8
	Between 101 and 200 times	34	15.2	34	15.2	68	30.5
	More than 201 times	5	2.2	10	4.5	15	6.7
Operating System	Android	92	41.3	83	37.2	175	78.5
	IOS	26	11.7	20	9	46	20.6
	Other	2	0.9	0	0	2	0.9
Money Spent for the Game	Less than 100 ₺	86	38.6	65	29.1	151	67.7
	Between 101 ₺ and 200 ₺	32	14.3	25	11.2	57	25.6
	More than 201 ₺	2	0.9	13	5.8	15	6.7
Mobile Device Type	Smartphone	120	53.8	103	46.2	223	100,0
	Tablet	38	17	18	8.1	56	25.1
	PDA	7	3.1	9	4	16	7.2

When the table is examined, it is seen that more than half of the students (56.1%) use a smartphone for 3-5 hours in a day, and most of the students (32.7%) use a smartphone for 6 hours or more. On the other hand, the number of students using smartphones for less than 2 hours per day is quite low (11.2%) among the total students. When evaluated according to gender, a similar picture emerges between 3 and 5 hours of use and 6 hours or more. However, while the rate of female students who stated that they use the smartphone for less than 2 hours is quite low, the rate of use by male students in this period is higher. In other words, at a more limited level of use, male students use it approximately four times more than female students.

When examining the frequency of daily smartphone checking, it is seen that students generally check their phones 100 times a day or less (62.8%). However, 30.5 percent of the total number of students check their smartphones between 101-200 times a day. A tiny percentage of students (6.7%) make more than 200 checks per day. While the rate of female students (36.3%) who stated that they check their phone 100 times or less in a day is higher than the rate of male students (26.5%), the number of female students who stated that they check their phone 101-200 times in a day is equal to that of male students. The rate of male students (4.5%) who stated that they checked their phones 201 times or more per day was higher than female students (2.2%). In other words, there is an increase in favor of men in very frequent checking situations, where daily checking turns into an addiction.

Considering the distribution of operating systems used by students on their smartphones, it is seen that 78.5% of the devices have Android operating systems and 20.6% have IOS operating systems. While there was no significant difference between female and male students using devices with different operating systems, it was observed that the rate of having IOS and Android-based devices was approximately four times parallel to the rate for all devices.

When the expenditure on smartphones is examined, it is seen that the students mostly spent 100 ₺ or less (67.7%), and the remaining students spent between 101 and 200 ₺. Students who spend 200 ₺ or more are very few (6.7%). While the proportion of female students who spend 100 ₺ or less (38.6%) is higher than that of male students (29.1%), when the amount of spending is higher, it is revealed that male students spend more (5.8%) than female students (0.9%).

All students participating in the study had a smartphone. However, since the other devices they had were also asked, it was seen in Table 1 that the number of devices was higher than the number of male and female students and the frequency changed. Also, it is seen that having a tablet as a mobile device other than a smartphone is higher for female students (17%) than for male students (8.1%). In total, it is seen that 25.1% of the students have a tablet as a second mobile device and very few (7.2%) a PDA device.

### **Smartphone Usage Purposes and Application Preferences**

Within the scope of the research, the students' smartphone usage purposes and the application categories that they frequently use on their devices were examined. More than one option could be ticked to answer these

questions. Considering the smartphone usage purposes of the students participating in the study, it is seen that the most important purposes are communication, social media and the internet (Figure 4).

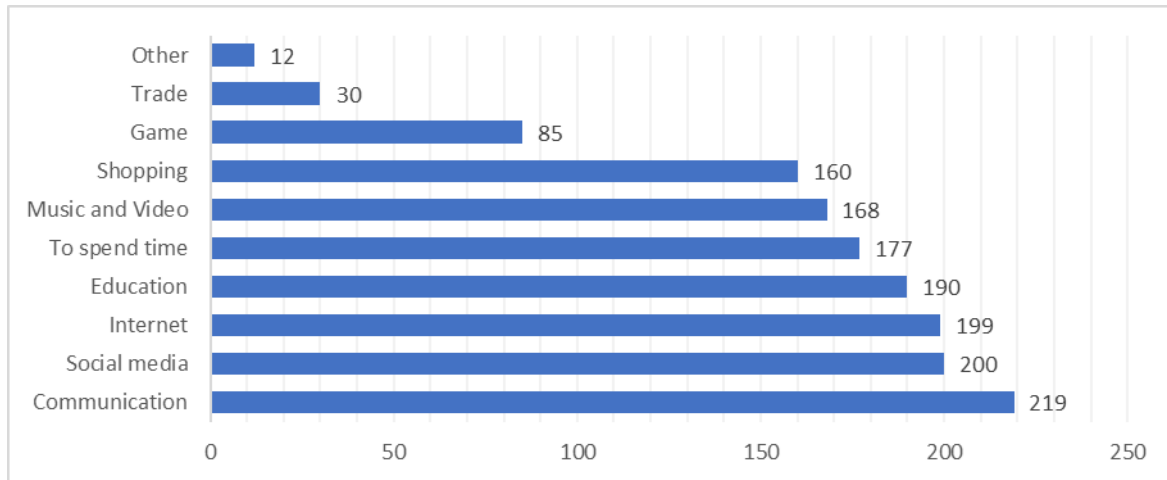


Figure 4. Students' Smartphone Usage Purposes

It is seen that almost all of the university students use their smartphones for communication ( $f=219$ ), social media ( $f=200$ ) and the internet ( $f=199$ ). Furthermore, it can be said that the number of those who use it for educational purposes is also high ( $f=190$ ). Additionally, it is seen that students use their smartphones for banking, transportation and following the agenda, although not widely.

The application categories that students frequently use on their smartphones are detailed in Figure 5. Students were presented with more than one option for this question.



Figure 5. Frequently used Application Categories

When Figure 5 is examined, it is seen that the application categories that are usually installed on the students' smartphones are music and video, shopping, education, and communication.

### Playing Mobile Games of the Students

Detailed information about the playing mobile game status of university students is shown in Table 2. In this context, frequency and percentage values of the daily game playing time, playing mobile games or not, and the number of devices playing the game were calculated. When Table 2 is examined, it is seen that the number of students who play mobile games (f=114) and those who do not (f=109) is close to each other. It is noteworthy that male students prefer the computer (f=47), and female students prefer the smartphone (f=43) in terms of the device played. Generally, it is seen that the computer environment is preferred for the game (f=78). Another finding is that the value with the highest frequency in terms of daily playing time is “less than 2 hours” (f=113).

Table 2. Playing Mobile Games of the Students

Variables	Options	Female		Male		Total	
		f	%	f	%	f	%
Playing Mobile Games	Yes	66	29,6	48	21,5	114	51,1
	No	54	24,2	55	24,7	109	48,9
	<b>Total</b>	<b>120</b>	<b>53,8</b>	<b>103</b>	<b>46,2</b>	<b>223</b>	<b>100</b>
Device	Computer	31	22,5	47	34,1	78	56,5
	Smartphone	43	31,2	17	12,3	60	43,5
	<b>Total</b>	<b>74</b>	<b>53,6</b>	<b>64</b>	<b>46,4</b>	<b>138</b>	<b>100</b>
Daily Playing Time	Less than 2 hours	113	50,7	77	34,5	190	85,2
	Between 3 and 5 hours	7	3,1	23	10,3	30	13,5
	More than 6 hours	0	0,0	3	1,3	3	1,3
	<b>Total</b>	<b>120</b>	<b>53,8</b>	<b>103</b>	<b>46,2</b>	<b>223</b>	<b>100</b>

### Game Addiction Level of Students

Under this heading, the game addiction average scores of university students in general and some items on the scale with low and high average scores were evaluated (see Table 3).

Table 3. Game Addiction Level of Students

	N	$\bar{X}$	S	Min	Max
Female	120	30.96	14.83	21	105
DGASUS Male	103	41.54	15.56	21	96
Total	223	35.85	16.04	21	105

The game addiction average score of university students was 35.85. The average score of female students was 30.96; male students are 41.54. According to these findings, it is seen that the students are in the “Low-Risk Group” (22-42 score range) category defined in the measurement tool. However, it is noteworthy that male



students were at the limit value. In this respect, it can be said that male students are in the “Low-Risk Group” (22-42 score range) and the “High-Risk Group” (43-63 score range). A few of the scale items with the highest and lowest average scores in the study, along with the game addiction levels of the students, are presented in Table 3.

Table 4. Scale Items with the Highest and Lowest Average Scores

	Items	$\bar{X}$
Highest Average Scores	Playing digital games relaxes me when I’m unhappy.	2.6
	I do not want to stay away from digital game tools such as computers, phones, tablets, and consoles.	2.3
	There are times during the day when I suddenly/suddenly want to play digital games	2
Lowest Average Scores	When I wake up in the morning, the first thing that comes to my mind is to play digital games.	1.3
	I lose my appetite when I’m not playing digital games	1.4
	I don’t have time for other fun activities (such as sports, music) because I play digital games.	1.4

In parallel with the research findings, it can be said that the items that increase the game addiction scores of the students are the items that describe the partial addiction symptoms. It is seen that the items with the lowest average emphasize that games are indispensable in general. The low average of these scores is a finding that supports the fact that the students are in the Low-Risk Group.

### Relationship Between Gaming Addiction and Gender, Gaming, and Gaming Device

In the study, whether there is a statistically significant difference between the game addiction score averages of university students according to gender, whether they play games or not, and the device they play games with was examined by independent groups t-test (see Table 5).

Table 5: T-test Results of DGASUS Scores by Gender, Mobile Game Playing Status, and Type of Device Used

		N	$\bar{X}$	S	df	t	p
Gender	Female	120	30.96	14.83	221	-5.19	0.00
	Male	103	41.54	15.56			
Playing Mobile Games	No	114	31.78	15.49	221	-4.00	0.00
	Yes	109	40.10	15.55			
Device	Computer	78	43.78	17.82	136	-2.75	0.00
	Mobile	60	35.73	15.92			

In Table 5, university students' game addictions show a significant difference in terms of gender, playing mobile games, and the type of device used ( $t(221)=-5.19, p<0.01$ ;  $t(221)=-4.00, p<0.01$ ;  $t(136)=-2.75, p<0.01$ ). The game addictions of the students are higher who are male students ( $\bar{X}=41.54$ ) compared to female students ( $\bar{X}=30.96$ ), playing mobile games ( $\bar{X}=40.10$ ) compared to not ( $\bar{X}=31.78$ ) and playing games in computer ( $\bar{X}=43.78$ ) compared to play in mobile devices ( $\bar{X}=35.73$ ). This finding can be interpreted as there is a significant relationship between students' game addictions and gender, mobile game playing, and the type of device used.

## Discussion and Conclusion

Smartphones and games occupy an important place in people's lives in the new world order. It is a fact that the developing technology will carry the game and smartphone technology to a different and high-level point in the coming period. As a matter of fact, games that were 2D and far from reality in the recent past have now gained a truly indifferent appearance with the effect of virtual and augmented reality technologies. It is inevitable that it will be at much better levels in the future. Similarly, the mobile phone technology used in the 90s has taken a completely different form in about the last 30 years. The phones, which were used only for conversation and messaging in the first time, have turned into a computer that fits in our pockets today.

The excessive and uncontrolled use of smartphone technology, which greatly facilitates human life, brings along behavioral addictions (Soni et al., 2017). As a result of the research, it is seen that the daily smartphone usage time of university students is between 3 and 5 hours. Some studies in the literature state that the duration of use (Haug et al., 2015) and the number of controls (Lin et al., 2015) are more important in terms of addiction. Again, in the literature, daily smartphone usage is less than 1 hour (Durak & Seferoğlu, 2018); 1-2 hours (Haug et al., 2015); 1-3 hours (Akyürek, 2020); 2-4 hours (Hebebcı, 2022); Different findings were encountered, such as 4-6 hours (Minaz & Bozkurt, 2017). This difference is thought to be due to the different demographic characteristics of the group in which the studies were applied.

When the duration of smartphone usage is considered separately by gender, it is noteworthy that female students are ahead in the category of using less than 2 hours, and men are ahead in the category of using more than 6 hours. Aljomaa et al. (2016), it was concluded that as the frequency of smartphone use increases, addiction also changes. There are some studies showing that women use smartphones more than men, and therefore smartphone addiction is higher (Kwon et al., 2014; Mok et al., 2014; Van Deursen et al., 2015). It can be said that this is related to the fact that women use instant messaging and social media more than men. It is also thought to be the result of more restrictions on women than men in many cultures. It is also expected that the physical restraint of women will lead them to spend more time in digital environments.

Another result obtained from the research is that the number of daily checking of the smartphone is less than 100. Accordingly, students interact with their smartphones at most 100 times in a day. Haug et al. (2015) also revealed similar results. Smartphone users in Turkey check their smartphones an average of 70 times in a day (Deloitte, 2016). Also, it is seen that the smartphone expenditures of university students are generally less than 100 ₺. The

entire workgroup has a smartphone. Tablets are most commonly used mobile devices after smartphones. According to the data of Deloitte (2019), the three most preferred mobile devices are smartphones, tablets, and smartwatches.

Students' smartphone usage purposes are communication, social media, the internet, and education, respectively. Some studies have similar results (Ataş & Çelik, 2019; Semerci & Kostak, 2019). There are also studies with different results in the literature. The results of the studies draw attention to the fact that the purpose of smartphone usage is generally social media (Akyürek, 2020; Çuhadar et al., 2020; Haug et al., 2015; Rung et al., 2014).

Students use smartphones for communication, social media, the internet, and education, in that order. Several studies have produced similar results (Ataş & Çelik, 2019; Semerci & Kostak, 2019). There are also studies with varying outcomes in the literature. The findings of the studies highlight the fact that the primary purpose of smartphone usage is social media (Akyürek, 2020; Çuhadar et al., 2020; Haug et al., 2015; Rung et al., 2014). This result can be explained by the fact that social media covers an important part of our lives today. It is seen that social media and internet are even used as synonymous concepts. One of the usage purposes that students frequently emphasize in the research is education. There are studies in the literature on the use of smartphones for educational purposes (Rung et al., 2014).

However, it cannot be said that education is at the forefront of the research. The reason why it is ranked so high in this study may be that the study was carried out in one of the first education and training periods after COVID-19. It is thought that it may be effective that students have gained the habit of using mobile technologies for their lessons, exams, assignments and projects during the education and training process in the COVID-19 period. Therefore, during this period, students benefited greatly from their smartphones. Another finding is that the applications used by students on their smartphones are music and video, shopping, education, and communication, respectively. It can be said that the study group, age, and gender distribution was effective in the formation of this ranking.

When the game addiction status of the study group is examined according to the criteria given in the measurement tool, it is seen that the group is in the low-risk group. Game addiction is higher, especially in Asian countries. Studies show that while the rate of game addiction is around 3.3% in Turkey, 1.5% in the Netherlands, and 11.9% in Germany, this rate rises to 50% in Asian countries such as South Korea (Clement, 2022b; Göldağ, 2018; Grüsser et al., 2007; Sakuma et al., 2017). It is thought that these differences are caused by the cultural diversity, research population, time period and the characteristics of the measurement tools used.

When game addiction is analyzed by gender, it is seen that there is a significant difference in favor of male students. The findings show that the addiction score averages of male students are approximately 11 points higher than that of female students. Additionally, according to the scores obtained, it can be said that male students are in a risky group in terms of game addiction. When the literature is examined, it is seen that there are many studies

showing that male students are more addicted to games than female students (Chiu et al., 2004; Ekinci et al., 2016; Göldağ, 2018; Li & Wang, 2013; Turner et al., 2012). It is also seen that there are also small number of studies with opposite results in the literature (Gürsu & Özçelik, 2022). It is believed that there are various reasons for the emergence of this finding. Games are generally perceived as activities performed by men (Fox & Tang, 2014). As a matter of fact, it can be said that the games are often designed for a male-dominated mass of people. Additionally, men are more interested and competent in technology than women may have been influential in the emergence of such a result. Another reason is the physiological and psychological differences between men and women. According to some researchers (Becker et al., 2017; Dong et al., 2018) men differ from women in mechanisms related to gaming addiction in their nervous system. Men enjoy addictive substances and behaviors more because the satisfaction area in their brain is more active. Therefore, they spend more time on such activities (Aktaş & Bostancı, 2021).

The game addiction scores of students who play games are significantly higher than those who do not. As individuals continue to play, their addiction to the game increases. This led to an increase in their playing time.

It is seen that the time that the study group spares for playing games in a day is mostly in the range of 0-2 hours. Some studies are showing that the duration of playing games is effective for game addiction (Ayhan & Köseliören, 2019; Göldağ, 2018). Studies show that daily gaming times vary between 1 and 5 hours (Talan & Kalinkara, 2020), 0-2 hours (Semerci & Balcı, 2020), 1-2 hours (Göldağ, 2018). Gentile and Anderson (2006) examined the time to play games in terms of gender. According to this, it was concluded that women play an average of two hours a week, while men play an average of four hours a week.

Another result obtained from the research is that students who play games with computers have significantly higher addiction scores than those who play games with smartphones. This may be the result of computer games being more realistic and immersive. It is thought that it is easier to use than mobile devices, and the variety of additional hardware is also effective in this result. In the literature, it is seen that the game addiction score averages of the students who have a computer are higher than the students who do not have a computer (Aktaş & Daştan, 2021).

Today, the rapid development of mobile technologies has also positively affected the development of mobile games. It can be said that today's mobile devices have reached the level to catch the high level of graphics and gameplay provided by the computer. Studies in the literature show that there is a trend toward mobile as a gaming platform (Mun, 2022; Talan & Kalinkara, 2020; Wang et al., 2019). It is one of the remarkable findings of the research was that women use mobile games more than men. However, regarding mobile game addiction, it is seen that the addiction scores of men are higher than women (Mun, 2022; Sayeed et al., 2021). One of the reasons for this situation is the difference in the averages that attributed to the games. While women generally see games as a way of spending time; men see games as a source of excitement (Lin & Tsai, 2016).

## Suggestions

It is important to organize activities to inform university students about the mental and physical negative effects of excessive and uncontrolled use of smartphones. It would be useful to conduct similar activities within the scope of game addiction. The involvement of university students in social groups and communities, as well as sports and cultural activities, reduces the amount of time they dedicate to gaming and prevents the development of addiction. Furthermore, mental support and control programs can be increased as needed to prevent gaming use from progressing to the degree of addiction. Projects on the constraints that will prevent game addiction can be conducted. The number of studies in the literature dealing with game addiction should be increased. In particular, the number of studies examining the effect of mobile devices on game addiction can be increased. Comparisons can be performed by establishing investigations on bigger study groups using different approaches and techniques.

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## Modern Teaching Methods Adapted to University Education


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**Abstract:** The didactic strategy is given by the set of methods and techniques by which the cooperation between the teacher and students, between students and teacher, between students and students is achieved to obtain the anticipated results. For a positive result of the didactic approach, there must be a good didactic strategy capable of leading to the achievement of the proposed objectives and competencies. Didactic methods and procedures take the main place because they contribute to stimulating the student's thinking and feelings and lead him to develop learning techniques capable of increasing his chances of success in the profession for which he is preparing. In the didactic process, a multitude of methods are used, either traditional or modern. The multitude of methods forces the selection of the appropriate ones for the types of lessons, the proposed objectives and competences, the established learning methods. The category of traditional methods cannot be abandoned, nor can only modern methods be used. Each of these has their role in the learning paradigm that cannot be ignored but, on the contrary, considered. Following the pandemic, communication and teamwork problems appeared in student lives. In the present work, some modern methods adapted to university education are presented.

**Keywords:** Teaching Methods, Modern Methods, Thinking Hats Method, Higher Education.

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### Introduction

We live in a society characterized by several special coordinates: digitalization of every segment and component of socio-professional life; globalization of all sectors of activity; knowledge condensed into principles, skills and

competences; the interdisciplinary approach to any theme of general interest; enhancing the possibilities of adaptation and socio-professional mobility; the complex development of the modern human personality through the higher level of general culture and specialized/professional culture. These are some benchmarks in a constantly changing world.

Technology knows a continuous progress and, therefore, scientific research in the field has an accentuated dynamic, in a short time new components, new performances, new standards of technological achievements appear. As a result, the novelty requires the improvement of the teaching system and application methods, as well as the students' acquisition of individual learning methods to face the challenges in the post-training period, in adult life. The changes appear in all activities every time, so we must be flexible and adaptive. To achieve this objective for young people especial, the teacher has an important role in students' life. He must develop them some skills necessary to face the challenges that appear in their personal and professional life (D'Angelo, 2022). Thus, in addition to scientific information, a student must also acquire the ability to integrate his knowledge in the context (Jumari et al, 2022), to solve the existing problems with analytical and critically thinking (Sachou, 2013). Among the skills that must be developed in education system we mention: communication, critical thinking, time-management (Rata et al., 2022), problem-solving (DeDecker et al., 2022), logic & reasoning, analytical & evaluative (Student infographics, 2016), creativity (Matina, 2022), collaboration, and of course technical skills for future engineering (Akdin, 2022). Some of these are summarized in Figure 1, with a short definition. Four of them: critical thinking, creativity, collaborative and communicative forms a model named 4C 21<sup>st</sup> century skills (Hasanah et al., 2023).

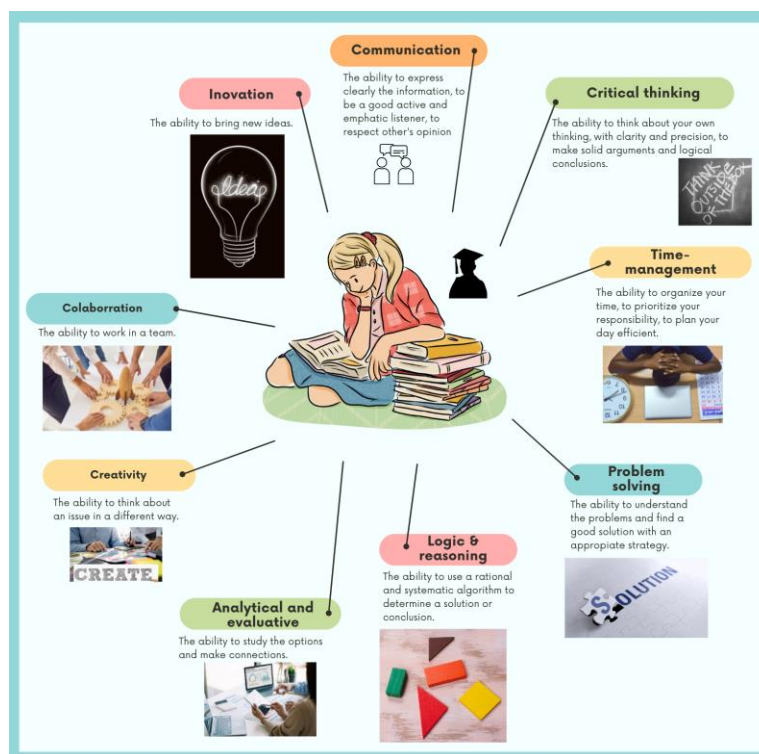


Figure 1. Students' Skills

Some of these skills are developed in family, some in the friends' group, but the most important part in school. It is well known that education is also outside the classroom. In this paper the higher education is in discussion, so we will refer to students, more exactly the electronics engineering students. As we said before, to build an adaptive a flexible young, the teachers play an important role and they must help the students in improving and developing the mentioned skills. This is realized by using in the didactic process, in addition to traditional methods, some innovative ones. In this way, the education quality is enhanced (Nicolaide, 2012), and the future engineer has all the assets to be good professional (Jumari et al., 2022).

This paper presents a teaching methods classification and some new modern teaching methods adapted to higher education, used on electronics engineering students in a technical faculty from Romania. These students need a refresh especially after the pandemic period, even if some teachers tried to motivate and engaged their students in many activities in online learning (Alasmari, 2022, Mishra et al., 2022). They forgot to collaborate, to work in team, to communicate with their colleagues or with their teachers, in general they forgot to live (Hasanah et al., 2023). So, it is mandatory to bring something new and interactive in didactic process. The presented methods are oriented on teamworking, and to have a comparison between modern and traditional approach, some classical methods are mentioned. In the last section, a vision of the technical engineering students on the methods used is presented.

### Traditional versus Modern Education

In the educational process, the two co-participants in the didactic act are like two components of an electric circuit: the power source (battery, generator etc.) which is the teacher and the consumers (light bulbs...) which are the students. But they do not have a relationship if there are not the connecting threads, in accordance with specific goals and conditions, which together with the other two elements previously enumerated, compose an operative system capable of placing the learning situations in a logical and natural order as we represented in Figure 2.

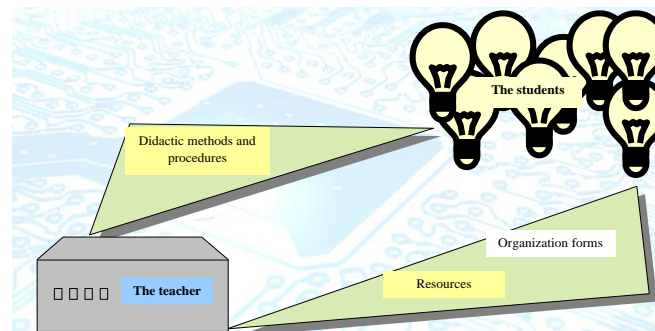


Figure 2. Didactic Approach

The information and skills transfer from teacher to student is evident in the didactic process. This is also made in the opposite direction, from the student to the teacher. Only in this way do we have respectful relationships, as

well as the types of intelligent, capable, active, generous people. The method chosen by the teacher to achieve the educational objectives is called didactic strategy. In detail, the didactic strategy is given by the set of methods and means by which the cooperation between the teacher and students, between students and teacher, between students and students. It is a different technique from teacher to teacher and becomes mastery or even educational art when it is perfectly constructed.

There are some clearly differences between generation (Bernad-Cavero & Llevot-Calvet, 2018), so the new one needs a new perspective and a new methodology to have good results. In Table 1 are summarized some characteristics for each generation. This table was reproduced from (Bernad-Cavero & Llevot-Calvet, 2018). Starting from these points of reference, traditional teaching must be changed and adapted to the new generation. In conclusion, it is time for innovation. There are 3 types of “new”: a new method, a modernized one and a modified one. So, the education methodology has 3 aspects: traditional, modern and innovative.

Table 1. Differences between Generations

Twentieth century generation	New generation
Books (reading)	Display (visual perception)
Small steps, gradual movement	Nonlinearity
Single tasking	Multitasking
Linear approach	Hyper media
Independence	Connection
Passive school	Active school, school as game
Reality	Fantasies
External technology	Internal technology
Fact awareness	Know how to find something necessary

In traditional education the transfer is made in one way: from teacher to student. The process is teacher-centered, the transmitted information is subject-specific and more theoretical. The students take notes and finally the have a competitive exam, with some reproductive knowledge (Yuchtman, 2017). Modern education is student-centered, the transfer is made in both ways, the classes are interactive, the practice is also included and, the most important, the skills presented in Figure 1 are developed (Del Campo et al., 2012). The advantage of this system is that not only the students benefit from these modern and innovative methods, but also teachers, because they must develop some skills and be open-minded to practice this type of education (Samuel and Rahman, 2018).

The multitude of methods forces the selection of the appropriate ones for the types of lessons, the proposed objectives and competences, the established learning methods. The category of traditional methods cannot be abandoned, nor can only modern methods be used. Everyone has their role in the learning paradigm that cannot be ignored but, on the contrary, considered. There is an interdependence between them that makes their ensemble a mechanism built from many cogwheels, like in Figure 3. One trains the others, and the mechanism works. A defective or absent one lead to the termination of the activity or to its poor functioning. Using this mechanism,

the education become active, and it implies more the students in the didactic process. In addition to their technical knowledge, they also develop the metacognitive knowledge (Močinić, 2012).

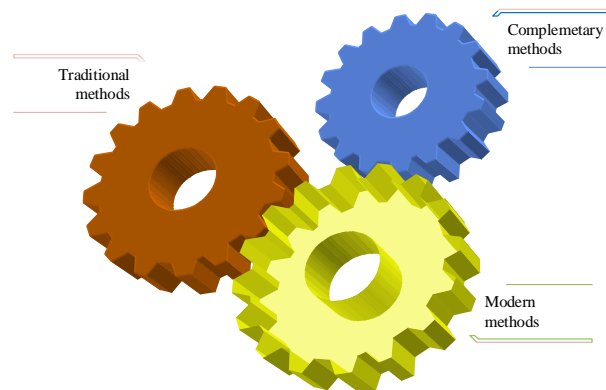


Figure 3. The Mechanism of Didactic Methodology

This active strategy involves the interdisciplinarity too because it is very helpfully in engineer training. "The strongest argument for interdisciplinarity it is the very fact that life is not divided into disciplines" (J. Moffett). The content of the above motto, "life is not divided by disciplines", is the most solid argument for the imposition of the term interdisciplinarity in education. It tries to achieve cooperation between disciplines and a special treatment to form personalities with clear and unified images of the environment in which they live.

The objectives of interdisciplinarity are cognitive, notional, and social in nature. Through this approach, certain correlations are made between notions studied in different disciplines, but which have certain points in common. Also, a fixation and a systematization of the knowledge acquired in different situations is carried out. There is a development of thinking and especially of its enrichment with a new attribute - flexibility. The ability to freely communicate the acquired knowledge as well as the created correlations is cultivated. And last but not least, it is a way of learning teamwork and applying the acquired knowledge in practice. The cooperation and interpenetration of disciplines at certain levels gave rise to certain terms within the concept:

- *monodisciplinarity* - it is, in fact, the traditional form of organization and independent teaching of contents for each individual discipline.
- *pluridisciplinarity* - is a way of approaching a phenomenon, body or process in its entirety;
- *multidisciplinarity* – is an overlap of those elements from different disciplines that can cooperate only to highlight the common points;
- *transdisciplinarity* - is a way of interpenetration of those disciplines that, over time, can reach the situation of constituting a new discipline;
- *interdisciplinarity* – consists in the fact that the study material from one discipline transfers to another discipline, in addition to information, and methods of teaching and observing reality.

It can be noted that a single science cannot encompass all the problems, to give a unified picture of all the phenomena and processes of the surrounding world. At the interdisciplinary level, horizontal transfers of



knowledge provided in programs, courses, or evaluation tests, of didactic methods and procedures are configured, contributing to the realization of concepts with truth value. Interdisciplinarity can also be seen in non-formal activities. This form of learning has some advantages:

- ensures sustainable learning because it depicts the surrounding world in its entirety;
- enters the training on the student supporting the motivation and interest in learning concepts from several points of view;
- forms the habit of learning using the interactions and correlations between the subjects studied;
- creates certain mental structures and certain behaviors capable of transfer and adaptation;
- opens the way to achieving a higher level of knowledge;
- provides clarifications and opportunities to correlate the disciplines languages entered into cooperation.

### Teaching Methods Classification

The educational process is essentially a set of instructional actions. These involve both the teacher and the student in a relationship whose ultimate goal is the young training. But the relationship is complete in the present case, if the teacher manages to engage the student in an effort of learning and thinking, in an act of effective living and manifestation. It is not enough for the teacher to simply transmit some information. The student must be involved in a more or less directed learning situation, so that he can discover certain aspects and relate them to practical elements. This is done with the help of teaching methods.

A multitude of methods are used in didactic process. Their large number as well as their varied use have imposed all kinds of classifications, according to certain criteria. Most classifications are made according to the criteria that consider their use over time, the degree of generality, the fundamental functions, the methods of intervention on the intellect, the degree of training of the learners, the mode of communication, the didactic purpose, the registers in which they act, etc. In Table 2 is a near-complete picture of this classification, depending on the source that generates school-type learning.

Table 2. Teaching Methods Classification

The criterion	Method type	Examples
Historical	a) Traditional methods	- exposition, conversation, exercise, story, description, lecture, conference etc.
	b) Modern methods	- algorithmizing, problematization, brainstorming, clusters, programmed learning, thinking hats etc.
The generality degree	a) General methods	- exposition, conversation, lecture, master class etc.
	b) Specific methods	- moral exercise etc.

The criterion	Method type	Examples
The education process bilaterality	a) Teaching methods	- exposition, conversation, description, demonstration, explanation, I know-I want to know-what I learned etc.
	b) Learning methods	- exercise, role-playing games, learning on simulators etc.
The fundamental function	a) Transmission and assimilation of new knowledge methods	- exposition, conversation, exercise, story, description, lecture, conference etc.
	b) Training skills and abilities methods	- exercise, algorithmizing etc.
	c) Consolidation methods	- exercise, practical test, portfolio etc.
	d) Evaluation and self-evaluation methods	- oral, written, and practical tests - systematic observation, investigation, project, portfolio, self-evaluation etc.
	e) Application methods	- practical test, portfolio, modeling method etc.
The way of work organizing	a) Individual work methods	- programmed training, activity method based on cards, algorithmizing, project etc.
	b) Teaching-learning in groups methods	- cooperative learning, role play, dramatization, project etc.
	c) Frontal methods	- the conversation, the modeling method etc.
	d) Teamwork methods	- didactic game, practical activities etc.
	e) Combined methods	- practical activities etc.
The mental activity determination method	a) Algorithmic methods	- algorithmizing etc.
	b) Heuristic methods	- conversation etc.
The learner's participation degree	a) Active methods	- brainstorming, laboratory work, exercise, problem solving, modeling, debate, didactic game, computer-assisted training etc.
	b) Passive methods	- storytelling, description, explanation, lecture, learning with audio-video means etc.

The opposition between mechanical and conscious learning	a) Methods based on reception	- explanation etc.
	b) Methods that mainly belong to directed discovery	- problematization, demonstration, case study etc.
	c) actual discovery methods	- practical test, experiment, modeling method etc.
The education fields	a) methods for the formation and development of intellectual education	- exposition, conversation, exercise, story, description, lecture, conference etc.
	b) specific methods of physical education	- explanation, demonstration, game etc.
	c) methods specific to moral- civic education	- case study, modeling, brainstorming, thinking hats, problematization etc.
	d) methods specific to ecological education	- description, case study, explanation, Venn diagram, cube etc.
	e) methods specific to aesthetic education	- analysis, conversation, comparison, case study, demonstration etc.
	f) methods specific to laboratory applications	- description, explanation, demonstration, practical test, thinking hats, I know - I want to know - what I learned etc.
Oral communication	a) Expository methods	- the lecture, description, conference, exposition, exposition with an opponent, information, instruction, micro- symposium, radio instruction, theoretical demonstration etc.
	b) Interrogative methods	- heuristic conversation, interview, debate, group consultation, seminar, colloquium, brainstorming etc.
	c) problematization method	- problematization etc.
Written communication	a) Explanatory reading	- working with the text, slow reading, problematic reading etc.
	b) Independent reading	- working with the text or the document, slow reading, fast reading, critical reading, selective reading, synthetic reading etc.

Communication based on internal language	Personal reflection	- the essay etc.
Oral - visual communication (image, sound, word)	Instruction through films	- training with the help of TV shows or video films
Reality exploration	a) Direct exploration methods	- systematic observation, experiment, case study, learning by discovery etc.
	b) methods of indirect exploration	- demonstration, modeling etc.
	a) Methods of teaching new material	- lecture, lecture-debate, master class, explanation, demonstration etc.
	b) Methods of fixing knowledge	- conversation, exercise, discussion, debate, Phillips 66 etc.
Didactic purpose	c) Methods of training skills and abilities	- exercise, algorithmizing etc.
	d) Verification and evaluation methods	- the investigation, the project, the portfolio, the written tests, the tests, the control/verification list etc. - evocation, realizing the meaning, reflection, closing, expansion, thinking map, brainstorming, the retrieval procedure, the double log, the LOTUS technique, conversation, thinking hats, Venn diagrams, horoscope method, the 5- minute essay, the evaluation sheets, interviews, independent investigations, data collection - ice breaking techniques - methods for solving problems and debating - Bingo, Badge, Graffiti, Special Collector, Treasure Hunt - Mosaic, Phillips 66 Meeting, graphic method
	e) Methods of developing critical thinking	
	f) Collaborative learning methods	
	g) Exercises for solving problems and discussions	- More heads together, group discussion, group consensus

The register in which it operates	a) Methods for the symbolic register	- logical-mathematical modeling, algorithmizing, exercise, computer-assisted training etc.
	b) Methods for the figural register	- description, observation, demonstration
	c) Methods for the action register	- experiment, reading, documentation, design, investigation, report etc.
Action (operational, instrumental, practical)	a) Methods based on real, authentic, effective action	- the exercise, the case study, the project, the research-action theme, the practical works etc.
	b) Methods based on fictitious action, simulation	- role-playing games, dramatization, learning through simulation and simulators etc.
Rationalization	Operationalization methods	- activity with cards, algorithmizing, programmed training, computer-assisted training etc.

## Modern Methods used in Technical Higher Education

The didactic action begins with its end. Thus, the teacher first plans what he is going to teach, as well as the results he intends to achieve for those he instructs. Therefore, establishing the transformations of his students, he elaborates a work methodology. Practically, the action finality occupies an important role in defining the teaching method. The method becomes a tool for organizing learning conditions. With its help, a connection is created between students and teacher, but also between students and students. There is also a compatibility between the teacher's personality and the chosen method, because each teacher attaches himself to some methods and neglects others or adapts his methods to the class he teaches and depending on the situation.

Also, the methods are suitable for some disciplines and not for others. (Mohiuddin et al., 2020) made a study of the most used teaching methods in four higher educational domains: Art and Humanities (AH), Medical Education (ME), Science and Engineering (SE) and Social Science (SS). This research presents a list of significant methods used in every aforementioned domain and can be adapted to diverse situation, are not used exclusively for a specific discipline: brainstorming, Business/computer/game simulations, Cooperative learning group, Demonstration, Discussion sessions, E-learning, Flipped classroom, Group discussion, Industrial training, problem-solving, role playing etc.

In this section are presented some new modern and innovative teaching methods adapted to technical higher education and applied with electronic engineering students. These are used to improve the students' skills

presented in Figure 1, especially those who develop communication, collaboration, creativity, and teamwork. For some methods is given an application example from *Computer architecture* laboratory.

#### A. *Problem solving*

In many cases the accent was on methods that implies teamwork, using for example cooperative problem-based learning (Woods, 2014), because these are playing an important role in metacognitive skills, like problem-solving skills (Jumari et al, 2022). The base method is named problem-solving or training through problems. This is used more and more in practice due to the multiple instructive-educational values it has. It consists in the production of problem-situations which, in order to solve them, involve the students in a process of thinking and investigation through the states it causes: amazement, curiosity, probing, research, developing hypotheses, finding of solutions. The concept of situation-problem is embodied from the state of contradiction, conflict, disagreement between two realities of knowledge: the knowledge and experiences previously acquired and the constituents of the new, the unknown being difficult to penetrate or remaining an enigma for a long time.

Creating problem situations is the first and most important thing. It must contain an intellectual weight (the student not knowing how to explain the process, the phenomenon), a conflicting state (two aspects incompatible with each other) and a disagreement (a paradox between previously acquired knowledge and new knowledge). Then, it is necessary to ask the student to solve the problem situation as follows:

- to identify the problem situation;
- to solve the problem situation;
- to propose new problem situations.

Finally, the method proves useful if it comes to the application of the knowledge thus acquired. This method has the following advantages:

- exploits the students' cognitive resources in a superior way;
- amplifies divergent thinking, demands a higher level of creative abilities;
- supports logical learning and the motivation for such learning.

Due to its formative values as well as interferences with other methods (conversation, explanation, demonstration, case study, exposition, experiment, debate), the problem-solving can be applied in the teaching of all educational subjects, in all stages of the didactic process and at the level of all cycle's schools.

#### B. *Thinking hats method*

Another method for collaboration and teamwork, with many benefits in all content areas and also in adult life, is Six Hats Thinking Strategy (Mahoney et al., 2022). It is called in this way because the students interpret certain roles, depending on the color of the chosen hat. They will say what they think about the topic under discussion, the nuances being imposed by the color of the hat. The original method was proposed by de Bono (deBono, 1999). Even there are 20 years from then, the method can be reinterpreted and adapted in many forms and it can be considered a modern one. The functions for the six hats are:

- The white hat, neutral and direct, does nothing but inform. The student wearing it is neutral; he is

focused on the facts from the lesson, on the visualized images that he must relate without any interpretation, without any opinion.

- The red hat, having and offering an emotional perspective on the content of the lesson, says what he feels about everything that happened from an emotional, sentimental point of view. The student who wears it must generate emotional states among all the participants in the lesson, motivation to support learning.
- The black hat, with a certain caution, points out mistakes, what is bad, what risks, what dangers are on the horizon. He only highlights them and does not appreciate or argue them.
- The yellow hat, the one that shines the didactic act, giving it a valuable and optimistic perspective, expresses the hope that the benefits of instruction are values for students. The wearer tries to secure suggestions, proposals, thought patterns on a logical foundation.
- The green hat, the emblem of creative thinking, suggests new ideas, variants of solving tasks or possible alternatives.
- The blue hat has a multiple role: defining the problem, directing the questions, gathering information, formulating the main ideas, building the thinking process and respecting the rules.

This method allows the hats to be taken over, one by one, by other students. In this way, the most wonderful thing happens: people change their perspective of thinking, feelings, attitudes from a certain moment in time and then embrace, at another time, other points of view expressed by other people wearing other hats. Among the advantages of this method can be mentioned:

- stimulation of thinking;
- encouraging the ability to encourage;
- the development of intelligence;
- formation of decision-making capacity;
- contributes to the formation of the socialization capacities of the participants, of tolerance and respect for each opinion issued in the collective. The important thing is that an exploration of reality based on cooperation is reached, even if apparently a contradictory participation is observed.

We propose the application of this method to *Computer Architecture* laboratory in the following form. The main objective was to energize (and involve all students in the activity) the practical activities, at the ROM Memory theme, for the presentation of the constructive types of ROM memories. Thus, the students were divided into 6 groups as follows:

- White hat team – objective – 5 students. They presented the 5 types of ROM memories: MROM, PROM, EPROM, EEPROM, FLASH ROM, as they were described without any additional information and opinions. The students took into account the production technology (with transistors, fuses, etc.), the way of writing, erasing, etc., but without bringing personal additions, opinions about them, giving us only the objective information from theory.
- The red hat team - personal opinion - 1 student, who, based on the information received from the white team, expressed his own opinion about the presented memos, choosing one of them as the most

advantageous (only from his point of view! !).

- Yellow hat team – optimistic – 2 students. The 2 people made available to their colleagues the advantages of the studied memoirs.
- Black hat team – pessimistic – 2 students. This team was responsible for presenting the disadvantages for each type of memory.
- Green hat team – inventive – 2 students. The green team had the task of finding a solution to combine the types of memos stated, taking into account the advantages and disadvantages mentioned by the other colleagues, so as to obtain an advantageous variant both from a financial and qualitative point of view.
- Blue hat team - coordinator - 2 students. The blue hat was responsible for choosing the best memory option, which memory was then used for the practical measurements.

### C. *Brainstorming*

This method is also called storm in the brain because the term brainstorming is based on two English words: brain which means brain and storm which means storm. It is a method applicable to group activity, thus becoming a group activity technique (Kalyani & Rajasekaran, 2018). The moments of the method are as follows (Miron, 2008):

- first of all, the subject of the topic to be studied is established;
- the task to be solved, in fact, of a problem-situation is presented;
- students are divided into several groups;
- then the students are asked to produce as many ideas as possible based on the principle quantity generates quality, without any irony regarding the idea of any colleague; ideas are written on the board;
- time is required for clarifying ideas; its duration is established by mutual agreement;
- at the time of resumption, the ideas are reread, analyzed and grouped according to certain criteria;
- the ideas expressed are evaluated;
- each group chooses the ideas that can solve the problem under discussion and displays them;
- the final solution for the proposed problem is concluded.

The brainstorming method is used because it has a high degree of training students in their own training, determines the ability to search and express ideas, stimulates creativity and the desire to work in a team. Choosing a subject favorable to the application of this method, organizing students for the activity, creating motivation for issuing as many ideas as possible and removing inhibiting situations, as well as fixing the moment and methods of evaluating the solutions found are attributes of the teacher's work.

### D. *JIGSAW method (Mosaic)*

It is the method used by team learning and especially by experts because each student receives a specific load, a specific task, a field in which they must become an expert (Mohiuddin et al., 2020). For understanding, here are the stages found in the application of this method (Miron, 2008):

- 1 Preparation of the study material: the topic to be learned is chosen, it is divided into 4 or 5 sub-topics



and for each sub-topic a helping material is elaborated in the form of affirmative statements, in the form of questions or in the form of lacunar text;

2 Organization of the student body and expert groups: the group of students is organized into learning teams of 4-5 people and each student in the team receives a number and has the mission to learn the sub-theme that corresponds to his number by himself, for this those with the same number gather at the same mass and becoming experts in the learned problem; here, the students present an individual report on what they have learned independently, the misunderstandings are clarified and the manner in which they will transmit the accumulated knowledge to the other members of the initial team is established. After that, the experts return to the original teams and convey the information or demonstrate the ideas with the help of the word or denominator teaching aids (computer, diagrams, drawings, photos, etc.). Teammates are encouraged to ask questions, discuss, and implement the plan of ideas.

3 Evaluation: after the students have made sure that they have learned what was transmitted, they are convinced that they can demonstrate the solidity of the training. The teacher uses various forms of evaluation: oral (in the form of questions) or written (report, essay, or evaluation sheet). By using this method, students gain cognitively, affectively, and socially, training skills of cooperation, expression, listening, creative thinking, problem solving, etc.

The above presented methods are considered modern and innovative for teamworking. Because we want to see the students' opinions about the modern and traditional methods, bellow we make a short description of the classical methods used and evaluated in the end by them.

#### *E. Conversation*

One of the most used traditional teaching methods is conversation. Through the dialogue created between the teacher and the student, thinking is activated so that the acquisition of knowledge, its fixation and systematization, the formation of skills are carried out at the level that allows the achievement of the objectives of the educational process. The conversation can be:

- catechetics (of reproduction of previously acquired knowledge) – is used when updating anchor ideas or when providing feedback;
- heuristics (for acquiring new knowledge) – it is used to discover statements, solutions, examples or to make demonstrations through which the students are led to arrive at the formulation of the ideas that the teacher could have presented on their own (Miron, 2008).

According to the didactic purpose, the conversation is classified as follows:

For the method to be effective, the questions involve compliance with certain requirements (Miron, 2008): be correctly formulated, simple and accessible; be addressed to the whole group; not to suggest the answer; be gradual and varied; to stimulate thinking operations; be followed by a pause to construct the answer. Since it is said that the keystone of the heuristic conversation is illustrated by the question, modern didactics, wanting to update this method, recommends that at certain times questions with a reproductive function predominate, and at

other times, questions with a productive function; the convergent questions that encourage analyses, comparisons, syntheses, associations of ideas, the divergent questions that direct thinking along original trajectories and the finding of new and varied solutions, the evaluation questions that require the issuing of value judgments, as well as those of anticipation, of prediction.

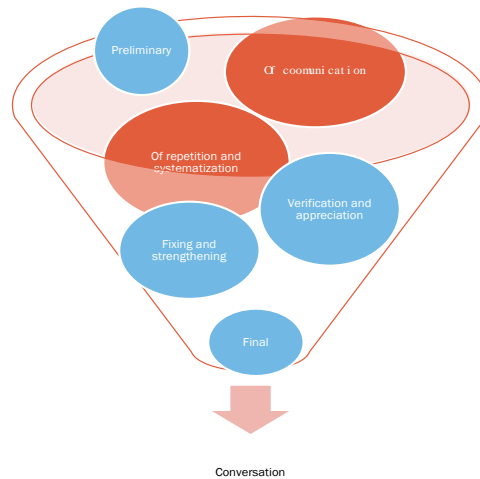


Figure 4. Conversation Classification

#### F. Description

Through this method, both the teacher and the students present with words the images and characteristic aspects of some objects, schemes, circuits, phenomena etc., in order to reach the generalizations needed in life. Its efficiency increases when it is made on the basis of didactic material appropriate to the subject under discussion and specific graphic representations. The advantages of this method consist in developing the ability to understand, the ability to retain what is described and the formulation of some generalizations. It also presents a disadvantage: it proposes a much too directed and interpreted observation.

#### G. Explanation

It is a variant of the oral presentation, necessary for both the teacher and the students, which requires a short time and aims to clarify a scientific truth with clear arguments. It only applies to parts of the content that are more difficult to understand. To achieve the purpose for which it is used as quickly as possible, an inductive or deductive approach is used, the one that best corresponds to the understanding of the phenomenon, the principle, some laws specific to the field. This method helps students highlight the basic elements of the studied phenomena, but also the logical links between them to interpret the reality studied correctly, scientifically, develops their thinking operations and facilitates the integration of new acquisitions into their own cognitive system.

#### H. Learning through discovery

It is one of the methods of exploring reality or its substitutes that is based on the cognitive effort of the students and obliges them to an active and interactive participation in the didactic process. The student acquires the stature

of a "researcher", a situation in which the scientist finds himself, the professional researcher, causing him to acquire knowledge as well as similar behaviors specific to scientific research. Often, discovery is associated with problematization or is an extension of it. When the problem under discussion is studied, the student extracts the data and reorganizes it, then analyzes the connections between them, tries solutions and, through those attempts, he can discover the solution which can be rule, legitimacy, correlation, knowledge, procedure, technique and so on. It can also be supplemented by other methods such as observation, experiment, scheme research, etc. And when it refers to a substitute for reality, it is completed with demonstration, modeling, simulation, etc.

### *İ. Systematic observation*

Among the methods of direct exploration of reality is systematic observation. The term is of Latin origin. The word "serv" with the prefix "ob" formed the new word with the meaning "to have before the eyes", "to have an eye on", "to search". In order to reveal the characteristic aspects of an object, a phenomenon, its structure and functioning, as well as the connections with other bodies, phenomena or processes, this method is applied which provides perceptions of the object in attention and, consequently, the information necessary about it.

The student thus gets data about the appearance of the studied objects and is not satisfied with that. He goes further, towards reflection, and operates with certain data of interpretation, because naturally he asks himself questions with reference to certain aspects and tries to give answers to these questions. In the observation process, the student has the observation plan, provided by the teacher, with a rich content: the purpose of the observation, the tasks related to appearance, structure, relationships between components, interactions of the object with the environment, observation strategies, technical means, such as and the way of recording the results. After becoming familiar with it, the actual observation takes place. Following this operation, the student proceeds to process the collected data, develop ideas and formulate conclusions. The student or engineer does not forget to capitalize on the observations made to give them value and liveliness. Systematic observation is also associated with other methods such as investigation, experiment, project, case study, within teaching-learning methods, or is used independently, when it comes to spontaneous observation or in research activity, hence borrowed. Among the advantages, we list: – increases the volume of information; - develops the spirit of observation; - forms the scientific spirit; – increases the sensitivity for an aspect or a field; – produces intellectual feelings; - develops the ability to capitalize on immediate observations.

## **The Technical Engineering Students View of Modern Teaching Methods**

To see the students' vision on traditional vs. modern teaching methods, we applied a short questionnaire with only 3 questions, to a sample of 64 technical engineering students, 23 from the 3rd year of study and 41 from the 2nd. Of these, 39 were male gender and 25 females. The questionnaire included the following items:

1. Which approach do you find more attractive?
  - a) Traditional
  - b) Modern

2. I like the method the most: a) Problem solving; b) Thinking hats method; c) Brainstorming; d) JIGSAW; e) Conversation; f) Description; g) Explanation; h) Learning through discovery; i) Systematic observation
3. I like modern methods because:
  - a) I retain information faster
  - b) I know my colleagues better
  - c) I learn to collaborate
  - d) I communicate more easily
  - e) Teaching is more entertaining
  - f) We interact more
  - g) Teamwork is developed

### Frequencies Analysis

The analysis was done in IBM SPSS Statistic. Figures 5, 6 and 7 and tables 3, 4, 5 show the percentages for the answers to each item. It is observed that most students prefer modern methods, the most loved being *Thinking Hats*, and 2 of the methods (*Description* and *Explanation*) do not appear at all in the answers. Regarding the advantages of the new methods, with the highest percentage are *I learn to collaborate*, and *We interact more*.

Table 3. Responses for Item1

Method	Frequency	Percent
Traditional	12	18,8
Modern	52	81,3
Total	64	100,0

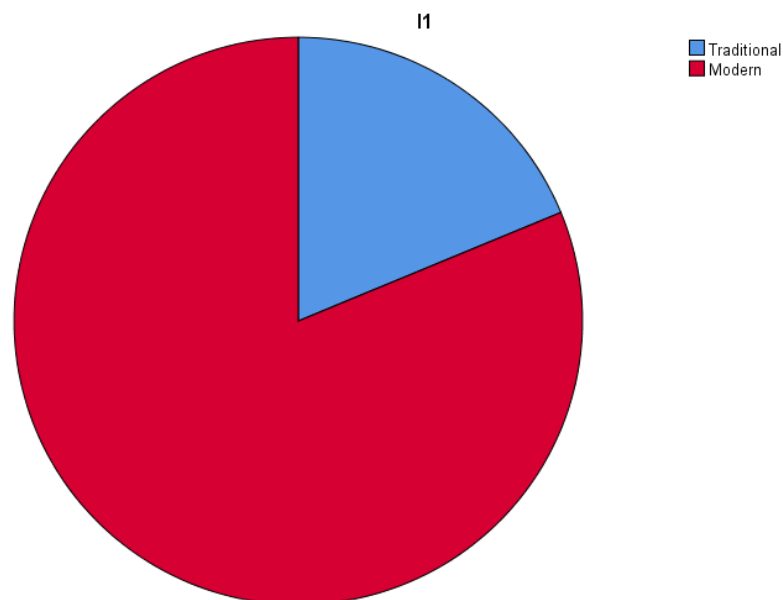


Figure 5. Traditional vs Modern Teaching

Table 4. Responses for Item2

Method	Frequency	Percent
Problem solving	7	10,9
Thinking hats	31	48,4
Brainstorming	9	14,1
JIGSAW	8	12,5
Conversation	1	1,6
Learning through iscovery	3	4,7
Systematic observation	5	7,8
Total	64	100,0

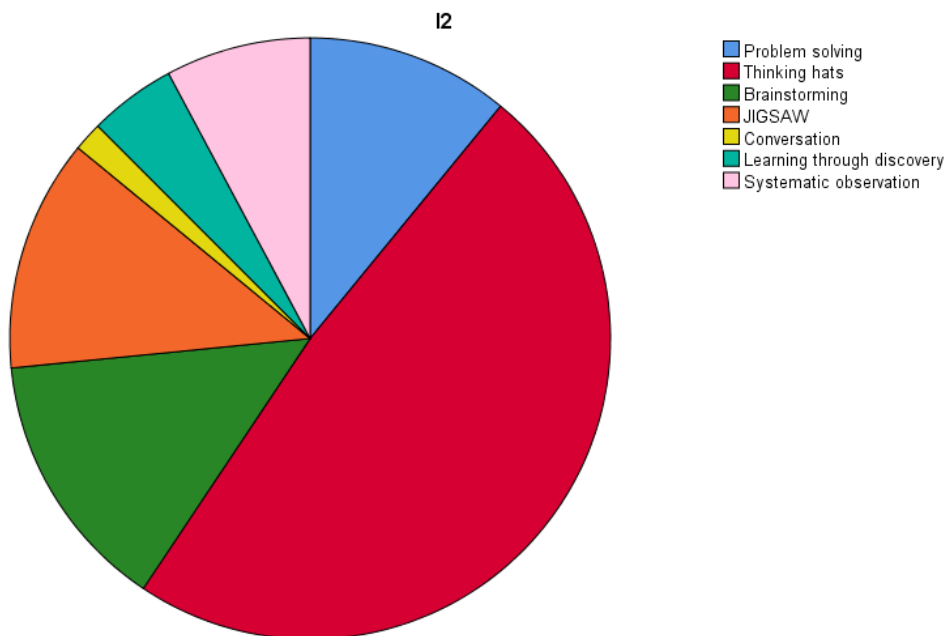


Figure 6. The Preferred Methods

Table 5. Responses for Item 3

Advantage	Frequency	Percent
I retain information faster	7	10,9
I know my colleagues better	8	12,5
I learn to collaborate	13	20,3
I communicate more easily	10	15,6
Teaching is more entertaining	8	12,5
We interact more	13	20,3
Team work is developed	5	7,8
Total	64	100,0

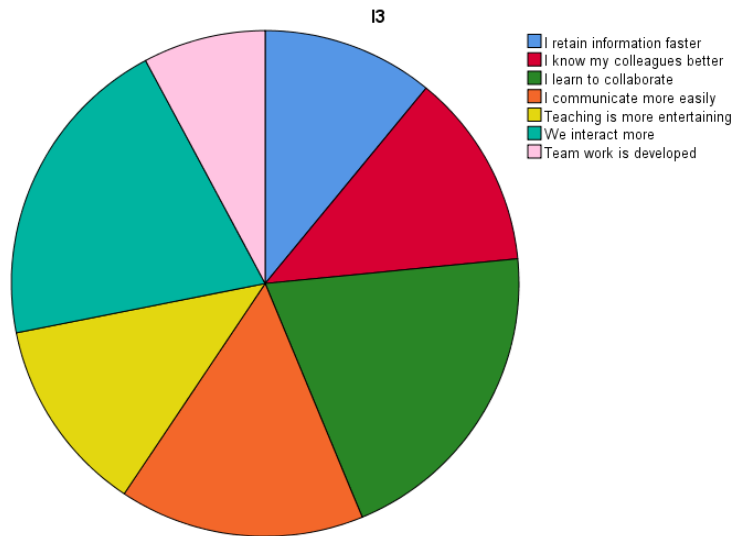


Figure 7. The Advantage of the Modern Methods

Crosstabs Analysis

To see the gender influence on the considered variables we used Crosstabs. The results are showed in the bellow figures and tables. It can be observed that are are the same values for JIGSAW method and there is no difference between male and female opinion about the advantage of the modern methods “I know my colleagues better”. The best score was obtained for modern teaching approach for both genders and the preferred method was Thinking Hats. The male students choose “Interact more”, for item 3, and the females “I learn to collaborate”. For those 3 items we used ANOVA and the results showed that there is a significant difference for the teaching approach. The results are presented in Table 9. Mean is noted with M and standard deviation with SD.  $p < 0.05$  in Item 1 case so, there is a significant difference between male and female opinion about traditional vs modern teaching methods.

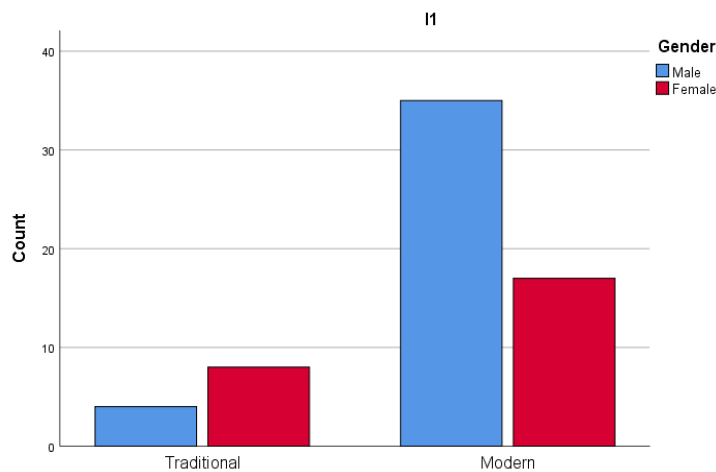


Figure 8. Gender Influence on Teaching Approach

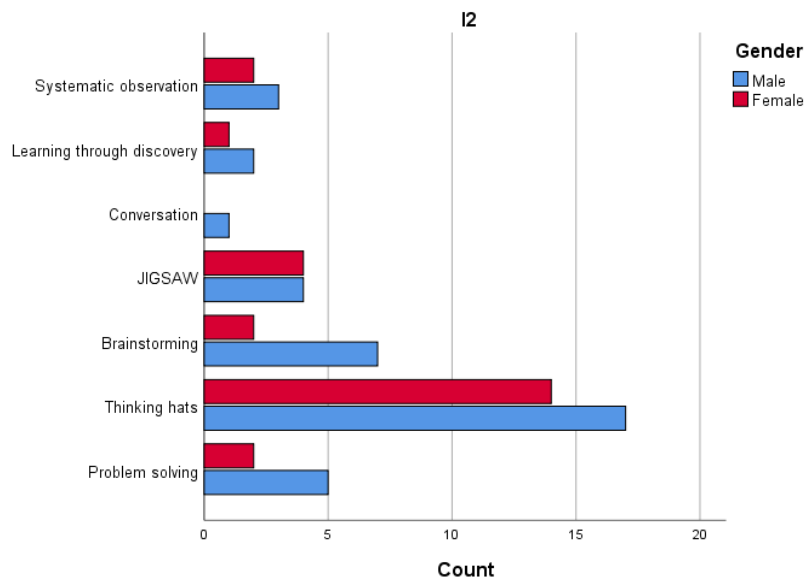


Figure 9. Gender Influence on Preferred Method

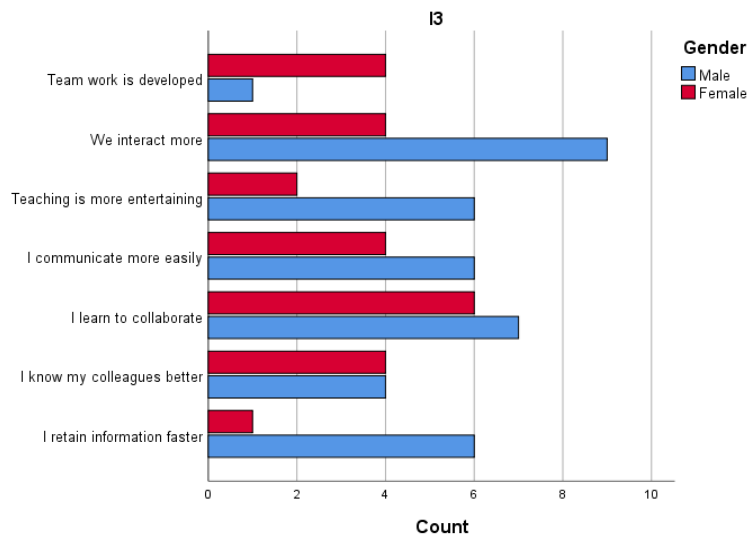


Figure 10. Gender Influence on Advantages on Modern Methods

Table 6. I1\*Gender Crosstabulation

		Gender			
		Male	Female	Total	
I1	Traditional	Count	4	8	12
		% within Gender	10,3%	32,0%	18,8%
	Modern	Count	35	17	52
		% within Gender	89,7%	68,0%	81,3%
Total		Count	39	25	64
		% within Gender	100,0%	100,0%	100,0%

Table 7. I2\*Gender Crosstabulation

			Gender		
			Male	Female	Total
I2	Problem solving	Count	5	2	7
		% within Gender	12,8%	8,0%	10,9%
	Thinking hats	Count	17	14	31
		% within Gender	43,6%	56,0%	48,4%
	Brainstorming	Count	7	2	9
		% within Gender	17,9%	8,0%	14,1%
	JIGSAW	Count	4	4	8
		% within Gender	10,3%	16,0%	12,5%
	Conversation	Count	1	0	1
		% within Gender	2,6%	0,0%	1,6%
	Learning through discovery	Count	2	1	3
		% within Gender	5,1%	4,0%	4,7%
	Systematic observation	Count	3	2	5
		% within Gender	7,7%	8,0%	7,8%
Total		Count	39	25	64
		% within Gender	100,0%	100,0%	100,0%

Table 8. I3\*Gender Crosstabulation

			Gender		
			Male	Female	Total
I3	I retain information faster	Count	6	1	7
		% within Gender	15,4%	4,0%	10,9%
	I know my colleagues better	Count	4	4	8
		% within Gender	10,3%	16,0%	12,5%
	I learn to collaborate	Count	7	6	13
		% within Gender	17,9%	24,0%	20,3%
	I communicate more easily	Count	6	4	10
		% within Gender	15,4%	16,0%	15,6%
	Teaching is more entertaining	Count	6	2	8
		% within Gender	15,4%	8,0%	12,5%
	We interact more	Count	9	4	13
		% within Gender	23,1%	16,0%	20,3%
	Team work is developed	Count	1	4	5
		% within Gender	2,6%	16,0%	7,8%
Total		Count	39	25	64
		% within Gender	100,0%	100,0%	100,0%



Table 9. ANOVA summary for gender and those 3 items from questionnaire

	Item	M	SD	F	p
1	Male	1.90	.307	4.945	.030
	Female	1.68	.476		
2	Male	3.1795	2.304	.010	.919
	Female	3.1200	2.2605		
3	Male	3.8462	1.8287	.560	.457
	Female	4.200	1.8708		

## Conclusion

For an engineering student is important also to receive the technical information necessary at its future job, but to develop some important skills to manage every situation in its life. Thus, you cannot have performances knowing only certain knowledge in the field in which you are active, if you do not have a broader vision of life, if you cannot make correlations between the information learned in different disciplines, if you are not creative, if you do not have a critical thinking or if you cannot work and collaborate within the team. There are a various teaching method who can develop these skills, these are not developed only in school period, it is a life learning process. The presents paper describes some modern methods adapted and used in higher education. Also, it is made a comparative analysis of them, and a vision of the technical students is also presented. We applied a short questionnaire on a group of 64 students, in second and third year of study, male and female. The results showed that the modern teaching approach is preferred, because they can collaborate and interact more. The most loved method was Six Thinking Hats. A significant gender difference was obtained for item1, traditional vs modern approach. In conclusion, students love modern teaching methods, and it is mandatory for professors to integrate modern and interactive methods into their teaching style in order to offer to their students a unique experience and a thorough preparation for adult life.

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## Prospective Social Studies Teachers' Perceptions of 21st Century Skills Efficacy

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**Abstract:** The aim of this study was to examine prospective social studies teachers' efficacy perceptions of 21st century skills based on gender, grade, academic success and mastery of information-communication technologies. Descriptive survey model was adopted in the study. The sample of the study consisted of a total of 257 prospective social studies teachers, 175 females and 82 males, from two different state universities in Türkiye. The participation was on a voluntary basis. The findings revealed that the participants had a high level of 21st century skills perceptions. It was also found that the participants' efficacy perceptions of 21st century skills differed significantly by gender in favor of female participants in the total scale and life and career skills sub-dimension. However, there was no significant difference in the sub-dimensions of learning and regeneration skills and information, media and technology skills in terms of gender. In addition, it was found that the participants' efficacy perceptions of 21st century skills and sub-dimensions differed significantly in favor of those thinking that they had mastery of information and communication technologies in the total scale and in the sub-dimensions of life and career skills and information, media and technology skills. However, no significant difference was found in learning and regeneration skills sub-dimension in terms of mastery of information and communication technologies. Finally, it was found that the participants' 21st century skills perceptions did not differ by grade and academic success.

**Keywords:** 21st century skills, social studies, prospective teachers, efficacy

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### Introduction

Education plays a significant role in raising individuals with the skills appropriate to the requirements of the age in order to increase the welfare of societies. A number of issues such as globalization, technology, migration, international competition and political changes have paved the way for social order and individual needs to

change and as a result, a number of innovations have taken place in the field of education (Aydemir, Karalı, & Coşanay, 2020; Saavedra & Opfer, 2012; Tican & Deniz, 2019). In order to keep up with these changes and be more productive, students are required to develop skills called 21st century skills (Anagün, Atalay, Kılıç, & Yaşar, 2016). In addition, individuals need to have the basic and high-level skills essential to respond changes in social life in a negative or positive way, to be able to have a mastery of technology, to select, analyze and evaluate the appropriate information among the masses of information, and to transform the information they have obtained into practice and product in their daily lives (Anagün et al., 2016). These skills cover basic skills such as critical thinking, effective communication, problem solving, flexibility, cooperation, creativity, communication, innovation, teamwork, decision making, leadership, applying knowledge, global awareness, self-management and learning to learn, which should be gained through education (Partnership for 21st Century Skills, 2009; Russell, 2010, p. 66). 21st century skills refer to skills that are different from the previous century and are necessary for students to cope with the demands of the age (Anagün, 2018). In the literature, 21st century skills have been defined differently by researchers and educators. Also some reports have been published by many organizations in order to establish a standard in 21st century skills. These reports include classifications of central international organizations such as Partnership for 21st Century Skills (2019), Organization for Economic Cooperation and Development (OECD) (Ananiadou & Claro, 2009), European Union (2007), World Economic Forum (2015) and International Society for Technology in Education National Educational Technology Standards (2022). Among these classifications, the most widely accepted one was proposed by the Partnership for 21st Century Skills (2019). The Framework for 21st Century Learning was developed by experts to help students acquire the knowledge and skills they need to be successful in business, life and citizenship (Partnership for 21st Century Skills, 2019).



Figure 1. Framework for 21st century learning (Partnership for 21st Century Skills, 2019. Used with permission)

As shown in Figure 1, the skills that individuals should possess are categorized under three headings: learning and innovation skills, life and career skills, knowledge, media and technology skills. Learning and innovation skills consist of creativity and innovation, critical thinking and problem solving, and communication and collaboration skills needed by students to prepare for a more complex life and work environment. Life and career skills refer to the competences of students to be flexible and adaptable, initiative and self-directed, engage in social and intercultural interactions, be productive and accountable, and have the potential to lead and manage responsibilities. Information, media and technology skills include the ability of students to produce, evaluate and effectively use information, media and technology in the 21st century, where people are guided by technology and media. Therefore, individuals need to possess information literacy, media literacy, information and communication technology literacy skills (Gelen, 2017; Partnership for 21st Century Skills, 2019). Teachers should develop creative ideas, attract students' attention (Karakas, 2015), improve their teaching skills, and follow innovations by integrating technology into their lessons in order to develop 21st century skills in students. In addition, 21st century teachers should be competent in pedagogy and communication as well as using technology (Ainley & Luntley, 2007), use basic and high-level skills, teach how to learn, and link knowledge with students' lives by making use of various disciplines (Saavedra & Opfer, 2012) and should support students' creativity and development. (Valtonen et al., 2021).

Students can only develop these skills required by the new century if their teachers possess them. Especially, social studies teachers, who are expected to provide students with 21st century skills such as critical thinking, decision making, problem solving, communication, entrepreneurship, research, innovative thinking, digital literacy, and media literacy (Ministry of National Education, 2018), should have 21st century competencies. In addition, the key topics defined as 3Rs in the framework for 21st century learning framework in Figure 1 cover contents of social studies courses such as history, geography, state and citizenship are among. Accordingly, a number of studies in the literature have emphasized the importance of social studies lesson and social studies teachers in the transmission of 21st century skills (Çiftçi & Bakar, 2020; Erol, 2021; Kubow, 1997; Ministry of National Education, 2018; Peker, 2019). Social studies teachers are expected to train learners with 21st century skills as a result of the personal, professional and practical training they receive in their education process (Urbani, Roshandel, Michaels, & Truesdell, 2017). Therefore, examining prospective social studies teachers' 21st century skills level is of great importance.

A brief literature review shows that there are numerous studies on 21st century skills. In this sense, there are studies focusing on the importance of 21st century skills in education (Coşkun, 2022; Engin & Korucuk, 2021; Lai & Viering, 2012; Larson & Miller, 2011; Pheeraphan, 2013; Saavedra & Opfer, 2012; Yalçın, 2018) and examine the 21st century skills of teachers in different disciplines with various variables (Uyar & Çiçek, 2021). These studies focused on classroom teachers' perceptions of 21st century skills competence and managing constructivist learning environments (Anagün, 2018), the predictive power of teachers' 21st century teacher skills on their skills in applying reflective thinking (Cemaloğlu, Arslangiy, Üstündağ, & Bilasa, 2019), 21st century skills self-efficacy perceptions and stem attitudes of teachers from different disciplines (Yaşar, 2021), and teachers' perceptions of 21st century skills efficacy (Çelebi & Sevinç, 2019; Dağhan, Nuhoglu Kibar, Menzi

Çetin, Telli & Akkoyunlu, 2017; Gürültü, Aslan, & Alcı, 2019; Tunagür & Aydın, 2021). There are also studies examining the 21st century skills of pre-service teachers using several variables (Akçay, Semercioglu, & Güllü, 2022; Karatepe & Karakuş, 2021; Li, Lemieux, Vandermeiden, & Nathoo, 2013). These studies focused on pre-service teachers' 21st century skills levels (Aktaş, 2022; Sural, 2017; Valtonen, et al., 2021), development of 21st century skills (Chai, Tan, Deng, & Koh, 2017; Lambert & Gong, 2010; Urbani et al., 2017; Williams, Foulger, & Wetzel, 2009), pre-service teachers' views on 21st century learner and teacher skills (Aydemir & Karalı, 2020; Orhan Göksün & Kurt, 2017; Bakir, 2019; Tican & Deniz, 2019) perceptions of competence (Dokumacı Sütçü & Sütçü, 2022; Erten, 2020; Karatepe, 2021; Kozikoğlu & Altunova, 2018; Özdemir Özden, Karakuş Tayşi, Kılıç Şahin, Demir Kaya, & Bayram, 2018) pre-service teachers' motivation and adaptation of 21st century skills (Hoon, Muthukrishnan, Choo, Kam, & Singh, 2022), metaphorical perceptions (Selçuk, 2020), emotional intelligence levels (Canpolat, 2021) and educational beliefs (Gökbulut, 2020).

Particularly in the field of the social studies, the studies examined the importance of social studies education in the 21st century (Aslamiah, Abbas, & Mutiani, 2021; Crisolo, Camposano, & Rogayan Jr., 2021; Gallavan & Kottler, 2012; Garcia, 2021; Kubey, 2004; Kubow, 1997; Mestiola, Naquita, & Tantengco, 2018; Rogayan Jr., Gallardo, Lacaste, & Roque, 2021; Şengüleç, 2021; Widodo, Indraswat, Sutisna, Nursaptini, & Anar, 2020), the curriculum (Erol, 2021; Gari, 2000) and undergraduate programs (Bozkurt, 2021), the teaching methods and practices of social studies teachers in the 21st century (Farisi, 2016; Russel, 2010). In addition, some studies investigated the prospective social studies teacher' levels of 21st century skills use (Ablak, 2020; Peker, 2019), the effect of 21st century skills on their democratic tendencies (Bakar, 2020), their expectations of undergraduate education in the 21st century (Ersoy & Yağcıoğlu, 2019). However, there are limited number of studies investigating the level of 21st century efficacy perceptions of prospective social studies teachers (Çiftçi & Bakar, 2020). Thus, in order to bridge this gap in the literature, this study aimed at examining the proficiency perceptions of prospective social studies teachers towards 21st century skills and whether these perceptions differ by gender, grade, grade point average, and knowledge of information and communication technologies.

## Method

The study is descriptive in nature since the prospective social studies teachers' efficacy perceptions of 21st century skills were examined based on various variables. Descriptive research aims to characterize a past and present situation as it is, in other words, it evaluates the nature of current conditions (McMillan & Schumacher, 2014).

## Sample

The sample consisted of 257 prospective social studies teachers in two state universities in Türkiye. Demographic features of the participants are shown in Table 1.

Table 1. Demographic Features of the Participants

	f	%
<b>Gender</b>		
Female	175	68.1
Male	82	31.9
<b>Grade</b>		
1st Grade	49	19.1
2nd Grade	69	26.8
3rd Grade	65	25.3
4th Grade	74	28.8
<b>Grade Point Average (GPA)</b>		
0-2.70 (low)	36	14
2.71-3.35 (moderate)	144	56
3.36 and above (high)	37	14.4
Not specified	40	15.6
<b>Mastery of Information and Communication Technologies</b>		
Yes	214	83.3
No	41	16
Not specified	2	.7

As seen in Table 1, the majority of the participants were female (68.1%), and were studying in the 4th grade (28.8%), had a moderate grade point average (56%), and had a mastery of information and communication technologies (83.3%).

### Data Collection and Analysis

The data were collected using the "Personal Information Form" and the "21st Century Skills and Competences Scale Directed at Teaching Candidates" through Google Forms. The personal information form, consisted of questions regarding a number of demographic information (gender, grade, grade point average and mastery of information and communication technologies) in order to obtain detailed information about prospective teachers. The 21st Century Skills and Competences Scale Directed at Teaching Candidates used in the study was developed by Anagün et al. (2016) and consists of 42 items and 3 factors (Learning and Innovation Skills, Life and Career Skills and Information, Media and Technology Skills). The Cronbach's alpha was calculated as 0.88 for the total scale, and 0.84, 0.82 and 0.81 for the factors, respectively. The internal consistency coefficients of the scale were found as .87 in the learning and innovation skills, .84 in the life and career skills, .82 in the information, media and technology skills, and .91 for the total scale.

Prior to the data analysis, whether there was missing data in the data set was examined and it was found that there



was no missing data. Then, the z-value of the scale's factor and total scale scores was calculated to examine outliers. Since the z-value of 8 participants was beyond the  $\pm 3$  limits, they were removed (Tabachnick & Fidell, 2013). In order to examine the data distribution, the kurtosis-skewness values were investigated and it was found that the values were within  $\pm 1$  value range. Therefore, the data were considered to have a normal distribution and parametric tests were used.

An independent sample t-test was performed to examine whether the participants' perceptions in the total scale and in the learning and innovation skills, life and career skills, and knowledge, media and technology skills proficiency dimensions differ by gender and mastery of information and communication technologies. One-way analysis of variance (ANOVA) was employed for grade and grade point average variables. All statistical tests were performed using the SPSS. Statistical significance was accepted as  $p < 0.05$ . In the interpretation of the scale scores, the following range was used: "1.00-1.80 very low", "1.81-2.60 low", "2.61-3.40 moderate", "3.41-4.20 high", "4.21- 5.00 "very high".

## Results

This section presents the findings of the study. Table 2 shows the descriptive statistics of the participants' 21st century skills and sub-dimensions.

Table 2. Descriptive Statistics of the Participants' Efficacy Perceptions for 21st Century Skills and Sub-Dimensions

	N	$\bar{x}$	Ss
Learning and Innovation Skills	257	3.89	0.49
Life and Career Skills	257	4.09	0.47
Information, Media and Technology Skills	257	4.23	0.56
Total	257	4.05	0.42

Table 2 revealed that the participants had a high level of perceptions in 21st century skills ( $\bar{x}=4.05$ ) and in learning and innovation skills ( $\bar{x}=3.89$ ) and life and career skills ( $\bar{x}=4.09$ ) sub-dimension and a very high level of perceptions in information, media and technology skills ( $\bar{x}=4.23$ ).

Table 3 shows the t-test results regarding whether the participants' efficacy perceptions of 21st century skills differed by gender. As seen in Table 3, the participants' efficacy perceptions of for 21st century skills ( $t_{255}=1.984$ ,  $p < 0.05$ ) and life and career skills dimension ( $t_{255}=3.241$ ,  $p < 0.05$ ) differed by gender in favor of female participants. However, there was no significant difference in the efficacy perceptions of learning and innovation skills ( $t_{255}=.687$ ,  $p > 0.05$ ) and information, media and technology skills ( $t_{255}=.272$ ,  $p > 0.05$ ) with regard to gender.

Table 3. T-test Results on the Participants' Perceptions of 21st Century Skills and Sub-Dimensions by Gender

	Gender	N	$\bar{x}$	Sd	t	p
Learning and Innovation Skills	Female	175	3.91	0.48	.687	.49
	Male	82	3.86	0.52		
Life and Career Skills	Female	175	4.15	0.43	3.241	.00*
	Male	82	3.95	0.53		
Information, Media and Technology Skills	Female	175	4.22	0.57	.272	.78
	Male	82	4.25	0.55		
Total	Female	175	4.09	0.40	1.984	.04*
	Male	82	3.97	0.45		

\* $p < 0.05$

Table 4 shows the t-test results regarding whether the participants' efficacy perceptions of 21st century skills differed by mastery of information and communication technologies.

Table 4. T-test Results on the Participants' Perceptions of 21st Century Skills and Sub-Dimensions by Mastery of Information and Communication Technologies

	Mastery of information and communication technologies	N	$\bar{x}$	Sd	t	p
Learning and Innovation Skills	Yes	214	3.90	0.48	.617	.53
	No	41	3.85	0.58		
Life and Career Skills	Yes	112	4.12	0.47	2.106	.03*
	No	51	3.95	0.47		
Information, Media and Technology Skills	Yes	112	4.27	0.56	2.124	.03*
	No	51	4.06	0.58		
Total	Yes	112	4.07	0.42	2.007	.04*
	No	51	3.93	0.38		

\* $p < 0.05$

As seen in Table 4, the participants who considered that they had a mastery of information and communication technologies had significantly higher scores in the total scale ( $t_{253}=2.007$ ,  $p < 0.05$ ) and life and career skills ( $t_{253}=2.106$ ,  $p < 0.05$ ) and information, media and technology dimensions ( $t_{253}=2.124$ ,  $p < 0.05$ ). It was also found that the participants did not differ by mastery of information and communication technologies in learning and innovation dimension ( $t_{253}=2.124$ ,  $p < 0.05$ ).

The results of the one-way analysis of variance (ANOVA) performed to examine whether the participants' efficacy perceptions of 21st century skills differed by grade are given in Table 5.

Table 5. ANOVA Results on the Participants' Perceptions of 21st Century Skills and Sub-Dimensions by Grade

	Grade	N	$\bar{x}$	Ss	Sd	F	p
Learning and Innovation Skills	1. Grade	49	4.00	.36	3/253	1.395	.24
	2. Grade	69	3.93	.60			
	3. Grade	65	3.83	.50			
	4. Grade	74	3.86	.44			
Life and Career Skills	1. Grade	49	4.13	.41	3/253	.406	.74
	2. Grade	69	4.09	.49			
	3. Grade	65	4.11	.47			
	4. Grade	74	4.04	.50			
Information, Media and Technology Skills	1. Grade	49	4.19	.57	3/253	.707	.54
	2. Grade	69	4.26	.56			
	3. Grade	65	4.30	.52			
	4. Grade	74	4.17	.59			
Total	1. Grade	49	4.10	.33	3/253	.429	.73
	2. Grade	69	4.06	.48			
	3. Grade	65	4.05	.41			
	4. Grade	74	4.01	.41			

Table 5 revealed that the participants' efficacy perceptions of 21st century skills did not differ by grade level in the total scale ( $F_{253}=.429$ ,  $p>0.05$ ), learning and innovation skills dimension ( $F_{253}=1.395$ ,  $p>0.05$ ), life and career skills ( $F_{253}=.406$ ,  $p>0.05$ ) and information, media and technology skills ( $F_{253}=.707$ ,  $p>0.05$ ). Therefore, it can be concluded that the grade did not have a significant effect on the participants' 21st century skills perceptions.

Table 6 presents the results of the one-way analysis of variance (ANOVA) regarding whether the participants' efficacy perceptions of 21st century skills differed by grade point average.

Table 6. ANOVA Results on the Participants' Perceptions of 21st Century Skills and Sub-Dimensions by Grade Point Average

	Grade Point Average	N	$\bar{x}$	Ss	Sd	F	p
Learning and Innovation Skills	Low	36	3.86	.49	2/214	.859	.42
	Moderate	144	3.88	.50			
	High	37	3.99	.55			
Life and Career	Low	36	3.96	.54	2/214	2.364	.09

Skills	Moderate	144	4.12	.44			
	High	37	4.18	.45			
Information, Media and Technology Skills	Low	36	4.37	.52	2/214	2.014	.13
	Moderate	144	4.21	.54			
Total	High	37	4.35	.53			
	Low	36	4.00	.44	2/214	1.384	.25
Total	Moderate	144	4.05	.39			
	High	37	4.15	.45			

As shown in Table 6, there was no significant difference between the participants' efficacy perceptions and the total scale ( $F_{214}=1.384$ ,  $p>0.05$ ), learning and innovation skills dimension ( $F_{214}=.859$ ,  $p>0.05$ ), life and career skills dimension ( $F_{214} =2.364$ ,  $p>0.05$ ) and information, media and technology skills dimension ( $F_{214}=2.014$ ,  $p>0.05$ ) with regard to grade point average. As a result, it can be put forward that the grade point average did not have a significant effect on the proficiency perceptions of the participants.

## Conclusion, Discussion, and Recommendations

This study aimed to investigate the efficacy perceptions of prospective social studies teachers' towards 21st century skills and to examine whether these perceptions differ by gender, grade, grade point average and mastery of information and communication technologies. It was found that the participants a high level of perception in the total scale and learning and innovation skills, and life and career skills dimensions, and a very high level of perception in the information, media and technology skills. The reason for this finding may be due to the fact that the social studies education undergraduate curriculum and course contents were developed in line with the needs of the age and were successful in developing 21st century skills (Bozkurt, 2021; Sütçü & Sütçü, 2022). Similar to the results of the present study, many studies in the literature reported that teachers (Eğmir & Çengelci, 2020), elementary school students (Rogayan Jr. et al., 2021), vocational school students (Engin & Korucuk, 2021) and pre-service teachers (Ablak, 2020; Akcay, Semercioğlu, & Güllü, 2022; Aktaş, 2022; Canpolat, 2021; Donmuş Kaya & Akpunar, 2018; Erten, 2020; Gökbulut, 2020; Karatepe, 2021; Kozikoğlu & Altunova, 2018; Özdemir Özden et al., 2018; Peker, 2019; Sütçü & Sütçü, 2022; Tican & Deniz, 2019) had moderate and high level of 21st century skills efficacy perceptions. Pre-service teachers with high efficacy perceptions towards 21st century skills may contribute to the training of learners having 21st century skills in their future career.

In the study, a significant difference was found in favor of female participants in the total scale and life and career skills dimensions. However, the participants' perceptions of learning and innovation skills and information, media and technology skills did not differ by gender. There are numerous studies in the literature indicating that there was no significant difference between efficacy perceptions and all dimensions of 21st century with regard to gender (Ablak, 2020; Akcay et al., 2022; Aydemir et al., 2020; Canpolat, 2021; Donmuş Kaya & Akpunar, 2018; Erten, 2020; Gökbulut, 2020; Gömleksiz, Sinan, & Doğan, 2019). On the contrary, some

studies revealed that male pre-service teachers had significantly higher levels of "entrepreneurship and innovation" (Aktaş, 2022), "learning and innovation" (Çolak, 2019) and "autonomous" skills (Peker, 2019) perceptions than female pre-service teachers. In addition, there are studies reporting that pre-service teachers' 21st century skills efficacy perceptions (Başar, 2018) and life and career skills differed significantly in favor of females (Kan & Murat, 2018; Karatepe, 2021; Özdemir Özden et al., 2018). In line with the findings of the present study, Çiftçi and Bakar (2020) found that pre-service social studies teachers' perceptions of 21st century skills and life and career skills differed significantly in favor of female pre-service teachers. Based on these findings, it can be concluded that female pre-service social studies teachers adapt better to complex daily life and work environments, and make career plans for their future.

It was also revealed in the present study that the participants' efficacy perceptions differed significantly in favor of those having mastery of information-communication technologies in the total scale and life and career skills and information, media and technology skills dimension. However, no significant difference was found with regard to mastery of information and communication technologies in the learning and innovation skills dimension. Similar to the results of this study, examining pre-service teachers' efficacy perceptions, Erten (2020) found a significant difference in "information, media and technology" dimension with regard to mastery of information-communication technologies. Accordingly, it can be said that pre-service teachers consider themselves sufficient in information and communication technologies. Similarly, in a study on 21st century skills and digital competencies in the context of lifelong learning, teachers regarded themselves competent (Keskin & Yazar, 2015). In addition, Aktaş (2022) and Sang, Liang, Chai, Dong, and Tsai (2018) also reported findings that support the findings of the present study. In contrast, some studies found that pre-service teachers did not consider themselves competent in the use of ICT (Ottenbreit-Leftwich, Glazewski, Newby, & Ertmer, 2010; Tondeur et al., 2012). However, most of the studies in the literature reported similar results with the present study (Akgün, 2020; Aktaş, 2022; Erten, 2020; Karatepe & Karakuş, 2021; Keskin & Yazar, 2015; Sang et al., 2018; Şad & Nağacı, 2015; Williams et al., 2009). Therefore, it can be said that mastering information and communication technologies play a significant role in the pre-service teachers' 21st century skills, life and career skills, and knowledge, media and technology skills perceptions.

It was also found in the present study that the efficacy perceptions of the participants regarding 21st century skills did differ by grade in the total scale and its dimensions. Thus, it can be said that grade level does not have a significant effect on pre-service teachers' 21st century skills perceptions. Although pre-service teachers take several courses on 21st century skills during their undergraduate education, it was an unexpected result. In the literature, there are many studies revealing that pre-service teachers' efficacy perceptions for 21st century skills did not differ by grade level (Akçay et al., 2022; Başar, 2018; Çiftçi & Bakar, 2020; Karatepe, 2021; Sural, 2017). Similar to the present study, Valtonen et al. (2021) found in their longitudinal study on 21st century skills and tendencies of pre-service teachers that the participants' 21st century skills levels remained at the same level during the 3-year undergraduate education. On the other hand, Ablak (2020) concluded that pre-service social studies teacher' grade level was effective in their 21st century skills perceptions. Similarly, Bakır (2019) found that pre-service teachers' level of 21st century learner skills use increased with the increase in the grade level.

Özdemir Özden et al. (2018) found that the efficacy perceptions of the 3rd grade pre-service teachers towards life and career skills were significantly higher than 2nd grade pre-service teachers.

Finally, it was found that the efficacy perceptions of the participants regarding 21st century skills did not differ significantly by grade point average in the total scale and its dimensions. In other words, grade point average did not have a significant effect on the participants' 21st century skills efficacy perceptions. Although there are studies supporting the findings of the present study (Başar, 2018; Erdoğan & Eker, 2020; Güler, 2019), most of the studies in the literature reported a positive relationship between academic achievement and 21st century skills (Aktaş, 2022; Anwar, Khizar, & Naseer, 2012; Canpolat, 2021; Doğanay & Demir, 2011; Engin & Korucuk, 2021; Erbek, 2021; Eryılmaz & Uluyol, 2015; Orhan Göksün & Kurt, 2017; Özdemir Özden et. al., 2018; Pagani, Argentin, Gui & Stanca, 2016; Soh, Arsad & Osman, 2010; Sütçü & Sütçü, 2022; Şahin et. al, 2016; Tican & Deniz, 2019). Engin and Korucuk (2021) found that students with high grade point average had higher information and technology literacy, critical thinking and problem solving, social responsibility and leadership skills than students with low grade point average. The difference between these studies may be due to the sample and data collection tools.

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## Investigation of University Students' Awareness of Digital Game Addiction


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**Abstract:** Today's digital games attract the attention of many people from various age groups. Some sources suggest that acquaintance with digital games is as low as three years old. When digital games are evaluated from a general perspective, it is seen that the largest user group is individuals in adolescence and youth period. Individuals at this age spend most of their time playing digital games. However, playing digital games for uncontrolled and excessive periods causes some physical and mental negative effects on both children and adults over a long period of time. In the long run, such excessive use turns into an important problem, such as digital game addiction. Digital game addiction, which is considered a behavioral addiction, is defined as a situation in which digital games cause various changes and deteriorations in daily life as a result of the inability to control the desire of individuals to play digital games. In this context, it is crucial to identify and increase the awareness of young people who spend more time with digital games and are at risk of digital game addiction. In this research, the awareness of university students about digital game addictions was examined. The research sample consists of university students studying at various education levels. Descriptive statistics, independent samples t-tests, and chi-square tests were used in the analysis of the study, which was designed with the survey model, one of the quantitative research methods. As a result of the research, it was found out that digital games are generally used for entertainment and spending time purposes, women have a higher level of awareness than men, and there is a significant relationship between gender and the device where digital games are played. The obtained findings were compared with the studies in the literature. In line with the results, some suggestions were presented.

**Keywords:** Digital game addiction, Awareness, University students

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## Introduction

Gaming activities that in the past were usually carried out face-to-face and interactively in open spaces or playgrounds have turned into virtual activities done through game consoles, computers, or mobile devices with the development of technology in recent years (Dursun & Eraslan-Çapan, 2018; Horzum et al., 2008). In parallel with the development of technology, the platforms on which digital games are played have been differentiated in terms of the number and features of the game participants and categorized according to these differences. Digital games are named video games, mobile games, console games, computer games, and online games according to the environment and vehicle they are played, while they are named as single-player games played alone, multiplayer games played against artificial intelligence or with other real players according to the number of players. (Bozkurt, 2014). Digital games have a vital place in people's lives with various features such as sound, reality, visuality, the interaction between players, and the advantage of accessibility brought by mobile technology.

There are controversial views on digital games' positive and negative effects in the literature (Ferguson, 2007; Hebebe, 2022). Granic et al. (2014) stated that digital games could have cognitive, emotional, social, and motivational benefits. They also have many positive effects, such as improving problem-solving skills (Kim & Smith, 2015), increasing course success (Prot et al., 2014), improving motor skills (Lin & Hou, 2015), supporting decision-making skills (Kim & Smith, 2017), and getting away from problems (Kneer et al., 2014). Besides, some other studies reported that digital games contribute to emotional relaxation when played in moderation (Prot et al., 2014; Green & Bavelier 2003). However, in addition to these positive effects, playing digital games uncontrolled and for a long time causes physical problems such as the low back, neck, back pain, burning and irritation in the eyes, and fatigue (Ögel, 2012; Ministry of Health, 2018). Young people especially show great interest in games, which are users of almost all ages, and the time they spend on the game is gradually increasing (Gentile 2009, Rideout et al., 2010).

The competition in the field of digital games (Yalçın & Bertiz, 2019) obscures the boundaries of reality and virtuality of digital games and causes individuals to immerse themselves in this artificial world (Timisi, 2003). The immersion and diversity provided by digital games enabled individuals to spend more time on these platforms, bringing the concept of digital game addiction to the agenda (Gentile & Anderson, 2006; Lieberman et al., 2009; Griffiths & Meredith, 2009). Digital game addiction has been defined by Grüsser and Thalemann (2006) as the uncontrolled use of digital tools and behavioral addiction. Although digital gaming addiction is not considered a disease by current diagnostic systems, when the Diagnostic and Statistical E-Book of Mental Disorders-5 (DSM 5) is examined, it is seen that digital gaming addiction is considered an internet gaming disorder (APA, 2013). More studies are needed for it to be considered a disease.

When the process of playing digital games reaches the level of addiction, it can cause various important problems such as attention disorder (Hyun et al., 2015), decrease in academic achievement (Gentile, 2009), loneliness,

dissatisfaction with life, fear, depression (Mentzoni et al., 2011; Anderson et al., 2007), the tendency to violence (Fisher et al., 2010), decrease in social behaviors (Greitemeyer & Mügge, 2014), sleep problems (Bruni et al., 2015). Moreover, considering that individuals from all age groups can be addicted to digital games (Gentile, 2009), digital game addiction is a critical issue that should be highlighted and researched. Hence, individuals need to be conscious and aware of digital game addiction.

The literature review suggests that there are studies focusing on digital game addiction and awareness from different aspects. However, in the literature, there are scale development studies to determine awareness of digital game addiction (Tekkurşun Demir & Cicioğlu, 2020; Lemmens et al., 2009). In the study of Can and Demir (2020), the relationship between digital game addiction and awareness levels of digital game addiction among athletes and e-athletes was examined. Sezgin et al. (2021) also study the level of awareness of digital game addiction in youth and adults in terms of different variables such as age, gender, and frequency of playing digital games. Similarly, in the international literature, various studies have been conducted, such as trying to determine the underlying causes of digital game addiction in adolescents related to digital game addiction Haghbin et al., (2013) (Wan & Chiou, 2006), examining the relationship between high school students' digital game addictions and their academic performance and self-control levels, studying the relationship between impulsivity and digital game addiction (Irles & Gomis, 2015), determining the effect of virtual reality therapy on digital game addiction (Park et al., 2016).

Although it is not possible to remove digital games from human life in the age of developing technology, a controlled awareness can be created. Çebi and Colonel (2022) stated that awareness should be developed in order to keep young people and children away from the effects of digital game addiction. It is known that high awareness can reinforce and strengthen the relationship between behavior and attitude (Hutton & Baumeister, 1992). Young (2009) argues that it is vital to recognize the symptoms of addiction in terms of stopping the progression of the addiction process. Considering the addictive effect of digital games, awareness studies on digital games are needed to protect individuals from this effect and to enable them to play controlled digital games (Irmak & Erdoğan, 2016). Nevertheless, the studies in the literature on digital game addiction are limited. In this context, this research is considered to be important. In addition, this study is crucial as it is expected to guide new studies in this field. The main purpose of this research is to examine the awareness of university students about digital game addictions. In this direction, the study seeks answers to the following research questions:

1. What are the students' goals for playing digital games?
2. Is there a significant relationship between awareness of digital game addiction and gender?
3. Is there a significant relationship between gender and digital game device?

## Method

This study, which aims to determine the awareness of university students about digital game addictions, is a

descriptive study in the survey model.

### **Study Group**

The study group of the research consists of university students studying in different departments and education levels. Demographics about the students are explained in detail in the findings section (see Table 1).

### **Data Collection Tools**

Data were collected through a data collection consisting of two parts. In the first part, there are questions about demographics and the variables used in the research in the personal information form developed by the researchers. In the second part, there is the Awareness of Digital Game Addiction Scale (ADGAS). This scale is a valid and reliable 5-point Likert-type measurement tool that measures the level of awareness of digital game addiction (Demir & Cicoğlu, 2020). The total point for Cronbach's Alpha value of the scale, which consists of two factors, external awareness (EA) and internal awareness (IA), is 0.88.

### **Data Analysis**

The data collected online was first examined in a general way. Invalid data were excluded from the study. Scoring the items in the scale are as follows: 1 "Strongly Disagree," 2 "Disagree," 3 "Undecided," 4 "Agree," and 5 "Strongly Agree." Analyzes were made considering an item that required reverse coding. Then, it was checked whether the data showed a normal distribution or not. In this context, the skewness and kurtosis coefficients were investigated, and parametric and nonparametric tests were used (George & Mallery, 2019). Independent sample t-test and Chi-Square test were used to analyze the data. Additionally, descriptive analysis methods such as frequency, percentage, and standard deviation were used in the data analysis. The results of the analyzes are discussed in the findings section.

## **Findings**

### **Findings Regarding Participants**

Gender, department, duration of gaming, type of the game, and status of playing games on computers and mobile devices regarding the participants are shown in Table 1. Table 1 indicates that approximately 60% of the students participating in the research are female, and 40% are male. Most of the students are computer engineering students. The numbers of students in other departments are close to one another. While approximately 34% of the students participating in the study do not play games, 14.2% play games on computers, 23.1% on mobile devices, and 28.7% on both computers and mobile devices. When examined in terms of the type of the game, approximately 26% of the students prefer war and strategy games. The least preferred game category is educational games.

Table 1. Demographics of the Participants

		f	%
Gender	Female	159	59.3
	Male	109	40.7
Department	Computer Engineering	121	45.1
	Elementary Mathematics Teaching	40	14.9
	Classroom Teaching	35	13
	Turkish Teaching	38	14.1
	Psychological Counseling and Guidance	34	12.6
Type of the game	Adventure	67	21.9
	Sports and racing	57	17.8
	War and strategy	111	34.6
	Educational	33	10.3
	Simulation	52	16.2
Device	Not playing	91	34
	Computer	38	14.2
	Mobile	62	23.1
	Both computer and mobile	77	28.7

### Findings Regarding Purposes of Playing Digital Games

The word cloud created for the purposes of participants to play digital games is shown in Figure 1. Students' digital game playing purposes were evaluated under the components of entertainment, spending time, avoiding problems, socialising, and earning money.



Figure 1. Word Cloud for Digital Game Usage Purposes



When Figure 1 is examined, entertainment (f=132) and spending time are among the most frequently mentioned digital game usage purposes by students. Other purposes include avoiding problems (f=46), socialising (f=16), and earning money (f=9).

### Examining Awareness of Digital Game Addiction by Gender

Awareness scores of students for digital game addiction were examined in terms of gender. The independent samples t-test results are shown in Table 2.

Table 2. t-test Results of ADGAS Scores by Gender

Factors	Gender	N	$\bar{X}$	S	df	t	p
Internal Awareness	Female	159	17.4	4.61	266	6.13	0.00
	Male	109	13.6	5.50			
External Awareness	Female	159	25.9	6.75	266	4.55	0.00
	Male	109	21.8	7.82			
Total of ADGAS	Female	159	43.4	10.91	266	5.47	0.00
	Male	109	35.5	12.49			

Students' awareness of digital game addiction differs by gender in terms of IA ( $t_{(266)}=6.13$ ,  $p<.01$ ), EA ( $t_{(266)}=4.55$ ,  $p<.01$ ), and total ADGAS ( $t_{(266)}=5.47$ ,  $p<.01$ ). Mean awareness scores related to digital game addiction were significantly higher in favor of female students in terms of across the scale ( $\bar{X}_{\text{female}}=43.4$ ;  $\bar{X}_{\text{male}}=35.5$ ), IA ( $\bar{X}_{\text{female}}=17.4$ ;  $\bar{X}_{\text{male}}=13.6$ ), and EA ( $\bar{X}_{\text{female}}=25.9$ ;  $\bar{X}_{\text{male}}=21.8$ ) factors. This can be interpreted as female students' awareness of digital game addiction being higher than that of male students.

### Examining the Relationship Between Gender and Digital Game Devices

The Chi-square test was used to determine the relationship between gender and the digital game tool (Computer, laptop, mobile device etc.) (see Table 3).

Table 3. Chi-Square Test Results Showing the Relationship Between Gender and Device

Gender	Not playing games		Computer		Mobile Device		Both		Total	
	n	%	n	%	n	%	n	%	n	%
Female	71	44.7	4	2.5	46	28.9	38	23.9	159	100
Male	20	18.3	34	31.2	16	14.7	39	35.8	109	100
Total	91	34	38	14.2	62	23.1	77	28.7	268	100
$\chi^2=59.54$		df=3	p=0.00							

Based on the figures in Table 3, about half of the female students participating in the research do not play games

(44.7%), while most male students (81.7%) play games. Besides, 32.2% of male students only play games on the computer, while 35.8% play games on both mobile platforms and computers. Males usually play games on computers, and women generally play on mobile devices. The results of the Chi-Square test conducted to determine whether there is a relationship between the gender of the students and the devices they play digital games with report that there is a significant relationship between gender and the device on which they play digital games ( $\chi^2=59.54$ ;  $p<0.01$ ). In other words, gender has caused differentiation in the devices on which students play digital games.

## Discussion and Conclusion

In this study, which investigated the awareness levels of university students for digital game addiction, it was concluded that students' awareness of digital game addiction was significant by gender. According to the results, significant results were found in favor of women. The high level of awareness of female students about digital game addiction may be due to the fact that women can play digital games in a controlled manner without making them addicted (Sezgin et al., 2021). There are studies showing similar results in the literature (Hazar, 2016; Pala & Erdem, 2016; Gökçearslan & Durakoğlu, 2014). Besides, this result can be evaluated as a result of women playing digital games less than men (Christakis et al., 2004; Hastings et al., 2009; Sherry et al., 2003). As a matter of fact, it is thought that they do not play digital games because they are aware of the negative effects of digital games.

Another finding obtained as a result of the study is the determination of students' digital game playing purposes. When the results were examined, it was concluded that most of the students played games for fun and spending time. Considering that digital games are a fun learning environment (Casby, 2003), it can be thought that playing games for entertainment and spending time is a natural outcome. As a result of the studies of Toran et al. (2016) and Yumrukuz (2021), it was concluded that digital games are played for fun and spending time. In the literature, games are also played for purposes such as leisure activities (Tarlakazan & Yavuz, 2018), and entertainment (Uluyol et al., 2014).

When the relationship between the gender of the students and the device they play games with is examined, it is concluded that women play more games on mobile devices and men play more games on computers. Additionally, female students play fewer games than males. However, when it comes to mobile games, it is noteworthy that women play more games than men. Similar results were found in studies conducted in the USA and Japan. In the USA, the proportion of women playing mobile games in 2021 is 55%, and 45% of men (Clement, 2021). 52% of this rate is women in 2022, and 48% are male (Kunst, 2022). More than half (55%) of mobile-first players in Japan are women, while the rest (45%) are men (Gu, 2019).

In terms of games played on the computer, male students have a considerably higher rate than female students. The number of people playing games with both devices is close to each other. Considering that those who use

computers while playing games are more addicted than those who play smartphones (Semerci & Balcı, 2020), it can be concluded that male students play more games because they are more addicted.

## Suggestions

Awareness activities can be designed for individuals and parents that digital games are beneficial to be played in a controlled manner, but excessive use causes physical, psychological, and social problems. Comparisons can be made by examining the digital game awareness status of individuals in different age groups. Studies can be conducted to examine the reasons behind the high digital game awareness of women.

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## Mapping Fuzzy Logic in Learning Environments


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**Abstract:** With the rapid development of science and technology in recent years, the application areas of fuzzy logic have also gained speed. Fuzzy logic is a frequently preferred approach in the educational process, and it can be said that scientific publications on this topic have recently gained momentum in the literature. In this context, the present study aims to shed light on the research forms of fuzzy logic approach in education. The Web of Science (WoS) database was used for data collection. The search reached 374 scientific publications on the topic after various exclusion procedures. The obtained data were visualized using the mapping technique. As a result of the research, it was found that the number of publications on this topic has generally increased from past to present. The analysis revealed that the most influential countries reporting on this topic are the United States, China, and Taiwan. In addition, National Cheng Kung University, Gazi University, Cornell University, and Marmara University have published the most publications. The authors with the most publications on the fuzzy logic approach are Reyna V.F., Castillo, O. and Huang, Y.M. The analysis of the journals showed that Computer Applications in Engineering Education and International Journal of Electrical Engineering Education are the journals that contribute the most to this topic. The concepts that appeared in the clusters of co-occurrences analysis are fuzzy logic, higher education, e-learning, data mining, matlab and education.

**Keywords:** Fuzzy Logic, Web of science, Learning environments.

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### Introduction

In some situations, in daily life, we avoid making precise definitions. For example, when we state the temperature of water, we use expressions like a little hot or a little cold instead of saying how many degrees it is. Or in our weather forecasts, we say that the weather is a little cold or a little hot. Depending on the age of the people we meet, we refer to them as old, middle-aged, adult or young without drawing clear boundaries. This situation reveals the fact that we make imprecise definitions for some situations we encounter in daily life.



The formulation and measurement of individual learning behavior in educational environments is possible through the collection of neurological data in information systems (Korkmaz, 2020; Korkmaz & Gülseçen, 2022). How to formulate ambiguous expressions mathematically is an important problem. With his 1965 work, Lotfi A. Zadeh introduced the concepts of fuzzy set and fuzzy logic to better understand systems with uncertainty (Altaş, 1999). Fuzzy logic was developed with the goal of better understanding situations that are not precise and has been used in many fields since its introduction in 1965. Fuzzy logic is a subfield of artificial intelligence that has the ability to think like a human and solve those thoughts by converting them into equations (Tiryaki & Kazan, 2007). Classical logic, which we encounter in our daily life and which we use frequently, has certain values. According to classical logic, an element belongs to a set or not (Dell'Aversana, 2017). In fuzzy logic, which is different from classical logic, an element can be an element of both sets at the same time. Fuzzy logic also allows us to operate in uncertain and approximate situations (Tiryaki & Kazan, 2007).

Fuzzy logic is used in many different fields/industries. Fuzzy logic applications are used in higher education (Ertuğrul, 2010), engineering (Değerli, 2009), business (Durgut et al., 2017), defense industry (Çakır et al., 2006), real estate (Özcan & Eldem, 2020), materials science (Filiz et al., 2014), soil science (Yakupoğlu et al., 2008), retail (Öztürk et al., 2017), and many other fields. Studies of fuzzy logic can also be found in education. Fuzzy logic is used in many disciplines such as engineering, mathematics, physics, computer science, automation, social sciences, biology, and economics. For example, Doz et al. (2022) used fuzzy logic in education as an assessment tool. In another study, fuzzy logic was also used in selecting the best student based on student performance (Ajoı et al., 2021). Fuzzy logic was used to create student models in educational games (Hamdoi, 2021). Fuzzy logic has also been used to determine student attitudes toward a particular lesson (Bakanay, 2009). Another study examined the effects of learning environments organized according to multiple intelligence domains determined by fuzzy logic on students' academic performance (Namlı, 2016).

The number of scientific publications on fuzzy logic is increasing day by day in many countries. Therefore, it can be said that the method of evaluating the publications on this topic has the potential to make an important contribution to the literature. In order to contribute to the related literature and fill the gap in the research field, an attempt was made to show the status of scientific publications on fuzzy logic in education. In this regard, the present study aims to highlight the publications forms of the fuzzy logic approach in the field of education. It can be stated that the results obtained in the study will be a source for researchers who want to study this topic, will guide them in defining different study topics, and will contribute to the production of original publications on this topic.

## Method

In this study, publications on the topic of fuzzy logic in education were examined using the method of bibliometric analysis. Bibliometric analysis is the quantitative evaluation of various characteristics of scientific publications from different databases, such as author information of publications, the year of publication, the

journal in which the publication was published, and the publication information (Al & Tonta, 2004).

The data for this study were taken from the WoS (Web of Science Core Collection) database. An attempt was made to access relevant publications using the search query and filtering features of WoS. Only articles indexed in SCI-E, SSCI, A&HCI with the keyword fuzzy logic in the education category in the corresponding database were included in the study. There was no restriction on the language and period of publications. As a result of the filters, a total of 374 publications were identified and included in the analysis. The data obtained from the search were analyzed using the descriptive analysis technique. In addition, the visual mapping program VOSviewer was used to create relationships and density maps for different variables.

## Results

### Distribution of Publications by Years

As part of the research, the distribution of publications on the fuzzy logic approach in education published in the WoS database was first examined by year and number of citations. The corresponding findings are presented in Figure 1.

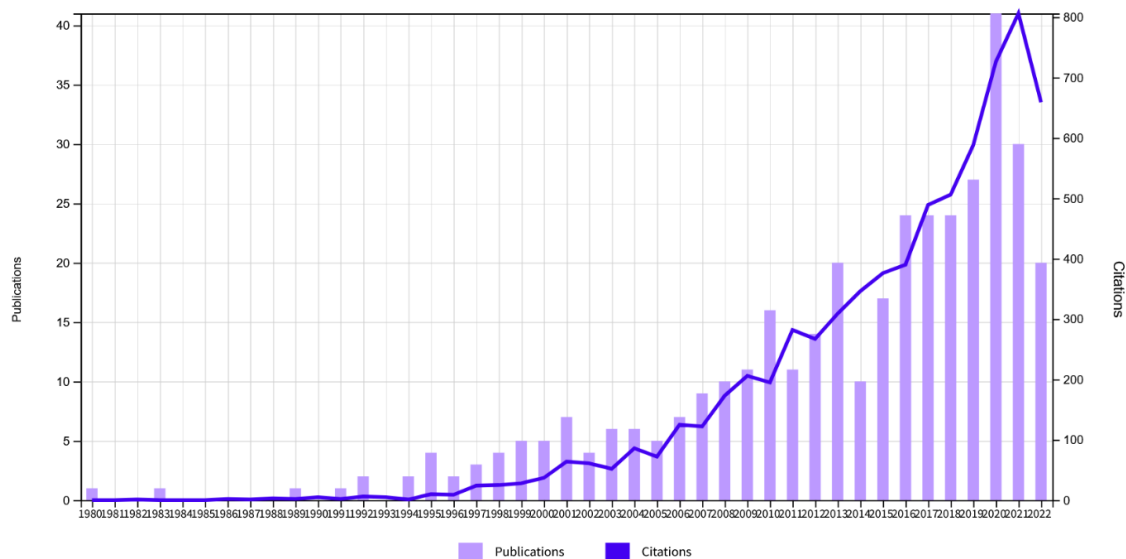


Figure 1. Times Cited and Publications over Time

When Figure 1 is examined, it is seen that the first publications on fuzzy logic in education appeared in the 1980s. It can be noted that the number of publications was low before 2000. However, the number of publications on fuzzy logic has generally increased over the years. It was found that the highest number of publications occurred in the last 5-6 years. The year 2020 was the year with the highest number of publications with 41 studies. On the other hand, it is noted that the number of citations has increased over the years. Since the study

was conducted in 2022, all publications and citation counts for that year are not yet indexed in WoS.

### Distribution of Most Prolific Countries/Regions

The study also examined the top 10 most prolific countries/regions that have published articles on fuzzy logic. The results in this regard are shown in Figure 2. As shown in Figure 2, the USA is the most prolific country in terms of number of publications. It is followed by China, Taiwan, and Turkey with the highest productivity. The total number of publications in these countries accounts for about 56% of the publications on the topic.

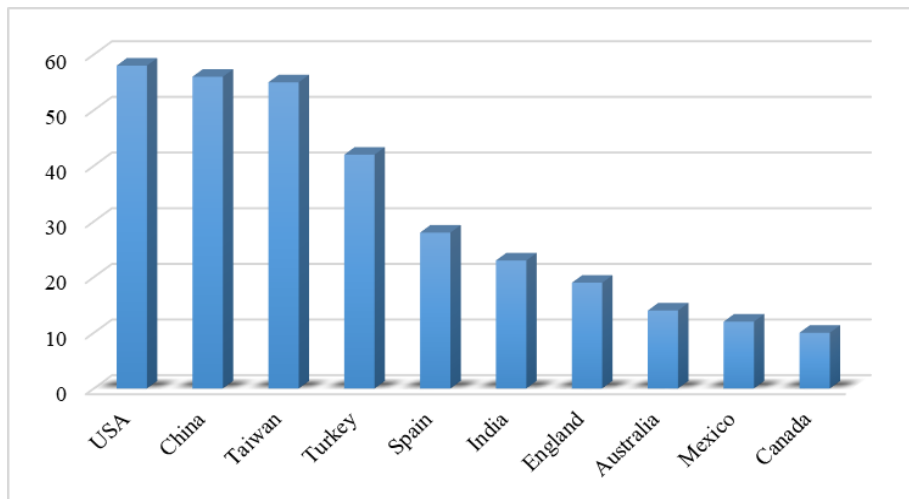


Figure 2. The 10 Most Prolific Countries/Regions

### Distribution of Most Prolific Institutions

The study also examined the total number of publications by institutions that publish about fuzzy logic in education. Figure 3 provides data on the 10 most prolific institutions in this regard.

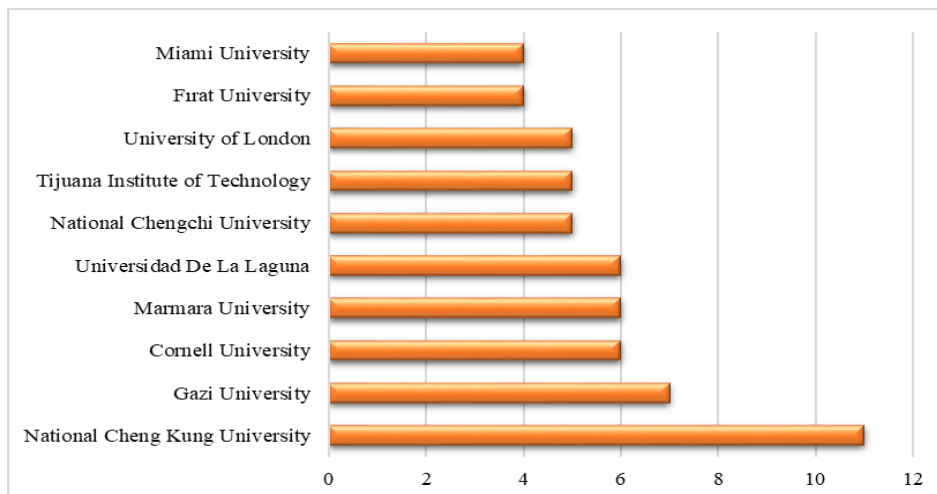


Figure3. The top 10 Most Prolific Institutions

When Figure 3 is examined, it is noticeable that National Cheng Kung University (Taiwan) and Gazi University (Turkey) are among the leading publishing institutions. After these institutions come respectively Marmara University (Turkey), Universidad De La Laguna (Spain) and National Chengchi University (Taiwan). Three of the 10 most productive institutions are in Turkey.

### Journal Distribution of Publications

Within the scope of the research, it was examined in the journals that published the most about fuzzy logic in education. The data related to this are given in Figure 4.

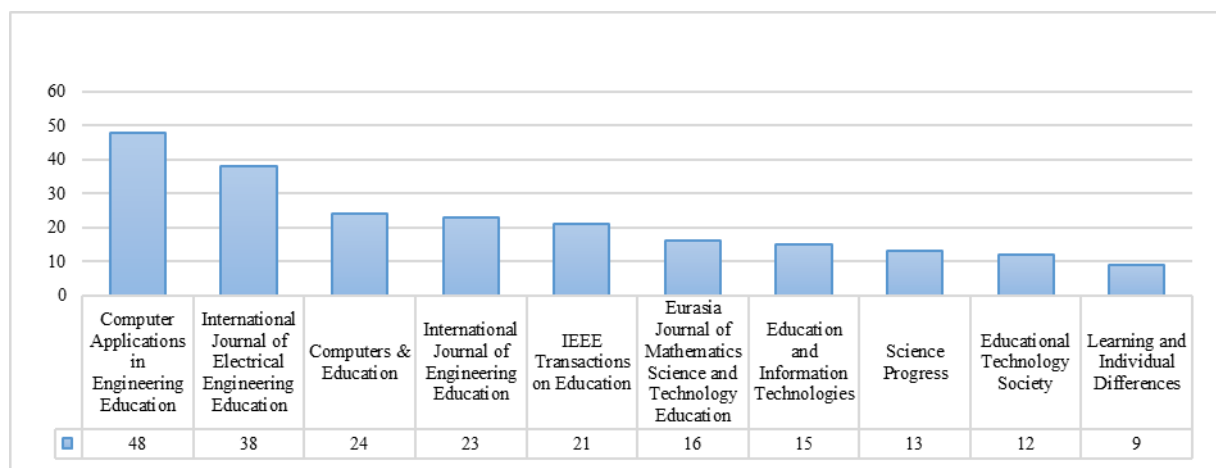


Figure 4. Journal Distribution of Publications

The distribution of publications by journal is shown in Figure 4. It can be seen that the journals "Computer Applications in Engineering Education", "International Journal of Electrical Engineering Education" and "Computers & Education" are in the foreground.

### Distribution of Most Cited Publications

The study also examined information on the most frequently cited publications on the topic. Table 1 shows the top 10 most frequently cited publications. The total number of citations of the publications is 7065, the average number of citations is 18.89 and the H-index is 39.

According to the data in Table 1, the most cited publication belongs to Reyna & Brainerd (1995) with 789 citations. The second most cited publication (299 citations) and the fourth publication (174 citations) belong to the same authors. This indicates that these authors' publications have been widely recognized since the day they were published. The third most cited publication is Lykourantzou et al. (2009) belongs.

Table 1. The Top 10 Most Cited Publications

Rank	Title	Authors	Year	Citation
1	Fuzzy-trace theory - an interim synthesis	Reyna & Brainerd	1995	789
2	Numeracy, ratio bias, and denominator neglect in judgments of risk and probability	Reyna & Brainerd	2008	299
3	Dropout prediction in e-learning courses through the combination of machine learning techniques	Lykourantzou et al.	2009	178
4	The importance of mathematics in health and human judgment: Numeracy, risk communication, and medical decision making	Reyna & Brainerd	2009	174
5	Web usage mining for predicting final marks of students that use Moodle courses	Romero et al.	2013	155
6	Development of a web-based laboratory for control experiments on a coupled tank apparatus	Ko et al.	2001	145
7	Department-level cultures and the improvement of learning and teaching	Knight & Trowler	2000	139
8	An application of fuzzy AHP for evaluating course website quality	Lin H.F.	2010	136
9	Process mining techniques for analysing patterns and strategies in students' self-regulated learning	Bannert et al.	2014	134
10	Modeling and simulation of an adaptive neuro-fuzzy inference system (ANFIS) for mobile learning	Al-Hmouz et al.	2012	133

### Author Collaboration Network

An author collaboration network has been established to detail the relationships of authors who publish on the fuzzy logic approach in education. The related network is shown in Figure 5.

When the co-author analysis of the studies on the topic is examined, it is seen that Reyna, V. F., Brainerd, C. J., Wolfe, Christopher R. and Widmer, Colin L. L. publish together. Again, cooperation was found between Brust-Renck P. G., Reyna, Valerie F., Widmer, Colin L. L., Wolfe, Christopher R., Weil, Audrey M. and Cedillos, Elizabeth M. As a result, it can be said that these authors have many publications on the fuzzy logic approach in education, have researched the subject in depth and contributed to the field.



According to the keyword analysis, it shows that many keywords such as fuzzy logic, higher education, e-learning, data mining, matlab, fuzzy-trace theory, education, artificial intelligence, and genetic algorithm are commonly used. These words are the most common words and concepts explored with other clusters. Current topics are concepts such as artificial intelligence, higher education, AHP, topsis, fuzzy-set qualitative comparative, decision making, and teaching quality evaluation.

## Discussion

In this study, the scientific publications published in the WoS database on the topic of fuzzy logic in education were examined by means of a content and bibliometric analysis. For this context, the distribution of publications by years, citation counts, countries/regions, and institutions was first examined. Then, information was provided on the journals that have published the most on the topic and on the most cited publications. In addition, bibliometric analysis methods, an author collaboration network, and keyword analysis (co-occurrences) were used to examine publications on the topic of fuzzy logic in education.

According to the research results, it should be noted that the first publications on this topic appeared in the 1980s and the number of publications before 2000 was relatively small. The main reason for this may be the limited resources, lack of communication facilities and the internet network at that time (Radu et al., 2021). In the following years, it was observed that the number of fuzzy logic researches in education increased in connection with the development of ICT in general, but this increase was not regular. In this case, it can be said that the interest in this topic has increased over the years and the topic has been extended to different areas. In the literature, similar to our research findings, it was found that the number of publications on this topic published annually increased significantly (López-Guauque & Gil-Lafuente, 2020; Merigó, Gil-Lafuente & Yager, 2015; Radu et al., 2021). It can be stated that fuzzy logic research has increased significantly, especially in the last decade (López-Guauque & Gil-Lafuente, 2020). Therefore, it can be said that fuzzy logic is an ever-evolving interdisciplinary topic and is used in the fields of computer science, automation, engineering, mathematics, and physics. Similarly, Yu, Xu & Wang (2018) examined the researches of Chinese scholars on fuzzy theory and found that the researches on this topic were mainly focused on computer science and engineering. However, especially in recent years, there has been more research on the application of fuzzy theory in many fields such as social sciences, biology and economics (Yu, Xu & Wang, 2018).

An analysis of the distribution of publications on fuzzy logic in education by country/region showed that the USA is the most productive country. This is followed by China, Taiwan and Turkey as the most productive countries. It can be said that the number of scholars in the USA and China is high and they have made important contributions to the literature in recent years. On the other hand, Radu et al. (2021) stated that the countries with the most publications in the field of fuzzy logic are China, India and the USA. At the beginning, the USA was the most influential country, thanks to Lotfi Zadeh, the father of fuzzy logic (Merigó, Gil-Lafuente & Yager, 2015). However, López-Guauque and Gil-Lafuente (2020) also noted that the contributions of the U.S. have declined

relatively recently, but that China continues to lead in the number of contributions. Similarly, Yu, Xu & Wang (2018) noted that fuzzy theory has received increasing attention from Chinese scholars over the past 30 years. It can be said that the subject has gained momentum and made visible contributions to the scientific literature in recent years, especially in Asian countries. The main reason for this may be the rapid increase in the number of academics and researchers in these countries and the increasing investment of these countries in this technology (Radu et al., 2021).

Publications and researches on fuzzy logic are conducted by many institutions and research centres from different countries and continents around the world. In the study, National Cheng Kung University (Taiwan) and Gazi University (Turkey) stand out among the institutions that publish the most on fuzzy logic in education. The study also found that three of the 10 most productive institutions are from Turkey. On the other hand, Radu et al. (2021) found that the most influential institutions in fuzzy logic research are Islamic Azad University, Tijuana Institute of Technology, and National Institutes of Technology, respectively. Similarly, it was found that the most effective and productive institution in the field of fuzzy logic in the literature is Islamic Azad University (Laengle et al., 2021; López-Guauque & Gil-Lafuente, 2020). In another study, it was found that many institutions in China, Taiwan and Spain have a very good position in this field (Merigó, Gil-Lafuente & Yager, 2015). It can be said that most of the most influential institutions publishing on fuzzy logic are located in Asian countries (Radu et al., 2021). However, if we look at the studies on fuzzy logic, we find that the subject is interdisciplinary and used by many researchers from different institutions in the world.

The study also examined the distribution of publications on fuzzy logic in education in journals. It was found that Computer Applications in Engineering Education, International Journal of Electrical Engineering Education, and Computers & Education are the journals with the most publications on this topic. Therefore, it can be concluded that these journals are among the important journals in the field of computer science and engineering. In the literature, it was found that IEEE Transactions on Systems Man and Cybernetics, IEEE Transactions on Fuzzy Systems, Information Sciences and Fuzzy Sets and Systems are among the most influential journals in fuzzy logic research (Laengle et al., 2021; López-Guauque & Gil-Lafuente, 2020; Merigó, Gil-Lafuente & Yager, 2015; Radu et al., 2021).

According to the results of the research, the most cited publications on fuzzy logic in education are from Reyna & Brainerd (1995). These authors are well-known authors who have published on this topic. The most frequently cited and influential publication on fuzzy logic in the literature is the article by Zadeh (Laengle et al., 2021; López-Guauque & Gil-Lafuente, 2020; Merigó, Gil-Lafuente & Yager, 2015; Radu et al., 2021; Yu, Xu & Wang, 2018). Zadeh prepared numerous scientific publications on the principle and structure of fuzzy logic and is the leading author in this field (Keskenler & Keskenler, 2017). When the co-author analysis of the publications on the subject is examined, it is seen Reyna, V. F., Brainerd, C. J., Wolfe, Christopher R. and Widmer, Colin L. L. publish together. Brust-Renck P. G., Reyna, Valerie F., Widmer, Colin L. L., Wolfe, Christopher R., Weil, Audrey M. and Cedillos, Elizabeth M. are examples of outstanding author collaborations. Therefore, it can be said that these authors have many publications on the fuzzy logic approach in education, have thoroughly



researched the topic, and have contributed to the field.

As part of the study, an analysis of the words used was also carried out in order to identify the frequently recurring terms and to take into account the content analysis of the publications on the subject (Talan, 2021). It was found that many keywords such as fuzzy logic, higher education, e-learning, data mining, matlab, fuzzy trace theory, education, artificial intelligence, and genetic algorithm are frequently used. The current keywords were also studied in terms of identifying the current research topics on this topic. In this regard, it is noteworthy that the current topics are concepts such as artificial intelligence, higher education, AHP, topsis, fuzzy set quality comparison, and teaching quality assessment. On the other hand, the study by Laengle et al. (2021) revealed that the most popular keywords on this topic are fuzzy logic, fuzzy sets, fuzzy control, and fuzzy numbers.

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## Monga'e (Beheading) Tradition among Tolaki People in Southeast Sulawesi, A Historical Perspective (1800-1930s)

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**Abstract:** Until the mid-1930s, the Tolaki people in Southeast Sulawesi, still practised the tradition of humans hunting or beheading called *Monga'e*. The ritual related to religious expression was also a symbol of the social existentialism of manhood among society. Through a literature study conducted on historical sources, colonial archives, and ethnologist records, especially from the late 19th and early 20th century period, this paper will assess how *Monga'e* functions in the Tolaki community and what motivations behind the practice. Some of the findings in this study proved that besides sacred values, the *Monga'e* tradition also has profane functions such as politics (tribal hierarchy and traditional elites); defence (military/ warrior class regeneration); and integrated adat systems (social laws). This causes the spectrum of motivation to be very broad ranging from religion (worship of the *Mbongae Sangia*); strategic (political and social consolidation); economy (labour and reproduction); and entertainment (arts performing and recreation).

**Keywords:** *Monga'e* (Mengayau), Beheading, Tolaki People, Southeast Sulawesi

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### Background

When reading Indonesian historiography, it is very few reveal the problem of beheading or beheading. This tradition is still found and carried out by some ethnic groups in the archipelago in the pre-Islamic period and after

the entry of monotheism, both Islam and Christianity. If we read archival sources and colonial documents as well as oral traditions, we find many traditions of headhunting or beheading in Kalimantan, Papua and Sulawesi. In Southeast Sulawesi, we read a lot of historical sources regarding the tradition of cutting or beheading, called Koppensnellen, the local language is called mongae. Around the second half of the twentieth century in Southeast Sulawesi, especially the Tolaki people in the interior, it was widely reported by the Dutch colonial government that the local population was still carrying out beheadings (see Gouweloos, 1923; Cruijt, 1922; Schuurmans, 1923; Haart, 1911; Treffers, 1913; Treffers, 1915). But their writings only report how the tradition is still alive and how the elites use this mongae as an excuse to attack the enemy. This tradition is very limited to our knowledge, so far we only know that the beheading tradition is only found in areas such as Kalimantan in the Dayak tribe, and tribes in the interior. Papuans. It turns out that in the people of Sulawesi, especially the Tolaki people, there are many historical sources that explain this tradition of beheading. The Tolaki people referred to in this study are a tribe that inhabited the former kingdoms of Konawe and Mekongga now on the mainland of Sulawesi, the Tanggara part of the former government of Onderafdeeling Kendari and Kolaka. Now this area includes the districts of Konawe, South Konawe, North Konawe, Kendari City and Konawe Kepulauan. Meanwhile, the former Mekongga kingdom includes the districts of Kolaka, North Kolaka, and East Kolaka.

There is something unique about this headhunting tradition for the Tolaki people, not just beheading the enemy. However, it has a function, and value so that it becomes a reason for headhunting. So far, our interpretation that mongae in our perspective is an act that is not allowed. However, for the perpetrators of that period had strong reasons such as status, religion, in addition to sacred values, the Mongae tradition contained profane functions such as politics (customary hierarchy and traditional elite); defense (military regeneration/knight class); and an integrated adat system (social laws). This causes the spectrum of motivation to be very wide ranging from religious worship to Sangia Mbongae or the God of War); strategic (political and social consolidation); economy (labor and reproduction); to entertainment (performance arts and recreation). The Mongae carried out by the Tamalaki and Tadu are different from the beheadings carried out by the Dayaks in Kalimantan.

## **The Mongae or Beheading Tradition**

Mongae comes from the Tolaki language consisting of two syllables, namely Mo is a verb, and ngae is a belief in a god as Sangia mbongae as a god of death or murder. So Mongae means beheading or known as mengayau (Indonesian), mongae is synonymous with beheading the enemy. This tradition was carried out before the entry of Islam in the land of Tolaki, both Mekongga and Konawe. But this tradition continues, a reality even though it has been banned by the Muslims and Zending, but some headhunting is still going on in the interior of the Tolaki tribe. This tradition ended around the middle of the XX century. The tradition of beheading is known to several ethnic groups in Indonesia, including the Dayak ethnic group in Kalimantan and several ethnic groups in Papua and Papua New Guinea. The mongae tradition is also known in several areas such as Kalimantan, Bali, Papua (Irian Jaya) and Sulawesi. The custom of mongae/mengyau is to find the enemy by cutting off the head, the head is usually split in half or used as a place to drink tuak. In the past this custom was a necessity in itself to make

everyone brave and immune from drinking the enemy's blood. This custom is a matter of pride for the perpetrator so that he will become a leader who is respected and feared, both by his group and by the opponent's group.

This tradition of mengayau or mongae arises because each population group in an area often attacks each other. As a result, there was a backlash which was later entrenched. This ancestral habit can be seen in the story of langgai Moriana and the story of To Tambarano wuta. In this story Langgai Moriana can be seen from the explanation below, that after the marriage is over, Langgai Moriana intends to go for mongae / headhunting. For this reason, he first prepared a good and safe place for his wife to pass through. (See Bergink, 1982; 1978/1979: Balai Bahasa, 2014: 141) We also find this mongae story in Tolaki's epic of Taenanggo, we also find it in folklore. tula-tulano mokole (the story of the king) and tula tulano wonua (the story of the land). Among the Tolaki tribe, headhunting has been carried out for a long time, even in the 1930s, we still get reports from zending about this tradition, especially in rural areas. Since the 17-18 centuries Islam and Christianity have entered this area, but it is precisely this tradition that is very difficult to change by agents and actors both from Islam and Christianity. This fact shows that the arrival of the zending reported that some residents who live in the interior are still carrying out headhunting. This tradition was eradicated by the Dutch East Indies government and the zending and missionaries in the mainland areas of East Sulawesi or Southeast Sulawesi. Although it sounds very studious and taboo to be discussed, this tradition has existed and was carried out by the indigenous people of Tolaki. Even the report of a Kendari Controleur, Lieutenant F. Trefeers, stated that the peninsula, which was located south of our previous route, was geographically an unknown area. Not a European or a westerner, not even Vosmaer, who spent considerable time in the Kendari bay, ventured out through the coastal area and the island's natives were known as headhunters (Treffers, 1914).

In several colonial reports (colonial verlaaq) the Dutch East Indies government is often mentioned about the mongae tradition for the Tolaki people. King Bokeo in Kolaka was reportedly involved in headhunting (see Zlabbekoorn, 1927/1936). The tradition of headhunting for the Tolaki people has always lived up to the expression among the Tolaki generation with the words "torea sunggano ipue" meaning the remnants of the spears of my ancestors or "torea taawuno ipue" meaning the remnants of my ancestors' machetes. Among the Tolaki tribe, the island is known as the term towue ndahi torea pade sunggano puendo cavity. Head hunting in Sulawesi continued until the arrival of Europeans. Alfred Russel Wallace, a British explorer, who visited Manado on June 10, 1859, got the story directly from local residents (Minahasa). Human heads are used to decorate tombs and houses. "They hunt for human heads like the Dayak tribe in Kalimantan... When a tribal chief dies, two pieces of freshly decapitated human head are used to decorate his grave... Human skulls are the most favored decoration for the chief's house," Wallace wrote in his notes. , published in East Indonesia Tempo Doeloe 1544-1992 by George Miller (see Jong, 2010).

Reports of beheadings for the Tolaki people are found in Van der Hart's writings reporting that in 1850 there were many complaints in Buton and Kendari about beheadings and piracy. Just before his arrival, a man named Sorani, a Tobelo who claimed to receive protection from the rulers of Ternate and Banggai, had seized two Bugis boats from Laiwoi whose crew were partly killed and partly transported by slaves (Aart, 1857). The tradition of

headhunting continues as one explorer reported that “The people here call themselves Tokea (as Tolaki) and have the same characteristics as in Lambuia. People tell us, in the forest still live people, who never want to appear; they are shy like the birds. Having heard all this, Islam seems to have influenced the customs here; hunting for heads was rare and so was crop yields and then at the time of the chief's death” (Sarasin, 1905).

A fact that is commonly experienced by every population group from an area is that they often attack each other. Because it has become the mandate of the ancestors to defend their territory from such attacks. As a result, there was a backlash which later became entrenched as a monga'e (heading) custom and even the customs surrounding the activity then became a separate need to make everyone brave, immune, and mubarak for drinking the blood of their enemies (Tarimana, 1993). Beheading a human head, according to Adriani, "the position of the spirit when humans are still alive" applies to the residents of Central Sulawesi in signs of tribal pride. A beheaded head becomes a means of medicine, a human life that is taken for his tribe. The victim's blood is drunk and the brain is eaten. Kruyt regards head fishing for religious purposes as a form of human offering. Vosmaer, Schuurmans and Gouweloos refer to it as an important goal of beheading by Tolaki is to free the condition of prohibition (mombado), in which a clan is found due to a death case. Clans or related families are subject to various restrictions. The harmonious life of the clan was disturbed and had to be restored. For that several heads are needed (Jong, 2010: 134).

Evidence of beheading activity was explained by Cristhian De Jong that they recognized beheading which had previously occurred sometimes as a form of ritual that must be carried out at the death of each member of his clan. They do not know irrigated rice farming, only dry rice and have hereditary leadership. They loved war and military superiority through better weapons such as bronze axes and spears which in Kruyt's time could still be found in excavations and river pools here and there. (Jong, 2010: 19).

As evidence of the headhunting of the Tolaki people, Laika mborasaa was built at several points. According to Vosmaer, this building in Central Sulawesi was called a lobo or howa, a village temple famous for beheadings, which served as a repository for human skulls. This building became the center of rituals and ceremonies closely related to beheading. In the lobo of Central and East Sulawesi (Poso, Mori), where until the early twentieth century every important village had, according to Adriani and others, the nitu or war god, the spirit of the most important and bravest ancestor who was offered offerings with his head cut off, lived there. This is also found in the Tolaki community in the form of building houses where headhunting is called laika mborasaa or headhunting houses. Several zending reports explain the existence of the laika mborasaa building. (Jong, 2010: 125).

In the 1934s, the activity of beheading according to Schuurmans began to decrease. This is due to the death of the headhunting leader so that it gradually decreases and efforts to stop headhunting by relatives or family of the headhunting leaders. Besides that, to stop the beheading, they do it by paying with a buffalo. This method is a warning to prevent cutting of the head from happening (Schuurmans, 1922: 208). The headhunting tradition disappeared completely around the middle of the 20th century where the Japanese power strictly forbade indigenous people to do this tradition, even the Japanese government punished residents who still did it.

## Beheading Mongae: From Rites, Wars to Performing Arts

The mongae tradition since ancient times, the Tolaki people, is especially carried out by the kings, nobles and warriors such as Tamalaki and others. This tradition continued into the second half of the 20th century. There are several reasons people carry out headhunting (beheading or head hunting, or mongae can be seen in the following explanation.

First, the reason for worship is related to the belief in dynamism and animism or the original religion. There is a belief in the Tolaki people towards Sangia (Gods), one of which is Sangia Mbongae (God of War/death). It is expressed by Haart that beheading is an integral part of the religious life of the Tolaki people who are still pagans, especially its function is to ward off evil spirits by having a skull. In various events it appears that a head must be beheaded, i.e. after death, in order to give the spirit of the deceased a slave in the spirit realm. In order to ward off the spirit of the beheaded enemy, people also after beheading held a big death feast. Since beheading is a negative endeavor and people always tell stories with fear in their hearts, our government easily ended it. Now in Southeast Sulawesi (as was the case throughout Sulawesi) calm and order prevailed and the kingdom experienced a period of prosperity and rapid development (1914).

Schuurmans also said that once they made a trip, they had to take as many heads as possible. This belief is a belief held by the Tolaki tribe set by Sangia (who has power). Belief in beheading as an offering to Sangia Mbongae (Schuurmans, 1934: 207). Gouweloos (1939:432) also acknowledged the issue of belief in Sangia Mbongae. The Tolaki people have always believed in two gods of war, namely Sangia Mbongae and Sangia Ndolula, or Sangia Mbonga and Onitu Mbongai (see Gouweloos, 1939 and Treffer, 1914, Vonk, 1928; Plas, 1929: 7; Tarimana, 1993) . Kruyt considers a religion consisting only of magic, with the rejection of acts directed against evil forces as dynamism, while he classifies rituals closely related to belief in spirits and spirit powers as animism. Belief in individual gods he eventually wrote as "belief in the earthly gods", the highest stage in religious development before the teachings of the monotheism of Islam and Christianity. The Tolaki people of eastern Southeast Sulawesi seem to fit this description of dynamism around 1830 (Jong, 2010: 126).

They show that the Tolaki people are actually calm, gentle and gentle people, but because of the demands of their beliefs, they are also able to carry out a kind of cruel and barbaric ritual, namely going out of the area to look for their enemies. From this trip they often return home with the pieces of the heads of their enemies. These head pieces were brought to the village as a sign of glory and were often hung in the "house of the dead" or buried in a special grave (Adatretc, 1922). The house of death is known as laika mborasaa.

Second, it relates to the mentality of the Tolaki people who have a brave soul called a brave man (langgai barani). A Tolaki man is not considered a knight if he has not performed the beheading activity. To behead a head, it takes courage. A fact that is usually experienced by every population group from an area is that they often attack each other. Because it has become the mandate of the ancestors to defend their territory from such attacks. As a result, there was a backlash which later became entrenched as a monga'e (heading) custom and even the customs

surrounding the activity then became a separate need to make everyone brave, immune, and mubarak for drinking the blood of their enemies (Tarimana, 1993).

A person cannot be considered a knight called Tamalaki (army) before being tested to behead the enemy, so deliberately headhunting. Nor the political reasons for the conquest of a region or region. According to Sarasin that because the Tolaki people inhabit the circular area along the east coast, it is now easy to explain how the natives of Southeast Sulawesi have a sense of smell, especially bloodlust (Sarasin, 1905).

Third, to carry out the death feast ceremony is the reason the Tolaki people carry out headhunting or mongae. Mongae is a must if the king (Mokole), a royal official will be buried. Tolaki people carry out mongae, namely to fulfill the burial requirements of king Mokole or Bokeo in pre-Islamic times. It is carried out when a king or Mokole dies (Mokole or Bokeo/otawe), the king is not buried before Tamalaki and Otadu returns with their head to be offered at the funeral ceremony. Headhunting takes months or even years until they get as many enemy heads or as needed. When people die, they usually wear a white cloth on their head as a headband. The cloth is called a rope or kowani. The origin of the white cloth is from the side when the person died. The rope can not be separated if there is no evidence that he cut off the head (Schuurmans, 1934: 208-209). Those who mourn tie their heads with a white cloth called lowani. During mourning the lowani was worn. The tamalaki (war heroes) were ordered to morning mongae (headhunting or beheading). If the tamalaki's journey is successful, then the head of the person who is obtained is brought back to the place of mourning. After the grieving family heard about it, the macalowani was removed. The man's head was brought to him and cut in half and drank water through the skull of the man. Usually the headhunters are not allowed to go home until they succeed.

Fourth, the reason for offerings to their ancestors, the blessings of the ancestors depend on a well-prepared beheading. Mongae is carried out to follow the traditions of their ancestors, in the pre-Islamic era, mongae was carried out because "the Tolaki tribe they followed the tradition from generation to generation, they still carried out the beheading of humans. This is because there are people among this tribe who are bloodthirsty, so they continue to carry out the customs outlined by their previous parents (Schuurmans, 1934: 207). Each stage is accompanied by war dances and ritual treatments which are very complicated and time consuming. In the Tolaki tribe, preparations are made with the tadu (a term that appears in many languages in Sulawesi), the traditional leaders who have this skill. This skill was acquired both because of his close relationship with Sangia Mbongae, the ruler of the beheading, and on the basis of his blessing by a clergyman. In a dream during which he was unconscious when he encountered Sangia Mbongae or one of the clan's ancestors, he received orders to perform the beheading and bestowed courage and strength on him. He mostly accompanies such endeavors as an advisor, not as a doer. The beheading is a tamalaki or anandamalaki, a brave person. The group consisted of only men (never women), which numbered in the tens.

Fifth, the reason for holding a war of conquest, the blessing of the ancestors depends on a well-prepared beheading. Each stage is accompanied by wild war dances and ritual treatments which are extremely complicated and time consuming. In the Tolaki tribe, preparations are made with tadu (a term that appears in many languages



in Sulawesi), traditional leaders who are proficient in this *bhidang*. He acquired this skill both because of his close relationship with Sangia Mbongae, the ruler of the beheading, and on the basis of his blessing by a clergyman. In a dream or while unconscious when he encountered Sangia Mbongae or one of the clan's ancestors, he received orders to perform beheading and bestowed courage and strength on him. He mostly accompanies such endeavors as an advisor, not as a doer. The beheading is a *tamalaki* or *anandalaki*, a brave person. The group consisted of only men (never women), which numbered in the tens.

Elbert relates that during his visits to Rumbia and Mekongga (1909) the traditional leaders often changed or sold slaves, whose heads were then beheaded for certain events (Elbert, 1911). Sixth, as an art in war related to traditional dance, *lulo*. *Lulo* is usually performed as a cover for various traditional rituals, at funeral ceremonies, including beheading rituals and weddings as entertainment. Only women or girls are involved in a dance, while other dances are only followed by men, returning to other dances can also take turns. The dead are considered to be dancing, *lulo tonuana* (dance of spirits). There are several forms and variations, of which the Tolaki people are best known for the *molulo monani* and *molulo mosusua*, which do not recognize drum or gong accompaniment but are sung and the faster *molulo dimba* in which the dancers are stirred by various types of drums, which range from the hollow hole covered with animal skins on the ground to bamboo drums and copper gongs. This ceremony determines which dance by whom and the ship is carried out and by whom and the amount of equipment that accompanies it (Jong, 2010: ). This is in accordance with what was explained by Schuurmans that in preparation for carrying out headhunting, it must be preceded by carrying out *lulo mongaE* (beheading dance). There are two kinds of *lulo*, ordinary *lulo* and war *lulo*, which are special for headhunting trips. The night is carried out by regular *lulo* and the next night *lulo mengayau* (*moleba*). This event is usually held in odd months such as 7-11 and 13 months in the sky. All the preparations started in the special house including the *lulo* party. Before the *lulo* is held, it is necessary to prepare beforehand (Schuurmans, 1934: 209). Likewise, after they return from headhunting, the *umoara* dance is performed, while they shout *umoara* (war dance), which is carried out at night, the game is placed on a mat. They continued to *umoara*, shouting with war dances while circling and circling on the mat (Schuurmans, 1934: 214).

Seventh, to ward off disease, in an article it is stated that the Governor asked him (Controleur Kendari) through Resident Brugman, "why do the natives here take the head when a noble dies?" this question makes him awkward, what is in the environment he is in is not surprising "I have never taken a head", he replied "that's great I believe" said the governor "but why do people in the interior do it?" He replied "because there will be night and disease will occur". The question "who sent the disease?" replied "if not sent the spirit of *sando* will be angry". *Sando* is a priest of this kind of spirit or demons there are seven, he said again. *Sando* is armed with the *klewang* of the question "don't especially the souls of the dead get angry, if a head is taken?" answered "I don't know, but the teacher (Islamic priest) knows; he learned a lesson from the Bugis" (Jong, 2010).

Furthermore, Treffers in his writings (1914: 227) "The ritual of searching for the enemy's head is not only carried out by people after harvest but also to ask the ancestral spirits to stop the plague (malaria) after the event of death, or also in the construction of a large house. If people will discuss the issue of ritual beheading with

residents in the mountains (Tolaki). To Mori or To Laki then previously had to make a distinction between beheading as a result of a war or it as a condition for holding something. According to Cruijt, the basis for this ritual of beheading the enemy (mongae) is according to the testimony of local residents that it is based on the event of death. Then this ritual will be carried out after an otadu (leader of the troops) announces to the population about his dream so that the population performs the ritual to avoid disaster (Cruijt, 1922).

Eighth, the reason for looking for captives or slaves regarding our head hunting was further experienced, that only the skulls were brought home without the scalps being removed, then put into wooden crates, which were placed on the graves or put in the houses. The scalps are then distributed to the hunting participants, then each person puts a small piece at the entrance of the house. On the other hand, most of the hair on the sword and shield do not come from the dead, but also from the raised. The brains of those who were beaten were not eaten; but their blood they drink and wash their faces. War slaves are not here they say. If the Bugis needed people they started with trickery, where they persuaded, went to Kendari or elsewhere and was then taken prisoner. After this information, it seems that the Tolaki people are a warlike ethnic group (Jong, 2010). A slave who was taken from head hunting but not killed then they were made into their slave called ata mbinongae. He will serve an anakia or noble for the rest of his life because he gets forgiveness and at any time his status as a slave can change hands (Vosmaer, 1834: 19).

Ninth, the reason as a form of legitimacy of marriage in the past, as for the ritual of beheading the enemy for the purpose of requirements in a marriage, no one knows and admits it. But what happens may be that a girl does not want to accept a young man's proposal because he is considered a cowardly young man (Cruijt, 1922). The head is beheaded in war or as an attempt to retaliate, but also for more sacred purposes such as the death of a traditional head, remarriage of a widow or other emergency situations (Jong, 2010: 34). After getting the victim then beheaded and brought home. After he arrived at his house, the pieces of the enemy's head that managed to get under him must not be directly under the entry must be placed outside for 3 days. During this time various rituals were performed with singing and the accompaniment of musical instruments such as drums and gongs (Vosmaer, 1832, 18). In this event which is like a party, usually the residents gather together at the place and on this occasion it is announced that one's obligation to perform the ritual of beheading the enemy has been successfully carried out (Vosmaer, 1834: 18). Mongae is a man's obligation related to rituals and as a form of proof as a brave man.

Tenth, the reason the Tolaki people do headhunting is to fill their spare time and at the same time as a form of duty and responsibility for the Tamalaki and Otadu. Regarding this problem, Vosmaer explained that after they had harvested the rice, they carried out a terrible habit of carrying out a search and beheading ceremony of the enemy (1879). This ritual event is usually carried out by male residents, this custom usually has to do with agricultural rituals. But this is not true according to Vosmaer that more of this custom is done because in one of the religious rules they do become an obligation in relation to rituals after the death of their siblings (Vosmaer, 1879: 19).

It may be the custom to behead the head before the death feast is held after the rice harvest, when people have spare time. Among some government officials there is a view that the beheading is carried out when there is an opportunity to harvest rice. But it doesn't seem to be common. However, a king from Konawe/Kendari in the early twentieth century was asked if he approved of beheading when rice failed for his ancestors. A beheading can also be part of a certain war strategy against a neighboring clan, for example to defuse conflict. This incident shows that the Tolaki people usually head hunting after harvest.

## Conclusion

Mongae is the activity of beheading the Tolaki people in the past and the tradition ended around 1935. In the past until the mid-1930s, the Tolaki people were still found in the interior carrying out the mongae or beheading tradition. Mengyau or mongae for the Tolaki community has a purpose, function and is related to the concept of religion or belief in Sangia mbongae (God of War). Mongae has a function as well as a form of worship, a dance performance, to show expression as a knight and the identity of the Tolaki people as brave people. There are several reasons why the Tolaki people in the past carried out mongae headhunting, namely the reason for their belief in the sangia mbongae, the rural people (vorstelanden) had not yet fully embraced the monotheistic religion, a test for the anakia knights (nobles), the Tamalaki and Otadu knights, war or conquest of an enemy or a territory. or in order to defend their territory, and reasons for the importance of the funeral ceremony of a King or noble. The mongae or headhunting tradition for the Tolaki community has a function not only related to the concept of religion and religion, but also related to mentality, politics, defense and security to recognition as a form of maintaining social status.

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## Content Analysis of Postgraduate Theses on the Concept of Oral Communication

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**Abstract:** This study aims to examine the postgraduate theses in the field of verbal communication skills, which have an important place in the individual's cognitively healthy, effective, and positive communication. In line with this purpose of the research, 24 full-text postgraduate theses in the National Thesis Database of the Council of Higher Education were examined and a content analysis was made by scanning the literature for researchers. The data of the research were collected through document analysis. The obtained data were analyzed by content analysis. Examined theses were examined and categorized according to the gender of the author, year of publication, distribution by the university, Institute and department, research method, sample of the research, type of the thesis, and advisor. The number of female authors was significantly higher than male authors in 1 medical specialty, 18 masters,'s and 6 doctoral theses, in which the concept of "verbal communication" was included in the research title. It has been determined that these studies are generally carried out within the Institute of Educational Sciences. The target audience of the studies is mostly university students, the least participating academics, and administrators. At the same time, the studies are mostly in the field of English Language Education, the least studies are prepared in the departments of Linguistics, Communication Management, and Public Relations, and the advisors of the theses are mostly Ph. D. It has been determined that it consists of faculty members with the title of Lecturer and Associate Professor.

**Keywords:** Oral Communication, Postgraduate Theses, Content Analysis

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### Introduction

As social beings, human beings need to constantly and permanently communicate with the environment in which they live to continue their life. In its simplest form, communication can be defined as the verbal or nonverbal exchange of information between individuals (Phutela, 2015; Özdoğan, Uzuner, and Gülay, 2018: 167). Oral communication is the transfer of information that is structured in the mind of the individual using language

(Demirel, 1999: 40). In other words, oral communication is an element that is a source of information verbally expressing its feelings and thoughts to the target audience (İl, 2018: 14). Oral communication is transferring, transmitting and explaining feelings, thoughts and wishes to the donor through auditory and visual materials (Taşer, 2015, 108). Oral communication is the most advanced and indispensable tool for communicating between individuals. In today's communication age, individuals generally communicate through oral communication. Studies show that 50% to 80% of an individual's daily life is spent communicating verbally; revealing that in the oral communication process, 45% is spent listening and 30% speaking (Nalıncı,2000:130).

Communication is a process where people share information and ideas verbally or nonverbally süreçtir (Phutela, 2015). Oral communication skill is the ability to use language as a tool to interact positively and effectively with the target audience in the social environments in which the individual lives (Abe, Bretanha, Bozza, Ferraro ve Lopes-Herrera, 2013; Özdoğan et all. 2019). Oral communication is a communication model that includes listening and speaking skills and these skills are used effectively. Since today's world is called the age of communication and information, the basic condition for individuals to be successful both in their academic and professional lives and to be sought after, admired, and loved in social life is closely related to the oral communication skills one has. Individuals who do not have effective oral communication skills often feel lonely because they avoid social environments, this affects the self-esteem of the individual and causes them to experience significant problems in solving a social problem (Ying ve Blanchfield, 2010; 487). For this reason, oral communication skill is a competency that individuals of all ages should have. Having effective oral communication skills has an important place in the socialization of the individual (Gertner et all. 1994; Rice, 1991). Oral communication is directly related to the social life of the individual and provides numerous conveniences to the individual in his social life. These:

- Thanks to oral communication skills, the individual transfers his knowledge, feelings, and thoughts faster. Thanks to this opportunity, the individual can communicate more easily.
- Since oral communication includes speaking and listening skills, feedback takes place in a short time between individuals and groups that communicate.
- It is possible to ask the sender instant questions about issues that are not understood during the communication or at the end of the communication.
- It allows using non-oral communication elements (gesture, mimic), which have an important place in communication.
- Thanks to oral communication, there is an opportunity to review or correct messages that are not understood or misunderstood, as feedback is received quickly between the parties (İl, 2018:15).

The research aims to examine the postgraduate theses made in the field of Oral communication in Master and Doctorate degrees in Turkey. For this purpose, answers were sought to the following sub-problems/questions:

1. What is the distribution of research authors according to their genders?
2. What is the distribution of the studies according to the years?
3. How is the distribution of the studies according to the university and type of publication?

4. What is the distribution according to the method used in the studies?
5. What is the distribution of the studies according to the target group?
6. What is the distribution according to the institutes where the research was conducted?
7. What is the distribution of the research according to the department/discipline?
8. What is the distribution of studies according to the title of consultant?

## Research Model

This study, in which postgraduate studies on oral communication were examined from various perspectives, was conducted in the screening model. This model is a model that identifies a situation and concept that exists in the past and present as it is (Karasar, 2020:109). The data of this research was obtained by document analysis. Document analysis is the examination and analysis of documents, written sources, or books about the facts, events, or situations that are intended to be investigated (Yıldırım & Şimşek, 2013:217). Document analysis also includes written materials such as official correspondence, reports, written or audio recordings, and open-ended responses (Patton, 2002).

## Data Collection Tools

The data of the research were collected with the “Graduate Thesis Review Form” prepared by the researchers through a literature review. While this form was being prepared, expert opinion was taken from academics with different titles working at various universities in Turkey. While analyzing the contents of the data collected with the Graduate Thesis Review Form, features such as the degree of the theses, the gender of the thesis authors, the university, institute, and department in which they were made, the method applied in the research, the sample group, the title of the thesis advisor were taken into consideration. The theses, which were examined by content analysis, were first transferred to the Graduate Thesis Review Form by the researchers, then they were re-examined and the data were transferred to the computer environment. The evaluation of the data transferred to the computer by the researchers was compared and the consistency among the researchers was calculated. The consistency of the data was calculated using the Miles & Huberman (2015) agreement scale, and a 93% agreement rate was reached. According to Miles and Huberman (2015), a compliance percentage of more than 70% is considered reliable.

## Sample Group

The sample group of the research consists of 24 postgraduate theses on “oral communication” in the National Thesis Database of the Council of Higher Education in Turkey. Among the studies on oral communication, 18 Master's (f=75), 5 Doctorate (20,8), and 1 Medical Specialization (4.1) study constitute 24 studies. The postgraduate these included in the research are shown in Table 1.



Table 1. Thesis Type

Year of Writing	Thesis Type
2015	Ph. D
2021	MT
2019	MT
2019	MT
2018	MT
2018	MT
2014	MT
2013	MT
2013	MT
2012	MT
2008	MT
2004	MT
2022	MT
2022	MT
2019	Ph. D
2018	MT
2018	MT
2018	ES
2017	MT
2011	MT
2009	MT
2008	Ph. D
2018	Ph. D
2019	Ph. D

### Analysis of Data

The data of the studies in which the postgraduate studies on oral communication were examined were analyzed by content analysis and the results were shown in tables. The main purpose of content analysis is to explain the data with meaningful and understandable concepts. (Yıldırım & Şimşek, 2013, s. 259).

### Findings

In this part of the research, the findings and interpretation of the research are given.

Table 2. Gender

Gender	<i>f</i>	%
Male	4	83,3
Female	20	16,6
Total	24	100

When Table 2 is examined, it is seen that 20 (%83.3) of the authors of the graduate theses participating in the research are female and 4 (%16.6) are male. In the studies included in the research, it is seen that female authors are more than male authors.

Table 3: Distribution of Publication Types of Studies by Years

	2004	2008	2009	2011	2012	2013	2014	2015	2017	2018	2019	2021	2022	Toplam
Ph.D.	-	1	-	-	-	-	-	1	1	1	1	-	-	5
MT	1	1	1	1	1	2	1	-	1	4	2	1	2	18
EM	-	-	-	-	-	-	-	-	-	1	-	-	-	1

When Table 3 is examined, out of 24 postgraduate theses on “oral communication” in the National Thesis Database of the Council of Higher Education, 4 Master, 1 Doctorate, and 1 Medical Specialization were made in 2018 at most. It was determined that the least number of studies were conducted in 2004, 2009, 2011, 2012, and 2014.

Table 4: Distribution of Studies According to Universities

	MT	Ph.D.	EM	Total
Anadolu University	2	2	-	4
Gazi University	6			6
Hacettepe University	2			2
Ege University		1		1
Marmara University	1	1		2
Ankara University		1		1
Pamukkale University	1			1
İstanbul Aydın University	1			1
Dokuz Eylül University	2			2
Kırıkkale University	1			1
Yüzüncü Yıl University	1			1
Bayburt University	1			1
Necmettin Erbakan University			1	1
Grand Total				24

When Table 4 is examined, six of the 24 postgraduate theses on “oral communication” in the National Thesis Database of the Council of Higher Education were made at Gazi University and the Master's degree. It was determined that two postgraduate studies were carried out at Anadolu, Dokuz Eylül, and Hacettepe Universities. In addition, it is seen that two studies were carried out at Anadolu University, and one study was carried out at Ege, Marmara, and Ankara Universities.

Table 5: Distribution of Studies by Institutes

	MT	Ph.D.	EM	Grand Total	%
Educational Sciences Institute	15	2		17	70,83
Social Sciences Institute	3	3		6	25
Health Sciences Institute			1	1	4,16

When Table 5 is examined, a total of seventeen studies (70,83%) in both master's and doctoral degrees were conducted at the Institute of Educational Sciences. It is seen that three master's and three doctorates (25%) were conducted at the Institute of Social Sciences, and one study in a medical specialty (4%) was carried out at the Institute of Health Sciences.

Table 6: Distribution of the Studies According to the Main Science/Branches of Science

	MT	Ph.D.	EM	%
Department of Turkish Education	4			16,6
English Language Teaching Department	6			25
Department of English Language Teaching	3			12,5
Department of French Language Education	4	1		20,8
Department of French Language Teaching		1		4,1
French Language and Literature	1			4,1
Department of Slice Science		1		4,1
Communication Management Department		1		4,1
Department of Public Relations		1		4,1
Department of Anesthesiology and Reanimation			1	4,1

When Table 6 is examined, it has been determined that 24 postgraduate studies on “oral communication” in the National Thesis Database of the Council of Higher Education were carried out in ten different Departments. In this context, it is seen that most studies are done in English Language and Education at 25%, French Language Education at 20.8%, Turkish Education at 16.6%, and English Language Teaching at 12.5%. In addition, it was determined that only one study was carried out in the Department of French Language Education, French Language Teaching, Linguistics, Communication Management, and Public Relations.

Table 7: Distribution of Studies According to Methods

	MT	Ph.D.	EM	%
Qualitative	3	3		25
Quantitative	8		1	37,5
Mixed	4	2		25
Method Unknown	3			12,5

When Table 7 is examined, the quantitative method (37.5%) was preferred the most in 24 postgraduate studies on “oral communication” in the National Thesis Database of the Council of Higher Education. In addition, it is seen that the studies conducted with qualitative and mixed methods are equal to each other (25%). The method was not specified in three studies (12.5%) conducted at the master's degree.

Table 8: Distribution of the Studies According to the Sample

	MT	Ph.D.	EM
Student	2694	76	
ÖğretmeTeacher	20		
Academician	43	10	
Manager		10	
Other (Patient)			50
Document Analysis	Turkish Language Association e-Dictionary 2196 proverb, Course Books		
Unspecified Sample	3 Study	1 Study	

When the table is examined, it is seen that the sample group of the studies consists of higher education students, teachers, academicians, managers, patients, and TDK e-dictionary and textbooks. The selected sample group generally consists of higher education students (2770). It has been determined that the least number of studies have been done on teachers and administrators, and both studies have been done on written documents.

Table 9: Distribution of Studies According to the Title of Consultant

	MT	Ph.D.	EM	%
Assistant Professor	8	1		37,5
Associate Professor	7	1		33,3
Professor	3	3	1	29,1

When Table 9 is examined, it is seen that of the 24 postgraduate studies, eight of the postgraduate studies and one doctoral study were carried out by the advisors with the title of assistant professor (37.5%). In addition, it is seen that postgraduate studies are carried out by consultants with the title of Associate Professor at 33.3% and Professor at a rate of 29%.

## Conclusion and Discussion

In this study, in which postgraduate theses on “oral communication” were examined, 24 postgraduate theses in the National Thesis Database of the Council of Higher Education and open to access as full text were examined. As a result of the examination, the following conclusions were reached.

The studies examined consisted of 18 master's, 5 doctorates, and 1 medical specialization study. In these studies, it was determined that most studies were carried out in the master's degree and that there were more female authors than male authors. This result of the study is similar to the results of the study by Ünal and Arık (2016) and Gündoğmuş (2018) in which they examined the distribution of thesis authors according to their gender. The studies on “oral communication” in the National Thesis Database of the Council of Higher Education were prepared in 2018 at most. It was concluded that the least number of studies in this area was conducted in 2004, 2009, 2011, 2012, and 2014.

When the studies on oral communication in the field of master's and doctorate are examined, most studies were prepared at Gazi University for the master's degree and Anadolu University for the doctoral degree. It was concluded that the least number of studies were carried out in Kırıkkale, Yüzüncü Yıl, and Bayburt University. This result of the study shows parallelism with the result of the study conducted by Akaydın and Çeçen (2015). Most of the 24 postgraduate theses (70.83%) on “oral communication” were prepared at the Institute of Educational Sciences. It is seen that three master's and 3 doctoral studies (25%) in the Institute of Social Sciences and one study in the degree of specialization in medicine (4%) were prepared at the Institute of Health Sciences. It was concluded that the studies were mostly carried out at the Institute of Educational Sciences. When the studies on oral communication in the field of master's and doctorate are examined, most studies were prepared at Gazi University for the master's degree and Anadolu University for the doctoral degree. It was concluded that the least number of studies were carried out in Kırıkkale, Yüzüncü Yıl, and Bayburt University. This result of the study shows parallelism with the result of the study conducted by Akaydın and Çeçen (2015).

Most of the 24 postgraduate theses (70.83%) on “oral communication” were prepared at the Institute of Educational Sciences. It is seen that three master's and 3 doctoral studies (25%) in the Institute of Social Sciences and one study in the degree of specialization in medicine (4%) were prepared at the Institute of Health Sciences. It was concluded that the studies were mostly carried out at the Institute of Educational Sciences.

24 postgraduate studies on “oral communication” were carried out in ten different Departments/Sciences. In this context, it was concluded that most studies were conducted in English Language and Education at 25%, French Language Education at 20.8%, Turkish Education at 16.6%, and English Language Teaching at 12.5%. The least number of studies were carried out in the Department of French Language Education, French Teaching, Linguistics, Communication Management, and Public Relations at the doctoral degree.

In the 24 postgraduate studies on “oral communication” in the National Thesis Database of the Council of Higher Education, it was concluded that the quantitative method was preferred the most, and the studies conducted with the qualitative and mixed methods were equal to each other. In addition, the method was not specified in three studies conducted on the Master's degree.

This result obtained from the study shows parallelism with the results of the studies conducted by Akaydın and Çeçen (2015) and Varışoğlu, Şahin, and Göktaş (2013). In the 24 postgraduate studies on “oral communication” in the National Thesis Database of the Council of Higher Education, it was concluded that the quantitative method was preferred the most, and the studies conducted with the qualitative and mixed methods were equal to each other. In addition, the method was not specified in three studies conducted on the Master's degree. This result obtained from the study shows parallelism with the results of the studies conducted by Akaydın and Çeçen (2015) and Varışoğlu, Şahin, and Göktaş (2013).

When the studies are examined in terms of the sample group, it is seen that the studies are composed of university students, teachers, academicians, administrators, patients, and the Turkish Language Association e-dictionary and textbooks. It was concluded that the majority of the postgraduate theses examined consisted of higher education students, and the least studies were done on teachers and administrators.

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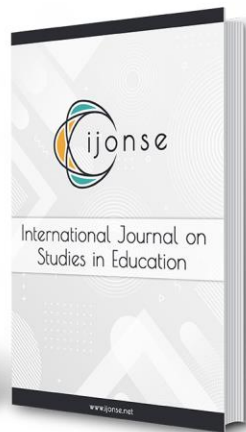
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