

# **Educational Practices during the COVID-19 Viral Outbreak: International Perspectives**

**Editors**

**Dr. Ismail Sahin**

**Dr. Mack Shelley**



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## Preface

The collection of chapters in this special book examines educational practices during the COVID-19 viral outbreak. This special book brings together a variety of studies and scholars in an effort to exemplify how the COVID-19 shapes the learning and teaching processes in different countries. The twelve chapters selected for this special book present diverse vantage points on the circumstances that influence students, teachers, parents, and schools. The focus of this book is on education, but in the context of broader global effects.

Education processes, practices, and outcomes in the time of COVID-19 do not occur in a vacuum. Disruptions to the normal processes and practices of education associated with the novel coronavirus are directly tied, among other considerations, to the societal risk of having students congregating in close quarters, the economic problems encountered by their families, difficulties of food availability, and loss of family cohesion due to death, illness, and lack of proximity and diminished support structures due to social distancing. Any return to “normal” education opportunities and the hope for improving (or at least sustaining) positive student outcomes likely will be impossible without a vaccine that is available worldwide at low or no cost, together with effective repair of the global economy, and the ability of students and adults to engage in larger-group activities. Until that situation becomes reality, many children will be unable to learn effectively and will not be equipped to realize their potential.

The first chapter, titled “A Methodology for Retaining Student Learning during the Pandemic,” by Howard S. Kimmel, John D. Carpinelli, Gale T. Spak, and Ronald H. Rockland, provides a review of the effect of the COVID-19 pandemic on teaching and learning at institutions of higher education. This chapter especially focuses on the transition from face-to-face classes to remote learning and analyzes different types of learning as total face-to-face, total remote, and hybrid. In this chapter, an example of best practice is also provided from a United States university.

The second chapter, by Serife Yucesoy-Ozkan, Feyat Kaya, Emrah Gulboy, Dilara Ecem Altun, and Nuray Oncul, is a very detailed review of general and special education practices during the COVID-19 viral outbreak in Turkey. The review consists of different perspectives from in-service and pre-service teachers. It also summarizes the measures being taken in

higher education and the experiences of families. It involves recommendations and measures being taken for normalization.

The third chapter, titled “The Use of Telehealth and Telemedicine in Medical Education: Effects of COVID-19,” by Amr Maani, nicely covers the topics of telemedicine, telehealth, and distant medicine. Maani, from the United Kingdom, describes how telemedicine helps the delivery of high-quality healthcare to patients at a distance during the pandemic. He argues that telemedicine contributes greatly to medical education and should be used during clinical rotation.

The fourth chapter, “Impact of COVID-19 on Education in a Spanish University: What Should We Change?,” by Carmen Alba-Linero, Silvia-Natividad Moral-Sanchez, and Paloma Gutierrez-Castillo, summarizes the effects of the COVID-19 pandemic on University education in Spain. This chapter features the results of a questionnaire-based study with 326 students of the University of Malaga. A variety of areas of interest (education, engineering, and medicine), such as the accessibility to technology, the effect on the students’ motivation, or the change in teaching methodology and evaluations, are measured in the study. The findings especially show that some significant problems exist because of the quick transformation of the educational system from face-to-face to online.

The chapter titled “The Opinions of Academicians on Distance Education during the COVID-19 Pandemic,” by Ebru Yılmaz İnce, Ahmet Kabul, and İbrahim Diler, reports the results of a research study on Turkish faculty members’ beliefs about distance learning during the COVID19 pandemic. For the participants, distance education can prevent students from socializing and the role of a teacher thereby becomes critical in distance education.

In the next chapter, Kado, Nim Dem, and Sonam Yonten report students’ perceptions on the effectiveness of Google Classroom as an online learning management system (LMS) in the wake of COVID-19 in Bhutan. They highlight that Google Classroom is an effective online learning management system. There is no gender difference in student perceptions regarding the efficiency of the Google Classroom LMS. They emphasize that the sudden transition from face-to-face traditional instruction to remote learning requires the successful integration of digital education tools.

Another chapter, titled “Role of Parents in Early Educational Childhood in Education Technology in COVID-19 Outbreak,” by Karisma Erikson Tarigan and Margaret Stevani, involves 43 Indonesian parents’ perspectives on educational technology in early childhood during the COVID-19 outbreak. The authors highlight different activities to promote online teaching.

In Chapter 8, Anas Sofi and Mohamed Laafou, from Morocco, analyze the effect of using online learning platforms in teaching during the COVID-19 pandemic. They state that learning by mobile technologies such as the Google Classroom platform is effective and an important way of integrating technology in teaching and learning. They further emphasize that using such technologies in education is related to students' success, motivation, and scientific thinking skills.

The next chapter, titled “The Perception of Teachers on Unlocking Technology by Redesigning Education System during and after COVID-19 Pandemic Lockdown,” by Smriti Mathur and Akanchha Singh, reports teacher satisfaction with unlocking technology for education purposes during the COVID-19 pandemic. In terms of bringing flexibility, a better-quality future, and career improvement, unlocked technology for education purposes is found to be beneficial. The researchers state that teachers’ satisfaction levels positively affect their views on continuation of an unlocked technology future in education.

In another chapter, Gokuladas V.K. and Baby Sam S.K., from Oman, provide a strategic approach for the successful reopening of schools post-Covid-19 lockdown. They list the challenges and responsibilities during school reopening following COVID-19. They argue that school reopening post-COVID-19 can be successful only if all the stakeholders fulfill their own responsibilities towards implementation of the proposed strategic plan.


In their chapter, Ahmed Al Rawashdeh, Muhammed Syam, and Derar Serhan focus on transitioning from face-to-face to online learning. They report that students from the United Arab Emirates University have a positive experience using the online format. The participants mention that they feel confident using the LMS for remote instruction and express that it provides them with more interaction than the face-to-face modality. They find the online format to be flexible, useful, and helpful.

In the final chapter, titled “Returning to Campus during the COVID-19 Pandemic: Perceptions of Calculus Students in Florida,” by Barry J. Griffiths, the results of a qualitative study are reported. It analyses why some students at the University of Central Florida choose face-to-face sections of calculus rather than online alternatives during the COVID-19 pandemic. It further explores their motivations, their concerns about the virus, and how the enforced experience of online instruction affects their decision.

In summary, the twelve chapters cover the topic of educational practices during the COVID-19 viral outbreak. The chapters are authored by scholars from 10 different countries: the United States, Turkey, the United Kingdom, Spain, Bhutan, Indonesia, Morocco, India, Oman, and the United Arab Emirates. The chapters provide readers with a wide range of international perspectives on educational practices during the COVID-19 pandemic. The reported studies involve research findings from students, teachers, parents, and school administrators at different levels of students’ education experience.



## CHAPTER 1: A METHODOLOGY FOR RETAINING STUDENT LEARNING DURING THE PANDEMIC

**Howard S. Kimmel** , **John D. Carpinelli** , **Gale T. Spak**   
**Ronald H. Rockland** 

### Chapter Highlights

- This chapter provides a review of the impact of the COVID-19 pandemic on the teaching and learning at higher education institutions, the challenges faced by educators, and approaches to dealing with the impact on the educational process of higher education.
- The chapter deals with the transition from face-to-face classes to remote learning, with a focus on engineering education.
- The transition involves the methodology for the creation of effective classroom lessons that align specified learning outcomes with learning experiences and measures of student achievement for the physical classroom that can be adopted for remote learning.
- The different modes of learning that are considered include total face-to-face, total remote, and hybrid.
- Synchronous and asynchronous modes of learning and appropriate technological platforms are considered.
- Approaches for providing students with hands-on experiences in the engineering laboratory are addressed.
- An example of best practice is provided.

## Introduction

As our educational systems, K-12 and post-secondary education, have had to quickly shift from the face-to-face learning in a classroom or laboratory/studio setting to a virtual or distance learning setting, teachers/faculty had very little time to plan and even less clarity about what happens next (Burke, March 9). It has become a challenge to educational institutions, higher education as well as the K-12 sector, since making the transition from in-person teaching and learning to an online environment is a big step. This transition has served to highlight both the potential and the limitations of educational technology.

## The Challenges

This switch to virtual education has created challenges to both teachers/faculty and students (Korkmaz & Toraman, 2020). Distance learning, for many teachers and students, will not appear to be as effective as face-to face learning. To quote the President of a University in our state at a State Senate Higher Education Committee Hearing, “Because the fact of the matter is you cannot function as a university with remote learning. It is not possible.” (Clark, 2020, May 20). The sudden movement of instruction during the spring 2020 semester from the traditional classroom to the virtual classroom included other related challenges. Students had received instruction in the traditional classroom during the first half of the semester and virtual learning in the second half of the semester. As a result, the following issues arose:

1. Would the students, after the transition to virtual learning, have acquired the skills and knowledge specified by the learning outcomes at the beginning of the spring semester?
2. How will grades be assigned for the students? What grading policies will be effective that are able to capture student learning accurately, and that reflect the achievement of the knowledge and skills specified for the students at the beginning of the semester?

These issues are relevant, not only to post-secondary students, but also to the high school graduating seniors who may be going on to college or even the workforce. Students may be returning to the classroom, or pursuing a career from very different learning experiences due to the mix of face-to-face and remote learning. Educators will have difficulties in closing learning gaps without understanding the full nature of these potential learning shortfalls: where students could be lacking skills and/or knowledge that will be needed to learn before they are ready for the following courses (Kuhfeld & Tarasawa, 2020, April; Kuhfeld, et. al.,

2020, May). Schools will need to conduct comprehensive benchmark testing to identify how the mixed learning environments have affected student learning and plan for remediation.

Prior knowledge is critical towards success in any course (Hailikari, et al., 2008). Completing a prerequisite course should mean that the students have acquired the skills and knowledge needed for success in the next course. And completing the sequence of courses within a degree program should indicate that the students have acquired the essential knowledge, skills and attitudes required by graduates of the program. Unfortunately, some instructors may have misconceptions about “flexibility” when it comes to their assessments and in the change to virtual instruction may “reduce expectations” for learners. Hence the students may not have the requisite skills/knowledge for success in the following courses. Students must understand how future courses or their career path after graduation require the skills and knowledge to be acquired in their current courses. They will need specific support in the following courses, perhaps through reviewing skills and content that normally would have been covered in the previous courses. High school seniors could begin the next school year having lost as much as a third of the expected progress from the previous year. This can mean that there will be more underprepared students entering college and university classrooms and the placement of students into appropriate courses, such as mathematics, and science will be critical. Earning college credit while still in high school could become problematic. Dual enrollment programs, usually one-year college courses taught at the high school, probably lost at least one-quarter of the course content, leaving students unprepared for the following college courses.

The Advanced Placement (AP) courses have become problematic during this period. The AP took place this year in a very different format than previous exams (Halford, 2020, May 11; Wan, 2020, May 14). The exam, which could earn students college credit if they score well, was typically about a 3 hour exam, consisting of a set of multiple choice responses as well as several problems requiring long-form written answers submitted on paper, and is taken under supervision at school. This year, students have taken the exam at home in an online format. Further the exam has been shortened to 45 minutes, consisting of two questions with long-form answers, and students can consult books and notes—but not people—during the exam. The material that the exam covered has been truncated to account for the shortened time students were in school. How can students who complete the AP exam receive full college credit for a course which did not give the students the opportunity to demonstrate that they

have acquired the skills and content of the college course which would be required for students to succeed in further STEM (Science, Technology, Engineering & Mathematics) courses?

Little, if any consideration, appears to have been given to the impact on student learning, where post-secondary institutions, as well as the K-12 sector, have been modifying grade policies for the spring 2020 semester. As a result of the sudden movement to remote learning in the middle of the semester and the resulting loss of instructional time for about half of the semester, many educational institutions have modified their grading policies to pass/fail (i.e., P/F) grades rather than the A through F scale (Schwartz, 2020, June; Watanabe, 2020, March 27). The “P” or “F” grade would then be based on the simple question of if the student performed well enough to pass a class. As a result, a student earning a grade of 60 would receive the same final grade as a student earning a grade above 90. But what does that mean for the student earning a grade of 60? Has the student demonstrated the acquisition of skills and content specified for the course so that the student has the pre-requisite for the next courses in his/her degree program? Or will the student have fallen behind and have to retake the classes or receive additional support?

### **The Instructional Issues**

Many instructors have had to deal with unfamiliar technologies, while adapting their instruction for remote learning to continue to support their students’ academic needs. Many issues must be resolved, such as:

- How to plan and design an online course?
- How to identify best practices for synchronous and asynchronous learning and the reasons you would use one vs. the other?
- How to prepare students for online learning?
- How to engage with students remotely?
- How to assess students remotely?

There have been several publications recently to provide guidance to faculty on how to switch from the classroom to remote instruction (Kelly, 2020, March 13; Schaffhauser, 2020, March 18; Arnaud, 2020, March 30).

The roles of participants in a classroom often are defined as teachers teaching and students learning. But the reality is that many students may not have an understanding of some specific concepts. In the classroom, a good teacher can usually understand what skill or knowledge concept about which a student may have questions, which can then be explained from a different perspective. This is a more difficult issue in a remote setting; where the students may not be able to get the support and learning they need.

The issues for STEM faculty are even more complex (De Jong et al., 2013). Science and engineering require hands-on laboratories. Further, hands-on engineering involves students working in teams in the application of the Engineering Design Process to solve real-world open-ended problems. Thus, engineering faculty has to find a source of engineering activities, which can be adapted to virtual learning. Then, a process is needed that will allow students to work in teams virtually. The existence of video conferencing systems can address this challenge by allowing instructors to pre-assign, or randomly assign students, into teams that will allow peer-to-peer and peer-to-instructor discussions in the virtual environment. The instructor can monitor the discussions and activities of the teams, ensuring that the students stay on task, provide feedback and guidance as necessary, facilitating the integration of both science and mathematics content with engineering content, and assess the progress of the students and the development of their skills and knowledge in the content.

As an example, once the students have been assigned into teams, they can work virtually, where, as a class, the teams can go through the engineering design process, while brainstorming and discussing the specifications and constraints that must be considered prior to developing engineering design solutions. Then each team can apply the acquired skills and knowledge to solving real-life engineering challenges, during which students would have opportunities to compare, contrast, and critique their different designs and refine their own designs. Within each team, students work individually to develop and test their own design solutions, or within the team, each member would have their own role. Within each team, students would then share online their solution and help each other to improve each design so that the team can decide which one is the best option. This activity should simulate for the students a student-centered classroom environment. The virtual learning scenario described here would be applicable only to K-12 engineering or technology courses or lower level undergraduate engineering courses. Upper level undergraduate engineering courses have more complicated issues, such as special equipment, etc., which would require different

approaches to providing hands-on experiences for the students. There are several different modes of instruction that can be employed for all undergraduate engineering laboratory courses. Some are not suitable for specific courses, but each can be used somewhere in the undergraduate curriculum.

### *Face to Face Laboratory Courses*

This is the traditional model for laboratory courses. Students come to the lab and perform experiments using equipment present in the lab. However, with many colleges forced by the pandemic to use mostly or entirely remote instruction, this may not be an option for many universities.

### *Hybrid Model*

This model involves a split of laboratory groups, in which one member of each lab group is physically present in the lab and the other students are remote; all students are in communication with each other as the laboratory experiment is performed. The student physically present takes measurements as in the face-to face-lab; after all, the student is really doing the experiment in the actual room. The other students discuss the experiment with the physically present student and each other, guiding the taking of measurements and discussing and analyzing the data. This is suitable to courses with physical presence limited to accommodate social distancing. For example, a class might be divided into lab groups of three students each, and the students rotate being physically present in the lab each week. The latter point is important. To achieve learning outcomes, it is necessary that each student be present and physically performing the laboratory experiments at least part of the time during the semester.

### *Remote Access Laboratory Courses*

In this model, students access equipment physically located in the lab room to take measurements remotely. This requires equipment to be accessible from outside the physical classroom, typically through the Internet via a web browser or dedicated software. The equipment may be accessed directly via the Internet, if equipment can be configured as Internet of Things, or through an interface that is Internet-accessible. Students do not actually



connect the equipment used to take readings, but recording readings and analyzing data are largely the same as in a face-to-face laboratory course. Collaboration among members of a laboratory group requires additional communication capabilities. Another model of remote access is to make use of videos in which the instructors record short video segments showing measurements being taken. Students then process data as if they had taken the measurements themselves.

### *Perform Experiments Remotely*

In this model, students actually perform experiments outside of the lab. For example, in the Electrical and Computer Engineering version of the Freshman Engineering Design course taught by one author, students purchase a parts kit that they use to build simple circuits. With the addition of a cheap power supply and multimeter, students can perform most of the experimental work anywhere. This can work for courses that do not have significant equipment requirements, but obviously won't work if the course requires expensive equipment that is located solely in the lab.

### *Virtual Laboratory Courses*

As distinguished from remote access laboratory courses, students do not work with physical equipment. Instead, they use software to simulate the functioning of a system under analysis, recording and processing measurements as they would in the other modes of instruction.

### **Effective Instruction**

Good online instruction begins with good instructional methods. Usually, what works in the face-to-face classroom will work in remote and hybrid settings also. Thus, lesson planning could be done first for the face-to-face classroom. Then it is necessary to consider what aspects of the lesson would need modification to adapt for the remote or hybrid setting.

Many instructors have difficulty measuring student progress and designing instruction to maximize it in a face-to-face classroom. In general, they fail to provide students with specification of learning expectations (i.e., learning outcomes) for their course, how they will be acquired, and how the acquisition of learning will be measured (Weimer, 2018, May 2).

Determining whether students have acquired defined skills and knowledge requires that faculty provides specification of the skills and knowledge to be acquired by students, performance indicators and assessment of student achievement (Kimmel, et. al., 2011; Kimmel, 2019). Setting these performance indicators for learning requires faculty to decide:

- What knowledge and skills will students be learning (criteria)?
- What experiences will be used to ensure that students learn (instruction)?
- What evidence will be gathered and used to ensure that students learn (assessment)?

Providing this teaching-learning-assessment cycle to students becomes even more critical in a virtual classroom. Successful implementation provides the pathway for the establishment of a quality remote learning experience for the students, and practical methods to approach assessment for the online learners. This alignment allows for the design of assessments which can then then provide feedback to both students and instructor as to the level of achievement of specified skills and knowledge by the students.

.Outcomes should be student-centered and have four elements:

- Action or Behavior, which are verbs or phrases describing an observable performance;
- Specific Content Skill or Knowledge;
- Measures of achievement (i.e. performance indicators);
- Student Work Product or the needed documentation to evaluate the acquisition of that skill or knowledge.

The alignment requires the conversions of outcomes into measures of achievement (i.e., performance indicators) that provide feedback regarding the achievement of each outcome by the students. Data which are collected related to performance indicators should focus on improving student achievement of specified skills and knowledge. Proper alignment allows for connecting classroom practice with outcomes, since

- Outcomes are meant to define what students should know (content) and be able to do (skills).
- Outcomes must state desired skills and knowledge in terms of measurable student behavior.
- Assessment must measure the student achievement of the skills and knowledge defined by the learning outcomes. Outcomes may be achieved in a variety of ways.

## Assessment Issue

As faculty move from the face-to-face classroom to the virtual classroom, the issue of assessment becomes more difficult to address (Tobin, 2020, March 25; Korkmaz & Toraman, 2020). In addition to the challenge of facilitating student learning, instructors must be able to provide a means to measure student learning and to assign grades to the students. The learning experience can be synchronous or asynchronous in nature. Regardless of the learning environment, assessments must be designed that maximize the likelihood that the students are able to demonstrate their learning accurately by achieving specifying skills and knowledge (i.e., learning outcomes). Assessments can include several different methodologies, and must be able to provide written feedback for students. Unfortunately, for a good many instructors, their assessment of students focuses on the use of testing to determine what they have learned. And the primary use, if not the only use, of test results usually is to provide the final grades for the students. Also, while instructors can be flexible when it comes to assessments, the flexibility should not be used to “reduce expectations” for learners.

In the classroom, an instructor can use traditional classroom assessment techniques to gather information and examine students’ learning of key concepts or skills from lectures, class discussions, study of a textbook or other sources of information, or working through a common learning assignment by all students in the classroom. The results would be a determination of the skills and knowledge that the students have acquired as a result of the time they have spent in class, regardless of the learning environment. In addition to demonstrating and documenting student achievement, assessments should also serve as a feedback to the students so that they know their achievements and weaknesses. Thus, the instructors should be able to assess and reflect upon real-time student learning, so that they can effectively provide feedback to the students and adjust their teaching based upon what the students have actually learned.

This is usually accomplished in a face-to-face classroom. It could become a difficult task in a virtual environment where consistency in the assessment process is even more complex. Assessments should draw from multiple ways of demonstrating knowledge. The instructor must be able to determine if, and how, assessments used in traditional classrooms can be utilized remotely. The learning experience for online students would have both synchronous and asynchronous activities, In addition to testing, other forms of assessment could include

discussions, short and long term projects, portfolios, papers, etc. (Crosslin, et. al., 2020). Student discussions can be viable assessment tools of both traditional and online courses (Sherry, 2020, April). And online discussions have the advantage that the format can allow for more discussion than face-to-face courses. Instructors would still be able to provide ongoing feedback at different points in the discussions. Online, students would have much more “think-time” to craft responses, since there should be no need to have time limits on discussions. Finally, students can speak to each other as well as to the instructor, and recordings of the discussions can accommodate students whose schedules may not allow them to attend the real-time events as well as serve as an assessment tool for the instructor.

### **Synchronous vs. Asynchronous Learning**

Good online instruction begins with good instructional methods and the availability of the different technology tools that power synchronous vs asynchronous learning may require different tactics and techniques. There are two major categories of instructor-led and semester-based remote learning: (1) entirely synchronous or live-online learning, using such platforms as Zoom, WebEx, and Microsoft Teams; and (2) entirely asynchronous or “anytime” online learning using such platforms as Canvas and Blackboard. Each of these two categories has many combinations that have led to the creation of hybrid, blended or hylflex scenarios, which, by definition, require some proportion of learning to occur in physical classrooms with actual instructors. As pointed out by Maloney and Kim,” there are now multiple ways to combine and deploy these two 2 major categories” (Maloney and Kim, 2020). While there is a long history of higher education offering learners the opportunity to study online, up until recently the asynchronous or anytime instruction has been the most prevalent mode. Thus, the pedagogy associated with it has been modified over the years to produce learning experiences demonstrated to be equal in quality to that achievable in a physical classroom (Hiltz & Goldman, 2004). But with the advent of COVID-19, there has been a rapid transition to live online synchronous classes. One instructional issue related to the two main remote modes of learning is that the different technological platforms required by each can uniquely constrain the ways in which faculty can provide instruction to their students. The content may be the same regardless of whether the mode of delivery is face-to-face or remote, but it must be presented/prepared differently depending on which of these modes are being used.

As basic definitions, entirely synchronous or live-online remote learning refers to “education in which the students have the opportunity to learn and interact at the moment (i.e., ‘live’) with their teacher and peers.” (Delgado, 2020, June 23) On the other hand, entirely asynchronous remote learning is a type of group learning that relies on the instructor having designed in advance how to integrate his/her or others written words, videos, materials and educational resources into a class before it is ever conducted virtually. That is, the students learn the same content created by the instructor, but each student has some control over the time, place, and pace. However, it is not entirely self-paced because it is led by an instructor who typically expects assignments to be completed week by week. Despite the differing times of the day or night that an individual learner is able to log-on to a class, he/she is still able to interact and stay abreast of what the teacher and classmates are doing due to the embedded archiving feature in the technology platform that supports this anytime/any place category of remote learning. There is also a difference between the two modes as to the amount of time the instructor needs to put into the course. If the instructor has given face-to-face classes for the same course, technically synchronous is simply simulating that instructor-led discussion remotely. An asynchronous class involves a lot more work – the thought as to how students can navigate each week, the creation of either self-made videos or links to other materials, and the need for “discussion groups” to try and engage students, even asynchronously.

In summary, the advantages and disadvantages of each modality should be listed. Advantages of synchronous learning include:

- Less prep time for an instructor, especially if he/she has taught the class previously.
- It is a familiar transition, since the instructor may “feel” that he/she is still in class.
- The concept of social distancing is non-existent, since each participant is remote from the others.

The primary disadvantage of synchronous learning is in terms of the technology, the Internet speed, and most of all the students have a fixed time. The primary advantage of asynchronous learning is the fact that students can decide when to study, when to do the homework (within the confines of an instructor’s constraint) and because there are many resources on the learning management page, students can review materials again and even go ahead. The disadvantages of asynchronous learning to the students are that they may not feel like they

are attending school, and that they are in charge of their learning. Not having to go at a specific time to class can be a problem for the procrastinator. When adapting to online instruction with the utilization of technological platforms, the support from Instructional Designers, when available, in creating effective remote learning classes could be key to the achievement of specified learning outcomes by students. These professionals, possess a wealth of knowledge about the differing capacities of each available technology platform, applicable apps and tools, and therefore are the ones who can guide instructors on how to best utilize a particular learning platform in their online classroom.

On the most basic level there are several major constraints imposed by the uniquely different platforms needed to power the two major remote learning categories so that instructors can provide the course content to their students. For example, with Zoom, so that faculty can focus on “teaching” their live-online classes, they often find it a great benefit to have a “navigator” or pilot” operating in the background to assist them with technical tasks/chores such as aggregating questions coming in during the class via “chat” and “Q&A” features and organizing and curating “breakout rooms” which are so useful in this platform for group discussions and project work. If possible, a Teaching Assistant or Instructional Design office staffer can be assigned to take care of these tasks. Otherwise, the instructor may assign one student, or rotate the assignment among all the students in the class to handle this task. This may also be a way for students to actually enhance their learning, and perhaps acquire new organizational skills,

As another basic example, for a WebEx class to yield successful learning outcomes, stable Internet and simultaneous access must be available to both parties—the educator and the students—and equally importantly, a student ideally should be located in the same time zone as his/her teacher. Otherwise, while recordings can be made of the live-online class, such subsequent passive viewing limits the learner’s ability to interact and obviously participate. Asynchronous platforms such as Canvas have a related but different constraint. Simultaneously stable internet access is not necessary given the nature of this mode of remote learning, but there are likely to be issues pertaining to delays in receiving help, answers, etc. That is, a student who poses a question or seeks to engage in discussions by logging-on at 10 pm may have to wait perhaps 24 hours before the teacher logs-on to answer questions or before fellow classmates chime in and add their comments and contributions to assigned group projects. Taking these platform peculiarities into account, instructors may need to



develop different types of projects and assignments.

### An Example of Best Practice

There are a few best practices that are related to asynchronous learning, based on one of the author's experiences with an upper division engineering course. They are:

- Each lesson should have an introduction, whether video or document, that summarizes the material dealt with in that lesson, how it relates to prior and future material, and the importance of that material. This way, students get a perspective of what they will be reviewing and how course objectives are being achieved.
- Videoing an entire lecture is not the best way to get material to students, especially since the video will be rather long. An alternative approach is to break up a lecture into a series of learning objects, or learning chunks, where the video is ten minutes or less (Bradley, & Boyle, 2004, December). If a student understands, perhaps by studying the textbook first, one of the learning objects, then the student can skip that video and go on to the next video. The other advantage of videos is that the students can replay the video, where it is not possible in a traditional lecture.
- The use of learning objects requires an assessment of the learning object as well as student acquisition of specified learning objectives or outcomes (Kay & Knaack, 2008). Learning objects are designed to be an independent and self-standing unit of learning content that must also contain a learning objective, a learning activity and an assessment. Assessment methods of student learning have already been described. But the quality of the learning objects must also be evaluated, especially since they will probably be reused. The evaluation of the learning objects should demonstrate how it supports and enhances student learning.
- Students should be told to take notes while watching the videos, since the process of listening and writing notes enhances comprehension (King, 1992).
- The ability to provide video, web links and other external material along with a textbook can help in the learning process for the student, but the instructor should provide a “roadmap” as to a suggestion on how to best use the material. Students will find what method works for them, but they do need help to start using the material.
- If links are provided to websites for additional materials, make sure that over a period of time that the links are still viable.

- Provide a method of interaction, such as chat rooms, for students to interact with both their peers and the instructor. Sometimes students are reluctant to post something, so an alternative would be to encourage them to email the instructor. If the question could help the entire class, then the instructor could post the question and answer to the class, perhaps leaving off the name of the original student
- In an engineering course, typically concepts are introduced by virtue of an example or two. The learning objects should deal with simple examples to introduce the concepts. One way of dealing with more complicated examples is to develop “Challenge Problems”, which are harder problems in a specific topic area. There are self-grading problems, and students can listen to the initial part of the video that deals with the problem, stop the video, try to solve the problem, and then compare their solution to the rest of the video. If students do not get the correct answer or method, they can try again in one to two days.
- In most lessons, especially in the STEM area, there is a lot of material for the student to digest. Instructors can create a “Quick Guide” that summarizes, in less than a page, the material. This would allow the student to quickly read the guide, get an overview of the lesson, and then look at all the material.

### Reopening Higher Education

Colleges and universities are now dealing with reopening campuses, as they consider possible learning models and plans for instruction (Burke, 2020, June 9; Hooker, 2020, July 15). It appears to be almost a given that many, if not most, educational institutions will continue some level of remote learning this fall. What needs to be part of the consideration is how they will be able to ensure that students will have the opportunity to acquire all skills and knowledge from each course that is required in the pursuit of a degree and future career. And that appropriate assessment practices will be able to demonstrate that the students have acquired those skills and knowledge specified by the learning outcomes of the course.

Models being considered include in-person, remote learning, or some hybrid model. Remote learning could be synchronous, asynchronous, or a combination of them. The hybrid model allows for a combination of in-person learning supplemented with virtual learning and can have different approaches. For example,

- Students could have face-to-face classes for part of the semester, and remote learning for part of the semester. This approach also provides the opportunity for small-group collaborations in which teams of students can begin work on a project together in the classroom and then continue to work on the project remotely.
- For a given class, some of the students are in the classroom with the instructor and some of the students are doing remote learning synchronously. In this approach, learning could be consistent for students in the classroom and those in the virtual classroom (Schaffhauser, 2020, June 3).

Regardless of the differences between the different modes of learning, students must be able to achieve the specified skills and knowledge to be acquired in the course, and appropriate assessments will be used to demonstrate student acquisition of those skills and knowledge, and providing feedback to both the instructor and the student.

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## CHAPTER 2: GENERAL AND SPECIAL EDUCATION PRACTICES DURING THE COVID-19 VIRAL OUTBREAK IN TURKEY

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Dilara Ecem Altun , Nuray Oncul 

### Chapter Highlights

- The purpose of this chapter is to assess the impact of the COVID-19 pandemic on general and special education in Turkey.
- In this chapter, Turkey's general and special education practices during the COVID-19 viral outbreak are described.
- The chapter aims to describe the distance education activities taking place in K–12, explain the roles of the Ministry of National Education (MoNE) during the pandemic, and examine the impact of COVID-19 on students with special needs.
- It intends to describe the situation and explain the measures being taken in higher education, reveal the experiences of families, and investigate the situation of in-service and pre-service teachers.
- It also explains the decisions and measures being taken for normalization, addresses a number of additional concerns, and suggests a number of future recommendations.

## Introduction

The world first met the novel coronavirus (SARS-CoV-2) after an outbreak in December 2019. The outbreak began in Wuhan, China, and has now led to a pandemic (World Health Organization [WHO], 2020a). Coronavirus disease, called COVID-19, is an infectious disease that causes mild respiratory symptoms and requires special treatment (Repici et al., 2020). Many people have been infected in 216 countries, areas, and territories worldwide, with having been 21,756,357 confirmed cases and 771,635 confirmed deaths by August 18, 2020 (WHO, 2020b). There are yet no specific vaccines or medications for COVID-19 that have been proven effective (Dikmen et al., 2020; Liu et al., 2020; Wang et al., 2020). Since transmission occurs through direct or close contact with people or via small air droplets (Repici et al., 2020), social distancing is one of the best ways to prevent the transmission and spread of the virus. Therefore, to slow down its transmission by reducing social contact, school closures were put into effect worldwide as a first response. Country-wide school closures were carried out in 143 countries, while several other countries implemented localized closures. All over the world, 1,184,126,508 students, making up 67.6% of total enrolled students (by May 05, 2020), were affected by these closures, this fact being based on data from the United Nations Educational, Scientific and Cultural Organization (UNESCO) Institute for Statistics (UNESCO, 2020).

In Turkey, the first official COVID-19 case was confirmed on March 11, 2020, and the first death was declared on March 17, 2020. A total of 250,542 cases and 5,996 deaths were officially recognized by the Ministry of Health by August 17, 2020 (MoH, 2020a). A coronavirus scientific advisory board, the president of which is Turkey's minister of health, was established on January 20, 2020. During the COVID-19 pandemic, the precautions and restrictions recommended by the scientific advisory board began to be implemented after confirmation of the first case. Some of these precautions and restrictions included staying at home except for obligatory reasons; controlling international and domestic flights; banning domestic travel, both by mass transportation and private vehicles; closing shopping centers, community leisure centers, movie theatres, and concert halls; not allowing the congregational prayers; banning wedding ceremonies and funerals; implementing a lockdown for children and older people (under 20 and over 65), declaring a curfew for all people during some periods, accepting only emergency cases in hospitals and health facilities, developing health



and education apps for mobile devices, and closing schools and childcare institutions country wide (Bostan et al., 2020; Sertdemir, 2020).

In addition to affecting the economy and social life, the COVID-19 pandemic has significantly interrupted education. The routines and activities of millions of students, teachers, and parents have changed (Ozer, 2020), with school closures affecting a total of 19,559,437 students from preschool to high school (Ministry of National Education [MoNE], 2019). Students have had to be socially isolated, and this isolation has affected them in an undesirable manner. The results of a study conducted with preschool children demonstrate that children are aware of the terminology related to the pandemic and regularly obtain information from the media as well as parents concerning the current situation (Yuksekk-Usta & Gokcan, 2020). At the same time, they have negative feelings about the pandemic and have been significantly affected by social isolation during this period.

Due to school closures, distance education and digital learning platforms have gained more attention and become crucial parts of life, as distance learning is the best way to ensure learning continuity during COVID-19 (Moreno & Gortazar, 2020; Ozer, 2020). In this chapter, Turkey's general and special education practices during the COVID-19 viral outbreak are described. The chapter aims to describe the distance education actions taken in K–12, explain the other roles of the MoNE in the pandemic, and examine the impact of COVID-19 on students with special needs (SN). In addition, it intends to describe the situation and explain the measures taken in higher education, reveal the experiences of families, and investigate the conditions of in-service and pre-service teachers. It also emphasises the decisions and actions taken towards normalization, addresses a number of concerns, and puts forward a number of future recommendations.

### **Distance Education Acts in K–12 during the Pandemic**

After the WHO's declaration of a pandemic, the MoNE, led by the minister of national education, took a number of actions. First, under the new COVID-19 measures, all social activities in schools were cancelled. Based on the recommendation of the scientific advisory board, the decision on a country-wide school closure for two weeks was made on March 11, 2020. The spring break was also moved to an earlier time to increase the time available for

the arrangement of distance education. Later, schools were closed until April 30, 2020, and then until June 19, 2020.

The MoNE has also adopted nation-wide distance education as an alternative to formal face-to-face education. Distance education is a modern and effective form of training that can be offered regardless of location and time, as it involves teachers and students being separated by physical distance. This form of education uses a number of different technologies to bridge the gaps in location and time (Soo & Bonk, 1998). The MoNE has decided to perform distance education via the Education Informatics Network (EBA) platform, the Turkish Radio and Television Corporation EBA Channel (EBA-TV), live courses, and using electronic sources.

### **Online Education: The EBA Platform**

The EBA platform, developed by MoNE and used since 2011 (Ozer, 2020), is an online social education platform available to students and teachers free of charge. EBA can be used via internet browsers or from mobile devices. Each student, teacher, and parent has an account (username and password) to sign into an individualized webpage. The individualized webpage interface includes messages, announcements, a usage summary, waiting assignments, tools for communication, and a calendar. It also presents current discussion activities, last studied lessons and topics, and polls on issues or questions. The interface further includes links to a portfolio, lessons, exams, work, and a library (see Figure 1). As can be seen in Figure 1, a student can reach any page whenever (s)he wants by clicking on the associated link (EBA, 2020a).

The EBA website was the 10<sup>th</sup> most visited website in Turkey between March 23 and June 19, 2020. During the same period, it was the third most visited education website globally, while the EBA app was downloaded 16.7 million times on Android and 1.8 million times on IOS. EBA has now has 7,383,213 active students and 1,030,516 active teachers (see Figure 2). In addition, an artificial intelligence called the ‘EBA Assistant’ was put into service on May 2, 2020, to answer frequently asked questions regarding distance education. Since that time, 10 million questions have been answered.

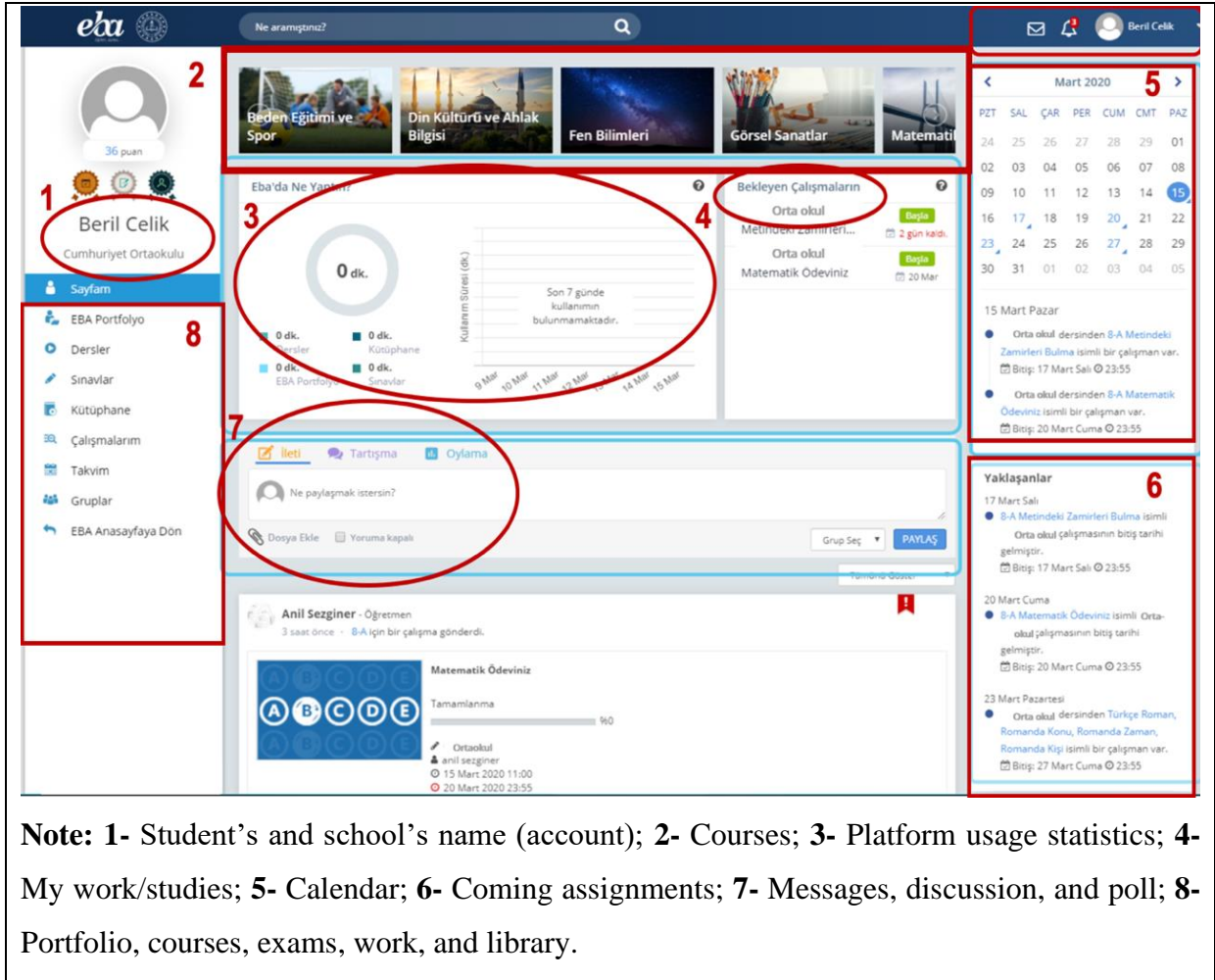


Figure 1. Interface of the Individualized EBA Platform

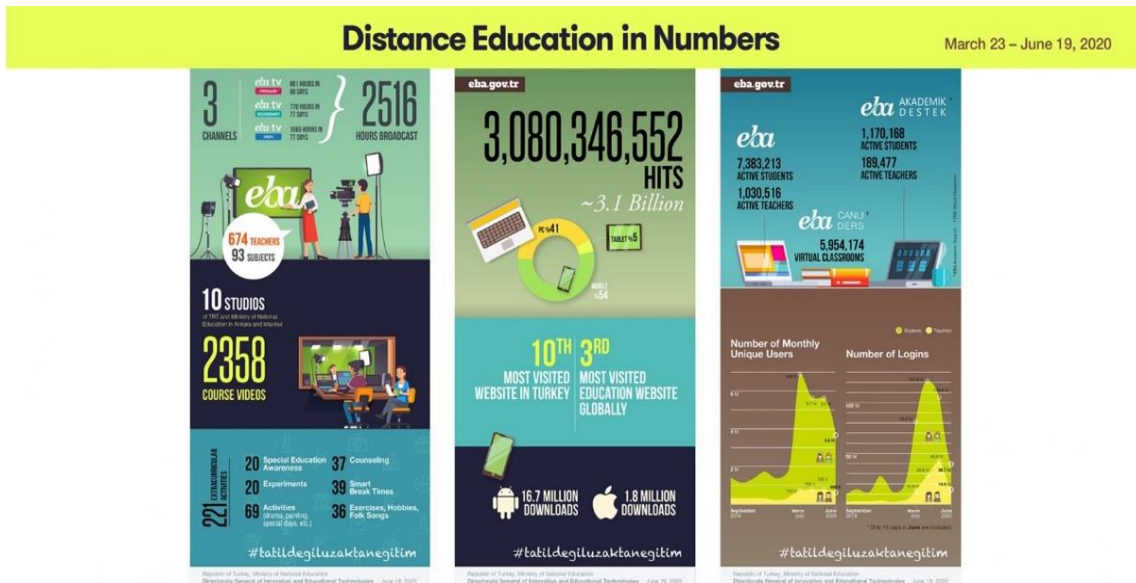


Figure 2. Distance Education in Numbers in Turkey during the COVID-19 Pandemic

Although the EBA platform is the primary method used for distance education, the fact that not all students have a computer and internet access in their home and the fact that students have different levels of digital competence is a major limitation for alternative education in Turkey (IPSOS, 2020; Korkmaz & Toraman, 2020; Moreno & Gortazar, 2020; Ozer, 2020). A report from the Association of Turkish Education has revealed that 60% of students have not entered the EBA platform during the pandemic (TEDMEM, 2020a). According to data from the Turkish Statistical Institute (TurkStat), the total rate of household internet usage was 75.3% in 2019, while the percentage of households with access to the Internet was 88.3%. The proportion of households with computer usage was 59.6% in 2018 (TurkStat, 2019), while based on 2016 data 96.9% of households had mobile phones or smartphones. At the same time, 22.9% of households had desktop computers, while 36.4% of houses had portable computers, and 29.6% had tablet computers (TurkStat, 2016). In another study, half of the undergraduate students who are attending the distance education during pandemic stated that they have a computer (54.5%) and internet connection (53%; Yılmaz-İnce et al., 2020). However, even when there is internet access at home, it may not be possible for a student to use it, such as in cases where it is the smartphone of the parents that has the access (TEDMEM, 2020a). TEDMEM has explained that based on the statistics of the Programme for International Student Assessment (PISA) 2018, 99.2% of 15-year-old youths in Turkey have television, 75.9% of them have internet access, and 71.1% of them have a computer (TEDMEM, 2020a). To eliminate or reduce issues regarding internet access, the MoNE has collaborated with mobile operators to provide internet access to students. These mobile operators have thus delivered up to 6 or 8 GB of free Internet access to students to use the EBA platform (Ozer 2020).

### *Educational Television: EBA-TV*

Educational television is the use of television programs for the aim of education and has been used as a learning tool in distance education practices. The MoNE has used EBA-TV as a secondary method for distance education. EBA-TV is a national television channel with three different channels for primary, secondary, and high school. Students can obtain information concerning the schedule of their courses by following the broadcast flow and the broadcast in the time interval determined for them (see Figure 3). The same content was released two times a day for each grade (09.00 a.m.–2.00 p.m., 02.30 p.m.–7.30 p.m.), with EBA-TV releasing a total of 2,516 hours broadcast on 93 subjects in 10 different studios in Ankara and

Istanbul using 674 teachers (681 hours for primary schools, 770 hours for secondary schools, and 1,065 hours for high schools).

EBA-TV also includes 2,358 course videos and 221 extracurricular activities for students (69 for art, 39 for break time, 37 for counseling, 36 for exercise and folk dance, 20 for the experiment, and 20 for special education awareness). In a number of cities and counties, governors, mayors, voluntary businesspeople, and Turkish Red Crescent also delivered free televisions to students who did not have one (TRT Haber, 2020a).

Educational television seems to have the disadvantage that it is not interactive, as there is no control mechanism for watching, and it includes no evaluation activities. However, it is essential to provide equity in education and contribute to learning in the case of school closure. In a study in which the views of social studies teachers regarding educational television were investigated, it was determined that the training settings and presenting teachers were correctly chosen, and the plan of the lesson flow was well-prepared. The main problem that teachers expressed was the presenting teachers making presentations by looking at a paper or screen. When evaluated in general, social studies teachers' opinions on educational television were positive (Osmanoglu, 2020).

### Live Online Courses

In addition to EBA-TV and the EBA portal, live online courses have also been carried out. These live online courses were scheduled centrally by MoNE (MoNE, 2020a). Live classes were explicitly conducted on the EBA platform for eighth- and twelfth-graders from both public and private schools from April 15 to June 19, 2020. In total, EBA included 5,954,174 virtual classes within three months.

Apart from the EBA live course, most private schools and several public schools filled live classes using commercial apps, such as Zoom, Google Hangouts, Adobe Connect, and Skype (Anadolu Agency, 2020a). In one study it was found that many of the students (65% of 13,000 students) and most of the parents (76% of 25,000 parents) of two private schools believed that the teachers of these schools conducted distance education successfully (Bahcesehir University [BAU], 2020).

EBA-TV Primary School						April, 20-24	
Grade	Time	Monday	Tuesday	Wednesday	Thursday	Friday	
1 <sup>st</sup> Grade	09:00 a.m.	Turkish	Science	Turkish	The Celebration of the National Sovereignty and Children's Day	Turkish	
	09:30 a.m.	Math	Math	Math		Science	
2 <sup>nd</sup> Grade	10:00 a.m.	Turkish	Science	Turkish		English	
	10:30 a.m.	Math	Math	Math		Science	
3 <sup>rd</sup> Grade	11:00 a.m.	Turkish	Science	Turkish		English	
	11:30 a.m.	Math	Science	Math		Turkish	
4 <sup>th</sup> Grade	12:00 p.m.	Turkish	Social Sciences	Turkish		Social Sciences	
	12:30 p.m.	Math	Science	Math		Science	
Support	01:00 p.m.	Turkish	Math	Turkish		Turkish	
Turkish for Refugees	01:30 p.m.	Turkish	Turkish	Turkish		Turkish	
Special Education	02:00 p.m.	Information	Math	Science	Cognitive Skills		
Parents Zone	08:00 p.m.						
EBA-TV Secondary School						April, 20-24	
Grade	Time	Monday	Tuesday	Wednesday	Thursday	Friday	
5 <sup>th</sup> Grade	09:00 a.m.	Turkish	Social Science	English	The Celebration of the National Sovereignty and Children's Day	English	
	09:30 a.m.	Math	Science	Math		Science	
6 <sup>th</sup> Grade	10:00 a.m.	Turkish	Social Science	English		English	
	10:30 a.m.	Math	Science	Religious Culture and Moral Knowledge		Science	
7 <sup>th</sup> Grade	11:00 a.m.	Turkish	Social Science	English		Math	
	11:30 a.m.	Math	Science	Math		Science	
8 <sup>th</sup> Grade	12:00 p.m.	Turkish	Revolution History	English		English	
	12:30 p.m.	Math	Science	Religious Culture and Moral Knowledge		Science	
Religious Secondary School	01:00 p.m.	Arabic	Arabic	Arabic		The Holy Qur'an	
Turkish for Refugees	01:30 p.m.	Turkish	Turkish	Turkish		Turkish	
Special Education	02:00 p.m.	Information	Math	Science	Turkish		
Parents Zone	08:00 p.m.						
EBA-TV High School						April, 20-24	
Grade	Time	Monday	Tuesday	Wednesday	Thursday	Friday	
9 <sup>th</sup> Grade	09:00 a.m.	Turkish Language and Literature	History	Turkish Language and Literature	The Celebration of the National Sovereignty and Children's Day	Geography	
	09:30 a.m.	Math	Chemistry	Math		English	
	10:00 a.m.	Religious Culture and Moral Knowledge					
10 <sup>th</sup> Grade	10:00 a.m.		History	Turkish Language and Literature		Geography	
	10:30 a.m.	Turkish Language and Literature	Chemistry	Math		Philosophy	
	11:00 a.m.	Math	Religious Culture and Moral Knowledge			English	
11 <sup>th</sup> Grade	11:00 a.m.			Turkish Language and Literature		The Celebration of the National Sovereignty and Children's Day	
	11:30 a.m.	Turkish Language and Literature	History	Math			Geography
	12:00 p.m.	Math	Chemistry				Philosophy
	12:30 p.m.		Religious Culture and Moral Knowledge				English
12 <sup>th</sup> Grade	12:00 p.m.			Turkish Language and Literature		The Celebration of the National Sovereignty and Children's Day	
	12:30 p.m.	Turkish Language and Literature		Math			
	01:00 p.m.	Math	Revolution History	Religious Culture and Moral Knowledge	Geography		
	01:30 p.m.		Chemistry		English		
All Grades	01:30 p.m.	Time to Exercise		Time to Exercise			

Figure 3. Sample Broadcast Flow of EBA-TV for Primary, Secondary, and High Schools



## Electronic Sources

To support distance education via online platforms and television channels, the MoNE has used a number of additional electronic sources. The MoNE has the portable document files of all textbooks for all courses and all grades and keeps these open-access files on its website for teachers, students, and parents. In addition to the EBA online platform and EBA-TV, the MoNE has introduced these textbooks to parents (see Figure 4). Any student, parent, or teacher can download these books from the EBA platform. Worksheets consisting of 1,000 questions per month have also been published for students who will take the high school entrance exam. Further, summer holiday books were developed for primary school students and embedded in the EBA platform. These free books were also posted to 5.23 million students individually.

Some teachers have prepared digital content, including text, images, figures, photos, audio, and videos, for their students and have sent these materials to students via e-mail or the WhatsApp application, which is an internet-based app that can be used to send messages, images, audio, or video. Students have also sent their assignments and homework to teachers using the same communication channel. Further, the MoNE launched an educational game app called Tabii ('Sure'). Tabii is a competitive and entertaining mobile app developed so that fifth-, sixth-, and seventh-grade students can repeat the content of the previous year's courses. Every day, students are tested on a total of 40 questions, 10 questions each from Turkish, mathematics, social studies, and science (see Figure 5).

## Assessment and Evaluation

During the period of online distance education, students were not subjected to a grade evaluation of the educational activities that were not carried out face to face. Students' grades were instead determined by considering their grades in the fall semester. In both public and private schools, the teacher generally used homework, projects, and portfolios to evaluate the students' performance and improvement. The MoNE also recommended to teachers that they avoid quantitative assessments. Some private schools still conducted online exams to test the knowledge acquisition of their students. It was decided that all students except those with special needs (SN) for whom it was determined by the parents that they should repeat their classes would move on to the next class (The Official Gazette, 2020a).

1. TEMA - Okuma Kültürü

**HAZIRLIK ÇALIŞMALARI**

1. Kitap okumayı sever misiniz? Niçin?  
2. Hangi tür kitapları okumayı seviyorsunuz? Nedenleriyle açıklayınız.



Mine SOYSAL (1959-...)  
Çocuk edebiyatımızda önemli yer edinen birçok kitabın yazarıdır. Başlıca eserleri: Ala Çocuk Yollarında, Eylülde Aşklar, Eyvah Kitap, İstanbul Masalı, Uzakta...

\* Öğretmeniniz metni okurken dikkatle dinleyiniz. Ardından siz de metni, noktalama işaretlerine dikkat ederek sesli okuyunuz.

**BU DA BENİM ÖYKÜM**

Ben kitap okumayı sevdiğimi sanan bir çocuktum. Denize girmek, bahçede oyun oynamak, bisikletle kaybolmak, uyumak ya da yığıla harika başka şey yapmak dururken kitap okumaktan çok sıkıldım. Oysa iki ablam da sürekli kitap okur ve bundan mutluluk duyarlardı. Nasıl böyle olabildiklerini hiç anlamaz, yine de alttan alta imrenirdim onlara.

Günün birinde ablarımdan biri elime bir kitap tutuşturdu. Çok kalındı. Duraksadığımı görünce üstüme düşmedi, yalnızca "Korkma, bir dene!" dedi. Denedim. Harikaydı! Birkaç gün- açıldı. Her kitapta, o eşikten korkusuzca geçmeyi de bitirivermişim koca kitabı. O, benim "büyülü kitabım" oldu.



öğrendim. Çünkü öte tarafa renkler, sesler, insanlar, olaylar ve bilinmeyenlerle dolu gizemli ve baş döndürücü güzellikte düşsel bir dünya keşfetmişim. Muhteşemdi!

Artık kitap okumak sıkıntı vermiyordu. Tersine hoşuma giden bir kitabı okurken kendimi çok iyi hissediyordum. Bir anda, yaşadığım zaman-  
 (...)  
Dağların eteklerindeki ormanlarda, kimi ür-  
küten kimi neşelendiren binbir sesin arasında yü-  
rürken bir pınar çıkarır bazen insanın karşısına.  
Serin ve berraktır. Susuzluğunuzu giderir, dinle-  
nirsiniz. Pınarın küçük sesleri bir anda ormanın  
koca gürlüğünü duyulmaz kular. Sadece berrak



dan ve yerden alıp götürüyordu beni. Sıkıldığım-  
oyalıyor, güldürüyor, korkutuyor, şaşırtıyor,  
eglendiyordu. Beni tanımadığım insanlarla, git-  
mediğim ülkelerle, yaşamadığım dönemlerle, bil-  
mediğim dillerle buluşturuyordu. Hayatımı bütü-  
nüyle etkileyen ve değiştiren ikinci büyük gücü  
keşfetmişim. Birincisi, yolculuk etmeyi; ikincisi,  
okumak oldu. Çok gezen ve sürekli kitap okuya-  
rak yaşayabilen biri oldum.

Mine SOYSAL

1. TEMA - Okuma Kültürü

1. Etkinlik: A) Metinde geçen anlamını bilmediğiniz kelime ve kelime gruplarını belirleyerek bunların anlamlarını tahmin ediniz.

Kelime veya Kelime Grubu	Tahminim

B) Tahminlerinizin doğruluğunu TDK (Türk Dil Kurumu) Türkçe Sözlük'ten kontrol ediniz.

\* Tema boyunca öğreneceğiniz kelime ve kelime grupları ile bunların anlamlarını ders kitabınızın sonunda yer alan "Kelime Defterim" bölümüne yazınız. Bu uygulamaya yıl boyunca devam ediniz.

2. Etkinlik: Aşağıdaki soruları okuduğunuz metinden hareketle cevaplayınız.

1. Yazar, tanıştığı ilk kitaptan neden "büyülü kitabım" diye söz etmektedir?
2. Yazar, kitaplarda nasıl bir dünya keşfetmiştir? Açıklayınız.
3. Kitaplar, yazarıda hangi duyguları uyandırmıştır?
4. Sizin de büyüleyici bir kitabınız olsaydı neler anlatmasını isterdiniz?
5. Bir insana kitap okuma alışkanlığı kazandırmamanın etkili yolu sizce nedir? Düşüncelerinizi arkadaşlarınızla paylaşınız.
6. Bir yazarla tanışma fırsatınız olsaydı kiminle tanışmak ve ona ne sormak isterdiniz? Anlatınız.

3. Etkinlik: Aşağıdaki görselleri inceleyiniz.




A) Yukarıdaki görseller arasındaki farkları açıklayınız.

B) Yukarıdaki görsellerden hangisi sizin günlük yaşamınızı yansıtmaktadır?

C) Hangi görseldeki ailenin bir üyesi olmak isterdiniz? Nedenleriyle açıklayınız.

4. Etkinlik: Seneca (Seneka)'nın "Bir kütüphane bin hapisane kapadır." sözünden hareketle öğretmeninizin açıklayacağı konuşma kuralına uygun bir konuşma yapınız.

5. Etkinlik: Aşağıdaki ifadelerde boş bırakılan yerleri duygu ve düşüncelerinize uygun şekilde tamamlayınız.

A) Kitaplar ..... gibidir. Çünkü .....

B) Kitaplar hayatımızda önemli bir yere sahip olmalıdır. Ama .....

C) Bir yazar olsaydım .....

istirdim. Ayrıca .....

Figure 4. Sample Pages of Electronic Turkish Textbook



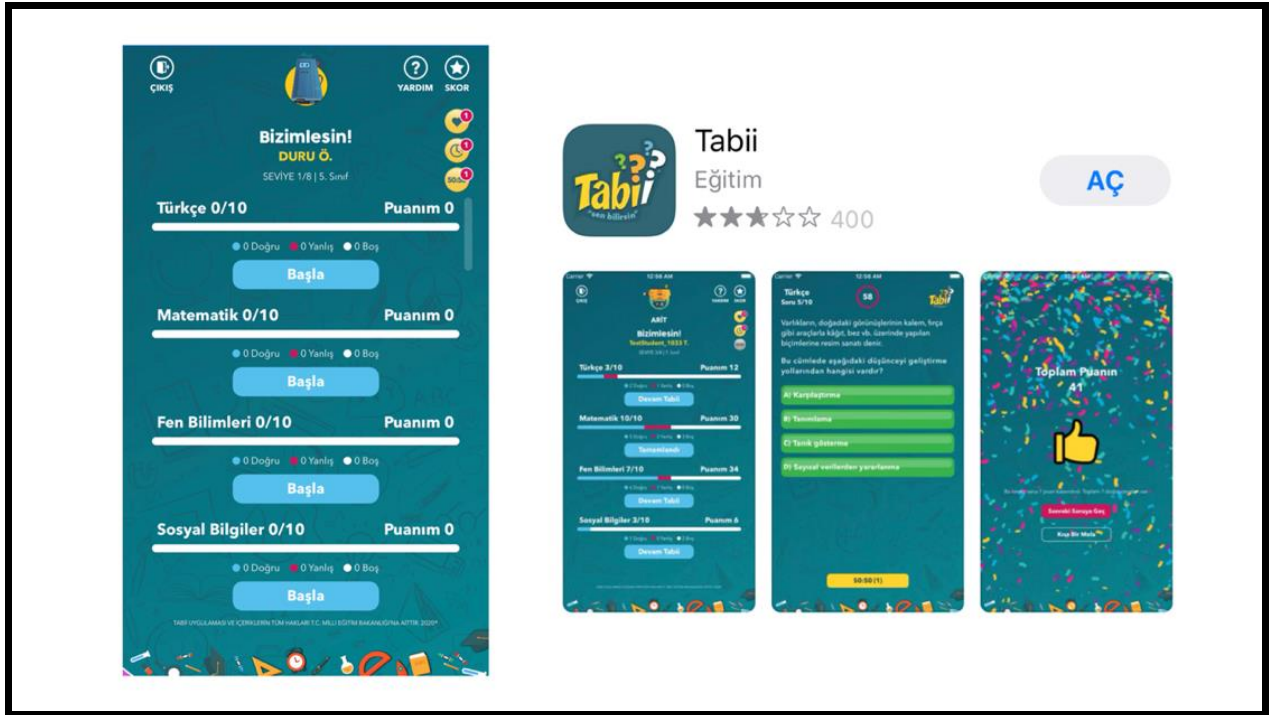


Figure 5. Screenshot of the Tabii Educational Game Mobile App for Secondary School Students

All students between the fifth and eleventh grade across the country were assessed online to determine the impact of distance education during the pandemic (MoNE, 2020a). At the same time, the high school entrance exam was carried out face to face according to COVID-19 measures in 111,918 classrooms, five times more than usual, on June 20, 2020. A total of 18,139 students took this exam. High school students received their diplomas from their schools upon request (TRT Haber, 2020b). Pilot exams were also held for students who wished to take the higher education entrance exam (MoNE, 2020b). A total of 2,433,219 students took the higher education entrance exam face to face from June 27–28, 2020 (The Center for Evaluation, Selection, and Placement [OSYM], 2020).

### Other Roles of the Ministry of National Education

The MoNE has not only made a big difference in distance education but has also fought against the coronavirus pandemic in other ways. For example, to relieve the anxiety caused by the outbreak, the MoNE developed three guides for children, youth, and adults. In addition, to support students' and their parents' mental health and well-being, a psycho-social support line was established. This guidance service has so far been provided to 12.5 million

students and parents. On EBA-TV, ‘Movie Time’ was also established every Saturday night to meet the leisure needs of students and their families. Several virtual competitions on topics such as art, creative writing, innovation, digital coding, and environmental control were further arranged for students. In addition, the MoNE established a YouTube channel containing Turkish and English narrations of Anatolian tales told by teachers and illustrated by students. Further, the National Sovereignty and Children’s Day and The Commemoration of Atatürk, Youth and Sports Day, which are two of the main national festivals of the Republic of Turkey, were celebrated virtually (MoNE, 2020c). The MoNE also contributed to national production by manufacturing a number of devices and supplements. In some vocational high schools, the creation of sanitiser, cologne, disposable aprons and boiler suits, ultrasonic surgical masks, n95 masks, and specially designed kid masks was begun. As a result of these efforts, two billion surgical masks were produced in one month. The teachers and students of vocational high schools have also produced mask-making machines, remote-controlled respiratory devices, non-contact thermometers, and ultraviolet C (UVC) air sterilization devices. Besides vocational high schools, BILSEMs (Science and Art Centers), which gifted students regularly attend, have also begun to produce face shields and video laryngoscopes for healthcare workers and police officers (MoNE, 2020d).

### **Educational Practices for Students with Special Needs**

The outbreak of COVID-19 has affected students with SN more than students with typical developmental characteristics because people with disadvantages are disproportionately impacted by ill-health (WHO, 2017). The weak immune system of these people makes them more vulnerable to viruses (Grier et al., 2020; Soylu et al., 2019). Many people with SN also live in conditions that require close contact with other people due to their incompetence regarding independent life skills (Courtenay & Perera, 2020). Thus, they may not be able to social distance due to the level of support they need. It can therefore be concluded that individuals with SN are at a high risk of suffering severe complications from COVID-19 (Courtenay & Perera, 2020; UNICEF, 2020). Due to the closure of schools, care institutions, and social groups, there have been drastic changes in the daily routines of people with SN (World Economic Forum, 2020). Such significant changes require special planning, especially for individuals who are heavily dependent on routines, who may also experience difficulties in understanding the measures and decisions that need to be taken during the pandemic (Macaroglu-Akgul, 2012). The lockdown increased the duration and intensity of

the challenging behaviors of children and youths with SN and left their parents weak without a solution. Therefore, during lockdown children and teenagers with SN were legally allowed to leave the house accompanied by their parents/caregivers, as staying indoors for a long time would negatively affect their mental and physical health (Ministry of Interior [MoI], 2020). The interruption of education services provided to individuals with SN has negatively affected these people and their parents (Atlar et al., 2020; ElSahel-Elhage, 2021).

### **Training on COVID-19 and Related Skills**

After the outbreak began, the first precaution taken regarding people with SN was to give them an explanation of COVID-19. The Ministry of Family, Labour, and Social Services (MoFLSS) published several information guides on COVID-19 for individuals with SN and their parents (MoFLSS, 2020a). TRT-Cocuk-TV also prepared cartoon movies with subtitles on COVID-19, methods for protection from viruses, and general hygiene rules. These cartoon movies were released regularly on television and uploaded to YouTube (TRT Cocuk, 2020). The MoNE also published a free-of-charge storybook series for preschool and primary school students to enable children to understand COVID-19 and express their feelings during the outbreak. In addition, several storybooks on COVID-19 (Figure 6; e.g. ‘My hero is you: How kids can fight COVID-19!’, ‘Mischievous Coronavirus’, ‘Hello, My Name is Coronavirus’) were translated into Turkish (Akyol, 2020; Inter-Agency Standing Committee, 2020; Molina, 2020; ). Two coronavirus audio guides were also created for visually impaired children and adults and uploaded to an e-library in an assistive technology and education laboratory for individuals with visual disabilities (GETEM, 2020). Moreover, 10,000 disadvantaged adult refugees were informed about COVID-19 and ways to prevent it (MoNE, 2020e).

The second measure taken was to teach safety skills to individuals with SN so that they could protect themselves from the disease. Along with the pandemic has come a need to acquire new skills, such as cleaning hands with disinfectant or cologne, maintaining social distance, wearing masks and face shields, consuming plenty of fluids, and eating healthy. Based on these new-sprung necessities, new goals have also been added to individualized education plans, and teachers and parents have begun to teach these skills to their students or children. Some scholars have also begun to conduct e-coaching research with the aim of guiding parents in skills training.

## Educational Practices

The school closures directly affected the learning processes of 1,440,577 students with SN in Turkey. It can be stated that the development of children with SN has stopped or even regressed during this recent period (Karabulut, 2020). Over 400 videos, more than 20 web-based educational apps on different topics, and a number of adapted activity sheets on 25 various topics were prepared by the special education teachers affiliated with MoNE for students with SN. The content created for language arts, mathematics, science, social studies, and daily living skills has been presented in lessons broadcast on EBA-TV (MoNE, 2020f). Besides the MoNE, several nongovernmental organizations, such as the Foundation of Ege Special Kids (2020), have created free online education platforms with contributions from volunteer teachers to prevent the disruption of learning for children with SN.



Figure 6. Coronavirus Books for Children

A mobile app called Ozelim, Egitimdeyim ('I am Special, I am in Education') was developed (Figure 7) and launched on April 24, 2020. Although it was delayed, this app has been downloaded over 50 thousand times on Android. Another free app that converts text into Braille for students with visual impairment has been made available. Although distance education content has been created by the MoNE for individuals with SN, it is difficult for the creators to make this content meet the needs of all individuals (Education Reform Initiative [ERI], 2020a).

In addition, an award-winning educational game app called Icimdeki Hazine ('Treasure in Me') was been developed by the mobile operator Turkcell for children with SN (see Figure 7). The app was developed by child psychologists and trainers based on applied behavior analysis principles. A wide variety of skills can be taught to children through this app, which consists of two separate platforms: 'child' and 'family'.

The child section consists of a variety of educational games that open in a specific order according to the age of the child and their performance. It also contains an alternative augmentative communication system and individually adapted curriculum for the children. This section contains no distractions, such as ads or purchasing options. The family section includes child development reports, educational settings, and informative resources for guidance on autism, Down syndrome, and other special needs (Turkcell, 2020).

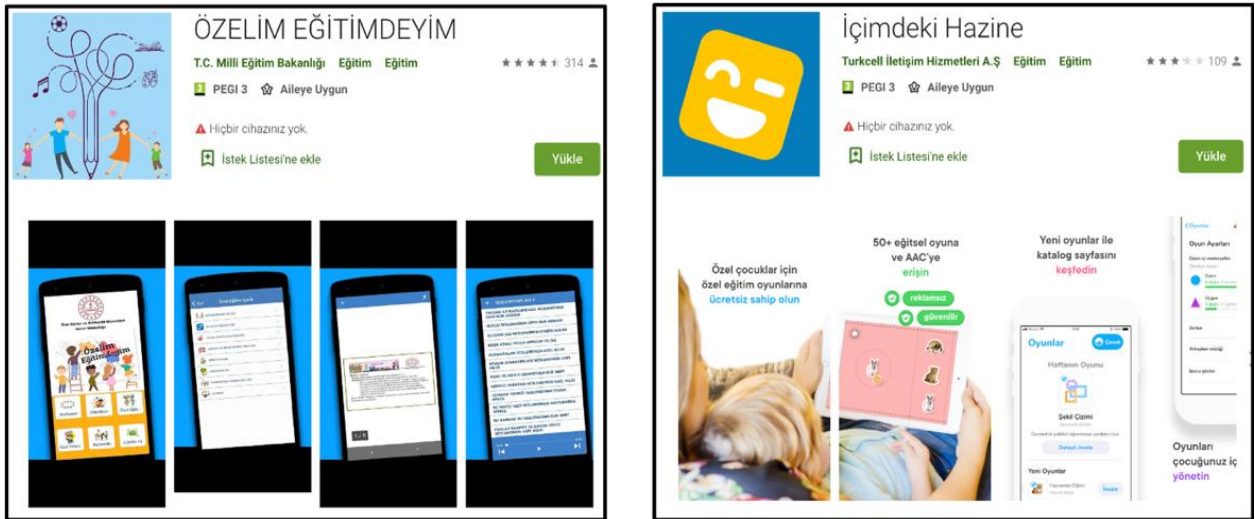


Figure 7. Educational Mobile Apps for Children with SN



## Educational Leisure and Entertainment Activities

Besides educational activities, a number of educational leisure and entertainment activities have also been provided for students with SN and their families. The MoNE published a digital entertainment events calendar including 500 events and put into service an instructive entertainment kit to enable parents to spend quality time at home with their children (MoNE, 2020g). The Ministry of Culture and Tourism (MoCaT) has also provided virtual museum rides for children (MoCaT, 2020). In addition to the MoCaT, a number of municipalities and organizations have released several online children's theatres. At the same time, The Association of Down Syndrome has organized 101 online seminars on sports (24), independent living (21), yoga (16), art (14), dance (13), and food (13) for children and youth with Down syndrome. It has further conducted 26 online conversation sessions with adolescents and adults with Down syndrome (The Association of Down Syndrome, 2020a). These online seminars were uploaded to the YouTube channel and Facebook account of the association and were watched by over 70 thousand people.

## Refugee Children

The number of Syrian children between the ages of 5–17 years living in Turkey who are victims of war is 1,082,172. However, the schooling rate of these children is only 63.29% (684,919; MoNE, 2020h). Refugee families, whose living conditions are challenging, have also been adversely affected by school closures. Within the scope of 'Promoting the Integration of Syrian Kids into the Turkish Education System (PIKTES)', course videos on 'Turkish for adaptation' were prepared by the project team. In addition, 3,547 Turkish teachers and 375 psychological counsellors provided guidance services to refugee children and their families (MoNE, 2020e). Though EBA-TV and EBA platforms provided educational content to all students, refugee children have more difficulty in online distance education than their peers due to language barriers (24%). A lack of technological equipment (26%) and adaptation difficulties (19%) also limits their access to distance education (Red Crescent, 2020; Small Project Istanbul, 2020). The findings of a study carried out with school-age refugee children enrolled in schools revealed that 84% of the refugee children became aware of distance education through teachers and the media. 64% of the children included in the study had television and the Internet at home, and children who benefited from the distance education generally followed the lessons on television and smartphones

(Red Crescent, 2020). It can be assumed that these challenges in accessing distance education may increase the risk of being left behind by the education system (Small Project Istanbul, 2020).

### Higher Education Practices

The pandemic has caused many unexpected changes in higher education as well. The Council of Higher Education (CoHE) made great efforts to slow the transmission of disease and look for new education methods. This search has led to the use of online distance education (European University Association, 2020). As soon as the first cases of COVID-19 were detected in Turkey on March 11, 2020, all universities were closed. A scientific advisory board then developed a distance education roadmap for universities on March 17, 2020. Online distance education began on March 23, 2020.

The university closures affected 7,740,502 students from 209 universities, including 7,469,323 undergraduate and 271,179 graduate students (CoHE, 2020a). Because the development of distance education in Turkey goes back a long way, almost all universities had existing sub-structures for distance education (Telli-Yamamoto, & Altun, 2020) and adapted themselves to online distance education easily and quickly. The CoHE also built a website to publicize the administrative process and the legislative decisions made during online distance education (CoHE, 2020b).

Online education is a form of training offered electronically and includes multimedia, interactive media, or rich media (Telli-Yamamoto et al., 2010). As soon as the decision to implement distance education was made, 80 private universities began online distance education. While 121 of 189 (64%) public universities began distance education one week after universities had closed, 41 of them (21.6%) began two weeks after, and 25 of them (13.2%) began three weeks after. In the spring semester, 663,808 (90.1%) of the 736,341 total active courses were opened using distance education. Almost all of the universities (99.2%) conducted their theoretical courses from a distance, and 89% carried out the theoretical parts of their applied courses as well (CoHE, 2020b). The CoHE also transferred all digital courses to a pool and made them open-access via an online interface. It has further been decided to add all newly developed digital courses to this pool (CoHE, 2020c). In addition, graduate

students in the thesis or dissertation phase were given an additional two semesters upon their request (CoHE, 2020b).

The use of a number of apps for live online lessons has also begun, including Google Meet, Google Hangouts, Zoom, Cisco Webex, Bigbluebutton, Skype, and Microsoft Teams (Telli-Yamamoto & Altun, 2020). The most crucial problem in this regard has been that students' internet quotas were insufficient to attend live lessons and to download lesson materials. To solve this problem, the CoHE created a protocol with Turkish mobile operators, and 6 GB of free Internet was provided to undergraduate and graduate students (CoHE, 2020c). In the pandemic, while the undergraduate and graduate students are satisfied in accessing the course documents and accessing registered and live classes; they stated that they were not satisfied with the quality of video and sound of the system during live lessons in the distance education system. Also, the students thought that formal education was more effective and efficient than distance education (Yılmaz-İnce et al., 2020). Another problem has been a change in the feeling of the students. For example, the findings of a study have revealed that undergraduate students have a fear of getting infected and losing their relatives, have anxiety about uncertainty for future and life satisfaction, and got bored due to the pandemic (Tümen-Akyıldız, 2020).

### **Undergraduate and Graduate Students with Special Needs**

The CoHE created a number of regulations regarding online distance education for undergraduate and graduate students with disabilities. To prepare for this, the representatives of the students with disabilities gave information about the problems faced by students with disabilities in distance education to The Commission of Students with Disabilities in the CoHE. After it was determined that some of the students with hearing impairment and visual impairment would need to attend online courses with one of their family members, the CoHE made a number of decisions regarding what should be considered in distance education for these students. It was declared that all lessons, presentations, and instructional materials should be accessible to students with disabilities. The lecturers were informed about the measures to be taken according to the challenges these students faced. In addition, measures were during live lessons taken to overcome the problems experienced by students with disabilities. These students were also informed in writing about distance education systems (CoHE, 2020d).



For students with hearing impairment, a number of specific measures were taken, such as adding subtitles to the lectures, sending the text of the course to the students in advance, and having the lecturer appear on the screen to facilitate lip reading. Some of the measures taken for students with visual impairments included providing rich text formats as a part of reading systems; using large fonts and high-contrast colors in presentations; describing the visual content, graphics, and tables during the lecture; and giving additional time for online exams. The CoHE also emphasized that for students with intellectual disabilities and autism spectrum disorder (ASD), the lecturers should make sure to contact them and their families at regular intervals and that the families should receive support from specialists if necessary (CoHE, 2020b).

### **Families during the Pandemic**

The fear, unpredictability, and the necessity of staying at home accompanying the pandemic period made it a difficult time for families. During the outbreak, trying to remain calm and move on with life was extremely tough. Families had to explain the pandemic to their children, keep their children safe, manage their children's behaviors, undertake the responsibilities of care and education for their children, protect the daily routines of family members, and organize the housework (including cooking, housekeeping, etc.). The coronavirus pandemic and its adverse effects thus increased the anxiety, negative feelings, stress, and burnout of parents. In recent research, the perception of the mothers of preschool children on COVID-19 was examined. The results revealed that most mothers experienced negative feelings about COVID-19, as their children were adversely affected by the information on case and death rates shown on television. The mothers also tended not to consult any sources while informing their children about the pandemic (ElSahel-Elhage, 2021; Yuksek-Usta & Gokcan, 2020). This study's findings thus reveal that mothers need to be directed to resources and informed on how to explain the pandemic to their children.

As soon as the first case was declared in Turkey, daycare centers, nurseries, and kindergartens were closed for two weeks. When the number of cases then increased over the following days, they were shut down indefinitely (MoFLSS, 2020b). This decision incited a discussion on how to care for the children of parents who both had to work. Working parents first attempted to compensate for these two weeks through annual leave. On March 13, 2020, pregnant and breastfeeding women who worked in public institutions were given

administrative leave for 12 days. Women with children in preschool or primary school were also granted annual leave. On March 22, 2020, flexible work strategies, such as working remotely or alternatively, were implemented for public employees (Public Agency, 2020; The Official Gazette, 2020b). Employers have since made arrangements for parents working in the private sector regarding the use of leave or flexible work (The Presidency, 2020). In addition, on April 17, 2020, the Presidency stated that employers could not dismiss their employees and had instead to give them unpaid leave or short-term employment or unemployment benefits (The Official Gazette, 2020c). Although it is not possible to say that these arrangements allowed parents to stay at home under ideal conditions, it can be said that they have facilitated the pandemic process to a certain extent.

Families have had to act as parents, caregivers, teachers, friends, cooks, and housekeepers for their children during the pandemic, and this overloading increased parental stress and burnout, leaving parents feeling overwhelmed. However, the findings of a study aimed at determining how the pandemic affected family life revealed that parents with children aged 0–16 years have had both positive and negative experiences during the pandemic. The results showed that family interaction and father involvement increased, while child- and spouse-related parental stress also increased. At the same time, eating and sleeping problems, the overuse of technology, and challenging behaviors escalated among children (Basaran & Aksoy, 2020). Further, children have had difficulties engaging in distance education during the pandemic (Basaran & Aksoy, 2020), and the distance education process has negatively affected parent–child relationships (IPSOS, 2020).

During the implementation of distance learning, MoNE provided 24/7 service to families through a call center to help families easily handle the process. In addition, a psycho-social support line was established, according to which teachers and counselors provided guidance and psycho-social support for students and parents. More than 16 million students and parents benefited from this service during the first wave of the pandemic (MoNE, 2020i). EBA-TV also broadcasted programs on health, education, and psychological support every weekday for parents (MoNE, 2020i). With the closing of schools, a guide was also developed for preschool, primary, and secondary school students aimed to ensure that children would spend quality time with their parents. This guide contains suggestions of 100 different activities that students can do with their parents at home. To provide quality adult–child interaction, a game proposal was offered for each curfew day (MoNE, 2020j). The MoNE has also published two

separate guides titled ‘Safe Internet Usage’ and ‘Cyber Bullying’ for families who want to help guide their children in distance education, which leads to an increase in technology usage (MoNE, 2020k). In addition, the largest ever digital parent meeting was conducted with parents from all provinces around the country.

Even though distance education was difficult for families, the findings of a study aimed at investigating the opinions and expectations of parents with school-age children regarding distance education found that half of the parents found the distance education to be successful or very successful. Conversely, approximately one third did not find it successful. Many parents still do not feel comfortable sending their children to school. Parents who prefer their children to receive face-to-face, distanced, or hybrid training have almost the same rate, so there is currently no consensus on this issue (IPSOS, 2020).

### **Families of Students with Special Needs**

The pandemic has also negatively affected the families of children with SN, who have had to undertake both the care and the education of their children. Considering that there were essential changes in the routines of children with SN, it can be said that families of children with SN needed much more support than those of children with typical development. In one study, the effects of health anxiety caused by the pandemic on the dispositional hope and psychological well-being of mothers of children with ASD (n = 60) and mothers of children with typical development (n = 66) were compared. The results revealed that mothers of children with ASD had a higher level of health anxiety and lower levels of dispositional hope and psychological well-being than mothers of children with typical development (Ersoy et al., 2020).

A number of measures have been taken for families who have children with SN. Because the lockdown escalated the challenging behaviors of children with SN, these children and their families were allowed to leave the house during the lockdown period (MoI, 2020). Further, it was decided that existing reports and prescriptions would continue to be considered valid so that individuals with SN would not suffer from victimization (MoFLSS, 2020c). For families to carry out this process more efficiently, a number of institutions and organizations conducted a variety of activities, such as online seminars, digital education, and material development.

The MoNE published 36 videos on their website for families of students with SN. The videos have content related to hygiene, human relations, psychological support, preparation for reading and writing, nutrition, independent living, reinforcement, and challenging behaviors (MoNE, 2020l). Beginning on May 15, 2020, online meetings were also held for parents once a week. In these meeting sessions, social life and social skills, academic skills, self-care skills, daily life skills, support of language skills, and behavior management were discussed (MoNE, 2020m).

The MoFLSS also provided support to both children and parents during the pandemic. In particular, the ministry developed three different guides for families of children with SN. These guides provide a variety of suggestions and basic information that families might need during the pandemic, such as on education and health, coronavirus protection, security measures, coping with stress, and spending quality time at home (MoFLSS, 2020a). A booklet was further developed that includes recommendations for caregivers on maintaining communication within their families and social environment, maintaining well-being, understanding their children's reactions/response, coping with stress, and using controlled media (MoFLSS, 2020d). In addition, a list of 427 books recommended by experts was prepared and published on the ministry website to ensure that children aged 0–6 years had an enjoyable time at home (MoFLSS, 2020e).

The MoH also developed and launched a mobile app entitled *Ozel Cocuklar Destek Sistemi* ('A Support System for Children with SN') to respond to the demands of families of children with SN (see Figure 8). Through of the app, support has been provided to families by voluntary behavioral counselors and physicians. Video talks with counselors and physicians were also made available by appointment via messaging with operators (MoH, 2020b).

During the pandemic, a number of foundations, associations, and organizations shared various resources, held seminars on social media, and created informative videos to support families. For example, the Tohum Autism Foundation published an electronic social story on how families could explain the coronavirus to children with ASD as well as a guide to support individuals with ASD during extraordinary times (Tohum Autism Foundation, 2020a). The foundation further organized online seminars for families of children with ASD and shared them on their YouTube channel. During this period, 43 online workshops on applied behavior analysis, evidence-based practices, coping with challenging behaviors, and

skill training were held, and these videos were watched over 25 thousand times. In addition, a list of resources consisting of online training platforms, mobile apps, instructional material development, useful links, reports, and valuable podcasts were shared on the foundation's website (Tohum Autism Foundation, 2020b).



Figure 8. Support System Mobile App for Children with SN and Their Families

The Association of Down Syndrome translated a picture guide called 'Doing what matters in stressful times' created by the WHO into Turkish and published it on its website (The Association of Down Syndrome, 2020b). The association also prepared a booklet titled 'How can you be protected from Coronavirus?', which explains what the coronavirus is and methods of protection against it (The Association of Down Syndrome, 2020c). The association also held 29 online seminars for families. The videos of online workshops were viewed by over 40 thousand people (The Association of Down Syndrome, 2020a). In addition, the Association of Special Educators (27), the Association of Education and Solidarity of Special Kids (40), and the Ilgi Autism Association (45) conducted Instagram live streams for families of kids with SN.

During the COVID-19 pandemic, The Scientific and Technological Research Council of Turkey (TUBITAK) has called for projects on 'COVID-19 and Society: The Social, Humanities, and Economic Impacts of Pandemic: Problems and Solutions'. Based on this call, 102 projects were funded (TUBITAK, 2020). Two of these projects were for children

with disabilities and their parents in particular. The first project aimed to determine the impact of the COVID-19 pandemic on children with SN and their families. It also proposed that the perceived family burden and social support as well as the psychological health and well-being of parents during the pandemic should be examined (Rakap et al., 2020). The second project aims to develop a free online parental support portal and evaluate its effectiveness. It is intended that the online portal will provide access to information on disabilities and coping with disabilities along with psycho-social support for parents of pre-schoolers with disabilities via print and visual materials as well as video clips (Diken et al., 2020).

## **In-service and Pre-service Teachers during the Pandemic**

### *In-service Teachers*

The importance of teacher qualifications became evident during the educational interruption and resulting online distance education caused by the COVID-19 pandemic (ERI, 2020b). After the closure of schools, many teachers who had not received sufficient training on online distance education and had never had this kind of experience were caught unprepared for the process. In a study examining teachers' experiences with distance education during the COVID-19 pandemic, it was determined that the majority of teachers (80% of 5,661 teachers) did not have distance education experience (BAU, 2020). In another study, it was found that only half of teachers had the knowledge and skills regarding technology use necessary for distance education (Orhan & Beyhan, 2020). During the pandemic, teachers were expected to support students academically and to provide instruction at a distance. Many teachers have put a great deal of effort into developing their ability to use technology, prepare digital content, and perform distance teaching while improving their knowledge of their field. Although teachers believe that distance education is not as effective as face-to-face education, they have identified a number of sources of motivation for undertaking the process, including ensuring the continuity of learning, supporting the students' psychology, and relieving the anxiety of students taking the high school entrance exam (Orhan & Beyhan, 2020). In addition, teachers have had to cope with the social and psychological difficulties of the pandemic in their own lives while supporting their students' learning and well-being (BAU, 2020; TEDMEM, 2020b). In Turkey, during the pandemic, the most common problems stated by the teachers have been about students' facilities, students' internet

connection, teacher-student interaction, instruction time, the assessment of learning, providing feedback to students, individualised instruction, and students' motivation (Hebebcı et al., 2020; Korkmaz & Toraman, 2020).

The Teacher Network is a network for sharing and collaboration that strengthens teachers by having them come together with colleagues and institutions from different disciplines. The Teacher Network conducted a survey to determine how teachers communicated with their students during the pandemic. A total of 1,536 in-service teachers from 16 different branches from 80 provinces participated in the study. According to the results, 93% of teachers communicated with their students during the pandemic, while 4% did not communicate. 24% of teachers communicated with their students more than once a day, 22% connected once a day, 15% interacted one in two days, 18% of teachers kept in touch once a week, and 14% connected infrequently. The teachers who communicated most with their students were preschool and primary school teachers (ERI, 2020b).

The MoNE requested that schools engage in activities other than EBA-TV to support their students' academic development. Teachers also carried out their courses based on the EBA-TV schedules. Some volunteer teachers taught their students using additional live lessons through apps such as Zoom and Skype, while some created digital content for EBA-TV. During the pandemic, the individual efforts of teachers made a world of difference. For example, two teachers, Zeynep and Ali Hasirci, turned their homes into studios and created instructional videos, sending these to their students via WhatsApp. They also visited students who did not have internet access in their homes to deliver print materials. Most teachers also developed and posted assignments and worksheets compatible with EBA-TV for their students (ERI, 2020b). Elif Okan, who works as a preschool teacher, created digital content at her home for students with SN and sent these videos to her students via social media. With the approval of the videos' release through the mobile app, Miss Elif has reached many more students than she otherwise would have (Anadolu Agency, 2020b).

A number of projects have also been implemented in Turkey improve the quality and support of the professional development of teachers throughout the pandemic. The improved professional development programs, developed in cooperation with universities and non-governmental organizations and accredited by UNESCO's National Commission of Turkey, were presented to teachers online. A total of 850 thousand teachers participated in distance



professional development programs and received certificates (MoNE, 2020n). In addition to these programs, approximately 500 thousand teachers benefited from national and international accredited distance education programs prepared using informatics (MoNE, 2020o). The Istanbul Teachers Academies, which consists of 16 different academies, held 274 webinars with 46,291 participants from all the academies throughout the pandemic. More than 30,000 people watched these webinars through YouTube, Facebook, or Twitter (Istanbul Teachers Academies, 2020).

Further, the MoNE brought together experts from different fields with teachers through the Teachers' Lounge project. According to this project, the minister of the MoNE met with teachers from various provinces online and listened to the problems faced by teachers during the pandemic, then shared data regarding distance education (MoNE, 2020p).

### *Pre-service Teachers*

During the pandemic, one of the main issues for pre-service teachers was the conducting of applied courses. Since both K–12 schools and universities were closed, the school experience and teaching practice courses were left half-finished. The theoretical parts of these courses were carried out via online distance education. Considering that pre-service teachers participated in practice studies for 5–6 weeks in schools before the COVID-19 pandemic, it was decided that teaching videos, homework, and portfolios would be used to compensate for the lack of applied lessons. Accordingly, lectures were digitally completed, and lecture videos and hypothetical lesson plans were uploaded and stored to cloud systems. In addition, evaluations regarding the teaching practice course were carried out in collaboration with teachers and faculty members (CoHE, 2020b).

### *Special Education Teachers*

During the pandemic, special education teachers had to put in much more effort than general education teachers. Because most of the students with SN could not benefit from online education platforms and educational television due to their unique characteristics, special education teachers planned and conducted their students' educational activities. They created digital content and sent this to their student via WhatsApp or e-mail. Some special education teachers also carried out live online courses.



Many special education teachers further participated in the special education meetings organized by the MoNE (MoNE, 2020m). In these professional development meetings, updated information and current literature by scholars from various universities were provided to teachers. In addition, the Association of Special Educators and the Virtual University Platform organized more than 50 online seminars collaboratively with the slogan ‘Stay at Home; Don’t Stay without Learning!’. These events reached more than 16 thousand people, including 10,000 through Facebook, 2,000 through YouTube, and 4,000 through Zoom and Skype (Akpinar et al., 2020).

For 14 years, career days have been organized under the leadership of The Association of Special Educators to help special education teacher candidates and special education institutions and to support pre-service teachers in taking the first step in their careers. Due to the pandemic, the fifteenth annual career days were held virtually on social media platforms in 2020. A total of 2,770 members (2,103 on Facebook and 667 on Instagram) participated in the 15<sup>th</sup> Special Education Career Days. On these platforms, candidate teachers, special education teachers, faculty members, and special education institutions all came together. In addition, special education teachers from the field as well as scholars from universities shared their good wishes with pre-service special education teachers through videos.

### **Going Back to the Old Days: Normalization**

Approximately four months after the declaration of a pandemic, the government has begun to make some decisions regarding going back to the old days, a process referred to as normalization. As emphasized by the minister of health, the new normal will not be identical to the past. The first step taken for normalization was the cancellation of the curfew on individuals over 65 and under 20. First, these individuals were allowed to leave home at certain times on certain days of the week, then this ban was abolished entirely (MoI, 2020). International and domestic flights were also started, shopping centers and community leisure centers were opened, and congregational prayers, wedding ceremonies, and funerals were allowed. It was further decided that special education and rehabilitation centers, day-care centers, nurseries, kindergartens, and facilities, such as lounges, cafeterias, and restaurants, would open starting on June 1. A number of decisions were also made regarding schools and students, and a framework was drawn up for higher education.

### *K–12 Schools, Students, and Teachers*

In Turkey, distance summer school was set to take place on the EBA platform and EBA-TV between June 29 and August 28, 2020 (MoNE, 2020r), and schools planned to begin face-to-face education on August 31. However, due to the increase in the number of cases, it was decided that distance education would begin again on August 31, 2020, with a gradual switch to face-to-face teaching occurring until September 21, 2020. Private schools also began online distance education on August 17, 2020 and are providing compensatory training based on the previous year's curriculum (MoNE, 2020s). Teachers' workdays will be held between August 24 and August 28 at the schools in which they usually work (MoNE, the 2020t).

The MoNE has also announced several rules to be followed in classrooms, cafeterias, gymnasiums, dormitories, dining halls, and school buses so that schools can be opened. Each school must assign a manager responsible for COVID-19. General cleaning and disinfection of schools before opening has been made compulsory. Each school should have a non-contact thermometer, masks, liquid soap, and hand sanitizer or cologne.

During the lessons, a seating arrangement should be created between the teacher and students that includes at least 1 meter between each person, and all teachers and students must wear masks. The seating arrangement in the classrooms will follow a cross-seating arrangement. For contact follow-up, the same student will have to sit in the same place in his or her classes. In addition, attention will be paid to the use of areas such as corridors, cafeterias, dining halls, and sports halls, with fewer people using them in alternation (MoH, 2020c).

Special education and rehabilitation centers, which provided supportive special education services to students with SN, were opened on June 1, 2020. They are currently delivering one-to-one instruction to students with SN after having completed a number of special measures. Some of these measures include the disinfection of instructional settings and materials to be used at least 45 minutes before classes, maintaining social distancing, using disposable products in cafeterias, taking the temperature of all students and staff, providing special protective equipment for students, complying with rules regarding hygiene and social distancing on school buses, and carrying out informative activities on COVID-19 (MoNE, General Directorate Special Education Institutions, 2020).

### *Higher Education*

The CoHE has announced that universities can begin educational activities on October 1, 2020 and have developed a guide based on the drawing of a general framework for possible scenarios from a global viewpoint. This guide includes information on distance education practices, hands-on training, measurement and evaluation, international students, congresses, and exchange programs. The CoHE has also planned the 2020–2021 educational calendar. Accordingly, universities can carry out their courses via face-to-face methods, online distance learning, or blended education based on the characteristics of the courses, the number of students, the number of the academic staff, and the physical substructures of their buildings. With regard to online distance education, the CoHE suggests that live courses should be used as much as possible.

It is also recommended that the digital content should be varied, and that presentations, videos, animations, graphics, visuals, stories, and case studies should be developed. The CoHE has further advised all academic staff to develop their knowledge and skills regarding technology use and create digital content for distance education. Small groups and rotational training have been recommended for hands-on training. Exchange students can choose either to suspend study or attend online distance education (CoHE, 2020e).

### **Concerns and Suggestions for the Future**

Despite the precautions taken during the pandemic, a number of problems have arisen. In this section of the chapter, a number of concerns are listed, and some suggestions for the future are made.

#### *Schools*

- Although the opening and closing dates of schools are based on the recommendations of the scientific advisory board, these are sometimes difficult decisions to make. For this reason, parameters should be determined to make an objective decision about the opening of schools.

- The number of COVID-19 cases experienced in different provinces and districts of the country varies depending on the population and its mobility, and some villages even have no cases. Therefore, decisions regarding the opening of schools should not be made centrally but instead by individual governors.
- Schools have difficulties in obtaining cleaning supplies and employing cleaning staff. Schools should be provided with an additional budget for disinfection and regular cleaning if face-to-face training begins. Support in this regard may also be requested from non-governmental organizations and businesspeople.
- Communication between students, parents, and teachers during the pandemic process was sometimes a challenge, and teachers communicated with students and parents using personal platforms. A practical and institutional communication should be developed to solve this problem.

### *Students*

- The restrictions made during the pandemic caused stress, anxiety, and fear in children. To reduce these feelings or make them easier to cope with, the curriculum should be enriched, taking the health and well-being of children into account.
- Evaluations of students' acquisition of knowledge during distance education could not be sufficiently performed. If distance education continues, online exams should be developed to evaluate students' performance.
- Inadequacies in internet access and technological facilities have negatively affected the effectiveness of distance learning. It is unknown to what extent students follow distance education and to what extent it provides learning support to children. Therefore, learning losses and deficiencies due to school closure should be determined, and planning should be done with regard to compensating for the loss of learning.
- Internet addiction has developed in some students due to online education. To prevent internet addiction, traditional games should be played in the family, restrictions should be imposed by parents on internet use, and children should be given homework to be done in traditional ways.
- Students with SN or disadvantages in rural areas needed more support during the pandemic. In order to avoid neglecting these children, more flexibility and support should be provided to teachers in rural areas.

- Students with SN experienced different difficulties during the distance learning process compared with their peers. Therefore, various resources and healing processes should be created to support students with SN. Decreasing the number of students during face-to-face training might be considered.
- As there has been a significant increase in the challenging behaviors of students with SN during the pandemic, parents should be delivered distance coaching to cope with these behaviors.
- Students with SN could not sufficiently benefit from distance education. For them to benefit from these educational activities at the highest level, skills in using technology can be taught in cooperation with parents.
- Students with SN have different needs than students with typical development. Thus, alternative education methods should be determined based on these needs. Instead of nation-wide distance education, school-based distance education can be adopted.

### *Higher Education*

- Limitations on internet access and technological facilities have negatively affected distance learning. Universities should determine students' needs regarding online distance education and implement concrete measures to meet these needs, such as renting devices or mailing printed materials.
- Digital infrastructure, capacity, and experience differ among universities, affecting their adaptation to distance education. Universities should take steps to increase their equipment and capacity.
- The pandemic has disrupted hands-on training, laboratory studies, and applied research. The conditions under which hands-on training will be given and what kind of measures will be taken should be determined in detail.
- It can be determined which critical professional skills the students who had to complete applied courses with distance education did not acquire. These students should be taught these skills before starting in their professions.
- The burden placed on academic staff to provide distance education has also affected the quality of the education. The difficulties faced by academic staff in the previous distance education experience should be analyzed, and professional development activities should be organized in line with their needs.

### *Families*

- Determining who would be responsible for the care of children during the pandemic was a critical issue in families where both parents still had to work. Therefore, a government care service should be planned so that families can leave their children if necessary.
- As parents took on the roles of teachers during the pandemic, their learning needs increased and differed. The learning needs of families should be determined across the country, and online family education services should be provided to meet these needs.
- Even though mobile educational apps were developed, and education was carried out at a distance, families with low socioeconomic status could not access these opportunities, leading to a significant interruption in education. For this reason, social support should be provided for families to access technological devices, and printed materials could also be mailed to these families.
- As special education services are mostly based on institutions, families have to undertake the education of their children in extraordinary situations. Thus, more family-oriented studies should be planned. Side-by-side or distance coaching activities might be carried out for families so that education can be continued.
- During the pandemic, challenging behaviors increased in children with SN due to changes in routines. With this increase, anxiety and stress levels of their family members also escalated. Therefore, families should be taught how to help their children adapt to new habits, and psychological support should regularly be provided to families.

### *Teachers*

- Many teachers were caught unprepared to use technological devices, teach field skills through distance education, and conduct distanced student assessments. Further, most teachers did not have any distance education experience prior to the pandemic. Studies should be undertaken to develop in teachers the digital and pedagogical competencies required for distance education.
- With the pandemic, differences in the learning needs of teachers became evident, and many of these needs could not be met in traditional ways. Teachers' learning needs

should be determined country wide, and online professional development activities should be planned to meet these needs.

- The lack of school social activities was one of the most overlooked issues during the pandemic. Such events are crucial for the development and learning of students. Workshops can thus be organized for teachers to carry out these activities, and competitions can be held to reveal creative ideas for implementing them.
- Besides dealing with distance education, teachers had to cope with the social and psychological difficulties of the pandemic in their own lives. Thus, teachers' well-being should be taken into account, and psychological support should be provided to them when necessary.

## Conclusions

Along with its effect on the economy and social life, the COVID-19 pandemic has significantly interrupted education. Accordingly, the routines and activities of millions of students, teachers, and parents have been forced to change (Angelova, 2020). Due to school closures, distance education and digital learning platforms have gained increased attention and have become a crucial part of life, as distance learning is the best way to ensure learning continuity during COVID-19. In compulsory situations, distance education can be a solution. However, distance education has both benefits and limitations. These benefits and limitations are listed in a study that examines the views of 1,000 secondary school students on the conduct of distance science lessons during COVID-19. The students stated that distance education was beneficial and supportive of previous learning. However, they also stated that not being able to do experiments was a significant deficiency. Students emphasized that traditional face-to-face training with experiments was preferable to distance education in terms of helping them to understand the subject, become motivated for the lesson, have fun, and socialize (Pinar & Donel-Akgul, 2020). Teachers, students, and parents have also argued that education should be mostly face to face (Niemi & Kousa, 2020) and in schools with distance education being used as a support (BAU, 2020; Egitim Sen, 2020; IPSOS, 2020). Because schools are crowded and their facilities are limited, it is not yet possible to begin face-to-face education (Egitim Sen, 2020). In Turkey, continuing with a distance or blended/hybrid education model may be the best solution for a while to come.

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## CHAPTER 3: THE USE OF TELEHEALTH AND TELEMEDICINE IN MEDICAL EDUCATION: EFFECTS OF COVID-19

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### Chapter Highlights

- Telemedicine means “distant medicine.”
- Telemedicine promotes the delivery of high-quality healthcare to distant or remote locations, as well as patients who are really in need of it.
- The increasing affordability of technology, as well as a shortage of medical personnel, makes it clear that telemedicine could be a solution to healthcare delivery. Telemedicine is also important in medical education.
- Studies have shown that telemedicine contributes immensely to medical education, being almost as effective as conventional education methods.
- The Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) has caused a great disruption in medical education.
- Educators in medical institutions are required to attend promptly to students as well as patients.
- The global pandemic has revealed that there is a great need for physicians. Logistical and practical challenges have been presented by this pandemic considering that asymptomatic students may spread the virus or acquire it in the course of training.
- This article discusses the application of telemedicine in medical education, educational practices during the COVID-19 outbreak specifically the use of telehealth during clinical rotation, and the future of telemedicine in education.

## Introduction

There has been an exponential growth in telemedicine over the past 2 decades. It has been adopted by most healthcare institutions. Studies suggest that the telemedicine market was valued at \$14.3 billion in 2013, and presently is worth over US \$36.3 billion (Dinesen et al., 2016; O'Shea et al., 2015). The United States healthcare industry encourages the growth of telemedicine. Other incentives to the growth of telehealth include low physical workforce, shortage of specialists, high healthcare expenditure by the government, and unequal geographic distribution of primary care.

The field of telemedicine is expanding by the day. It is distinct from but overlaps with mobile and electronic health. An important question that must be asked before the creation of any curricula is where to draw the lines as regards the definition of telemedicine. According to Sood et al, telemedicine involves the provision of medical services over a spatial distance. The service is provided via telecommunications technology. Of course, it aims to provide health benefits to a patient or a populace (Sood et al., 2007). These benefits include the provision of healthcare at a cheap cost, providing easy access to essential healthcare services, and providing high-quality healthcare to the patient at the patient's convenience (Berwick et al., 2008).

It is worth noting that these benefits have been realized. There is an increase in the number of healthcare systems, health insurance companies, and states adopting telemedicine for the provision of healthcare services (Lowery et al., 2014; O'Shea et al., 2015; Wu et al., 2014). Russo et al. 2016 analyzed the cost and time saved by providing health care solutions to Veterans Affairs hospital sited in a rural area. They saved an average of 820,000 miles of travel time over 9 years. A 2008 study by Darkins et al. shows that telemedicine has a positive influence on the quality of healthcare outcomes in various conditions and settings (Villanti et al., 2017).

Societal and cultural trends also contribute to the growth of telemedicine in the developed world. A 2017 study by Villanti et al shows that over 80 percent of American adults have access to the internet, and at least 90 percent of American adults own a cell phone. This implies that most Americans are technologically equipped (Villanti et al., 2017). The study also shows that the populace is more willing to answer health questions using such

technology. At least 70 percent of American adults admitted that the internet was their first source of medical information. These trends are a clear indication that telemedicine may be able to meet the health care needs of a heavily digitalized society.

In addition to all of this, the current coronavirus pandemic has increased focus on telehealth. As the COVID-19 pandemic spread across the globe, each sector of society was forced to re-imagine, reorder and restructure. This virus forced a revolution upon us and technology was at the core of our adaptations in almost every instance. This has been more pronounced nowhere than in medical practice. By necessity Telehealth has been at the forefront of the response of the medical sector to this pandemic. If telehealth becomes more common, we need to rigorously analyze and research its effects on patients and clinicians to ensure it is wisely and properly implemented and used. Although telehealth is not a panacea, during the COVID-19 pandemic and beyond it provides an unparalleled opportunity to protect and improve the health of our patients and our societies (Hollander & Carr, 2020).

### **Telehealth: A Brief History**

Some medical practitioners may be unfamiliar with telehealth but this is not novel. The use of pedal radios for remote care dates back to the 1920s with Australia's "Royal Flying Doctor" service. NASA has promoted the development of telehealth by funding research to create innovative ways for commercial airlines to offer medical treatment to astronauts in space and in flight medical care. Telehealth was gradually introduced from 1960 to 2000 to provide healthcare to communities in under-served and hard-to - reach areas of the world such as rural / village communities, jail populations etc. Then, as internet connectivity and digital devices became omnipresent in tandem with a increasing need for more efficient, available, and cost-effective health care, telehealth growth started to burgeon. A few health care organizations such as Kaiser Permanente have led the way in the use of telehealth. Over 50 per cent of all outpatient experiences inside the Kaiser system have been via telehealth since 2015. And this was the case for Kaiser. Global telehealth growth has been steady but much slower than expected. This slower than planned telehealth acceptance was due largely to the lack of viable payment models along with the inertia of our health care systems. When COVID-19 struck, though, the stage was well set for the telehealth revolution we are witnessing now.

## Telehealth and COVID-19

The possible benefits of telehealth came to a sharp focus when much of the world went into "lockdown" in an attempt to restrict the spread of the virus. Health systems were encouraged to provide virtual medical services whenever possible in an attempt to quarantine patients at home while also providing access to essential medical care agencies and governments, including the CDC (Hollander & Carr, 2020). Health systems had a rapid and dramatic response. The experience gained at VCU Hospital System (VCUHS), a Richmond, Virginia, university tertiary care facility, highlights the remarkable change to telehealth. As part of a concerted push to flatten the COVID-19 curve in early March, VCUHS quickly migrated all elective outpatient and low-acuity emergency care visits to telehealth. This covered all follow-up visits, chronic care visits, and any visits that were considered physically and mentally healthy to patients. Within 2 weeks, volumes of VCUHS virtual visits skyrocketed from 25–30 to 1700 every day, reflecting an rise in excess of 5000 percent. This expansion was maintained with VCUHS telehealth appointments continuing to average 1500 per day and comprising 62 percent of total outpatient visits from 3/29/20 to 5/2/20 for the period (Gilbert et al., 2020; Tuckson et al., 2017). Many have also mentioned similar rapid upscaling of video consultations. This move to telehealth has simultaneously reduced exposure to patients and services, and has left medical staff less exposed to working on the front lines and thus available for personal care when needed. In addition, telehealth has allowed COVID-19-positive providers with mild symptoms and providers in the COVID-19 "high risk" population to stay at home while still contributing to patient care. This dual advantage of flattening the curve during the COVID-19 crisis and retaining flexibility in the healthcare system cannot be overestimated.

## Medical Education in 2020

For over ten years, medical institutions have worked to transform pedagogy via reduction or outright elimination of lectures; replacing or enhancing anatomy and laboratories with technology; enhancing self-learning, and promoting interprofessional and individualized education (Irby et al., 2010; Serhan, 2020; Skochelak & Stack, 2017). Most medical schools have reduced the basic medical curriculum to 12 months or at most 18 months. Clinical medicine is also integrated within this timeframe while the basic sciences are revisited as the student advances in their medical education (Emanuel, 2020). In most medical schools,

lectures are held in physical settings during the first 12 – 18 months. The goal is to enhance interaction and small group discussions. The physical presence of students in both outpatient and inpatient settings is seen as a tenet of preclinical experience. The last 18 months of clinical education may feature advanced clinical rotations, scholarly projects, or sub-internships. It is an understatement to say that COVID-19 has affected the education of medical students in 2020 (Ananga, 2020; Korkmaz & Toraman, 2020; Unger & Meiran, 2020).

A gradual but substantial transition is under way in medical education at present. Part of the ongoing transition is to reduce the length of schooling by shortening the duration of preclinical schooling from 24 months to 12 to 15 months, and thereby eventually decreasing the overall length of medical school (Raymond et al., 2015). Another shift is more preparation at the primary place of treatment, the ambulance environment. In addition, validation and review of completed training would change from school time to demonstrated competencies. It's hard to implement all those changes — excessively hard for many people. But certain changes tend to be unavoidable. And those improvements are just the beginning. They don't recognize one of the most significant developments of today. At many institutions, most medical students no longer attend in-person preclinical classes but watch video lectures (AAMC, 2017). Finally, it is very likely that all preclinical training will be video, done anywhere in the world by a multitude of learners from only a handful of the best professors in the world. Competence of Students Standardized test or series of tests will be verified. Then clinical training should be reconfigured, combined with medical school residency training Related clinics, and increasingly specialist outpatient facilities. Students are recruited on the basis of established professional competencies, not time in service.

The proportion of the medical school class that attends preclinical lectures in-person has steadily declined at many medical schools. When attendance is required at certain campuses, one-third or fewer students actually attend the class in person when they have the opportunity to view the recorded presentations online. The majority of students "see" the material of a 60-minute class in 30 minutes by playing the lecture at double pace. They will constantly rewind and replay every section of the lecture they didn't completely understand the first time around. This learning can be done in their desired environment, at their convenience. This method saves students time, gives them more flexibility and encourages them to pay more attention to the topics they find hard. They can group similar lectures together, watch them

over again, take breaks while studying, and share the lectures with other students in small groups. Any reason for conducting live classroom lectures seems to be disappearing given the decreasing attendance at preclinical classes. Why should professors give the same lecture for a small number of students about the cranial nerves or pharmacokinetics they gave last year and the year before? It is a waste of all time. Given this pattern, if not sooner the presentations for all preclinical classes should be available online exclusively by 2025. The nature of these preclinical classes will also change once online education becomes the standard. Sixty minute sessions are not suitable for learning online. Instead, the video is a collection of short, about 6 to 15 minutes.

### **Education and Telemedicine**

Although telehealth has proven to be an invaluable tool in reacting to COVID-19, telehealth's clinical benefits beyond COVID-19 have also become apparent. But all of these advantages come with their own specific obstacles and challenges that need to be tackled as we step into a future where telehealth becomes increasingly a pillar of medical practice (Tuckson et al., 2017). As telehealth advances and extends research evaluating the impact of telehealth on patient and provider satisfaction in pediatric medicine, priority must be given to patient outcomes and cost-effectiveness. Study nowadays is incredibly thin. Studies show that while overall patient satisfaction with telehealth experiences is high, a large minority still prefers face-to-face consultation (Gilbert et al., 2020; Shaw et al., 2020; Timm et al., 2020). Early evidence suggests that telehealth treatment is as effective in treating chronic conditions such as childhood asthma as it is in person care (McLean et al., 2011; van den Wijngaart et al., 2017). While telehealth technology is rapidly improving technical constraints, it still contributes to suboptimal and stressful telehealth interactions between providers and patients. Research evaluating Telehealth 's efficacy, drawbacks, and risks must direct our implementation and practice as we step into the future. In a matter of months, the telehealth revolution has changed medical education equally and medical educators are just beginning to explore the numerous possibilities that telehealth offers our learners. Telehealth has enabled medical learners to monitor patients remotely during the COVID-19 crisis and engage actively in the treatment (Nadell, 2020; Rasmussen et al., 2020).

The telehealth teaching and learning experience has given renewed focus to the value of a discerning medical background along with a perceptive observation-based evaluation –



resources that may have been a forgotten art. Students and residents were given the opportunity to learn the basics of telehealth care quickly and, from their experience as digital natives, have made useful feedback in some cases (Klasen et al., 2020). In addition, thanks to telehealth, medical learners have been able to learn about topics of interest from local and world experts, as many medical societies have made online lectures and webinars (with accompanying CME credits) widely accessible and often free to access. The King's College John Price pediatric respiratory conference was the first pediatric respiratory conference to go entirely online. In addition, telehealth technologies have allowed global experts to collaborate on the treatment of COVID-19 patients who are critically ill as they work together to understand how this virus functions and what could be the best treatments. This telehealth-based immersive learning experience definitely is already encouraging the field of medical education to re-imagine itself as we look past the COVID-19 pandemic (Paudel, 2021).

### **Effect of COVID-19 on Pre-clerkship and Clerkship Studies**

Social distancing is one of the key preventative measures against COVID-19 (Del Rio & Malani, 2019). This implies that students must refrain from gathering in lecture halls, learning studios, and in small groups. Over the last couple of years, most faculties had begun “flipping” the conventional lecture halls to provide individualized teaching for asynchronous learning. However, medical students met physically for laboratory sessions, technology sessions, simulations, and clinical instructions in patient-centered environments. The arrival of COVID-19 in quick transitioning of the pre-clerkship curriculum to web-based formats that include health system sciences, basic sciences, and behavioral sciences. Virtual teams convene online. In some cases, clinical skills sessions are performed online or sometimes, deferred. Examinations are also done online. One of the benefits of online learning may be seen in the area of content material updates. Virtual activities also tend to run smoothly. However, the outcomes are subject to evaluation. The transition from clinical school or workplace setting to a continuous stay at home results in high usage of email, isolation, and an inability to create a boundary between work and home. Of course, this will have an impact on the students, the support staff, and the entire faculty as a whole.

What role does the medical student play in a clinical setting? The medical student is a learner in need of supervision. The student builds his or her professional identity by prioritizing their patients while also aspiring to altruism. But then, how deep should a student be involved

during a crisis to represent that he or she prioritizes their patient? The fact is, COVID-19 is a highly contagious pandemic. The medical student may unknowingly contract or transmit the virus. Other factors that may prevent the medical student from performing at their best include lack of testing, cancelation of appointments and surgical procedures, and insufficient personal protective equipment. Students were excluded from caring for COVID patients, especially with the inadequacy of personal protective equipment. As the number of confirmed cases increased, medical schools directed the removal of students from the clerkship environment. By March 2020, the Association of American Medical Colleges recommended that clinical rotations be paused in medical schools (Rose, 2020). So, what happens to students who are usually assigned to outpatient or inpatient rotations? Well, the options are many and include holding timely online clinical didactic classes to give room for late entry into the clerkship environment, creation and utilization of virtual cases, deferring clinical rotations, and creating a telehealth setting for the students.

### **What is the Role of Telemedicine?**

Medical students and patients can benefit immensely from telemedicine vis a vis provision of high standards for medical education and low-cost care, as illustrated in Figure 1. Medical schools can partner with communities-in-need, either internationally or domestically. Working with the communities, the medical schools could purchase the telehealth hardware and set up the infrastructure required for effective communication (such as the laptop, camera, microphone, internet connection, and staff trained in IT support and physical examination techniques). This is then followed by the coordination of patient appointments with the medical institution and the community health center. Medical students, under the supervision of the faculty, will take charge of patient care. Using the same faculty resources and patient care principles as conventional standardized patient encounters, patients in need of consultation would benefit immensely from students' care. Consultation schedules would be dependent on the student's level of training. For instance, the first and second-year medical students would take charge of collecting history. Trained medical professionals who are with the remote patient can assist with performing some aspects of the physical examination. These tasks can also be done by upper-level students, who can as well generate their assessment and plan of treatment. The faculty physicians and students can provide verbal instructions at a remote location and receive feedback from patients and healthcare providers at a distant site. The students' findings can then be reviewed by a physician faculty member.

The faculty physician will also evaluate their decisions and help in finalizing treatment and care recommendations to share with the health team and the patient.

The fact is that telehealth technology provides a lot of benefits during epidemics. It keeps healthy people away from hospitals and other infected centers via remote screening. Elderly people also have safe access to care (Smith et al., 2020). Telehealth has been used in past epidemics similar to COVID-19. This is seen in the 2014 – 2016 Ebola crisis. Healthcare professionals struggled with the challenge of how to interrupt the transmission of the virus. An approach called the *Ebola Contact Tracing* was used. Ebola Contact Tracing was a mobile app. It was used for remote monitoring and contact tracing of confirmed cases of the disease. The data gathered by the application were accurate, secure, faster, and complete as compared with paper documentation (Sareh et al., 2020).

In the current situation, AmWell, Teladoc, and other virtual healthcare service providers in the United States have facilitated communication between patients and physicians via secure video chats (Sodhi et al., 2020). Also, the “Coronavirus Preparedness and Response Supplemental Appropriations Act” has received government approval to boost telemedicine services. The law approves the use of telephones with video and audio functionalities for the provision of healthcare in remote settings (Sodhi et al., 2020). The situation is the same in Australia. The government has provided funding to encourage providers, to fight the pandemic, and also assist with the provision of mental health services in the COVID-19 crisis. Virtual visits are encouraged thus helping to protect healthcare providers, medical students, and patients against COVID-19. The “Medicare support at home” service also extends telehealth during the pandemic for all Australians (Andrikopoulos & Johnson, 2020).

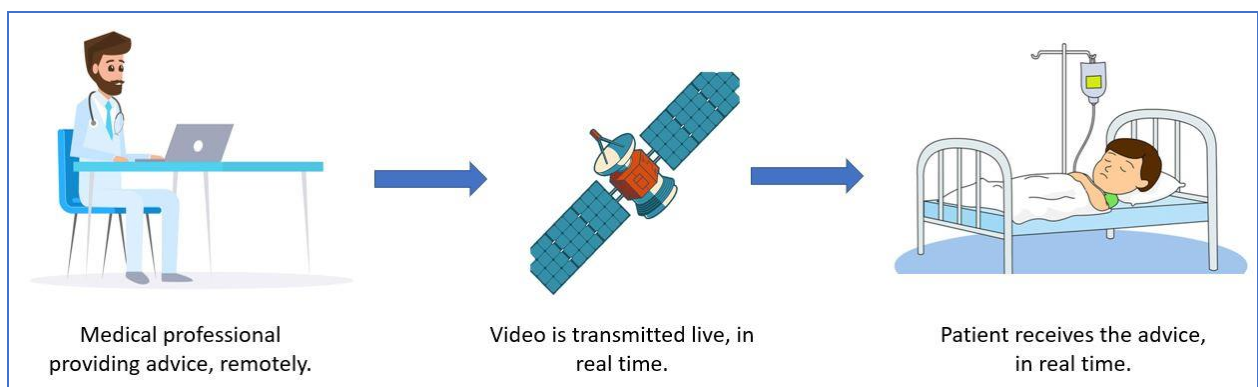


Figure 1. Schematic of Telehealth from Doctor to Patient

## The Role of Online Learning

One drawback to transferring online preclinical classroom instruction is that there is more to preclinical medical education than to lectures on the basic science. Basic science courses also account for 80 percent or more of preclinical medical education, however. Most of the additional material — small group meetings, corpse dissection, ethics courses, education, cultural skills, health system, and clinical medicine introduction — would also be well discussed online. For example, the University of Pennsylvania has an online class, "The American Health Care System," available with 45 presentations and 5 discussion sessions, and a course on "Ethics of Study with Human Subjects" with 25 short, approximately 10-minute presentations covering the basics of clinical research ethics. These are part of an 18-course online master's program. In addition, much of the other material, such as cultural competence and communication skills, really is about integrating clinical content into the preclinical years. Any of this, including clinical ethics and integrity, is unlikely to be tailored for those students with no clinical interaction experience. Online education services will also provide opportunities for open forums such as synchronous faculty question-and-answer forums as well as discussion groups for students. With more streamlined, effective technology and, most significantly, improvement in the field of increased, it will soon be possible to 'see' reality (AR) and virtual reality (VR), as if everyone in a virtual community is online, and digital anatomy dissection simulations are already available and will improve with VR. Moreover, when properly organized with collaborative projects or discussion groups, online courses may enable and promote deep, shared learning connections between students. For example, at the beginning of a 20-month online Master of Health Care Innovation program, a 4-day in-person meeting fosters deep body spirit among the students and helps promote daily contact and mutual support as the students all continue in the same room engaging in a single discussion through subsequent online courses. Additionally, there are already mostly lectures and slides on histology. It would be easier to include these topics in an extended clinical training vision. In addition, online courses can enable and promote the creation of deep, shared learning connections among students when properly organized with collaborative projects or discussion groups. For example, at the beginning of a 20-month online Master of Health Care Innovation program, a 4-day in-person meeting fosters deep body spirit among students and helps promote daily contact and mutual support as all students go through following online courses (University of Pennsylvania Master of Health Care Innovation, 2020). Another criticism concerns the difficulty of studying solely online.

Approximately 90 percent of students starting a huge open online course never finish (Parr, 2020). This is in part because online courses generally offer lower finishing incentives and are not essential for graduation. However, if there is anything at stake for students, such as course credit, online program retention is about 70% (WGU, 2020). Arizona State University had a retention rate of 87 percent for the first year, with a graduation rate of 68 percent for 6 years (UOIA, 2020).

Online training takes real motivation and dedication in learning as a person. But this is not a fault but a function. Being able to complete months of online education in molecular biology, anatomy, and other complex topics is a successful measure of some of the very attributes that physicians desire — persistence, ambition, and lifelong learning dedication. If medical students learn entirely online from a few excellent professors during their preclinical training, they would not actually have to live in the same town where the school is situated but may practically be given high-speed Internet access anywhere in the world. This ensures that the medical schools would not have a preclinical training monopoly. Students will be able to complete the preclinical years in different ways, through traditional schools of medicine, organizing the best lessons, on their own. Or, without a doubt, with the advent of new businesses, providing a complete range of preclinical courses by great instructors from around the world, encouraging conversations, simulations and research. Regardless of the educational course, the competence of the students to advance to clinical training would also need to be licensed in a standardized manner, such as United States Medical Licensing Review Stage 1.

### **Technology and Telehealth**

For several years, technology and internet-based polling has been well developed and highly advanced, mainly for marketing and customer surveys or opinion polls. There are college and career majors that concentrate on this form of study. Similarly, research on epidemiology is increasingly reliant on data collection, data processing, and data analysis and relies on specialist software and computer training. As COVID-19 safety concerns at several academic institutions closed conventional clinical and basic science research, investigators shifted their attention on what work could be done during this pandemic. Standard clinical study, the randomized clinical trial, typically requires participants to undergo a pre-enrolment physical evaluation and laboratory examination. These behaviors represented an unnecessary danger

to investigators and subjects during the pandemic. Screening subjects for possible inclusion in a study, obtaining informed consent, and clinical follow-up of participating subjects who do not require laboratories or physical evaluation may all be easily achieved using remote technology. This has proved most useful in recognizing and screening possible subjects for research. Since researchers are requesting additional monitoring tools to collect critical data from study subjects remotely, we will definitely see the development of remote monitoring tools for things like blood glucose, pulmonary function, and electrocardiography. Basic science research has been more difficult to move to remote computer technology although this could promote further production of computer models, increased use of data mining and computational biology. This time, many bench scientists used to build grants and protocols; in some cases, they reach out to colleagues around the world who are facing the same challenges (Wijesooriya et al., 2020).

### **What Does the Future Hold?**

Technological advancements have created new opportunities in healthcare and medical education. In the same vein, the evolution of technology has also created new telemedicine applications. Medical education assumes a progressive model, one that fosters communication, collaboration, and longitudinal care, while also teaching the students what they need to know about future practices. Adoption of this model by medical schools will ensure that educational funds are utilized to train medical students, while also providing cheap health care to remote communities. First, what effect does virtual communication have on the doctor-patient relationship? Does this technology sideline the importance of human contact and touch? How about confidentiality? Is it affected by digitalizing healthcare, and does the technology present any medico-legal challenges? The success of telemedicine requires to a large extent the development of favorable eHealth policies and legal frameworks. Challenges to telehealth in medical education include the difficulty of setting up and maintaining facilities in remote, low-income, and international locations. Training of health providers for local communities also poses a challenge. These providers must be able to use the new technology to send patient information to teaching centers. Getting funding for the purchase of equipment may be a herculean task. Internet security, connection speeds, and reliability may act as barriers. And after setting up the systems, the health providers will have to educate patients about telehealth – how it works and the role of the medical student. All

necessary measures should be taken to prevent unnecessary transfers of patients from students to physicians; the needs of the patient should be a priority.

The climate surrounding medical education affects individuals from all eras. The former attitude that doctors must operate while they were sick was deemed to be altruistic and competent, with patient prioritization above doctor. However the situation represented by COVID-19 is different. Clinicians who come to work while sick, as well as those who may be asymptomatic and incubating the virus silently, may facilitate the transmission of the virus to others. Therefore it is important to redefine the culture of professionalism and altruism and take into account the consequences of future actions, even with good intentions. This is all the harder considering the lack of COVID-19 research and the restricted availability of PPE. Additional unknown academic issues will require attention, including standardized exams when testing centers are closed, the timeline for residency applications for current third-year students and the ability to meet the requirements for certain sub-specialties before applying for residency (e.g., away rotations). Yet learners across the education spectrum have engaged in this crisis in several ways to care for patients and communities. In medical schools throughout the world, students volunteer in call centers, develop patient education materials and assist with grocery shopping, among other things such as physical isolation, safe travel (walking, mountain biking, or personal car), and surveillance. Recognizing the risk of the COVID-19 pandemic leading to a shortage of health care staff, students will need to be engaged as part of the work force and immersed in the clinical setting. This situation could rapidly change and medical schools will need to be sensitive and versatile. Some schools are considering early graduation with fourth year students being trained to participate in the clinical setting either as volunteers or as residents sooner. The above may require flexibility from the university regarding the awarding of degrees, as well as updated licensing processes.

## Conclusions

COVID-19 has boosted the Transition of Telehealth. As we step into the future, creative and collaborative models of treatment must be scrupulously assessed and if confirmed should be built upon and extended. Telehealth "home visits" would possibly be the practice. Online telehealth consultations would be normal with local, regional, and national experts. New mobile telemedicine devices, smartphone add-ons and applications like virtual stethoscopes,



otoscopes, ophthalmoscopes, pulse oximeters, blood pressure monitors, ECGs, glucometers, spirometers and numerous other resources can allow clinicians to collect more valuable information during a telehealth experience until creating a medical plan with the patient. More and more medical research will require automated training, screening, and tracking. Digital learning for students will increasingly become normal; while at the same time medical schools and residency programs change curricula to incorporate comprehensive telehealth training as a core component of medical education. Healthcare future will be developed progressively around telehealth. Health care systems and providers re-imagine how we do our job; where we do our job, and when we do our job. Our current paradigm is a centric, reactive healthcare provider model that favors action over prevention, is not conducive to collaborative treatment, and is prohibitively costly. COVID-19 asked us to dream all over again. Now we have a rare opportunity for health care to shift towards something that we all want: a model of treatment that is more patient-centered, holistic, collaborative and cost-effective. Telehealth, like any medical tool or action, needs to be carefully researched, wisely designed and carefully implemented to mitigate its risks and optimize its potential its opportunity-for patients and caregivers alike.

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## CHAPTER 4: IMPACT OF COVID-19 ON EDUCATION IN A SPANISH UNIVERSITY: WHAT SHOULD WE CHANGE?

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**Paloma Gutierrez-Castillo** 

### Chapter Highlights

- The effects of the COVID-19 pandemic on the University education are analyzed based on a questionnaire filled by more than 300 students of the university of Malaga.
- The questions include a variety of areas of interest, such as the accessibility to technology, the effect in the student's motivation, or the change in teaching methodology and evaluations.
- The results point out some significant problems resulting from the quick transformation of the educational system from face-to-face to online.
- Performing a detailed analysis by areas of study (education, engineering, and medicine) has revealed some critical differences in the effect of online teaching in each of them.

## Introduction

At the end of December 2019, coronavirus disease 2019 (COVID-19) appeared in Wuhan city, China (Ceylan, 2020). Little is known about it, although human-to-human transmission has been confirmed (Jacob, 2020). As of July 2020, 11.2 million COVID-19 cases were confirmed worldwide, including 528,000 deaths. In Spain, a total of more than 140,000 infected and nearly 28,000 deaths are estimated (Official data of Spanish Ministry of Health, 2020).

Its clinical manifestations are very heterogeneous; the slightest symptoms occur with fever and cough. The most severe symptoms associate bilateral pneumonia and disseminated coagulation syndrome after a systemic inflammatory after virus exposition (Hamed, 2020). Anosmia and ageusia are two very characteristic symptoms determined in this entity. The transmission of COVID-19 is potent and the infection rate is fast. Since there is no specific drug for COVID-19, the treatment is mainly symptomatic supportive therapy. In addition, it should be pointed out that patients with severe illness need more aggressive treatment and meticulous care (Huang, Wei, Hu & Wen and Chen, 2020).

On March 14, the *state of national alarm* was decreed in Spain, a situation that forced the lockdown of the population. Efforts to reduce the spread of the COVID-19 virus among the younger and adult populations has prompted the widespread closure of schools, colleges, universities, and other educational institutions in many countries (Sahu, 2020). Theoretical and practical classes had to be adapted immediately for their virtual realization, entailing a significant effort for teachers and students, in addition to the psychological stress derived from the health, economic and educational situation. It was also a demonstration of the impact of poorly resourced institutions and socially disadvantaged learners where limited access to technology and the internet impacted on organisational response or student's ability to engage in an online environment (Zhong, 2020). Many scholars questioned if higher education was prepared for the forthcoming digital era of learning (Crawford et al, 2020) and the same kind of issues, even more marked, were found by teachers of all levels (Korkmaz & Toraman, 2020). Online mode or e-learning mode is not just conducting videoconferencing sessions or sharing the PowerPoint slides, videos and documents to learners. Online education can be effective only if it promotes active learning in learners by providing opportunities to read, write, discuss, think, ask questions, solve problems, analyze and create



new things depending on the learning content (Zayapragassarazan, 2020). The objective of this study is to know the educational and psychological impact of the COVID-19 pandemic on students from university disciplines.

## **Methods**

This is an observational study in 326 students of the College of Medicine, Education and Engineering of the University of Malaga carried out between April and June 2020 to know the effects of the recent pandemic by COVID-19 on the education of different university disciplines. Participant data were collected from the public University of Malaga by three teachers in Education, Engineering and Medicine respectively.

### *Instrumentation*

A structured questionnaire, titled the ‘Effects of COVID-19 in University Education Questionnaire’ was used in obtaining information for the study. The questionnaire protocol was developed by the authors of this paper (see Appendix A for the complete questionnaire). The questionnaire comprised twenty structured multiple-choice questions, and it was distributed through the Google Forms platform. All the questions had the multiple choice of 4 answers in which a Likert scale (Cañadas & Sánchez ,1998) was used, except for one question (question 15) in which the number of hours taught in online teaching was asked with respect to face-to-face teaching. In this case, the answer contains 5 options so the intermediate value for cases in which the number of hours was similar in both teaching methodologies is available. The questionnaire consisted of different structured parts. There were two demographic questions, three questions on accessibility to technology, four questions on personal effort in adapting to the new situation, six questions on the change in educational methodology when doing all the online activities, four questions on personal experience throughout the whole period and an open question to obtain qualitative information about the opinion of the students.

### *Data Collection*

Data collection and analysis was collected using Microsoft Excel, carrying out a thorough detailed study of each of the disciplines. The results have been reported in percentages in

general and stratified by subgroups. The main results have been represented by bar charts and a sector charts.

## Results

The results of this study point out the major problems that the COVID-19 pandemic has created on the education university sector in Spain. The twenty questions of the questionnaire were organized in different groups to obtain information in different areas of interest. The results are presented following these categories: the demographic data, the accessibility to the required technology to follow the online teaching, the student's motivation and effort, the change in educational methodology and evaluation, the changes in the educational methodology and evaluations, and the online learning as a global experience.

### Demographic Results

The questionnaire was answered by 326 students: 59 educational students, 56 engineer students and 211 medical students (Question 1). The students are in different grades of completion of their bachelor degrees. Note that most of the bachelor degrees in Spain are 4-year long. However, the medical bachelor requires 6-year. From the participants 69 are freshmen, 111 sophomore, 99 third-year students, 30 fourth-year students, 14 fifth-year students, and 3 sixth-year students (see Table 1, Question 2).

Table 1. Course of Students

<b>2.-Course / Statement</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>Total</b>
<b>Number of students</b>	69	111	99	30	14	3	326
	21.2%	34%	30.4%	9.2%	4.3%	0.9%	

### Accessibility to Technology

Another point to consider is access to remote teaching during the pandemic. Many of the students are not living in their usual student homes, but they have come back to their family homes and have lost some of the usual student facilities such as libraries, computer labs, study rooms, etcetera since they were closed due to the pandemic. Furthermore, some of them

live in areas where internet access is not desirable at most. To quantify the student’s accessibility to remote teaching, we have designed three questions. The first one focused on the accessibility to required technological equipment with internet access at their actual homes (Question 3). The second one focuses on the possibility of using this equipment whenever it is needed or having only partial use (Question 4). The last question of this group refers to the quality of their internet access (Question 5, see Figure 1).

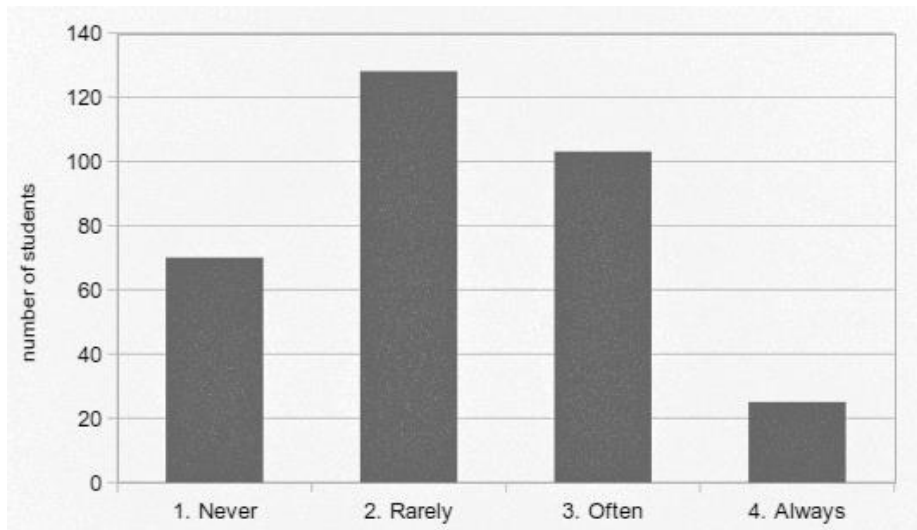


Figure 1. Question5: “In my current home, I have good enough internet access to follow all the classes and my training normally”

No of the students have reported not having any equipment with internet access at home. Most of the students have at least access to a computer or laptop and a mobile phone with internet (57.7%). Additionally, 34.7% of them have also a tablet with internet access. Only a few of them (7.7%) have internet access only in their computers/laptops. Therefore, only by looking at these numbers someone could conclude that access to technological equipment was not an issue for the students.

However, about one-third of the students (34.7%) have described that they have to share this equipment with someone else (see Table 2). This fact could be a problem for some of the students. Especially, if they share them with someone else with the same kind of schedule (sibling also following remote education, students who are also working, etc). Also, consider that students need this equipment not only to be able to access the classes but also to study, to work on projects, etc.

Table 2. Share of PC at Home

<b>4.-PC sharing/Statement</b>	<b>Yes</b>	<b>No</b>	<b>Total</b>
<b>Total</b>	209 64.1%	117 35.9%	326
<b>Medicine</b>	131 61.8%	81 38.2%	211
<b>Education</b>	39 66.1%	20 33.9%	59
<b>Engineering</b>	15 26.8%	41 73.2%	56

Nevertheless, we have found an even bigger problem when analyzing the results of the question: “In my current home, I have good enough internet access to follow all the classes and my training normally.” Only 21.5% of students have always good internet and 39.2% of them often.

However, 31.6% have difficulties with their internet access. From these students, 7.7% never have the minimum required internet to follow their classes. This problem is even more appreciable when considering the Education students (with 52.6% of students with difficulties and of them, 17% having serious problems). On the contrary, the group of engineering students has fewer difficulties with 3.6% sever cases and 25% with difficulties.

The study shows the difficulties of a sector of the students to get a good access to the internet depending mainly on the geographical location when having to move from their usual place during the course due to the state of alarm and not having access to the physical spaces at the University. It is clear that Spanish homes do not have a high digitalization that allows each individual to have individual equipment for exclusive use (similar situations where reported in other countries, see Yilmaz Inze, Kabul & Diler (2020) as an example). In this sense, it is concluded that students related to technological studies, such as Engineering, had more means to deal with online learning and, on the other hand, those who had less developed digital competence, such as in Education, have strengthened and improved it, facing a future blended or mixed teaching.

*Personal Effort and Motivation Results*

The question about dedication (Question 6) is not as clear. By observing the total data, there is no clear tendency. However, when observing the different subsets of students, the tendency is clear for each of them.

Figure 2 represents the data for each subset (a) medicine, (b) engineering, and (c) education. Most of the engineers and education students consider that they study more or a lot more than previously. However, this fact does not occur in the medical student group. Note that here, all the clinic work has been stopped; therefore, medical students have less hours of teaching, which could influence their perception of the amount of study. Concerning the effort (Question 7), the student’s affirmation is clear. More than 90% of them consider that they have to put more or a lot more effort into their studies than in the situation previous to the pandemic.

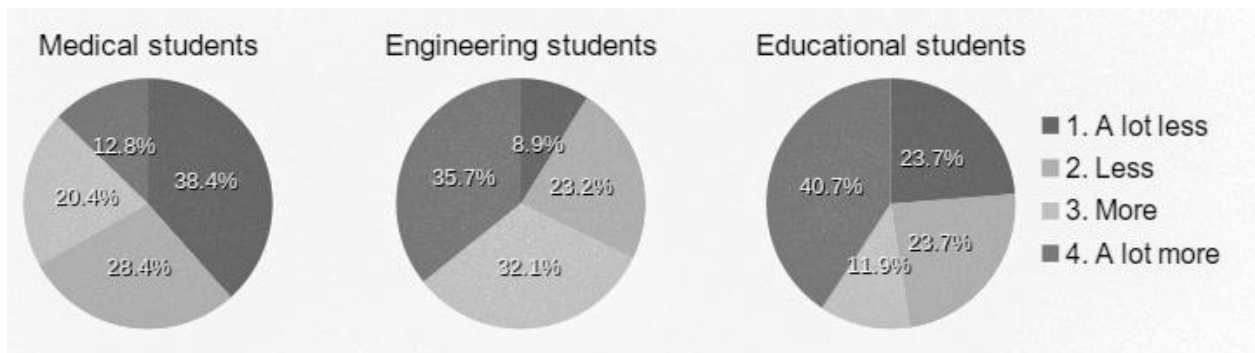


Figure 2. Question 6: “Comparing to the situation previous to the lockdown, now I study ... grade from 1 (a lot less) to 4 (a lot more)

With respect to the student’s motivation (Question 8), the observation is also clear. More than 90% of the students consider that they are less or a lot less motivated than before. In the study, a downward curve is observed in terms of the motivation and involvement of the students throughout the weeks of confinement, perhaps here many external factors are influenced by the confinement and not only the academic ones. Other studies (Al Rabiaahab et al., 2020) have revealed that student stress in a pandemic situation affects their academic performance.

*Change in Educational Methodology and Evaluations*

The pandemic generated a very quick transformation in the courses, since the lockdown was announced during a weekend and the next Monday the courses were already only. Therefore, the Universities and departments did not have time to organize themselves before starting and each Professor adapted his/her course in the best way they could. To quantify this diversity, we asked Question 9: “Which the most used platform in your courses?”. Here, the diversity was clear with 37.7% using Moodle University which is a platform very commonly used, even with face-to-face classes to post announcements, materials, etcetera so the students know how to use it, 21.8% used Google Meet, 14.7% used Microsoft Teams, 7% used Zoom, used 4.6% Adobe connect, 3.4% used Power Point, 2.5% used Skype and others platforms were used in smaller percentages (see Table 3).

Table 3. Use of Videoconference Tools

<b>9.-Platform/ Statement</b>	<b>Total</b>
<b>Moodle University</b>	123 37.7%
<b>Google Meet</b>	71 21.8%
<b>Microsoft Teams</b>	48 14.7%
<b>Zoom</b>	23 7%
<b>Adobe Connect</b>	15 4.6%
<b>Power Point</b>	11 3.4%
<b>Skype</b>	8 2.5%
<b>Others</b>	27 8.3%
<b>Total</b>	326 100%

This variety of platforms and methods required and extra effort from the students and it has created a big disappointment. Some authors (Gewin et al., 2020) advocate that a single tool be established to facilitate better management among teachers and students. One of the key questions for any student is the evaluation. In general, in Spain, most of the courses have a final exam at the end of the quarter, which has a significant influence on the final grades for the students. Since the Universities were closed, these final exams have to be virtual now. Some professors have decided to adapt their evaluations and give more credit to some other items like projects, midterms, etcetera what is usually called in Spain continuous evaluation. To obtain information about this matter, the students were asked two questions. Question 10 asks about how many of the courses are using now “continuous evaluation” and Question 11 asks about when the students knew how they were going to be evaluated. We first analyze Question 10, Comparing how many courses are doing now continuous evaluation compare to the previous situation grade form (1) more to (4) less. We have observed very heterogeneous answers in all the groups with about 43% of the students more inclined to “more” and 57% more inclined to “less”. This answer evidences one more time how the adaptability in the classes varies from professor to professor.

Question 11 was enunciated as: “Since the online teaching started, many things had to be quickly adapted, including the evaluations. Include an average of how long was the period before knowing the evaluation method.” This question evidences that in most of the cases, it took at least a month to choose the evaluation methods. Note that the classes were canceled on March 15th and the final exams are always scheduled to start on the second week of June. Therefore, when 70 % of the students were disclosing that they still did not know how they were going to be evaluated at the beginning of May, it was about one month before the final exams. However, this issue was not equally distributed between the different areas (see Figure 3). In medicine, 84.4% of the students did not know the evaluation method at the beginning of May. However, in education it was about 44% and 37.5% between engineers who had this uncertainty about evaluation. Some authors (Eskilsson et al., 2015) proposed to extend the preparation time until the evaluation in special situations, as now is happening with the pandemic.

We have also considered the accessibility for the students to contact the Professors (Question 12) and to schedule office hours. In this question, the students have not noticed a significant change accessing office hours, with most of the answers in the middle values. Nevertheless,



greater access to virtual tutoring and contact through forums could be two of the advantages of online teaching as the constructivist posits that learning is highly achieved when students are made to interact with instructional materials and draw their own meaning from their interaction (McLeod, 2019; Applefield, Huber & Moallem, 2000).

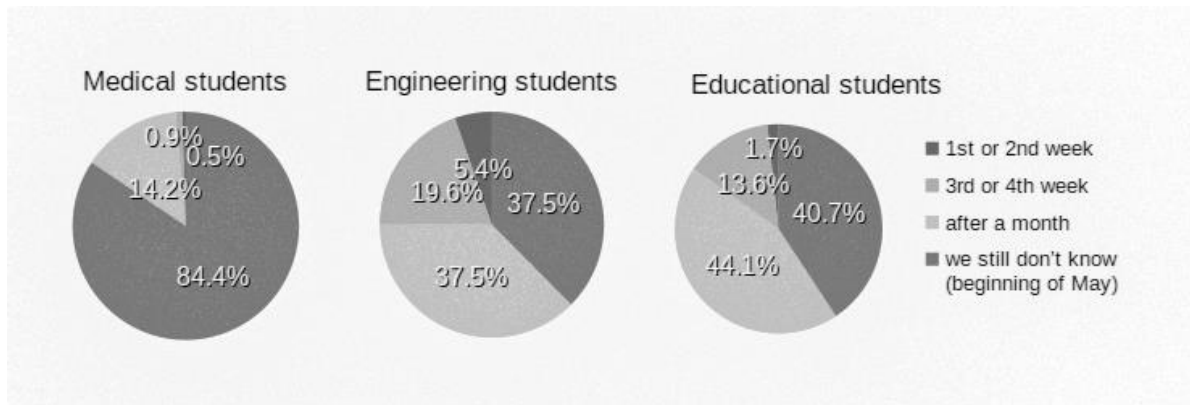


Figure 3. Question 11: “Since the online teaching started, many things had to be quickly adapted, including the evaluations. Include an average of how long was the period before knowing the evaluation method”

Another crucial element of the learning process is the realization of “practice work”. The practice work encloses different items depending on the area of study. Some examples are physical lab work, computer lab work, clinic work, school work, internships, etcetera. Most of them were impossible to do in their usual way because of the lockdown. In this sense, a great effort must be made to adapt the subjects that require a face-to-face practical part to avoid the students losing this essential part of their learning. To measure the impact of the pandemic in this issue we have asked the Question 13 (see Figure 4) “with respect to the accessibility to do practice work during the lockdown, select: (1) I was not able to do any practice work, (2) I was able to do only a small part of the practice work (even if it was adapted), (3) I was able to do several parts of the practice work (even if it was adapted), (4) I was able to do all the practice work (even if it was adapted).

This study shows that the practical work has been the most affected area and to a large extent the University has not been able to adapt it to online teaching. Furthermore, the effect of the lockdown was different depending on the area of study. The worst case was the medical students, 21.5% of them were not able to do any practice work and 48.6% only could do a few and only 8.1% were able to do all the practice work. However, engineer students were

less affected in general, and the education students do not show a clear trend. Note that in the case of engineer students, a substantial part of the practice work is dedicated to computer lab work. A few weeks after the lockdown, the University of Malaga provided access to the computer labs remotely. Therefore, students could access from their laptop to the campus computer facilities and use them. Having this access was crucial to the computer lab work since a big part of the software that students have to use is licensed and it is not easy to have access with their own machine in some cases. Consider that it is not only an economic problem but also, some of the programs do not run in some operative systems and with the virtual machine, this issue was also avoided.

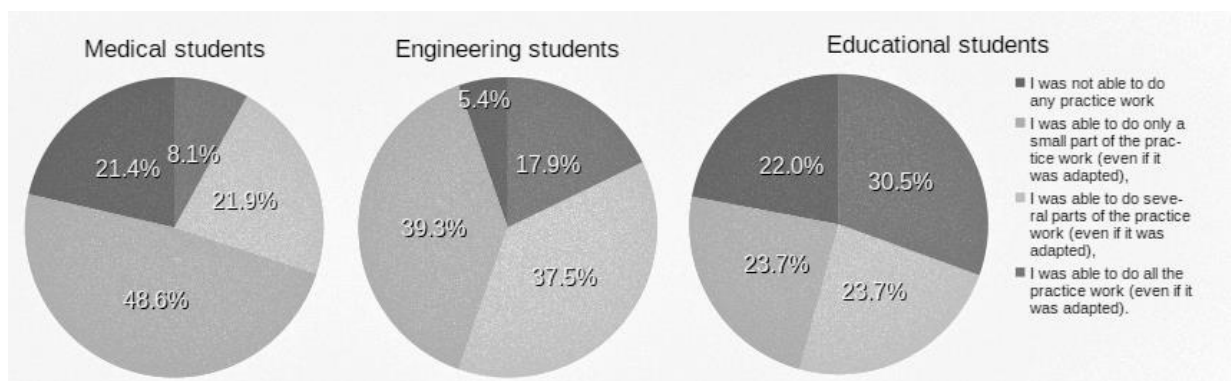


Figure 4. Question 13 "With respect to the accessibility to do practice work during the lockdown"

Additionally, the problem of having a computer/laptop without enough hardware capacities was also solved. Educational students could be even more affected that they were since almost all of them had completed their internships in schools before the state of alarm, but without a doubt that these internships can be carried out online is a challenge for the future. As Simon and Hans (2020) describe, the alternatives presented to carry out the practices and classes are of a lower quality than those offered online.

In the next question (Question 14), we have analyzed the influence of the pandemic in their group assignments. Students were asked to select from very few (1) to a lot (4) how much the way of doing group assignments have changed comparing to the previous situation. The majority of students in all the studied groups consider that the pandemic had a significant impact on the way of doing group assignments. This effect is even more noticeable in the education students that commonly use the university facilities to discuss with their peers the

projects, whereas for the others, the closure effect was less pronounced since they take a more individualist approach in some cases. Thus is, they divide the projects into different parts and assign each one to one component of the group, and it is not until the end of the project when they discuss everything together.

In Question 15, we collected data about the number of online teaching hours (see Figure 5). The selection was from a lot more than when it was face-to-face (1) to a lot less (5). Most of the answers are accumulated in the central part showing that the amount of teaching was at the same level than before.

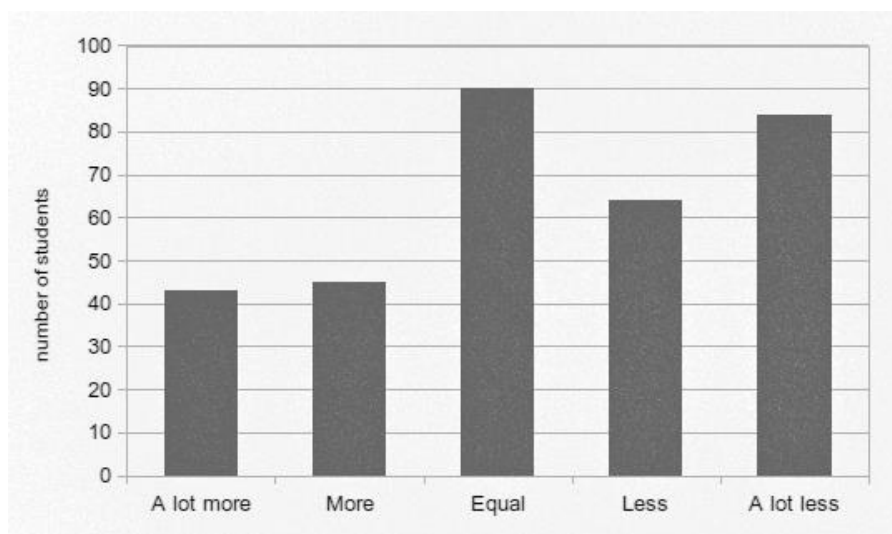


Figure 5. Question 15: “Regarding the number of hours of online classes that are being given. Now there are many MORE (1) many LESS classes (5)”

However, when considering the non-neutral answers, there exists a clear dominancy of the answers reporting fewer hours than before. This effect is even more pronounced between the medical students with a higher percentage of students choosing five on the Likert scale. This is probably attributed to the reduction in the number of hours practiced by the suspension of the same in hospitals.

### *Global Experience Results*

Question 16 investigates the improvement in the digital and technological capacities of the students during the pandemic. Students have to grade this improvement from (1) very few to (4) a lot. In general, students do not consider that they have improved substantially their

digital and technological capacities with the change to online teaching. The higher values are centered on the Likert scale and tend to very few. Only 6% of them consider that they have improved a lot. The lack of substantial improvement was expected since these are mostly young students born in the computer era. When considering each of the faculties independently, the education students are the ones who consider that they have improved the most and the engineers the less. Question 17 collected data about the timeline experience. It was formulated as: “in general I think that as the weeks progress, the online teaching experience was ... grade from worst (1) to best (4). The results show that students consider that the online teaching experience was worst in general with almost two-thirds of the students choosing 1 or 2, these results are consistent with other similar published studies (Ghazi-Saidi et al., 2020). This result is consistent in all the studied areas. In Question 18, students graded the online teaching experience compare to face-to-face education from a lot worse (1) to a lot better (4) (see Figure 6). Students’ general opinion about online teaching is terrible. This result is consistent in all the investigated majors, and it is an initial point to seriously analyze the deficiencies in the implementation of the online system.

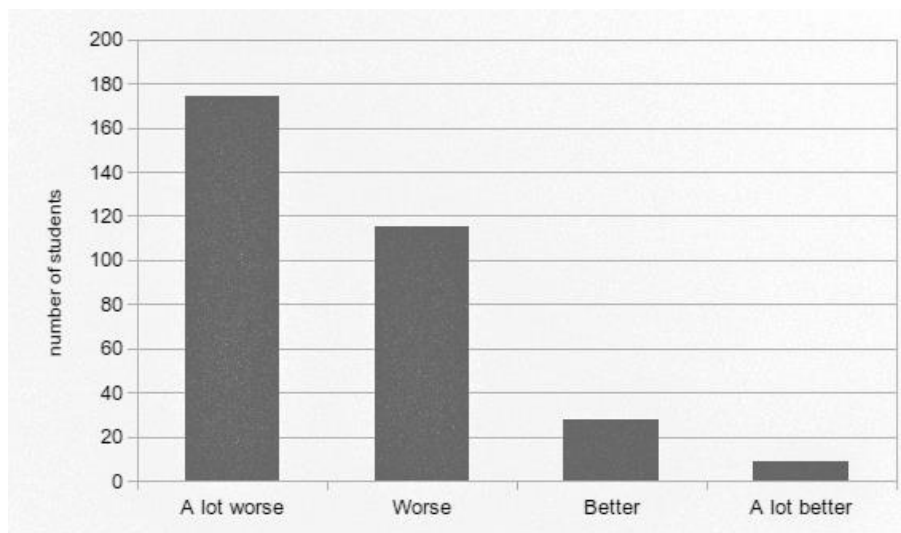


Figure 6. Question 18: “The global experience of online training with respect to face-to-face could be rated from much worse (1) to much better (4) than before”

Question 19 was formulated as: “After the pandemic situation stops I would like...” (1) All the classes to be face-to-face as before, (2) to have a combination of face-to-face an online classes, (3) the classes to be face-to-face but encouraging the online office hours, (4) all the classes to be online. 60% of the students would prefer all the classes to be face-to-face as before plus about 15% of the students that also want all the classes to be face-to-face but to

keep the online office hours. Therefore, 75% of the students prefer to have face-to-face classes. On the contrary, only a 2% would like repeat the experience of having all the online classes. The other 22.7% of them would like a combination of face-to-face an online teaching, other reports published agree with our results (Paudel, 2021). The distribution is practically equal in all the groups (see Figure 7).

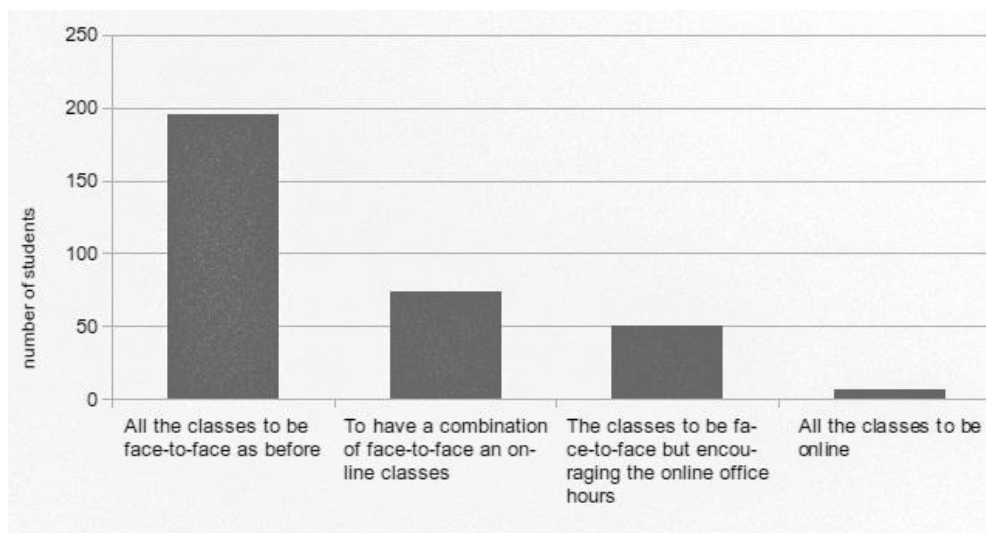


Figure 7. Question 19: “When the whole COVID19 situation disappears I would like... (1) All the classes to be face-to-face as before, (2) To have a combination of face-to-face an online classes, (3) The classes to be face-to-face but encouraging the online office hours, (4) All classes to be online.

A tactical virtualization of the subjects is necessary, combining the synchronous with the asynchronous in a proportionate way. More synchronous classes are demanded by the students through webinars, showing the practicality in real time for direct contact with teachers, especially in medicine, and yet the accessibility to teachers in general and the promotion of online tutoring has been valued. It worked more efficiently, assiduously, dialogically and collaboratively than when it was done in person. Note that the demand about more synchronous classes was also reported in other organizations (Hebebcı, Bertiz & Alan, 2020). Online teaching adaptation guidelines should be promoted by the institutions to universalize the methodology and provide quality to teaching (Alruwais, Wills, & Wald, 2018).

Lastly, Question 20 was designated to any other thought from the students. These answers point out some of the most relevant effects of the pandemic in education, such as:

- Students consider that the amount of work and effort is higher than before. Example of answer: “More amount of work, more stress and anxiety and lack of knowledge in how to act in this situation”, “The dedicated time to finish the online homework stop us from studying more for the final exams”.

- Students feel that the evaluations are unfair. Here they complain mainly about three points. First, the time in the final exams has been reduced substantially to avoid plagiarism, but in their opinion, the time is too short to read the questions and think legitimately. Second, the amount of effort dedicated to the continuous evaluation is not reflected in the final grades since they still have to pass the final exam to pass the class in many cases. As reported in other studies, the student’s the level of anxiety has been higher than years before (Unger and Meiran,2020). Third, the criteria have been changing over the weeks and they were unsure about the evaluation method until very late. Example of answers: “The evaluations are terrifically unfair”, “ Professors, in general, are concentrating their effort in avoid that we can copy during the exams demanding unfair requirements instead of prioritizing our learning a capacity to prove it”, “The uncertainty when doing the online homework without knowing what part of the grade is and how the final evaluation is going to be generates a big anxiety.”

- The difference between the adaptability of the Professors was very noticeable. Students even congratulate the effort of some of them, whereas they point out that some others are only submitting documents and they are not teaching online classes synchronous nor asynchronous. Example of answer: “Each Professor has lead the class in a different way. I had very involved Professors but at the same time I had Professors who are not involved at all and instead of facilitating everything are over complicating it”, “There are Professors who don’t know how to use the required technology or don’t want to try it”, “I want to thanks the Professors who put a lot of effort recording explanations, making extra videos, answering questions, etc.”

- Students also complain about the diversities in online platforms and methods.

Additionally, there is one more relevant point that was not evaluated explicitly in this questionnaire. It is the difficulty of studying when combining it with familiar duties. Here is important to remark that daycares and schools were closed during the whole state of alarm, and additionally, kids were not allowed to stay outside at all during the first six weeks. Furthermore, sanitary authorities did not recommend to the children to see their grandparents since they are a risk group in the COVID, so the care of the children was on the parents the



whole day. In the educational group there are many students who are parents, so they have used Question 20 to describe the difficulties of combining the studies with the care of the children. The demographics in the other two groups are different, so most of the comments related to familiar difficulties were connected to big families with a lot of siblings without a tranquil space to study or with helping the care of elder familiar members affected by the pandemic. It is important to remark that, even though the questionnaire was only for students, this situation also affected many of the young Professors, many of them with small kids, who had to put extra effort into adapting the classes and simultaneously combine it with the family care. The global results and the detailed analysis by groups are collected in Appendix B.

## Conclusions

Although it is true that an huge effort has been made to adapt face-to-face teaching to online teaching in such a short time, this transition has not been entirely satisfactory in some aspects analyzed in this article, showing certain deficiencies that must be attempted correct for the future and that in fact have been improved in this period. Regarding online teaching, the perception of the students has been a great effort in the study and dedication to the subjects compared to the face-to-face education. Underlying this idea is the breakdown in social relationships, which has made the possibility of sharing efforts directly impossible, and which has been reflected in group work, evidencing their individualization. The idea also prevails that the theoretical material should be adapted in a more concise way in terms of resources, making them more attractive to compensate for non-attendance and thus promote the motivation of the students who have been affected. In general, students opt for face-to-face teaching, although they also opt for a not inconsiderable percentage, for mixed or blended teaching in a planned way, adapting times and virtual spaces, if necessary.

It is necessary to invest in planning and digitization to alleviate all the errors that remain to be corrected, although much has already been done in part, there is still a great work ahead. The quality of online teaching needs these and other future studies to contribute to its improvement in implementation. A methodological adaptation of the teaching-learning process is necessary, including platforms and tools that support and sustain it. Related to the practice work, the possibility of remotely accessing University equipment has helped engineering, but not so medical students who perhaps need something more specific, such as the acquisition of simulators that could partially supply this problem. The research has been



carried out during the second semester of the 2019/2020 academic year of a public University, but the study could be part of a comparative study in successive years looking at online learning and its long-term consequences and depending on how the pandemic evolves results will be produced that must be analyzed and that will undoubtedly influence the planning of teaching for future generations.

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## Appendix A. Effects of COVID-19 in University Education Questionnaire

Q1- Faculty in which you are enrolled:

- 1- Medicine
- 2- Education
- 3- School of Industrial Engineering
- 4- Higher Technical School of Computer Engineering
- 5- Other

Q2- Year/Course in which you are enrolled:

- 1      2      3      4      5      6

Q3- Access to telematic teaching in your home.

- 1- I do not have access to any device that enables the internet connection.
- 2- I have access to a pc or laptop with internet
- 3- I have a PC or laptop and mobile with internet connection
- 4- I have a PC, laptop, mobile, tablet with internet connection

Q4- I do not share the devices with any family member (they are my exclusive use) :

1. Yes
2. No

Q5- In my current home, I have good enough internet access to follow all the classes and my training normally. Rate from 1 (always) to 4 (never):

- 1      2      3      4

Q6- In relation to my situation before the lockdown, now I study ... evaluate from 1 (much less) to 4 (much more) than before:

- 1      2      3      4

Q7- In relation to the effort involved in doing each of the tasks compared to the face-to-face situation, evaluate from 1 (much less) to 4 (much more) than before:

- 1      2      3      4

Q8- In relation to personal motivation to study compared to the face-to-face situation, evaluate from 1 (much less) to 4 (much more) than before:

1      2      3      4

Q9- Which the most used platform in your courses?

- 1- Zoom
- 2- Microsoft Teams
- 3- Campus Virtual
- 4- Google Meet
- 5- Others (write which one)

Q10- Since the state of alarm has been decreed, many ways of evaluating have changed. In relation to how many subjects do continuous assessment now compared to those that were before, evaluate from more (1) to less (4):

1      2      3      4

Q11- Since it was indicated that teaching became online many things had to be adapted quickly, including the way of evaluating. Include on average how long it took to know how you were going to be evaluated in the subjects you are taking:

- 1- In the first or second week
- 2- In the third or fourth week
- 3- After a month has passed
- 4- It is not yet clear how some subjects will be evaluated (at the beginning of May)

Q12- Since the state of alarm has been decreed, regarding tutorials or accessibility to ask teachers questions, evaluate from 1 (much worse access) to 4 (much better access):

1      2      3      4

Q13- Regarding the accessibility that I have to do practices in the alarm state, evaluate:

- 1- I have not been able to carry out any practice.
- 2- I have only been able to do some practice (even if it is adapted).
- 3- I have been able to carry out several practices (even if some are adapted).
- 4- I have been able to carry out all the practices (although some have had to be adapted)

Q14- Regarding the way of doing group work today. Rate from very little (1) to a lot (4) what has changed compared to when there were face-to-face classes:

1      2      3      4

Q15- Regarding the number of hours of online classes that are being given. Rate since there are many MORE that were in person (1) to we give many LESS classes (5):

1      2      3      4      5

Q16- My digital and technological competence has improved compared to the start of the state of alarm. Rate from very little (1) to a lot (4):

1      2      3      4

Q17- In general, I think that as the weeks progressed, the experience regarding online teaching has been, evaluate from worst (1) to best (4):

1      2      3      4

Q18- The global experience of online training with respect to face-to-face could be rated from much worse (1) to much better (4) than before:

1      2      3      4

Q19- When the whole COVID19 situation disappears I would like

1- All the classes to be face-to-face as before.

2- To have a combination of face-to-face an online classes.

3-The classes to be face-to-face but encouraging the online office hours.

4- All classes to be online.

Q20- Add anything that you consider relevant regarding the online education that you have received at the time of COVID19 and that has not been reflected in the previous questions.

## Appendix B. The Global Results and the Detailed Analysis by Groups

Table. Total Statistics

Statement	1	2	3	4	Total
<b>3.- Internet access</b>	0 0%	25 7.7%	188 57.7%	113 34.7%	326
<b>5.-Conecting hours</b>	70 21.5%	128 39.2%	103 31.6%	25 7.7%	326
<b>6.- Number of hours invested in learning</b>	100 30.7%	87 26.7%	68 20.8%	71 21.8%	326
<b>7.-Effort</b>	9 2.8%	22 6.8%	104 31.9%	191 58.6%	326
<b>8.-Motivation</b>	230 70.6%	69 21.2%	22 6.7%	5 1.5%	326
<b>10.-Conitnuous evaluation</b>	53 16.25%	89 27.3%	81 24.8%	103 31.6%	326
<b>11.- Information about exams</b>	225 69%	75 23%	21 6.4%	5 1.5%	326
<b>12.-Tutorship</b>	49 15%	154 47.2%	109 33.4%	14 4.3%	326
<b>13.-Practical subjects</b>	60 18.4%	139 42.6%	81 24.8%	46 14.1%	326
<b>14.- Work groups</b>	36 11%	76 23.3%	88 27%	126 38.7%	326
<b>15.- Teaching hours</b>	43 13.2%	45 13.8%	90 27.6%	4-5 64-84 19.6%-25.8%	326
<b>16.- Development of digital skills</b>	88 27%	117 35.9%	101 31%	20 6%	326
<b>17.-General experience</b>	78 23.9%	129 8.9%	104 32%	15 4.6%	326
<b>18.-Global experience</b>	174 53.4%	115 35.3%	28 8.6%	9 2.8%	326
<b>19.- Preference of learning modality</b>	195 (all face to face) 60%	50 15.3%	74 22.7%	7 (all online) 2%	326

Table. Medicine Statistics

Statement	1	2	3	4	Total
<b>3.- Internet access</b>	0 0%	15 7.1%	118 56%	78 27.5%	211
<b>5.-Conecting hours</b>	37 17.5%	91 43.1%	70 33.1%	13 6.2%	211
<b>6.- Number of hours invested in learning</b>	81 38.3%	60 28.4%	43 20.4%	27 12.8%	211
<b>7.-Effort</b>	6 2.8%	18 8.5%	78 37%	108 51.2%	211
<b>8.-Motivation</b>	146 69.1%	40 19%	9 4.3%	3 1.4%	211
<b>10.- Conitnuous evaluation</b>	24 11.4%	49 23.3%	47 22.4%	91 43.3%	211
<b>11.- Information about exams</b>	178 84.4%	30 14.2%	2 0.9%	1 0.4%	211
<b>12.-Tutorship</b>	29 13.8%	107 50.9%	67 32%	8 3.8%	211
<b>13.-Practical subjects</b>	45 21.5%	102 48.6%	46 21.9%	18 8.1%	211
<b>14.- Work groups</b>	22 10.5%	58 27.6%	65 31%	66 31.4%	211
<b>15.- Teaching hours</b>	29 13.7%	27 12.7%	46 21.8%	4-5 46-53 21.8%-25.1%	211
<b>16.- Development of digital skills</b>	65 31%	78 37.1%	58 27.6%	10 4.7%	211
<b>17.-General experience</b>	55 26.2%	85 40.5%	64 30.5%	7 3.3%	211
<b>18.-Global experience</b>	120 57.2%	76 36.2%	10 4.7%	5 2.4%	211
<b>19.- Preference of learning modality</b>	123(all face to face) 58.4%	51 24.3%	32 15% %	5 (all online) 2.3%	211



Table. Education Statistics

Statement	1	2	3	4	Total
<b>3.- Internet access</b>	0 0%	6 10.2%	23 56%	20 33.9%	59
<b>5.-Conecting hours</b>	12 20.3%	16 27.1%	21 35.6%	10 17%	59
<b>6 Number of hours invested in learning</b>	14 23.7%	14 23.7%	7 11.9%	24 40.7%	59
<b>7.-Effort</b>	2 3.3%	4 6.8%	24 40.7%	24 40.7%	59
<b>8.-Motivation</b>	44 74.5%	9 15.3%	4 6.7%	2 3.3%	59
<b>10.- Conitnuous evaluation</b>	19 32.2%	14 23.7%	16 27.1%	10 17%	59
<b>11.- Information about exams</b>	26 44%	24 40.7%	13.6 8%	1 1.7%	59
<b>12.-Tutorship</b>	6 10.2%	23 39%	27 45.8%	3 5%	59
<b>13.-Practical subjects</b>	13 22%	14 23.7%	14 23.7%	18 30.5%	59
<b>14.- Work groups</b>	4 6.8%	3 5%	11 18.6%	41 69.5%	59
<b>15.- Teaching hours</b>	7 11.9%	8 13.6%	21 35.6%	4-5 7-14 11.9%-23.7%	59
<b>16.- Development of digital skills</b>	6 10.2%	16 27.1%	30 50.8%	7 11.9%	59
<b>17.-General experience</b>	10 17%	20 34%	24 40.6%	5 8.5%	59
<b>18.-Global experience</b>	26 44%	16 27.1%	13 22%	4 6.8%	59
<b>19.- Preference of learning modality</b>	32 (all face to face) 57.1%	12 21.3%	10 18%	2 (all online) 3.3%	59

Table. Engineering Statistics

<b>Statement</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>Total</b>
<b>3.- Internet access</b>	0 0%	4 7.1%	37 66%	15 26.8%	56
<b>5.-Connecting hours</b>	21 37.5%	21 37.5%	12 21.4%	2 3.6%	56
<b>6.- Number of hours invested in learning</b>	5 8.9%	13 23.2%	18 32.1%	20 35.7%	56
<b>7.-Effort</b>	1 1.8%	3 5.3%	14 25%	33 59%	56
<b>8.-Motivation</b>	31 55.4%	15 26.8%	9 16%	1 1.8%	56
<b>10.- Conitnuous evaluation</b>	10 17.9%	26 46.4%	18 32.1%	2 3.6%	56
<b>11.- Information about exams</b>	21 37.5%	21 37.5%	11 19.6%	3 5.4%	56
<b>12.-Tutorship</b>	14 25%	24 42.9%	15 26.8%	3 5.6%	56
<b>13.-Practical subjects</b>	3 5.4%	24 42.9%	15 26.8%	3 5.6%	56
<b>14.- Work groups</b>	10 1.8%	15 26.8%	12 21.4%	19 34%	56
<b>15.- Teaching hours</b>	6 10.7%	9 16%	18 32.1%	4-5 10-13 17.8%-23.2%	56
<b>16.- Development of digital skills</b>	17 30.3%	23 41%	13 23.2%	3 5.3%	56
<b>17.-General experience</b>	13 23.2%	24 42.8%	16 28.6%	3 5.3%	56
<b>18.-Global experience</b>	28 50%	23 41%	5 9%	0 0%	56
<b>19.- Preference of learning modality</b>	39 (all face to face) 69.5%	10 17.2%	7 13.3%	0 (all online) 0%	56

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## CHAPTER 5: THE OPINIONS OF ACADEMICIANS ON DISTANCE EDUCATION DURING THE COVID-19 PANDEMIC

Ebru Yılmaz İnce , Ahmet Kabul , İbrahim Diler 

### Chapter Highlights

- This survey study examines academicians' beliefs about distance learning in the COVID19 Pandemic Process.
- Participants included 136 academic staff working in Isparta University of Applied Sciences in Turkey.
- Both quantitative and qualitative research methods were used.
- In order to collect quantitative data, the questionnaire method was used.
- Open-ended questions were applied to reach qualitative data, and the data was subjected to content analysis.
- According to the research results, it has been determined that the participants see distance education as a great power in reaching the masses and define as a contemporary method.
- According to the participants, distance education can prevent students from socializing and learning without a teacher cannot be realized in distance education.

## Introduction

Distance education is an education model where individuals are free from learning resources and have no time restrictions. There are many studies in the related literature on the opportunities and problems of distance education (Aggarwal, 1999; Mahlangu, 2018; Chen et al., 2020). Finding many positive and sometimes critical approaches about distance education will not affect the use of this education in some special cases. In 2020, after the COVID19 Pandemic, it made the distance education model obligatory, and it has been used in many countries at all levels of education (Ilmiyah and Setiawan, 2020; Ghazi-Saidi et al. 2020; Yılmaz İnce et al., 2020; Paudel, 2021). COVID19 Pandemic was announced on March 10, 2020 in Turkey by The Republic of Turkey Ministry of Health. Within the scope of coronavirus measures, universities decided to apply the distance education model in the Spring semester of 2019-2020 Academic Year, by taking the Senate decision. Isparta University of Applied Sciences has started distance education with asynchronous course documents on March 23, 2020. Then, synchronous courses started on March 30, 2020, has enabled students to continue their education with a distance education model during the pandemic process. During the distance education process of Isparta University of Applied Sciences, 855 faculty members and 13245 course contents were uploaded to the student information system and 2895 live lessons were held (see Table 1).

Table 1. The Distance Education Statistics Performed in the 2019-2020 Spring Semester

Data Name	Data
Number of loaded resources	13.245
Number of Live lessons	2.895
Number of live class participation	35.620
Number of access to asynchronous resources	170.372
The number of attendance to the recorded live lesson	34.350
Watched live lesson time	73.308
Number of faculty members who made content input	855
Number of students included in the distance education system	27.039
Uploaded video size	179 GB
Uploaded file size	35 GB
Total file upload size	214 GB

There are many studies comparing distance education with traditional education (Merisotis and Phipps, 1999; Hannay and Newvine, 2006; Chen et al., 2017). In this process, academics and students switched from traditional education to distance education within 2 weeks. The preparation of the course documents in a digital platform, learning the use of the learning management system and preparation of technical equipment's as computer, internet, scanner etc. took place in a very short time. The majority of academicians and students who have switched to the distance education system did not have any previous distance education experience. Despite all these conditions, the academicians quickly adapt to this process. This research was carried out to reflect academicians' views on distance education in the COVID-19 Pandemic Process.

## **Method**

### *Research Model*

The survey method is defined as “arrangements made on the whole universe or a group of samples or samples to be taken from it in order to make a general judgment about the universe in a universe consisting of many elements” (Karasar, 2008). In this study, it was carried out to reflect the opinions of academicians about distance education in the COVID-19 Pandemic Process using the survey method. Both quantitative and qualitative research methods were used to achieve this goal. In order to collect quantitative data, the questionnaire method suitable for survey technique was used. Open-ended questions were applied to reach qualitative data. The universe of the research is composed of faculty members of Isparta University of Applied Sciences.

### *Working Group*

The study was carried out with the participation of the faculty members of Isparta University of Applied Sciences during the Spring Semester Pandemic Period of 2019-2020 Education. Volunteering and availability principles were taken as basis in determining the participants. A total of 136 people, 96 of whom were Men and 40 were Women. In Table 2, demographic information of the participants is given as gender, title and age.

Table 2. Demographic Information of the Participants

	Frequency	Percentage
Gender		
Man	96	70.6
Woman	40	29.4
Title		
Prof.Dr.	24	17.6
Assoc.Dr.	11	8.1
Asist.Prof.Dr.	21	15.4
Dr.	6	4.4
Lecturer	74	54.4
Age		
52 and older	31	22.8
45-51	25	18.4
38-44	38	27.9
31-37	33	24.3
24-30	9	6.6

### *Collection of the Data*

The questionnaire used in the study consists of 3 different sections as demographic information, opinions on distance education and open-ended questions about distance education. Gender, age and title information of the participants were obtained in the demographic information section. The opinions on distance education survey, developed by Ayyildiz et al. (2006), that is organized Horzum (2003) and Süer et al. (2005) questionnaires. The attitude scale towards distance education consists of 30 questionnaire items, 1 is strongly disagree and 5 is strongly agree. The 5-point Likert scale used is an evaluation scale from 1 to 5, and the scale options and score ranges are given in Table 3 (Karadag et al., 2008).

In the third part of the questionnaire, it was collected by using an open-ended question from qualitative research techniques in order to reflect the opinions of the academicians in depth. It was thought that the interview was appropriate in terms of screening the opinions of academicians. In studies based on this method, questions such as what is the situation, where



we are, what we want to do, where we should go, how we go there are asked to find an answer based on the data that is thought to be in the current time section (Kaptan, 1991).

Table 3. Likert Scale Options and Ranges

Options	Scores	Score Range
strongly agree	5	4.20–5.00
agree	4	3.40–4.19
undecided	3	2.60–3.39
disagree	2	1.80–2.59
strongly disagree	1	1.00–1.79

### *Analysis of the Data*

The information obtained from the questionnaires applied to academicians was coded and uploaded to the computer. SPSS statistics program was used to analyze the obtained data. The collected data were transformed into tables that can be interpreted by making statistical operations with the SPSS program, which is a statistical package program. The data obtained are presented with frequency, arithmetic mean and standard deviation analysis results.

Data collected from open-ended questions were analyzed by content analysis method, which is essential in qualitative research analysis. Content analysis was completed with description, analysis and interpretation processes, which are the basic steps of qualitative data analysis (Yıldırım & Şimşek, 2000). In the first step of the analysis, transcripts of the answers given to the open-ended questions were produced. It is coded by word or words to reflect the texts obtained in the second step. In the third step, themes were created by considering the similarities and differences of the coding, and the thematic findings in the last step were tabulated with the help of frequencies.

In order to increase the reliability of the research, the opinions of academicians were directly conveyed where necessary. In the analysis of qualitative data, coder reliability was determined by calculating the percentage of reconciliation proposed by Miles and Huberman (1994). For this purpose, after one of the open-ended questions in the study was coded by the researcher, the same recording was independently coded by another person in the field of

education technologies. After the consensus and differences between the two analyzes were calculated, the percentage of compromise was determined as 92%.

## Results

### *Research Quantitative Data Findings*

The participants of this study are the academicians who teach in the 2019-2020 Academic Year Spring Pandemic Period. Distance education attitude scale was used to reflect the opinions of the participants about distance education. There are 30 questionnaire questions in the attitude scale, and the average and standard deviation information of the answers given to these questions are given in Table 4.

Participants answered the questionnaire “The Internet is an ideal tool for distance education” ( $\bar{x} = 4.21$ ) with an average of strongly agree level. “Distance education is a great force in reaching the masses” ( $\bar{x} = 3.62$ ), “I see distance education as a very modern method” ( $\bar{x} = 3.60$ ), “Distance education can be used to close the physical environment gap” ( $\bar{x} = 3.43$ ) and “I enjoy following research and publications about distance education” ( $\bar{x} = 3.43$ ) answered as agree. “Distance education can prevent students from socializing” ( $\bar{x} = 3.90$ ), “I do not think that learning without a teacher can be realized in distance education” ( $\bar{x} = 3.84$ ), “I do not think that distance education will provide student-centered education” ( $\bar{x} = 3.55$ ) and “Distance education can limit the student ( $\bar{x} = 3.46$ ) ” answered as disagree. These items reflect negative predictions about distance education.

“I think ethical principles are more applicable in distance education” ( $\bar{x} = 2.51$ ), “Distance education is as effective as traditional education as a method of education” ( $\bar{x} = 2.45$ ), “I think distance education can keep students' curiosity more alive” ( $\bar{x} = 2.26$ ), “Students can participate more in classroom activities with distance education,” ( $\bar{x} = 2.25$ ), “I think distance education is not much different from classical education” ( $\bar{x} = 2.18$ ) answered at the level of disagree. Therefore, when participants compare distance education with traditional education, they prefer traditional education. In addition, “I am sorry for the time spent on activities related to distance education” ( $\bar{x} = 2.26$ ) was answered at the level of disagree, although academics preferred traditional education, it was determined that they care about distance education activities.

Table 4. Research Quantitative Data Findings

No	Questionnaire items	$\bar{x}$	Sd
1	I see distance education as a very modern method.	3.60	1.226
2	I enjoy following research and publications about distance education.	3.43	1.146
3	Distance education is as effective as traditional education as a method of education.	2.45	1.222
4	I am sorry for the time spent on distance education activities.	2.26	1.241
5	Distance education creates a different excitement in human beings.	3.20	1.270
6	Distance education is an approach that will eliminate individuals' lack of education.	3.35	1.346
7	Taking part in activities related to distance education gives me great pleasure.	3.32	1.298
8	Distance education is a great force in reaching the masses.	3.62	1.174
9	I am not sure that qualified results can be obtained from distance education applications.	3.16	1.295
10	Studies on distance education should be expanded as much as possible.	3.25	1.310
11	I do not approve of distance education as it pushes individuals into individuality.	3.03	1.344
12	Investing in distance education disturbs me while there is an improvement in traditional education.	2.68	1.343
13	Resources allocated for distance education should be evaluated in traditional education.	3.21	1.306
14	Distance education means nothing more than an education approach to me.	2.93	1.221
15	I find distance learning programs commercial.	2.69	1.391
16	I do not find diplomas received by distance education respectable	3.15	1.375
17	The Internet is an ideal tool for distance education	4.21	0.922
18	I think distance education is not much different from classical education.	2.18	1.229
19	Distance education can be used to address the lack of faculty	2.77	1.440
20	Distance education can limit the student	3.46	1.154
21	I think that distance education can keep students' curiosity alive.	2.26	1.301
22	I do not think that distance education will provide student-centered education	3.55	1.304
23	Distance education can provide equal opportunities in education	2.87	1.403
24	I think ethical principles are more applicable in distance education	2.51	1.328
25	Distance education can facilitate the learning of emerging technologies	3.38	1.223
26	Distance education can prevent students from socializing	3.90	1.237
27	I do not think that learning without a teacher can be realized in distance education	3.84	1.156
28	It can give students the chance to read to students who cannot enter university with distance education.	2.99	1.453
29	Distance education can be used to close the physical environment gap	3.43	1.245
30	Students can participate more in classroom activities with distance education	2.25	1.281

### *Research Qualitative Data Findings*

The participants (32%) stated that distance education can be used in crisis periods such as the pandemic process. Academicians talked about the positive situations of distance education such as “applicable in some lessons not directly applied as laboratory or workshop (24%)”, “no time limitation (12%)”, “economic (11%)” and “no space limitation (10%)”. In addition, "repetition (6%)", "efficient course processing (5%)", "communication (4%)", "asynchronous lecture notes (4%)" and "student-centered (3%)" such opportunities of distance education are mentioned.

These are some of their views:

“Distance education can be an appropriate and correct approach for the pandemic process. However, I think that face-to-face education is more beneficial and efficient.” (P102)

“If the student cannot attend the lesson, there is the possibility to watch later; this also allows the student to repeat the course. The student has the opportunity to ask questions. There is space, time independence. All kinds of lecture notes, materials, etc. there is the possibility to upload to the system.” (P118)

“If the infrastructure and distance education curriculum are created and enough training is given to those who take and give lessons, distance education may be useful for some courses. Thus, time and money can be saved.” (P34)

"The positive sides are that the students can listen to the lessons again and ensure that the education continues under any condition." (P65)

“It has economic benefits. It is good that it can be done without the need for physical investments without large spaces.” (P81)

It has been announced before the classes start that students are not obliged to attend the classes simultaneously in the distance education given during the COVID19 pandemic. Academics complain about the low level of participation (25%) in simultaneous classes on distance education. Academicians think that "distance education is not suitable for workshops and laboratory applied courses (19%)", "interaction in distance education is not sufficient (18%)" and "assessment in distance education is unfair (16%)". Academics talked about "technical problems such as internet problems (12%)" and "inequality of opportunity for students (10%)". They claimed that the distance education system “made students antisocial

(7%)”, “lowered motivation (7%)”, “negatively affected their personal development (4%)” and “readiness levels were not sufficient (4%)”.

These are some of their views:

“The student's attendance must be compulsory. In this way, teacher-student interaction can be achieved. Lessons can be processed more efficiently with high student participation” (P10)

“It is inadequate especially for technical fields that require application. Since it is made away from social environments, it may create deficiencies in the personal development of the student” (P135)

“The environment of mutual discussion and lack of face-to-face training is an important deficiency especially in the processing of courses open to interpretation. In addition, the application of applied courses with distance education model causes the lesson not to be understood adequately” (P42)

“Participation causes inequality of opportunity for students with fewer opportunities, such as the Internet, and the possibility of measurement and evaluation” (P104)

“Interaction remains weak. The instructor's guidance function is not realized. Socialization is weakening” (P61)

“Would you like to continue to give some lessons through distance education after the pandemic process?” when asked this question, the participants answered this question as no (49%), yes (23%) and may be some lessons (22%). The academicians who said no, expressed their negative thoughts about distance education, and those who answered as yes expressed positive discourses about distance education. After the pandemic process, academicians who wanted to continue some courses with distance education mostly talked about the theoretical parts of the courses.

## Discussion and Conclusion

This research was carried out to reflect academician views on distance education in the 2019-2020 Academic Year Spring Pandemic process. Academics perceived distance education as a great power in reaching the masses, an education system that covers the deficit of the modern and physical environment, as stated Zanjani (2017). In addition, academics consider distance education to prevent students from socializing and to limit the student. For this prediction of

academics, Dickey (2004) emphasized isolation and alienation in a web-based distance-learning environment and suggested web-logs as a solution. In addition, academics do not think that learning without a teacher can be realized in distance education.

Academicians have expressed their opinions on the fact that distance education can be applied in the theoretical parts of the courses or in some courses and that it will not be successful in applied courses. The academicians who answered the open-ended questions in the study stated that they could not perform the laboratory and workshop practices of the courses. It is anticipated that this gap can be reduced with the integration of virtual and remote laboratories into distance education management systems and augmented reality (Ruiz et al., 2014; Andujar et al., 2010). Academicians also complain about the fact that there is less participation in lessons about distance education at the most. Koç (2017) was operationalized student participation through learning analytics of the number of submissions to discussion forums and attendance to online lectures whereas academic achievement was represented by students' performance on their project assignments and final exam, found that had a positive direct effect on students' project scores and a positive indirect effect on students' final exam scores via their project scores.

Academicians stated that interaction in distance education is not sufficient. Shackelford and Maxwell (2012) stated that the interactions between learners provided with instructor modeling, support and encouragement, facilitating discussions, multiple communication modes, and required participation. Andersen (2013) found that there was a strong positive correlation between both constructs of learner-instructor interaction and learner social media interaction with general course satisfaction. Also, Xiao (2017) emphasized that course materials or content important to increase interaction.

In closing, although the transition from traditional education to distance education is fast and academics and students have not had previous education experience; a successful education period has been realized when the situations such as uploading the course documents to the system, conducting live lessons, recording live lessons, and performing the exams online. According to the results of the research, academicians mentioned the positive aspects of distance education and some critical situations. Considering the suggestions for critical approaches, suggestions for continuing with higher education in higher education during the pandemic process:

- While students are informed that participation in the course is not compulsory, students should be informed that they are more likely to be successful in the course if they participate in the course by mentioning in the publications in the related literature.
- Considering that workshops and laboratory works cannot be carried out during the epidemic process, the integration of virtual and remote laboratories into distance education management systems and augmented reality should be investigated.
- In order to increase interaction in distance education, the correspondence section in the learning management panel should be used actively with in-class questions and answers.

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## CHAPTER 6: EFFECTIVENESS OF GOOGLE CLASSROOM AS AN ONLINE LEARNING MANAGEMENT SYSTEM IN THE WAKE OF COVID-19 IN BHUTAN: STUDENTS' PERCEPTIONS

**Kado Kado** , **Nim Dem** , **Sonam Yonten** 

### Chapter Highlights

- For the first time, Bhutanese students embraced Google Classroom as tools for teaching and learning in the wake of COVID-19.
- From this perspective, this study aims to investigate the students' perception on the efficiency of Google Classroom and identify the challenges and opportunities in implementation of Google classroom.
- We employed the convergent parallel mixed method design with 100 students from Gongzim Ugyen Dorji Central School. Survey questionnaires and structured interviews were used to collect the data.
- Findings indicated that Google Classroom is an effective online learning management system compared to traditional styles of teaching and learning.
- There is no statistically significant difference between the perceptions of males and females regarding the efficiency of the Google classroom.
- We examined the challenges and opportunities that students of less affluent families may encounter when attending online class because of the cost of digital devices, data plans and poor network connectivity.
- The abrupt transition of face to face traditional instruction to remote learning requires the integration of digital education tools to realize Bhutan's vision of becoming a knowledge –based society which invokes the need of a fourth industrial revolution.

## Introduction

The COVID-19 catastrophe struck the entire world, plunging global economies into their deepest slump (Hebebcı et al., 2020). The education sector also suffered a similar effect from the pandemic, resulting in the suspension of physical classes (ElSaheli-Elhage, 2021). Globally, over 1.2 billion children were out of the classroom (World Economic Forum [WEF], 2020).

The suspension of physical classes in all the institutions and schools worldwide accelerated the acceptance of digital technology in an attempt to replace the traditional teaching and learning style (Korkmaz & Toraman, 2020). The exponential surge in the pandemics' spread forced educators to shift from face to face didactic instructions to online learning modalities overnight (Dhawan,2020; Sehran,2020).Thus, in a relatively short period of time, COVID-19 became the catalyst for educational institutions ongoing search for innovations.

As a prompt effort to curb the spread of COVID-19 in Bhutan, the Royal Government of Bhutan issued an executive notification to shut all school and institutes on 18<sup>th</sup> March, 2020. The Ministry of Education and UNICEF led a general call for schools across the country to ensure that students would learn in the best possible conditions regardless of whether they are learning from home or at school. The traditional in-person classroom learning was supplanted by new learning modalities; from textbook oriented instructions to television-based remote learning augmented with asynchronous and synchronous online learning tools from the Google Classroom (GC). Such an emergency response was a remarkable moment in the history of the Bhutanese education system.

Bhutanese students from grades VII to XII adopted Google Classroom as a delivery platform mandated by the Ministry of Education. However, students of lower grades used different web 2.0 tools for their teaching and learning process. For the first time, Bhutanese students adopted digital tools exclusively for online learning. This integration of technology in education was envisioned in our education blueprint and the iSherig ICT Master plan (Ministry of Education [MOE], 2014).

The digitization of education, as envisioned in our iSherig-2 Education ICT master plan 2013-2019, was intended to leverage the potential of ICT to strengthen the quality of teaching

and learning (MOE, 2014). Alim, Linda, Gunawan, & Saad (2019) and Azhar & Iqbal (2018) also suggested that ICT integrated teaching and learning promotes collaboration, imparts active learning and individualized learning experiences through the use of digital resources. Thus, an adoption of Google Classroom will enhance the quality of teaching and learning, resulting in globally competent learners.

Among the variety of e-learning tools is the Google Suite for Education. It is one of the powerful web 2.0 tools effective for teaching and learning. It includes Google App tools like Drive, Gmail, Docs, Forms, Sheets and Slides (Bhat, Raju, Bikramjit, & D'souza, 2018). All these tools can be worked simultaneously in the Google Classroom to facilitate online learning. The Google Classroom was initially launched in 2014 (Azhar & Iqbal, 2018), therefore the research related to its efficacy is limited in international contexts in general, and Bhutan in particular.

It has been experimentally demonstrated that Google classrooms have inconsequential effects on teaching and learning strategies, but it helps to facilitate the documentation and basic class management (Azhar & Iqbal, 2018). They employed a qualitative technique to study the perceptions of 12 higher educators who implemented Google Classroom for at least one semester. This method attempted to unearth only the perceptions of the educator not the learners. It is equally important to determine the learners' perceptions about the effectiveness of these tools as they are the end users.

More recently, Khali, Abdelrahman, Basher, & Chauhan (2017), conducted a study on the impact of the Google Classroom on the teaching efficacy of pre-teachers. The researcher employed an experimental design where the control group was taught in the traditional style while the experimental group studied using the GC. The result revealed a significant difference between the control and experimental group. Their findings demonstrated that the Google Classroom method of teaching college students significantly improved their academic achievement, planning, executions and evaluation when compared to traditional approaches of teaching and learning.

Shaharane, Jamil, & Rodzis (2016) examined the relationship between identified factors and efficacy of GC by analyzing the learning activities using the TAM (Technology Acceptance Model). This study applied quantitative techniques. TAM is a theoretical model built to

assess the students' technology usage behaviors. The technology usage behaviors were determined by two factors; perceived ease of operation and perceived usefulness. Their findings indicated that overall students were more satisfied and they experienced stronger performance in communication and interaction while finding the technology easy to navigate and highly effective. Moreover, a recent systematic research study on the effectiveness of Learning Management System, employing Technology Acceptance Model (TAM) as a theoretical framework supported the original finding of TAM (Abdul Hamid et al., 2020). Our study also employed the TAM as theoretical framework to determine students' perception on the effectiveness of the Google Classroom.

Another research study was conducted by Iftekhhar (2016) at Daffodil International University which focused on teachers' and students' perceptions of using the GC. Generally, teachers use GC when it is required by the university. The use of GC creates stronger interaction between teacher and students, while students believe that this platform is helpful since they can easily access the learning materials and learning is more convenient as it breaks spatial and temporal confinement of traditional classroom. The inevitable transition to online learning transcends the old pedagogical teaching and learning environment to a new innovative ubiquitous learning environment (Cope, n.d.). Thus, online learning delivered through innovative digital tools create

The GC tools presents a compelling option for the education process as it demonstrates significant improvements for both students and teachers. Studies have shown that GC is a particularly potent tool among higher education learners. Moreover, based on this study, it can be construed that the knowledge and skills acquired with implementing GC is preferable over the conventional lecture-based instruction (Mafa, 2018). Similar, previous findings have demonstrated the significant impact of using Google Classroom as an e-learning toolkit when compared with traditional methods of learning (Bhat et al., 2018).

The GC also facilitates effective, paperless online collaboration between students and teachers. Teachers can generate online discussions or post various online learning activities with ease. Students also have an opportunity to give feedback or seek clarification regarding the particular topics with their virtual classmates and teachers (Alim et al., 2019). Moreover, GC caters to the participation of larger and more diverse groups of students when compared to traditional classrooms. It can be particularly useful to engage introverted students who may



be reluctant to participate in the traditional setting. The virtual classroom provides a platform for all learners to participate equally in the teaching and learning process. However, anecdotal evidence reveals that many Bhutanese students are reluctant to participate effectively in GC.

The GC also helps teachers to disseminate learning materials and academic related information directly to students as a whole instead of having to rely on emailing individually. Students get timely e-learning materials which will help them to improve their e-learning experiences (Alim et al., 2019). Moreover, the GC provides a platform for the convenience of learning when individual students cannot attend class due to unavoidable circumstances. The Google Classroom allows them the opportunity to access the posted materials and notes at any time, regardless of their unique situations.

Despite the efficiency of Google Classroom in teaching and learning, my search of literature revealed some of the challenges encountered by students while navigating the e-classroom; non-personalized user-interface, lack of communication with peers, privacy for assignments, and lack of reliable internet facilities at home (Kumar et al., 2020). Similarly, teachers also face difficulties in receiving feedback from students when security lapses allow anonymous students to join and disrupt the class by accessing secure codes. This can intimidate certain users from engaging in open, honest dialogue. Additionally, students may use Google Classroom as more of a social networking site than an e-learning platform (Joshi, 2019).

Other challenges are the lack of adequate smartphones or data plans to attend the online classes which only serve to widen the digital division. A significant gap between those from privileged and disadvantaged backgrounds in the US still exists. Nearly 25% of those from disadvantaged households do not have reliable internet access and digital tools to participate in e-learning (WEF, 2020).

The existence of digital divide is still a significant concern in highly affluent nations like Australia and the US. Globally, three out of four students who live in a rural household cannot be reached with any remote learning modalities (UNICEF, 2020). As Bhutan is still a developing nation, the digital divide exists as a formidable obstacle to equal education. Consequently, the use of Google Classroom by the teachers and students may not be optimally effective as disadvantage students may experience difficulty in obtaining the

technological advantages it demands. Alim et al., (2019) also posit that one of the crucial barriers that deprive the efficiency of GC is lack of accessibility to smart gadgets, data plans and a lack of online Google accounts.

More recently, it has been demonstrated that learning remotely on the digital platform fatigued many students, decreased their interest, and the perceived heavy workload negatively influenced their motivation (Niemi & Kousa, 2020). This finding also assimilates with Akyıldız's (2020) research where he finds that lack of interaction and communication in online classrooms can possibly lead students to new challenges such as effective time management, feelings of isolation, undue worry about exams, and unstructured educational habits.

### *Google Classroom in Bhutanese Contexts*

Until the advent of the modern education system in 1960, the monastic education served as the primary source of teaching and learning in Bhutan. With the onset of modern practices, the Bhutanese education system has mounted many landmark reforms through periodic efforts in the form of policy changes. Some of these were the nationalization of school curriculum in the early 1970s, introduction of the New Approach to Primary Education (NAPE) in the mid-eighties, the nationalization of high-stake examinations, and educating for GNH to ICT integration in Bhutanese Education System (Tshewang, 2015). All of these efforts were intended to improve the quality of teaching and learning.

The Bhutanese education system made commendable and rapid progress in producing a younger generation that benefited the development of the country. However, challenges of providing quality education to our children still remain (Bhutan Council of School Examination and Assessment [BCSEA], 2019). To address this challenge, ICT is accorded as one of the crucial tools to enhance the quality of education. Thus, MOE (Ministry of Education) launched iSherig-2, ICT Education Master Plan after a successful completion of iSherig-1(2014-2018) to harness the potential benefit of ICT in enhancing the quality of education.

Despite the overwhelming vision to produce “an ICT-enabled, knowledge-based society as a foundation for Gross National Happiness” through the pervasive use of digital educational

resources (MOE, 2019), educational technologies like Google Classroom are seldom integrated in teaching and learning in Bhutan. Thus, the COVID-19 pandemic situation may present the challenges of adopting the Google Classroom e-learning platform into a unique opportunity, embarking its e-learning journey to produce globally competent learners through the pervasive use of emerging and relevant technology.

It was challenging for Bhutanese students to adjust their learning to an online platform, as learning in the Bhutanese context has always been confined to the classroom with a limited integration of technology. Furthermore, many of these classrooms are not well equipped with digital tools designed for teaching and learning. The quality of the online learning experience not only depends on the quality of IT infrastructures but also on students' and educators' perception, knowledge and skills in navigating the features of these digital tools. Implementing a technology that is not willingly to be accepted by the end users only exhausts resources and wastes time as well as money.

Based on the available research studies, many efforts have focused on the efficacy and practicality of implementing e-learning platforms within the classroom. However, less research exists on examining the merits of the GC in general, and even less study has been undertaken with its potential in Bhutan specifically. Moreover, the adoption of Google Classroom as an alternative to the traditional classroom created a need to ascertain the effectiveness of its tools through an empirical study. The work conducted by Azhar & Iqbal (2018) also recommended conducting the study in secondary schools by employing quantitative techniques to validate and corroborate their findings.

### *Aims and Objectives*

The aim of the study is to chart a way forward for the implementation of Google Classroom as an e-learning platform for Bhutanese students. The objectives are as follows:

- i. - Ascertain the students' perception on the effectiveness of Google Classroom
- ii. - Investigate difference in genders' perception of GC
- iii. - Identify Challenges and Opportunities of online learning

### *Significance of the Study*

This study shall be significant for following:

- It provides empirical evidence to policy makers, educationist, teachers, and students of the effectiveness of Google Classroom
- It will facilitate the effective implementation of Google Classroom.
- The result of the study shall add knowledge to the existing research

### *Research Questions*

How will students of Gongzim Ugyen Dorji Central School perceive the effectiveness of Google Classroom as an Online Learning Management System?

1. What are students' perceptions of the effectiveness of Google Classroom?
2. How do male and female students perceive the effectiveness of Google Classroom?
3. What are the Challenges and opportunities of Google Classroom?

### **Method**

#### *Research Design*

Mixed method research was used, with survey questionnaires as a tool to collect the quantitative data and the interview to collect qualitative data. A convergent parallel design was adopted as this design ensures that both data sets are concurrently gathered, independently analyzed and then meaningfully analyzed to derive the overall findings and interpretation of the study (Creswell, 2017; Mertens, 2019)

#### *Sampling*

For quantitative design, simple random sampling had been used when selecting the sample. Whereas, non-probability convenience sampling was used to select ten students. In purposive sampling techniques, samples were selected on the basis of their knowledge, relationships and expertise regarding the research subject (Mertens, 2019). In this study sample selected had sufficient and relevant experience in the usage of Google Classroom.

### *Data Collection*

Before data collection, the administrative and ethical procedures were strictly followed to get approval to conduct the study with participants from the cluster research committee. After getting an approval, informed consents were sought from all the respondents of the study. An online survey questionnaire was sent to all the students of Gongzim Ugyen Dorji Central School for the purpose of quantitative data collection.

A total of 100 responses were received from a total of 200 questionnaires dispensed. The response rate was 50%. The 5-points Likert scale ranging from 1(Strongly Disagree) to 5(Strongly Agree) were used to measure the students' perceptions.

### **Findings**

This section summarizes the main findings of the research. Students' perceptions about the Google Classroom were analyzed in the realms of *Perceived usefulness, Perceived Ease of use, Facilitating conditions, Communication & interaction and Hedonic motivation using the mean and standard Deviation (SD), challenges and opportunities in implementation of GC and genders' perception in using GC.*

#### *Finding regarding Students' Perceptions*

##### *Finding of the Overall Perceptions*

The Table 1 depicts the analysis of students' perceptions using the mean and standard deviation. The highest mean and lowest SD is the perceived usefulness with the weighted mean of 3.55 and SD 1.16. This result indicated that on average the respondent strongly agreed that Google Classroom is a useful online learning management system. The lowest mean and highest SD is the Hedonic motivation with the weighted mean of 2.71 and SD 1.92. This indicates that respondents lack intrinsic motivation to embrace Google Classroom as a synchronous form of e-learning tools.

Table 1. Students' Perceptions

<b>Factors</b>	<b>Mean</b>	<b>SD</b>
Perceived usefulness	3.55	1.16
Perceived Ease of Use	3.54	1.61
Facilitating Conditions	3.37	1.18
Communication and Interaction	3.38	1.21
Hedonic Motivation	2.71	1.92

### *Finding of Students' Perception of Usefulness*

The effective usefulness of Google classroom was felt strongly with the weighted mean of 4.05 and SD 1.05 as depicted in Table 2. Respondents strongly agreed that in terms of perceived usefulness, the accepting Google classroom as a virtual learning platform is considered as useful. The lowest mean value and highest SD goes to the component of Google Classroom not having the distinctive useful features with weighted mean value of 3.01 and SD 1.01. This result signifies that respondents disagreed that Google Classroom does not have any distinctive features for learning.

Table 2. Mean Value of Perceived Usefulness

<b>Factors</b>	<b>Mean</b>	<b>SD</b>
I find Google Classroom useful e-learning tools.	4.05	1.05
Google Classroom enhances my learning productivity.	3.60	1.15
Google Classroom enables me to accomplish tasks more quickly.	3.50	1.28
Google Classroom improves my performance.	3.70	1.32
Google Classroom saves my time.	3.52	1.18
Google Classroom doesn't have any distinctive useful features.	3.01	1.14
<b>Weighted Mean</b>	<b>3.55</b>	<b>1.18</b>

### *Finding of Students' Perception of Ease of Use*

Based on Table 3, the highest mean and lowest SD is for submission for assignments/project/homework via Google classroom with weighted mean value of 4.06 and SD 1.02.

Table 3. Mean Value of the Perceived Ease of Use

<b>Factor</b>	<b>Components</b>	<b>Mean</b>	<b>SD</b>
<b>Perceived Ease of Use</b>	It is easy to navigate the Google Classroom.	3.52	1.17
	Google Classroom enables me to access the teaching and learning materials.	3.67	1.31
	Google Classroom is convenient and user-friendly.	3.55	1.15
	Google Classroom allows me to submit my assignments/ projects/ homework.	4.06	1.02
	It is more convenient for me to learn via Google Classroom than other social media platforms like WeChat, messenger and etc.	3.00	3.52
	I dislike using Google Classroom in mobile because small sized screen cause me difficulty in navigation and typing.	3.47	1.49
	<b>Weighted Mean</b>	<b>3.54</b>	<b>1.61</b>

This depicts that respondents strongly agreed that Google classroom allows submission of assignments/project/homework effectively. The lowest mean value and highest SD goes to the component that it is convenient for them to learn via Google Classroom than other social media platforms like WeChat and messenger with weighted mean value 3.00 and SD 3.52. This result depicts that respondents prefer other social media platforms than Google Classroom for teaching and learning.



*Finding of Students' Perception of Facilitating Conditions*

Based on Table 4, the highest mean and lowest SD is about the teachers' orientation about the navigation of Google classroom with weighted mean value of 4.06 and SD 1.08. Respondents strongly agreed orientation regarding the features and navigation of Google classroom was done before the implementation. The Lowest mean and highest SD is students lacking necessary knowledge and skills to participate in Google classroom with weighted mean value 2.71 and SD 1.25. Respondents disagreed that they had necessary knowledge and skills to participate in Google Classroom.

Table 4. Mean Value of the Facilitating Condition

<b>Factors</b>	<b>Components</b>	<b>Mean</b>	<b>SD</b>
<b>Facilitating Conditions</b>	I have the resources necessary to participate in Google Classroom.	3.38	1.19
	I have the knowledge necessary to participate in Google Classroom.	2.71	1.25
	I can get help from others when I have difficulties participating in Google Classroom.	3.34	1.19
	My teacher oriented me about the features and navigation of Google Classroom.	4.06	1.08
<b>Weighted Mean</b>		3.37	1.16

*Finding of Students' Perception Communication and Interaction*

Based on Table 5, the highest mean and lowest SD is about the teacher keeping students engaged and participating in discussions with weighted mean value 3.83 and SD 1.15. Respondents agreed that teacher kept them engaged meaningfully in the wake of COVID-19 when all the schools are closed. The lowest mean and highest SD is students feeling comfortable to interact with their friends and teacher. Respondents disagreed that they feel comfortable to interact with their friends and teacher via Google classroom.

Table 5. Mean Value of Communication and Interaction

Factor	Communication and interaction	Mean	SD
<b>Communication and interaction</b>	I felt comfortable conversing through this medium for learning.	3.10	1.25
	Teachers helped to keep all the students engaged and participating in productive discussion.	3.83	1.15
	I felt comfortable interacting with other participants through Google Classroom.	3.12	1.22
	My point of view was acknowledged by other participants during online discussion.	3.20	1.18
	Teachers are enthusiastic in teaching and explaining via the Google Classroom.	3.68	1.18
<b>Weighted Mean</b>		3.38	1.21

#### *Finding of Students' Perception of Hedonic Motivation*

Based on the Table 6, the highest mean and lowest SD is students feel it is more fun to participate in Google Classroom compared to a traditional classroom with weighted mean value 2.85 and SD 1.18.

Table 6. Mean Value of Hedonic Motivations

Factor	Hedonic motivation	Mean	SD
<b>Hedonic motivation</b>	Participating in Google Classroom is fun, compared to traditional (offline) courses.	2.85	1.18
	Participating in Google Classroom is enjoyable, compared to traditional (offline) courses.	2.69	1.29
	Participating in Google Classroom is entertaining, compared to traditional (offline) courses.	2.60	3.29
<b>Weighted</b>		2.71	1.92

Respondents claimed learning via Google Classroom is fun compared to conventional teaching and learning. The lowest mean and Highest SD is that learning via Google classroom is entertaining with weighted mean value 2.60 and SD 3.29. Respondents

disagreed that participating in Google Classroom is entertaining as compared to traditional teaching and learning.

*Finding regarding Genders' Perception of Google Classroom*

As seen in Table 7, the Levene's test indicated that the assumption of homogeneity of variance in overall perceptions of students towards usage of Google Classroom was violated as p value is greater less than 0.05 ( $F(1,97.443) = 13.2486.571, p = 0.00$ ).

Table 7. Levine's Test for Equality of Variances

		<b>F</b>	<b>df</b>	<b>Sig.</b>
Overall Perceptions	Equal variances assumed	13.248	98	0.00
	Equal variance not assumed		97.443	

Significant level: >0.05—no significant, <0.05—significant

*Difference in Genders' Perception of the Efficacy of Google Classroom*

An independent- samples t-test was conducted to check whether there is any statistically significant difference between male and female perceptions toward effectiveness of Google Classroom. The mean score of the male students' overall perception towards effectiveness of Google Classroom ( $M = 3.22, SD = 0.30$ ) is not statically significantly higher ( $t = -0.66, df = 97.443$ ), two tailed ( $p = 0.50$ ) than female students on the same variable ( $M = 3.25, SD = 0.17$ )

Table 8. Independent Sample t-test

<b>Test</b>	<b>Group</b>	<b>Mean</b>	<b>Mean Difference</b>	<b>Standard Deviation</b>	<b>Sig. (2 tailed)</b>
Overall Perceptions	Male	3.22	0.32	0.30	0.50
	Female	3.25		0.17	

Significant level: >0.05—no significant, <0.05—significant

## *Finding regarding Challenges and Opportunities*

### *Challenges While Using Google Classroom*

When students were asked about challenges faced while using Google Classroom, the main finding that emerged was inequality in knowledge dispersal via Google Classroom due to digital division. Some of the students do not have smart gadgets, or lack connectivity and are unable to access the internet data. Some of the students also claimed that the small sized screen causes difficulty in navigation and typing:

*I don't have personal phone, I use my parent's phone for online learning (S1, S2, S3 and S5)*

*During raining times, network connectivity is poor at my place (S10, S9, and S8)*

*I feel uncomfortable to use Google classroom in phone due to small sized screen (S6, S7 and S4)*

*I was unable to participate actively in Google Classroom as I need to help my parents during day time and I felt exhausted at night (S3, S4)*

Some students pointed out that teachers gave out numerous assignments so it was difficult to complete the assigned work in stipulated time. Consequently, they prefer the conventional offline teaching and learning instead of a virtual, asynchronous form of learning. They also asserted that they may use smart for social networking instead for academic purpose.

### *Opportunities of Implementing Google Classroom*

Students highlighted some of the features they like about the Google classroom. It is evident from their statement that Google Classroom is effective for online collaboration where they can interact with their friends, share the files, and intimate their teachers for academic support. Indeed it's an effective platform for those students who seldom participate in traditional offline class to participate actively in online learning. Moreover, it is effective for submission of the homework and assignments:

*Google classroom helps me to interact with my friends (S3, S4)*

*I feel comfortable to ask doubt to my teacher via Google Classroom (S6, S8, and S9)*

*Teachers were approachable while teaching through Google Classroom. (S4, S10)*

*It is easy and convenient to submit the assignment and homework via Google Classroom (S5, S8)*

## Discussion

This section begins by drawing some final discussion of the findings. The analysis of the quantitative data revealed that Google Classroom was perceived useful for online teaching and learning. Respondents agreed that Google Classroom is an effective online learning management system in contrast to traditional modes of instruction. This is consistent with findings of Iftakhar (2016) which suggest that the virtual classroom, a synchronous form of e-learning embraced by schools to an attempt to replace conventional mode of instruction delivery was perceived useful by the respondents. This result also supported the claims made in the literature that usefulness and perceived ease of use are two main factors that influenced the use of a system (Cigdem & Ozturk, 2016). This finding is also congruent with findings of Gupta and Pathania (2020) and (Sathish et al., (2020). Their findings revealed that 80% of students favour the use of Google Classroom step up compared to conventional face to face teaching and learning. Students felt they received individual attention and their presence was accounted for in virtual classroom setup.

The Google classroom has many distinctive features which are deemed to be effective for both asynchronous and synchronous for of learning. The similar pattern of results was observed in the study of Ventayen et al. (2017) which revealed that most of the respondents agreed Google Classroom is extremely useful in submission of assignments and collaborative learning with a weighted mean of 4.31 and 4.24 respectively. The finding of the study was also strikingly similar to the finding of Panthania (2020). He posited that the Google Classroom enhances the collaborations between friends and autonomy to facilitate individualized learning environments. Yang and Baldwin (2020) also asserted that technology-enabled instructions facilitate students learning by actively constructing the knowledge instead of receiving passively.

The lowest weighted mean and highest standard deviation is for the factor Hedonic motivation. Respondents agreed that they lack intrinsic motivation to accept Google classroom as an e-learning platform. The close agreements of the results with the literature suggest when learners were novices in the field of digital based teaching and learning it will

be apparently difficult to get tailored with e-learning platforms (Rosstyawati, 2018). For Bhutanese students, the journey of the integration of the Google Classroom in teaching and learning had started in the wake of COVID-19 as an attempt to replace the traditional modes of education. Thus, it was challenging for most of the Bhutanese students to adapt to the new normal that required the powerful digital tools to process the teaching and learning.

Regarding the challenges, embracing the Google Classroom as an alternative to traditional styles of instruction may create inequality in knowledge dispersal. Some students do not have reliable internet access, adequate data plans or digital tools to participate in learning, thus reaching the inaccessible students through Google Classroom is still challenging in our context. This claim is supported by the study conducted by Sepyanda (2018), he asserted that most of the students will not have smart gadgets and network accessibility at home for e-learning. This finding is also congruent with the work of Hebebcı et al. (2020), who claimed that lack of adequate data plans and infrastructure creates negative opinions toward online learning. Therefore, June, Hassan, and Azizi (2020) suggested that relevant stakeholders need to ensure the availability of smart gadgets and network connectivity at their disposal for effective teaching and learning via Google Classroom.

## Conclusion

The closing of all the educational institutes on the 18<sup>th</sup> of March to contain the spread of COVID-19 in Bhutan resulted in a dramatic paradigm shift in the education system with the distinctive rise of adopting e-learning, where teaching and learning is undertaken remotely and on digital platforms. Among many powerful web 2.0 tools for teaching and learning, we adopted Google Classroom as our online teaching and learning tools. The adoption of Google Classroom as a medium of teaching and learning is challenging, yet we had transformed the obstacles into opportunities. Capitalizing on the efficiency of educational technology, we created a platform for online collaboration, enhanced interactions, uploading assignments and active participation. Moreover, the technology-supported learning environment created individualized learning environments where students actively construct their knowledge instead of consuming the knowledge from the teachers. Unlike the traditional classroom, which focuses on academic skills and rote learning, e-learning enhances 21<sup>st</sup> century skills like collaboration, communication, critical thinking and creative thinking. However, due to

widening socio-economic inequality, the digital divide could be further exacerbated if the access to education is governed by the access to the latest emerging technologies.

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## CHAPTER 7: ROLE OF PARENTS IN EARLY EDUCATIONAL CHILDHOOD IN EDUCATION TECHNOLOGY IN COVID-19 OUTBREAK

**Karisma Erikson Tarigan** , **Margaret Stevani** 

### Chapter Highlights

- The present study revealed the considerations of Indonesian parents in educational technology and the effects of educational technology on the education character in early childhood in COVID-19 outbreak by applying descriptive qualitative research.
- The subject of the research was 43 Indonesian parents (mothers) in a playground.
- The role of parents was increased by applying educational technology after COVID-19 than the application of technology before COVID-19.
- The results showed that 25 activities to promote online teaching activities and 17 positive characters of education based on Indonesian Ministry of National Education in 35 online learning activities by using educational technology.
- The parents showed some positive behaviors about the benefits of communication technology after COVID-19 outbreak, such as an online questionnaire, online live video conferencing by using Zoom, WhatsApp group, telephone call, mobile message, website school, and email newsletter.
- Half of Indonesian parents (51%) were most definitely agreed of their involvement with the children's school lives in COVID-19 outbreak.
- All the results revealed a positive correlation of home-school relationships after COVID-19 outbreak by applying educational technology.

## Introduction

The temporary closure of schools in Jakarta, as well as in some other Indonesian cities to limit the spread of COVID-19, corona virus has added a new challenge for parents and guardians of the now studying from home children (Jakarta Post, 2020, p. 1). Our understanding of COVID-19 disaster shows that although the children are at lower risk still mental trauma of the children should be dealt with in a very effective way to strengthen them emotionally. Global organizations need to focus more on issues related to children by effective planning and should endorse necessary measures (Saxena, 2020, p. 196). Building a strong relationship with parents is crucial. The survey shows that the partnerships between staff and parents to support children's development can be strengthened. Even in the four participating countries with strong experience with Education and Care for Children, staffs are not always well prepared to make the most of the interactions with parents, and some staff rank engaging with families as being among their top professional development needs (OECD, 2020, p. 4). An abundance of research says that parents' interest in their child's education plays a key role in the child's learning and has a beneficial effect on the child's behavior.

It concluded that teachers must also develop strategies to increase parent involvement in their children's academic life. This means teachers should go beyond traditional once-a-year parent/teacher conferences and work with parents to see that learning is valued in the home. They found that high-efficacy teachers not only acknowledged the importance of parental involvement, but they also reached out to parents through conferences, telephone calls, and even mailing letters to maintain communication with parents and to let parents know how well their children were progressing in school. Of all technology available to today's teacher, the best is still the telephone, which can provide an immediate connection (unlike email and handwritten letters) (Giulio, 2014, p. 64).

Indonesian Education and Culture Minister, Nadiem Makarim said that education technology was being adopted at an unprecedented rate as parents, teachers, and students adjusted to the demands of distance learning during COVID-19. He said that it can heavily accelerate technology adoption in education in the future. This is a very encouraging trend (Jakarta Post, 2020, p. 1). In Indonesia, the COVID-19 epidemic negatively affected the education life of 68 million students. Upon the spread of the epidemic in the country in mid-March, President

Joko Widodo called for national education to be continued at home. Because all students and teachers do not have internet access, it is planned to broadcast courses on the state-owned TVRI channel for 3 months (Kayalar, 2020, p. 26). The Ministry of Education and Culture conducted an online survey with 38,109 students and 46,547 parents as respondents at all levels of education in all provinces in Indonesia. Based on the survey results, in both 3T and non-3T areas in Indonesia, 96.6% of students studied entirely from home. Teachers need to teach at the ability level of their children, not according to the demands of the curriculum. Special attention needs to be given to the children who are left behind (Kompas, 2020, p. 2).

Similarly, according to the 2017 “Stress in America” survey, compiled by the American Psychological Association, 48% of parents say that regulating their child’s screen time is a constant battle. 58% say they worry about the influence of social media on their child’s physical and mental health. They are concerned for their children, and they know that their current relationship with tech is unsustainable. And yet, as parents allow their smartphones to control more and more of how parents spend their time, how parents feel, and how parents act, too many for parents are letting their kids down the same path (Kang, 2020, p. 16). The most important thing is the role of parents in this current situation related to the prevention of COVID-19, which parents also have a role as an educator in educating children about learning methods and providing education related to the function of the technology used. This is done to avoid the misuse of technology which causes damage to the students’ morale during the learning process carried out at home (Sudarsana, et. al., 2020, p. 30). It became apparent that teachers, students, and parents needed to be on the same page in terms of each day’s schedule.

To keep track of each person’s appointments and work needs, many families began creating their schedules too. For consistency, teachers tend to maintain a schedule including posting specific log-in times for themselves and students, often twice a day, plus time for group discussion and time for individual interaction and feedback when needed. The goal is not only to keep parents informed about what to expect, but to hear their concerns, get their feedback, and maintaining continuing interaction (Baecker, et. al., 2020, p. 23). Based on the facts and reasons, the research questions were:

1. What are the considerations of Indonesian parents in educational technology in COVID-19 outbreak?

2. What are the effects of educational technology on the education character in early childhood in COVID-19 outbreak?

### COVID-19 and Online Learning

Using technology in teaching the subject, considering the COVID-19 pandemic situation, is vital to bring teaching and learning meaningful to both teachers and learners (Marpa, 2021, p. 98). In response to that case, e-learning is an alternative for educational delivery especially in the era of technological advancement, the unceasing quest for education pursuit by prospective students amidst infrastructural constraints in our context and, the arrival of the COVID-19, as a global threat (Ananga, 2020, p. 318). Besides that, an examination of users' e-learning continuance satisfaction can provide new opportunities for research into users' adoption of learning technology. It also brings new understanding to the field of instructional technology, with an emphasis on users' behavioral intentions regarding e-learning tools. The importance and cause-effect relationships among the predetermined factors, along with the causal relationships between these factors and continuance satisfaction, can be used to explore students' and instructors' perceptions in other contexts, such as mobile learning, e-commerce, social network sites, e-medicine, and so forth (Al-Samarraie, et. al., 2017, p. 14). In COVID-19 and online learning context, research showed that 60% of the participants suggested that both the instructors and learners should have self-learning motivation; cooperation with each other's and should follow the ethics of technology. Likewise, 56% of the participants reported that online teaching should not be the replication of traditional teacher-centered lecture methods rather more focus should be paved to engage individual learners as per their abilities (Paudel, 2021, p. 78).

As a result of the effect of technology and learning activities, teachers highlighted the positive aspects of the distance education process and drew attention to the importance of sustaining education. Nine teachers (52%) stated that distance education will be used more widely and effectively in the future in COVID-19 pandemic (Hebebcı, Bertiz, & Alan, 2020, p. 278). To define that term, distance education is an education model where individuals are free from learning resources and have no time limitation. Current developments in information technologies have helped the development of the global communication network with distance education applications (Yılmaz, Kabul, & Diler, 2020, p. 343). Distance teaching and learning need other kinds of pedagogical and evaluation methods than face-to-

face teaching. Students' holistic development and support needs are not as easily recognizable as they are in normal classes. Teachers need methods and tools to follow how students learn and what kind of support they need. Technology can provide more real-time teaching methods, but their use requires clarification on certain ethical questions, especially those who have the right to access this data. There is also a need for an active communication between teachers and for opportunities to share experiences with colleagues (Niemi & Kousa, 2020, p. 367).

Online learning has been an overwhelming response to these closures and a game-changer in the way pedagogy is happening around the world (Mulenga & Marban, 2020, p. 1). The changes the educators expect in educational practices in the post-COVID-19 world are reshaping the competencies of the educators, undergoing a paradigm shift in education, supporting the educators' ability to provide online learning practices, integration of more courses about online learning into the curricula of education faculties, increase in students' motivation towards learning upon returning to schools/universities, the role of educators from teaching to facilitating. The educators in Turkey think that some measures must be taken against a potential outbreak in the future because such a pandemic like COVID-19 may occur again and they may go back to teaching online. According to educators, the measures to be taken in education are enhancing network capacity, internet speed, information technology, supporting educators' competencies related to online learning environment, training educators to use online learning management systems, guaranteeing every student's access to the internet or other necessary equipment, organizing special trainings about getting ready for another potential outbreak in the future, dynamizing educator, student and parent cooperation, placing more emphasis on teaching real-life problem solving skills, revising the curricula and making it more effective, integration of the topics related to self-care, health, hygiene etc. into the curriculum content more, making effective plans for extraordinary conditions in the future by the educational decision makers, revising all educational practices starting from the concept of education itself and making a new structuring program, taking measures to promote educators' creative thinking skills, considering educators as professionals who can manage complex processes rather than technical employees, and making effective plans for the potential extraordinary conditions in the future and taking measures about the post-COVID educational practices as this is a temporary situation, and getting back to circulation is not easy (Korkmaz & Toraman, 2020, p. 300).



## The Assumptions of Indonesian Parents of Education Industry 4.0

The role of technology in developing global education in Indonesia, especially in its unique position of having a huge diversity of ethnic and religious groups as part of its national character. Ideas associated with 21st Century Education (World Economic Forum), the soft skills such as the 4 Cs as in the Indonesia curriculum, skills, knowledge, and attitudes for global competence, and the Sustainable Development Goals (SDGs) are all linked to Education 4.0 and Industry 4.0. A critical educational focus of debate in Indonesia at the moment concerns distance and online modes of education and the extent to which these education delivery modes can promote and support policy realization to alleviate inequality between urban and rural districts (Kusmawan, et. al., 2020, p. 251). Research shows that several things need to be considered in education and industrial evolution 4.0 by the school and the teacher in deciding how education and learning held, that is the learning approach must be student-centered learning, learning must be collaborative, meaningful learning, and integrated with the community. Furthermore, to support the education and learning process, such as flipped classroom, Khan Academy, project-based learning, Moodle, Schoology, and PLATO can be integrated into the learning process (Lase, 2019, p. 13).

Before COVID-19, many schools were not making full use of technology as a component of instruction. Computers and maintenance continued to be a financial challenge. When asked to check each of the technology experiences their students had in their class, 73% reported using technology, 37% reported in-class computer sharing, and 36% mentioned visits to the computer lab. When COVID-19 hit and schools were closed, it was these teachers and their students who were more able to make a quick switch to full online-learning (Baecker, et. al., 2020, p. 32). In the COVID-19 era, classes delivered on virtual platforms such as Zoom will be the rule, not the exception.

New technologies are helping spread adaptive and personalized teaching, allowing students to determine their own pace, pathway, and destination (Goldin and Muggah, 2020, p. 47). COVID-19 turned everyone's life upside down. A communication system that takes into consideration connected and non-connected households should be put in place to offer regular and consistent ways for educators and parents to stay in touch about the students' progress (ElSaheli-Elhage, 2021, p. 67). Having parental support is vital to the success of the students in the online learning environment (Pina, et. al., 2017, p. 380). Parents and teachers need to

encourage children's efforts and achievements, no matter how small. As adults, we tend to overlook children's positive behavior and focus on the things they do wrong. Children need and want their parents' vote of confidence; it helps build self-esteem and makes them feel valued (Moore, 2012, p. 232).

### **The Education Character for Early Childhood Education**

The character proves to be one of the development aspects imperatively to be stimulated at an early age since the phase children in their early age very sensitive in terms of receiving and absorbing various stimulations as they appear in their environment. It is named disposition. Disposition as it is expected to develop in children is a positive disposition such as a feeling of curiosity, a deep involvement in doing work, cooperating in teamwork, creativity, feeling tough in facing troubles, a spirit to solve problems, generosity, responsibility, initiatives, being creative, and willing to help others (Retnowati, et. al., 2018, p. 431). Teachers commonly argue that there is little room in the school curriculum to educate for moral character. Many will say that moral character is the responsibility of parents together with faith communities and that in any case in a multicultural society there is no agreed way to determine what is good and bad character. In fact, teachers are generally non-judgmental in official language about children. Moreover, in reviewing character education programs, they identified six teaching methods. These were: (1) instruction in basic values and virtues, (2) behavioral codes established and enforced, (3) telling stories with moral lessons, (4) modeling desirable traits and virtues, (5) holding up moral exemplars in history, literature, religion, and extolling their traits, and (6) providing in school and community outreach opportunities (service projects) through which students can exercise good traits and pursue good values (Nucci & Narvaez, 2014, p. 54).

Schools will teach character education as part of their curriculum. It means that character education is a requirement that could be met by teaching children a specific number of lessons on topics such as respect or responsibility. Character education is a lifelong process that has a relationship at its core. If parents, educators, and other adults spend time building relationships with youths, then youths will have character (Thomsen, 2002, p. 50). On the other side, teachers are generally not receiving professional instruction for moral or character education at the preservice level in their education programs. In a survey done with 600 deans of education in 1999, over 90 percent of them responded that they supported the need for

character education in K-12 schools, but only 13 percent were satisfied with their institution's efforts to integrate character education within their teacher education programs (Power, 2008, p. 322). Like all of us, children today are raised in a family, influenced by their friends in their neighborhood and school, conditioned by the nature of a community that now includes televisions, computers, and the internet. Given the multiple influences on children's lives and behavior, moral, and character development are more than ever both a parental and public responsibility (Deroche & Williams, 2001, p. 12).

Ministry of Education and Culture of Indonesia implemented Curriculum 2013 to improve the good character of students in Indonesia. Character education in Curriculum 2013 is emphasized to balance hard skills (cognitive and psychomotor) and soft skills (affective) of students. The inclusion of character building in Curriculum 2013 is important due to some negative phenomena emerging recently, such as fights among students, use of drugs, corruption, plagiarism, cheating, and social unrest (Madya, et. al., 2019, p. 24). Curriculum Centre Ministry of Education states that to strengthen the implementation of the character education in Indonesian educational unit has identified 18 values derived from religion, Pancasila (national ideology), culture, and national education goals, which are:

1. Religious: Attitudes and behaviors are obedient in carrying out the teachings of their religion, the practice of religion tolerant of others, and live in harmony with other religions.
2. Honest: Behavior that is based on efforts to make himself as a person who always trustworthy in word, action, and jobs.
3. Tolerance to diversity: Attitudes and actions that respect differences of religion, race, ethnicity, opinions, attitudes, and actions of others who are different from themselves.
4. Discipline: Actions that showed orderly behavior and comply with various rules and regulations.
5. Hard work: Measures indicating orderly behavior and comply with various rules and regulations.
6. Creative: Thinking and doing something to generate a new way or the result of something that has been held.
7. Independent: Attitudes and behavior that is not easy to depend on others to complete tasks.
8. Democratic: How to think, behave, and act the same rights and obligations judging himself and others.

9. Curiosity: Attitudes and actions as attempting to determine the depth and spread of something that is learned, seen, and heard.
10. The spirit of nationality: How to think, act, and sound, which puts the interests of the nation and country above self-interest and group.
11. Love homeland: How to think, act, and sound that puts the interests of the nation and country above self-interest and group.
12. Rewarding achievement: Attitudes and actions that encourage him to produce something useful for society, and recognize and respect the success of others.
13. Friendly/Communicative: Attitudes and actions that encourage him to produce something useful for society, and recognize and respect the success of others.
14. Love peace: Attitudes and actions that encourage him to produce something useful for society, and recognize and respect the success of others.
15. Joy of reading: Habits take time to read the various readings that provide a virtue for him.
16. Environmental concern: Attitudes and actions which seek to prevent damage to the surrounding natural environment, and develop efforts to attempt to repair the environmental damage that has occurred.
17. Social concern: Attitudes and concern always wanted members to help other people and communities in need.
18. Responsibility: Attitudes and behavior of a person to carry out the duties and obligations, which should be done, against oneself, society, the environment (natural, social, and cultural), the State, and God Almighty. (Ministry of Education and Culture of Indonesia, 2010).

## Method

### *The Subject of Research*

The research design of this study was descriptive qualitative research. The writers used this method to find out the description of the Indonesian parents' consideration in educational technology in COVID-19 outbreak and to find out the effects of educational technology on the education character in early childhood in COVID-19 outbreak. To answer the problems in this study, the writer collected the data from the parents' interview and then designed the questionnaire to reveal the percentage of the agreed parents with the statements. As it

mentioned that an interpretive and descriptive qualitative study exemplified all the characteristics of qualitative research, which was, the researchers were first and foremost interested in understanding how participants made meaning of a situation or phenomenon. The researcher sought to discover and understand the phenomenon, a process, the perspectives and worldviews of the people involved, or a combination of these. These data were inductively analyzed to identify the recurring patterns or common themes that cut across the data. Exactly what questions were asked would depend upon one's discipline and the literature one was using to frame the study (Merriam & Grenier, 2019, p. 7).

The research was conducted at the Fajar playground which was located on Hayam Wuruk Street, Medan, North Sumatera in Indonesia. The subject of the study was 43 parents from Kindergarten B. The writers chose the mothers as the parents to conduct an open-ended interview because of their close relationships with their children. The school had been applying educational technologies and character education based on Ministry of Education and Culture of Indonesia during COVID-19 outbreak.

### *Data Collection*

The procedures for collecting data in line with (Hamlin, 2014, p. 382):

1. Read all the participants' descriptions of the phenomenon for an overall understanding.
2. Write interpretive summaries of each interview.
3. The research team analyzed select transcribed interviews or text.
4. Any disagreements on interpretation were resolved by going back to the text.
5. Common meanings were identified through comparison and contrast of the text.
6. Relationships among the themes emerge.
7. A draft of the themes with exemplars from the text was presented to the research team. Comments were incorporated into the final draft.

### **Results**

#### *The Role of Parents by Using Technology during COVID-19 Outbreak*

In this data analysis, the writers calculated the results of using technology by providing the parents' questionnaires for each item of technology. In Figure 1, the first and most dominant

technology that 42 parents (97%) chose during COVID-19 was an online questionnaire after the lesson, the second rank was 40 parents (93%) chose online ‘live’ video conferencing by using Zoom, the third rank was 35 parents (81%) chose WhatsApp group, the fourth rank was 32 parents (74%) chose telephone call, the fifth rank was 27 parents (62%) chose a mobile message, the sixth rank was 23 parents (53%) chose website school, and the last rank was 15 parents (35%) chose email newsletter.

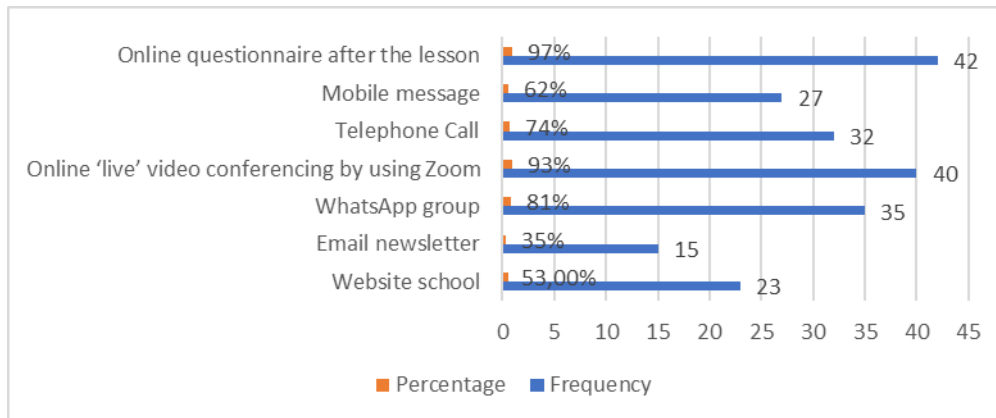


Figure 1. The Preferences of Parents by Using Some Technologies during COVID-19 Outbreak

In Figure 2, the most hours that the parents spent on schoolwork at home together with their children during COVID-19 outbreak were 4 hours and it was agreed by 17 parents (39%), the second rank was 3 hours and it was agreed by 8 parents (19%), the third rank was 1 hour and it was agreed by 6 parents (14%), the fourth rank was less than 1 hour and it was agreed by 5 parents (11%), the fifth rank was more than 4 hours and it was agreed by 3 parents (7%), and the last rank was 2 hours and it was agreed by 2 parents (5%), and 0 hour and it was agreed by 2 parents (5%).

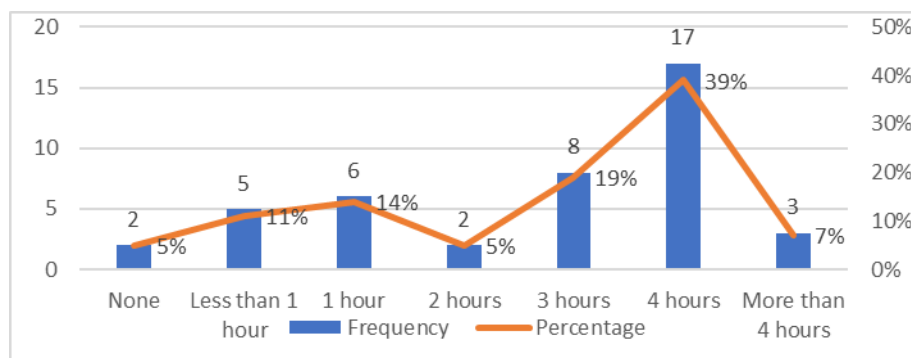


Figure 2. Hours Spent on Schoolwork at Home during COVID-19 Outbreak

In Figure 3, 22 parents (51%) were definitely agreed of their involvement with the children’s school lives, 18 parents (42%) tended to agree with their involvement with the children’s school lives, and 3 parents (7%) refused their involvement with the children’s school lives.

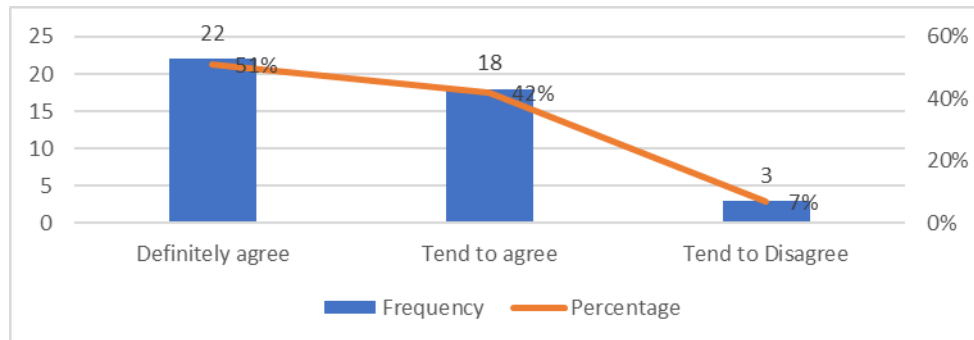


Figure 3. The Involvement of Parents in Their Children’s School Lives

In Table 1, there were some activities that parents were doing with their children in school day at home during COVID-19 outbreak. These activities would support the children’s advantages of using technology as a part of their school day. Based on the activities, the school should give parents the support to deliver the online learning material to increase the child’s emotional-social learning at home. It was a way to comprehend the child’s needs and interests in the school lesson.

Table 1. The Role of Parents in School Day at Home by Using Some Educational Technologies during COVID-19 Outbreak

No.	Activities
1.	Checked the stability of the internet connection.
2.	Noticed the distance between computer screen placement to the child’s eyes.
3.	Organized the time when the child was completing an assignment.
4.	Submitted the child’s assignments on time by using some education technologies.
5.	Shared the child’s assignments by using social media to other parents’ family and friends.
6.	Sang a song together by using online video conferencing.
7.	Made DIY papers together with the child based on an art website instruction.

8. Cooking a recipe together with the child based on YouTube videos.
9. Had a dance together with the child based on YouTube videos or TikTok.
10. Storytelling by using the child's voice record.
11. Played animated math games.
12. Did a gymnastic at home by using YouTube videos.
13. Wrote the child's activity diary and sent it online to other friends.
14. Checked the child's concentration during the lesson.
15. Always provided the drink for the child before he or she got hydration during the lesson.
16. Gave careful attention to the hygiene of their hands when he or she was touching the computer.
17. Turned on SafeSearch on the internet browser.
18. Set up strict privacy settings on online games.
19. Reminded the child about online gaming addiction made them forgetting the school's deadlines.
20. Reported the inappropriate content when searching the lesson on the internet.
21. Protected the child's personal information to unknown people in social media.
22. Be here if the child needed specialized adaptive communication devices or learning aides since the parents sit together with the child.
23. Informed the child's presence for the school lesson.
24. Gave the child's feedback on learning, such as their feeling and the difficulties after the lesson by using an online quiz.
25. Informed the teachers directly to re-explain the difficult lesson based on the child's lack.

### *The Effects of Educational Technology on the Education Character in Early Childhood*

In Table 2, there were some positive education characters that the child had during COVID-19 outbreak based on Ministry of Education and Culture of Indonesia 2010. It was hoped that the character of Indonesian education would improve based on the role of parents during COVID-19 outbreak.



Table 2. The Effects of Educational Technology on the Child's Character Education

Character Education	Benefits of Technology on Character Education	Frequency and Percentage Before COVID-19	Frequency and Percentage After COVID-19
Religious	Technology provided live in harmony with other faiths with other children in another region or another country.	12 (28%)	31 (72%)
	The child used the spiritual content online.	10 (23%)	33 (77%)
Honest	Technology guaranteed academic honesty for each child's work than teacher assessment.	12 (28%)	31 (72%)
	Avoiding the plagiarism of other friend's work.	5 (12%)	38 (88%)
Tolerance to Diversity	Technology increased the child's positive response to cultural diversity by watching some videos and expressed what other friend's feelings based on social media.	3 (7%)	40 (93%)
	The child could praise other children's choices and interests around the world by using technology in school day at home.	7 (16%)	36 (84%)
Discipline	The child could be more disciplined in keeping track of their activities by using a schedule online.	8 (19%)	35 (81%)
Hard work	Parents boosted up the child's confidence in the school day at home during COVID-19 outbreak.	18 (42%)	25 (58%)
	Technology provided information	12	31

	based on the child's need and interest in lessons in the classroom activities than the teacher's lesson plan.	(28%)	(72%)
	The child learned to think critically and evaluated the source of information on the internet.	14 (33%)	29 (67%)
Creative	Playing games in online application stimulated the child's attention to the object and motivated his or her to learn a new skill.	15 (35%)	28 (65%)
	The better hand-eye coordination of the child.	10 (23%)	33 (77%)
	The video encouraged the language literacy of the child by narrating their feelings about characters on the computer screen.	17 (40%)	26 (60%)
Independent	Technology cultivated the child's leadership quality.	20 (47%)	23 (53%)
	Technology increased the child's self-identity about their lives.	16 (37%)	27 (63%)
	The child increased self-awareness about their health of bodies based on the instruction on the internet during COVID-19 outbreak.	20 (47%)	23 (53%)
Democratic	Technology gave freedom for the child to select the best software to learn.	9 (21%)	34 (79%)
	The child got a sense of fun and enjoyment during the application of technology.	21 (49%)	22 (51%)
Curiosity	Technology increased the child's self-confidence about how to	13 (30%)	30 (70%)

	operate the computer.		
	Technology increased the child's self-motivation about the encouragement to speak in an online chat group.	12 (28%)	31 (72%)
The Spirit of nationality	The child collaborated with other children in another country to promote their sense of nationality during COVID-19 outbreak by using a blog or a video.	5 (12%)	38 (88%)
Love homeland	-	0 (0%)	0 (0%)
Rewarding achievement	Technology provided the rank of the child and could assess directly the child's work than the traditional method.	18 (42%)	25 (58%)
Friendly/ Communicative	Trained the child's self-focused because there was no fighting between peers directly.	9 (21%)	34 (79%)
	The child could ask their friend's opinion about the topic of what was happening around the world by using a website.	14 (33%)	29 (67%)
	The child shared their online work with the rest of the class.	8 (19%)	35 (81%)
Love peace	The child could be respectful and provided tolerant behavior about the opinion of another person.	11 (26%)	32 (74%)
Joy of reading	The child was able to absorb information quickly based on YouTube videos because it increased visual reasoning.	8 (19%)	35 (81%)
	Technology reduced the child's	5	38

	stress during the lesson.	(12%)	(88%)
Environmental concern	The child joined the virtual learning environment to build awareness of environmental issues.	3 (7%)	40 (93%)
	Social concern	The child gave much attention to the people outside during COVID-19 outbreak by using the internet.	10 (23%) 33 (77%)
Responsibility	The child could design an online card and gave it to the family members that they could not be able to meet during COVID-19 outbreak.	1 (2%)	42 (98%)
	The technology could build home-school relationships during COVID-19 outbreak.	0 (0%)	43 (100%)
	Created a physical exercise video made the child responsible to stay healthy during COVID-19 outbreak.	19 (44%)	24 (56%)
	Technology provided the child's healthy eating habits based on the internet sources during COVID-19 outbreak.	18 (42%)	25 (58%)

## Discussion

Research has shown that parental involvement in a child's education results in improved academic achievement, reduced absenteeism, improved school behavior, greater academic motivation, and lower dropout rates. No matter what the income, occupation, or the education level of parent or guardian, a student's academic achievement can be increased by creating a home environment that is conducive to learning (Wilson, 2013, p. 63). Regarding the research question number 1, the considerations of Indonesian parents in educational technology in COVID-19 outbreak could be seen from the activities that the parents did with the children during the school day at home in Table 1. There were 25 activities to promote online teaching activities. The frequency and the percentage of each online teaching activity

were increased before and after COVID-19 outbreak. It showed the positive impact of the role of parents in technology in cognitive development, physical development, emotional development, and communicative needs of the children.

Based on Figure 1, the reasons for parents chose an online questionnaire after the lesson were: (1) to know the child's difficulties and feelings, (2) to overcome the gaps in the child's comprehension of the lesson by giving some instructions, (3) to measure the students' satisfaction of learning, and (4) as an indicator that the child had submitted their homework. The reasons for parents chose online 'live' video conferencing by using Zoom were: (1) to provide face to face online teaching instruction, (2) to check the child's readiness and behavior, (3) to provide distance learning in COVID-19 outbreak, and (4) to contact directly with the teacher by using online resource. The reasons for parents chose WhatsApp group were: (1) to ask everyone about what was happening in learning activities, (2) to support other parents and children, (3) as an alternative to submit the child's tasks, (4) to make an announcement about the time of learning activities based on Zoom, and (5) to clarify the misinterpretation about the child's lesson and homework. The reasons for parents chose telephone call were: (1) to listen easily about the parents' problem about the development of their children, (2) to report an important situation to the parents, and (3) to clarify the truthful of announcements that sent among other parents, (4) to inform the reason of the child's absence to the teacher. The reasons for parents chose a mobile message were: (1) to remind the parents about the schedule, and (2) as an alternative giving the parent an important message about school. The reasons for parents chose website school were: (1) it was official for school, (2) there were many preferences in website school, and (3) the information was open to the public. The reasons for parents chose email-newsletter were: (1) to give information about upcoming events at school, (2) to inform the child's assessment, and (3) to offer a suggestion about another resource for online learning for parents. Based on the reasons, it proved that educational technology during COVID-19 outbreak was effective to enhance the role of parents in early childhood education. Besides, teachers could document all the children's work by using online documents and it would gain the trust of parents. The visual imagery in videos or online quizzes could build the child's interest to participate more in the school lesson during COVID-19.

Regarding the research question number 2, there was a relationship between educational technology and the child's education character as could be seen in Table 2. There were 17

positive characters of education in 35 online learning activities that the child had by using educational technology. It meant that technology could become a part of the new curriculum with the parents as a guide at home in the future in line with education industry 4.0 and Indonesian education character by Ministry of Education and Culture of Indonesia. Character education as ‘the implicit and explicit activities that help young people to develop positive personal strengths, called virtues (Smith & Pye, 2018, p. 18). The ability to feel curious about the new learning task by using educational technology could increase the child’s absorption of knowledge and skill. Moreover, the parents could report the students’ needs, interests, and difficulties and the teachers could make an individual lesson to achieve the academic standard for each child. Furthermore, the parents could search for some educational online games and played it by learning with children during COVID-19 outbreak. It would give the children a better school experience.

## Conclusion

As could be seen in Figure 1, the data analysis showed that the third dominant technologies that parents used during COVID-19 outbreak. First, 42 parents (97%) chose an online questionnaire after the lesson. Second, 40 parents (93%) chose online ‘live’ video conferencing by using Zoom. Third, 35 parents (81%) chose WhatsApp group. The child guided by parents when using educational technology in 4 hours were agreed by 17 parents (39%), in 3 hours were agreed by 8 parents (19%), and in 1 hour was agreed by 6 parents (14%) as showed in Figure 2. The reason why the rest of the parents did not want to sit together with the children during the application of online learning was that parents’ work lives. Surprisingly, even though the readiness of parents was not one hundred percent of technology, the results in Figure 3 showed that 22 parents (51%) were most definitely agreed of their involvement with the children’s school lives and only 3 parents (7%) refused their involvement with the children’s school lives. These results were reflected in 25 activities in COVID-19 outbreak as could be seen in Table 1. The parents had positive behaviors based on the results of the questionnaire and interview. The application of technology could boost the students’ characters of education as shown in Table 2. These results reflected 17 positive characters of education in 35 online learning activities by using educational technology. Moreover, when parents of children with learning or behavioral problems feel that schools do not meet their needs, they perceive the communication with supervisory teachers as difficult and are dissatisfied with the school in general. Surprisingly, if parents feel that schools meet

the special needs of their child, they are more satisfied and find communication even easier than parents who have children with no special needs (Paseka & Byrne, 2020, p. 39). All these results could lead to a positive correlation of home-school relationships during COVID-19 outbreak.

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## CHAPTER 8: EFFECT OF USING THE ONLINE LEARNING PLATFORM IN TEACHING DURING THE COVID-19 PANDEMIC

Anas Sofi , Mohamed Laafou 

### Chapter Highlights

- Like all other countries of the world, Morocco knew the Corona virus (COVID-19). This has resulted in the closure and discontinuation of studies in all schools and universities. In order to continue the educational process, distance education was used as a solution to this problem.
- Distance education is a method of education that focuses on technology and pedagogy that are integrated into the education process, and students can communicate easily online and from a distance
- Traditional education has undergone several changes in recent times, the technology-centric education system in the teaching-learning process. Before, teachers played the role of knowledge providers, but now their role has expanded.
- Our research therefore concerned with determines the effect of using a Google classroom learning platform on students' success and motivation and on their scientific thinking skills.

## Introduction

In this year of 2020, the world has faced issues caused by the Coronavirus (COVID-19). The spread of this pandemic has been an impact on not only the economic field, health, and environment (Marpa, 2021) but also has a great effect on education services include fundamental and higher education. Therefore, to guarantee educational continuity in Morocco, the minister of education and educators of made an effort to overcome their inability to prepare for e-learning.

Distance education has now emerged as one of the most important changes in the teaching and learning process (Simonson et al., 2011). Where the progress in the literature of this sector and the improvement in the research have been noticed. In recent years, research on the description of the vital role of distance education has become very popular. One of the examples of distance education applications during the COVID-19 is presented in (Elsaheli-elhage, 2021; Hebebcı et al., 2020; Marpa, 2021; Nnebedum et al., 2021; Paudel, 2021).

On the other hand, distance education is a very effective pedagogical practice of higher education. Expanding on distance learning tools can be a crucial aspect in developing and improving student learning so can give teachers an opportunity to present all their skills in transmitting the information to students. So, distance education can be considered as an alternative in the absence of the presentable teaching.

The idea of distance education dates back to the nineteenth century. Distance education has used the communication technologies available during these years - correspondence by mail. Email services were an inexpensive means of communication and they were at the origin of distance education. Teachers sent documents such as lectures, instructions, assignments to learners by mail (Kiryakova, 2009). (UNESCO, 2008) defines distance education as:

*A mode of teaching, provided by an institution, which does not imply the physical presence of the master responsible for giving it at the place where it is received, or in which the master is only present at certain times or for specific tasks. Teacher-taught communications are mainly through the use of correspondence, printed matter, various audio-visual media, computers, certain groupings.”*

Distance learning is a term relating to the use of information and communication technologies (ICT) in open and distance learning. In addition, distance learning is the technical solution to support teaching, learning as well as for study activities and it can also be educational software, a digital learning tool, " an online study program or learning resource (Kumar Basak et al., 2018).

Among the main advantages of distance learning (Belbachir, 2016; Paudel, 2021):

- Distance learning allows available access to information and has new skills, which are even more necessary than before to the demands of trendy life. Everyone is able to get used to NICTs like the PC, multimedia systems, and the web;
- The training is open to all, regardless of age, level of education, social and professional group;
- An opportunity for the learner to gain self-confidence, to free himself from a certain pressure, in front of his screen, has it all the time (autonomy of the learner);
- The learner is authorized to: learn, express themselves, speak, and exchange;
- They help make decisions, explain, improve results, and get information in real-time.

### *The Aim of the Research*

Although several studies have indicated the response learners and teachers of the physics of fluid mechanics, little attention has been paid to study the teachers' responses using e-learning technology and their impact on teaching physics of fluid mechanics, especially in higher education. Therefore, this issue was carried out in this work.

### **Methodology**

We conducted our research on students of the first year of the two courses DUT GBABB and LE SVT of the Normal Superior School of Tetouan (Morocco) as part of the fluid mechanics course, and of a sample of 76 students. This sample all has mobile devices (Smartphone, tablet, and laptop) and a connection. We asked the students to install the "Google classroom" platform on their mobile devices and then the teacher can access the platform and start sharing tasks and educational documents (lessons, exercises, videos ...). Teacher can do this by adding a list of students or by sharing a unique code that provides access to their online

lessons in Google Classroom.

### *Description of the Learning Platform*

In this research we chose to use the Google classroom platform because easy, the teacher just needs to create and distribute files (courses, exercises, links, videos, assignments, homework, etc.) to their students online and to provide comments and exchanges between him and the students on educational documents or on all tasks in Google Classroom (see Figure 1).



Figure 1. Platform Home Page

The home page of the platform (in French because the language of teaching in Morocco) shows the essential titles of the basic data that the teacher creates according to the module that will be taught to the students. Includes the name of the module (Physics G / A) and its subjects (Fluid Mechanics, etc.), courses (DUT GBABB and LE SVT) and the semester (S2). The platform contains the places of the headlines which consist of assignments and assignments. This is the place where the attachments are placed such as: lessons, tutorials, practical work, exams. Also the title persons who includes the names of the teachers who teach fluid mechanics and other module subjects, and students in the DUT GBABB and LE SVT courses. The notes box includes the results of exams and assignments that could also be given to students (see Figure 2 and 3).

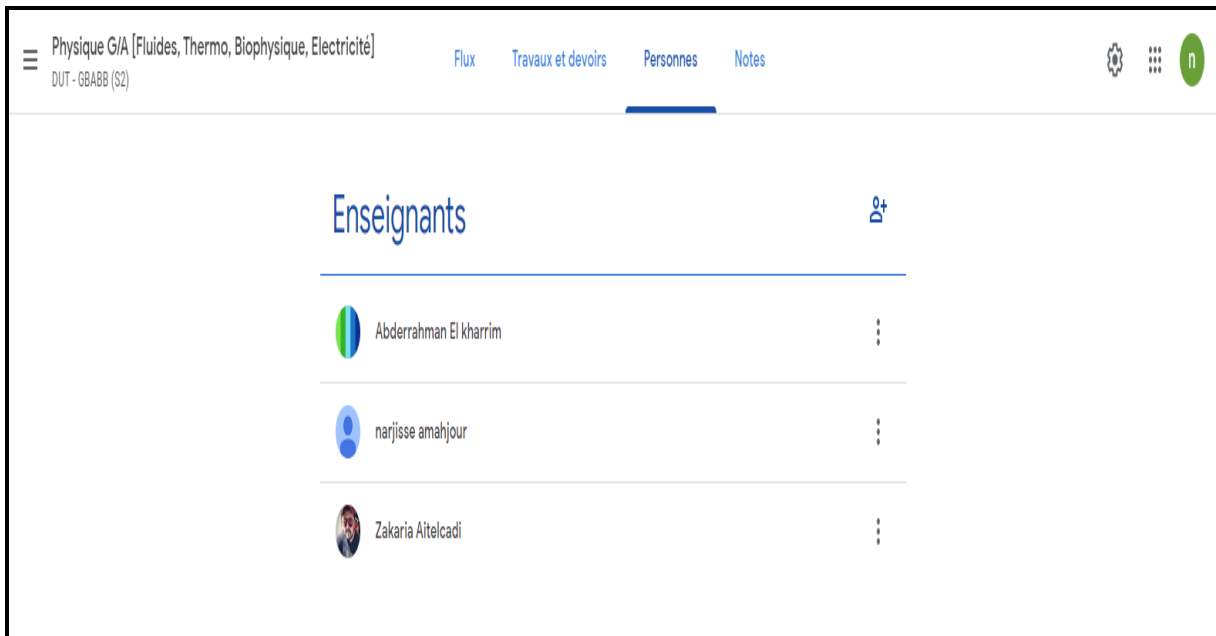


Figure 2. Screen Page Shows Teachers

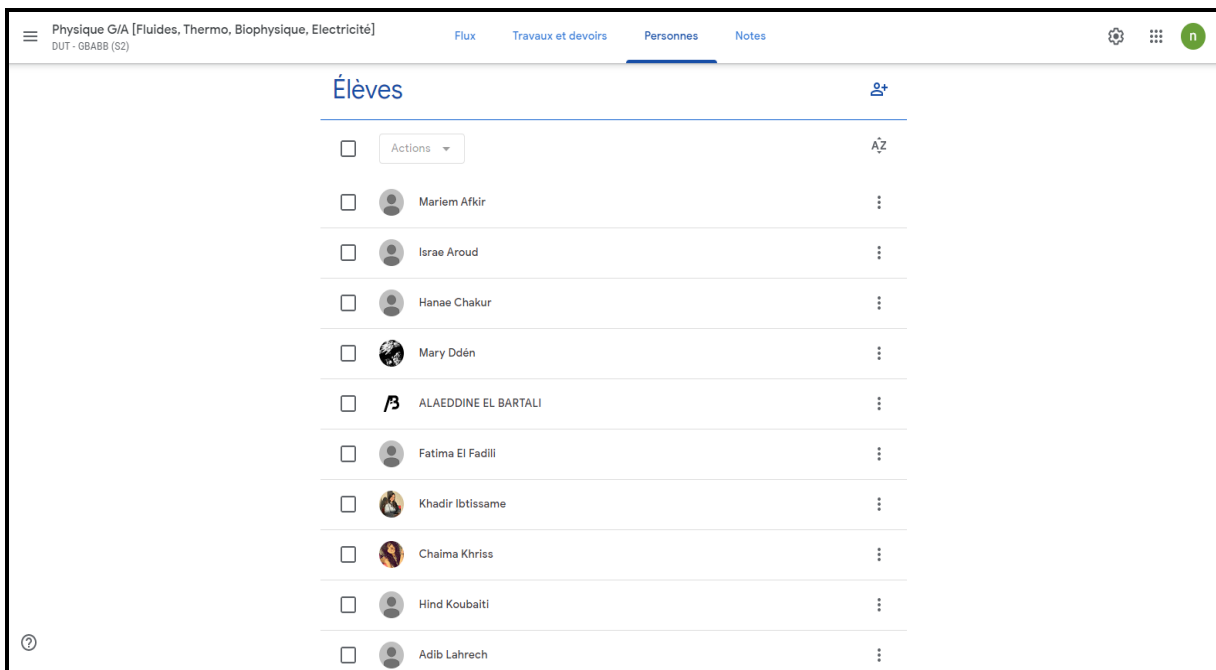


Figure 3. Screen Page Shows Student

The people box first includes teachers who teach fluid mechanics and other subjects, and second students in the sector. The teacher can do this by adding a list of students to access their online courses in Google Classroom (see Figure 4).



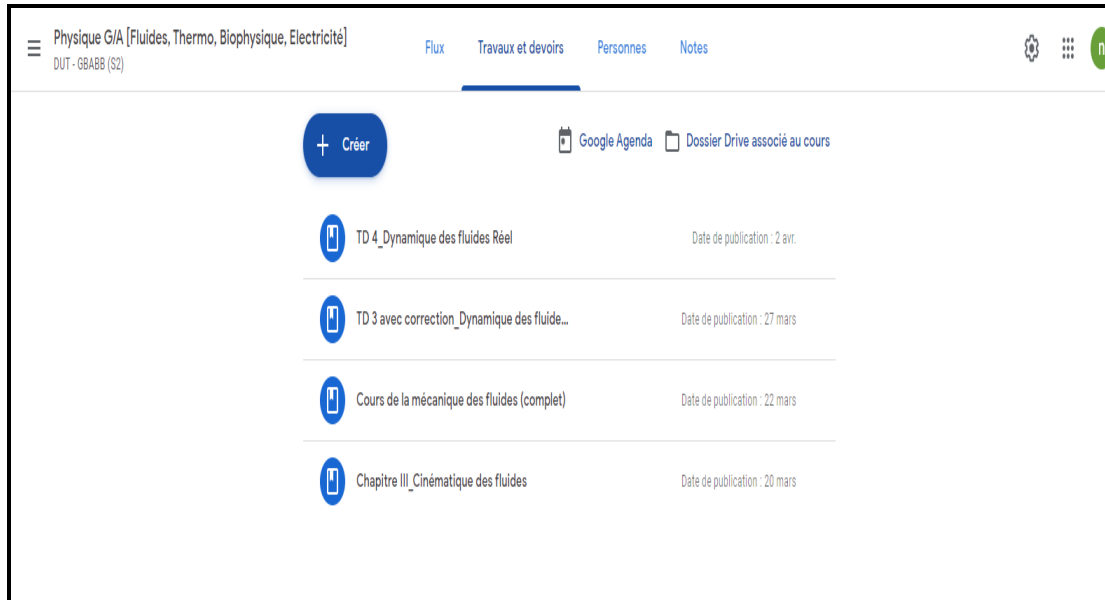


Figure 4. Screen Page of Content of Work and Homework Title of the Platform

The works and exam page contains the courses in fluid mechanics from the chapters, in each session the teacher puts the course in the Google Classroom platform and he explains its contents by comments, audio, links etc. and for exchanges between the teacher and his students. Then the teacher puts the work directed from the series and waits for the students' response and after several discussions on the exercises and the difficulties encountered, the teacher begins to solve the exercises in parallel to talk about the problems encountered by the students. Same thing for homework and exams that it displays on this platform, students can do the answers and return the reports in the same platform.

### *Collection of Information*

Gathering information is an important step in scientific research. To validate our research that we have done and to find the answer to our problems, a method used is qualitative description based on a questionnaire with students from the two sectors DUT GBABB and LE SVT. In this research, the learning environment is based on the use and efficiency of Google Classroom in the learning process. To this end, we sent the students who followed their educational activities from the platform a questionnaire about this process. The questionnaire consisted of a set of questions based on:

- Personal information of students;
- Characteristics of mobile devices and availability of connection tools;

- Training of students in ICT;
- Students' opinions on the steps, the operation and the difficulties in using the Google Classroom platform;
- Degree of satisfaction of the students to learn the pedagogical activities by Google Classroom;
- The added value of the Google Classroom platform on learning and in the training process;
- The comparison between the traditional teaching method and the mobile technology method;
- Proposals that will allow students to express themselves freely and thus obtain rich and diverse information;

Data analysis was carried out after the teachers' interviews had ended and the students had replied to the questionnaire. We thus used Microsoft Excel software on the questionnaire items and the interviews to make a more detailed analysis of the results from each response to the questions.

## Results and Discussion

Our sample is made up of 76 students from two subjects, DUT GBABB and LE SVT from the Normal Superior School of Tetouan (Morocco). 84% of the students are female and 16% are male. So the majority of the students are women (see Figure 5).

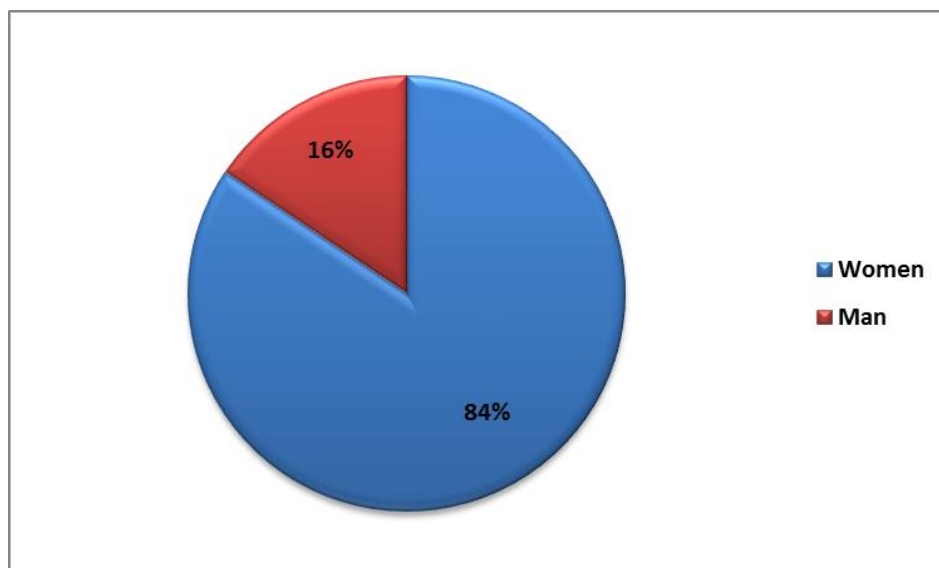


Figure 5. Breakdown of Respondents by Gender

Figure 6 shows those students who have a laptop (48%), cell phone (97.5%) and tablet (27%). And that 94.80% who have an internet cable, wifi or 4G connection. These results encourage the use of mobile technology in learning fluid mechanics through the Google Classroom platform. Where all students can communicate via any device they have, with the installation of the platform in these devices.

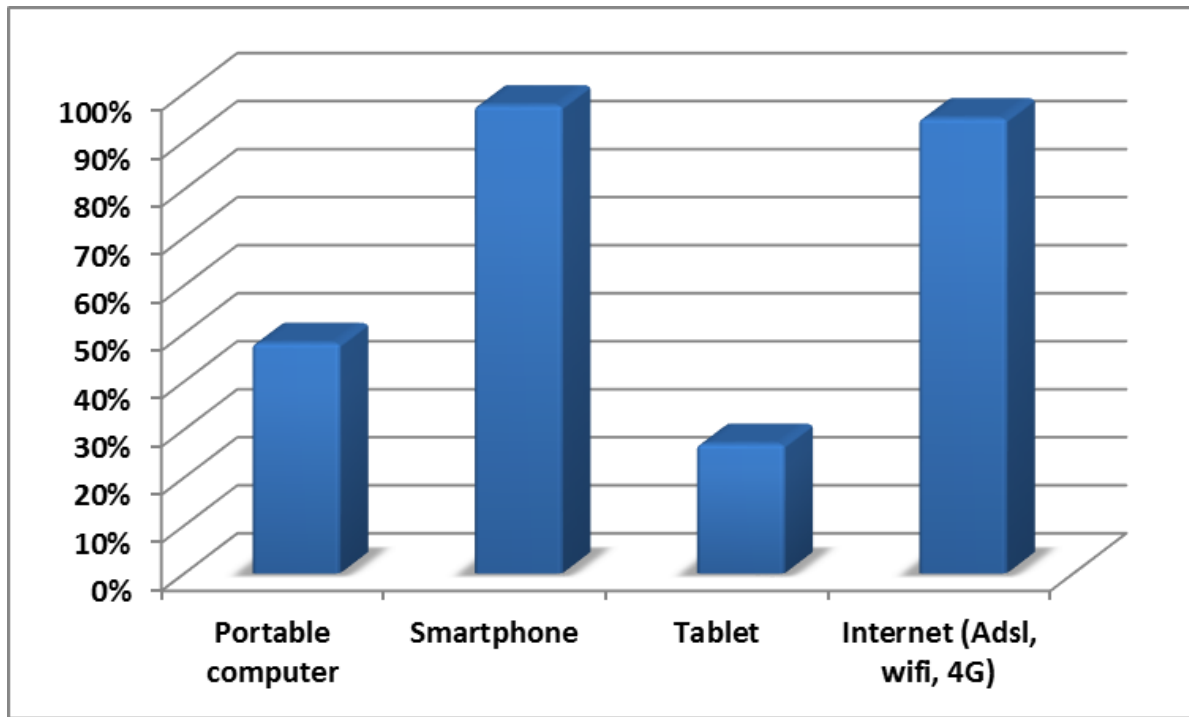


Figure 6.Types of Mobile Devices

ICT plays a very important role in the process of teaching and learning in scientific subjects in general, and in the resolution of a set of problems which hinder the objectives aimed at in this subject and which lead and participate in progress and reform of our education system.

The majority of students benefited from ICT training during their initial training at 72.7% and 18.18% by self-training. Furthermore, students who did not benefit from ICT training exceeded a total of 9.12 %. These results of this question show that most of the students are trained during the initial training, because two modules concerning ICT are introduced in their training of the LE SVT sector, the other students especially of the DUT GBABB sector are trained by self-study. This makes it easier for us to integrate the Google Classroom learning platform into educational activity and the teaching of fluid mechanics.

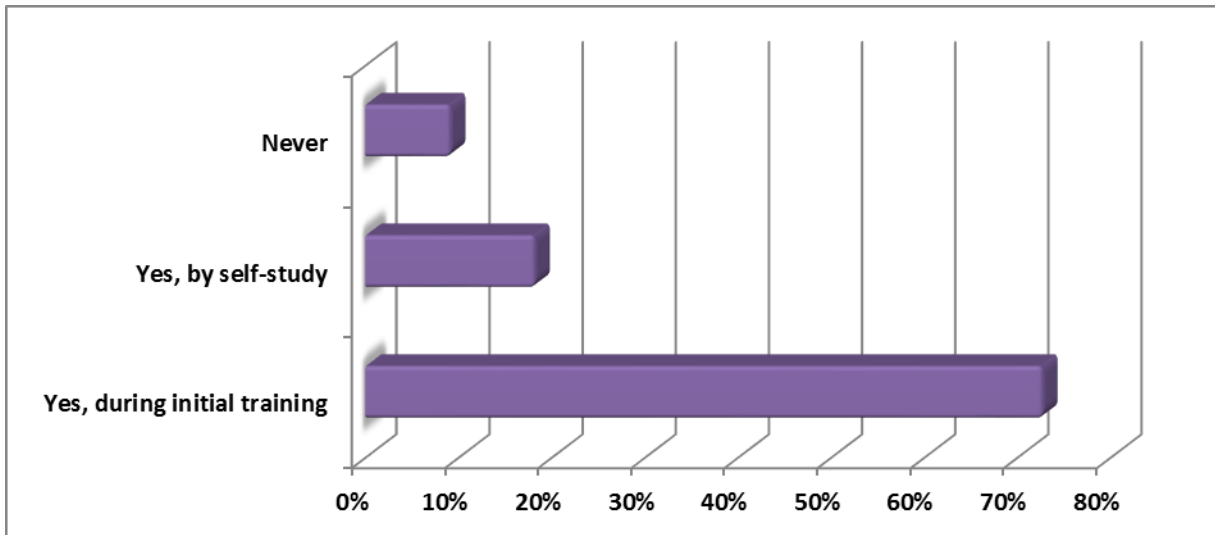


Figure 7. ICT Training

Figure 8 shows that only (7.79%) of respondents find that the steps for operating the Google Classroom platform are not clear for proper monitoring, and on the other hand the majority of students (66.23%) find that the steps for each task are usable and easy to use. Also there are students who report having had some difficulty using some of the works in the platform.

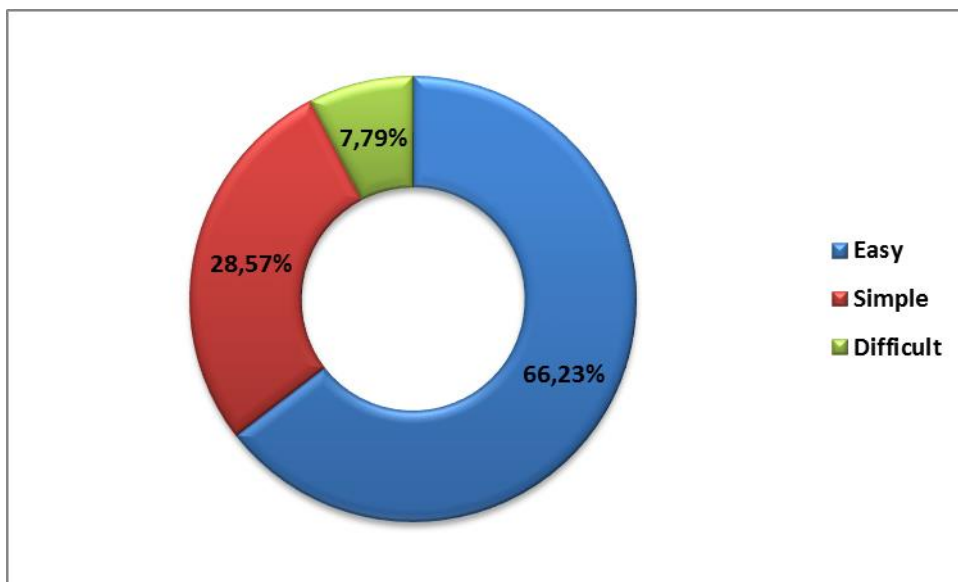


Figure 8. Notice of Students on the Steps, Operation and Difficulties over the Use of the Platform

The students show that after entering the platform and through the invitation of their teachers, the home page and the essential titles of the basic data that the teacher creates according to the subject they found simple to use, also comments and exchanges between their and the

teacher on the educational documents and easy to communicate at any time. The students also believe that the technical characteristics of the Google Classroom platform contribute significantly to these results, as well as the ease of access to the platform and the possibility of using from any device, in particular smartphones and is not limited to using it via the desktop computer and its work on most operating systems and the possibility of downloading files in different formats, and not adhering to a certain size of these files. In addition, some students said that the inadequacy of the infrastructure, especially its absence from the Internet and their dependence on connection services through their subscriptions, which led to their reluctance to use the platform significantly.

The results in Table 1 show that the degrees of satisfaction of the students in several categories concerning the teaching of fluid mechanics by the learning platform. The majority of students declare that they agree or rather agree on the degrees of satisfaction in course data, data exchange, file format and acquiring knowledge.

Table 1. Degrees of Satisfaction of the Students to Learn the Educational Activities by Google Classroom

	<b>Completely agree</b>	<b>Somewhat agree</b>	<b>Disagreement</b>
Satisfied with course data	76.62%	15.58%	7.79%
Satisfied on data exchange	68.83%	25.97%	5.19%
Satisfied with file format	92.20%	5.19%	4.20%
Satisfied on acquiring knowledge	51.94%	42.85%	5.21%

The result in Figure 9 presents the added value of distance learning by mobile technology, most students (76.62%) and at the end of this learning experience in fluid mechanics notice that the platform to be simplified learning from their training, because it has helped in improving students' problem-solving skills and keeping in touch with the teacher outside the classroom. Also the wealth of information is on various subjects of the subject of fluid mechanics. So the students had a positive attitude towards mobile technology in teaching and learning. On the other hand, some students (23.37%) declared that distance learning did not change anything in the education system.

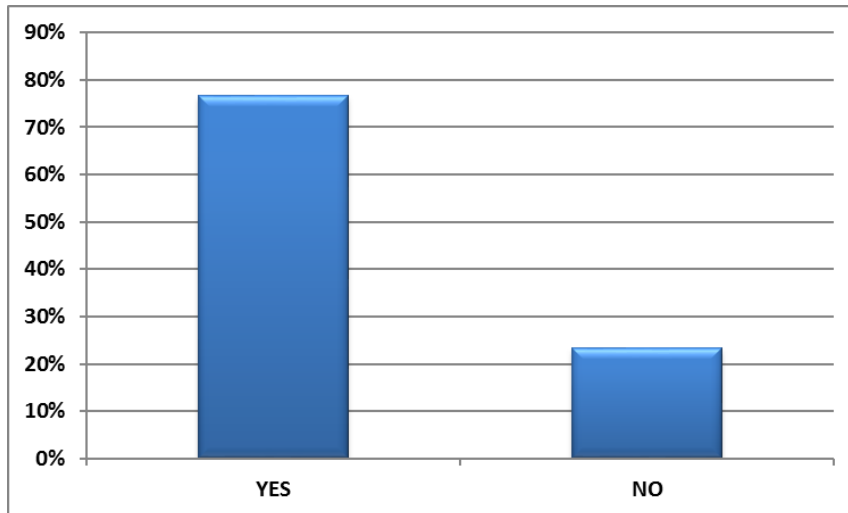


Figure 9. The Added Value of the Google Classroom Platform on Learning

The results showed that most of the students (62.33%) consider that the method of integrating mobile technologies in learning facilitates the use of available resources and build new knowledge, with many advantages as regards flexibility, accessibility, communication and interaction, also to keep studying outside the classroom anytime and anywhere. In addition, the other student respondents (37.66%) declare that the traditional method depends mainly on the school and the style of the course, the students are limited to a single learning method, a source of information and the link between the learning processes. through the time of the conference, the teacher also communicated directly with the students (see Figure 10).

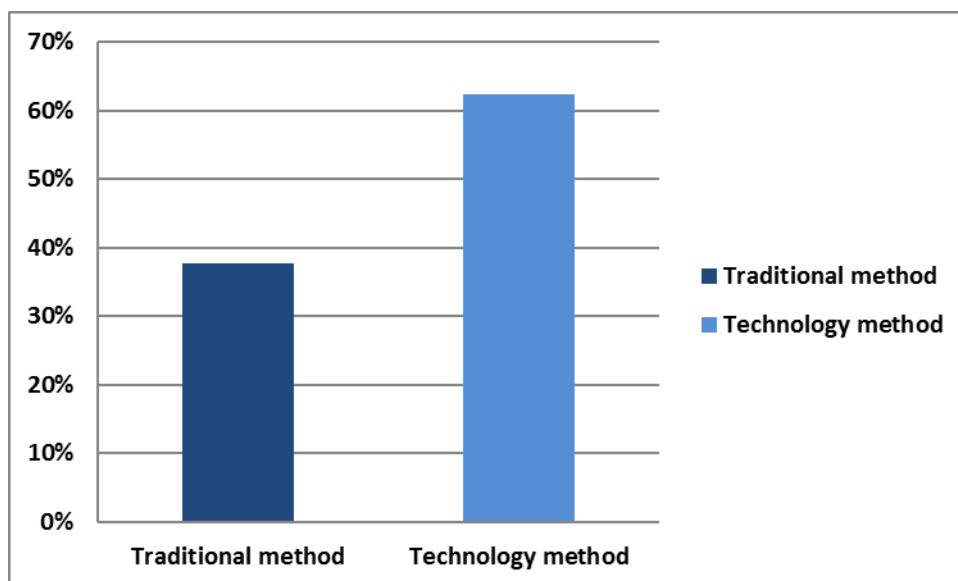


Figure 10. Students' Opinion on the Comparison between the Traditional Teaching Method and the Technology Method

## Conclusion

The results of our research show that learning by mobile technology through the Google Classroom platform is effective and it is an important solution to integrate technology in teaching and learning. To make this experience you have to take the proposals and suggestions of students. The most notable are:

- The need for continuous training on the effective use of ICT and online education by platforms;
- Improve the interface and content of the platform by different formats and by different educational resources such as explainable videos ...;
- Share this wider experience and in other matters;
- Provide equipment, infrastructure and internet to continue online courses;

Grace to the suggestions of the students, it becomes obvious that they accepted and appreciated the idea of distance learning of fluid mechanics through the Google Classroom platform, but by introducing continuous training parallel to this process. In addition the recommendation to disseminate it to other subjects and courses of the Tetouan (Morocco) teacher training college in order to generalize the benefit on the one hand and on the other hand the large number of samples to obtain important results is concerning the effectiveness of distance and mobile learning. Then some students stressed that for the success of this learning process must be provided the infrastructure and materials (Smartphone, laptop, internet ...) for students who are not available with these facilities.

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## CHAPTER 9: THE PERCEPTION OF TEACHERS ON UNLOCKING TECHNOLOGY BY REDESIGNING EDUCATION SYSTEM DURING AND AFTER COVID-19 PANDEMIC LOCKDOWN

Smriti Mathur , Akanchha Singh 

### Chapter Highlights

- To deal with the COVID-19 pandemic situation, the government of India took a life-changing decision of lockdown all over the country.
- The total number of affected learners in India is 320 million. This leads to an increase in the scope of redesigning the Indian education system by bringing teachers and education technology together i.e. by unlocking technology.
- This study aims to access the relationship between level of teacher's satisfaction towards unlocking technology for education purpose during the phase of COVID-19 Pandemic and its four determinants.
- It also aims to identify the relationship that exists between current satisfaction levels of teachers towards unlocking technology for education purpose during the phase of COVID-19 Pandemic and continuation of usage of unlocked technology for education purpose after COVID-19 Pandemic.
- The inferential statistics suggest that the future scope of using unlocked technology has a significant impact on teacher's satisfaction levels which includes bringing flexibility, better quality future, and career improvement.
- It was also found that teacher's current satisfaction positively affects their views on continuation of unlocked technology future.

## Introduction

The globe is witnessing the biggest scathing attack on humanity. In the last 50 years, the world has not seen such an enormous, intensified & disastrous attack of deadly and awful virus called COVID-19 and undoubtedly the impact of COVID-19 on the economy and humanity is believed to be bigger than the sum of all crises in the last century. This pandemic has adversely affected humanity, human lifestyle, business and economics which proved to be very destructive. More than 212 nations worldwide have witnessed the colossal destruction created by this deadly virus in a time when advancement and supremacy of science and technology are the topmost subject matters for nations to illustrate their dominance and power (WHO Report 2020).

This pandemic has not only affected our lives but also it is challenging our potential to adapt the latest technologies and being resilient. But, every change is for a good along with its negative point. This pandemic situation has broadened the scope of adoption of new technologies especially digital technologies at different sectors of Indian Economy. Due to highly contagious nature of this virus, government of India had to go for complete nationwide lockdown which has incredibly affected the livelihood and way of living of approximately 1369.56 million people of India. COVID-19 pandemic which started from the city Wuhan in China, has affected almost every sector of the nation and education sector is no exception at all (Habebe et al. 2020).

This pandemic has thrown the entire education system in a tangled loophole. After health sector, education sector is the second most affected sector by COVID-19 outbreak (Telli, Yamamoto & Altun 2020). A report issued by UNESCO shows that total number of affected learner all over the world is approximately 1.5 Billion i.e. 90.2% of the enrolled learners and the number of affected learners in India is 320 Million. This pandemic has holistically affected the entire Indian education system be it primary level or higher education which is a substantial determinant of the country's economic future.

In response to schools and colleges closure, UNESCO recommended the use of distance learning program and open educational applications and other platforms that the teacher can use to reach the learners virtually and limit the disruption of education. In this pandemic situation, online education has become the most suitable tool to keep running educational

activities in all the corner of the world (Paudel, 2020). This disruption is pushing teachers to figure out how to drive engagement scale while ensuring inclusive e-learning solutions and tackling the digital divide. It becomes a necessity for all teachers to go hand to hand with this pandemic situation.

As the need of the hour, to educate future generations, technology has stepped into the breach. Academicians evolved from their traditional education to the applied blended learning pedagogy by unlocking technology. Unlocking Technology indicates grappling with the new ways of communicating with future generation with an aim to impart continuum of quality education to our existing and prospective students. Exponential technology is the intersection of technology and problems arrived as well as resolving them. Industry 4.0 is the driving force for exponential technology indicating innovations that advance exponentially with disruptive economic effects (Insights Report, 2019). Educational technologies are emerging at exponential rates such as augmented reality, artificial intelligence, Io T, cloud computing, mobile learning etc. In the current scenario distance learning program, open educational applications and many more online platforms like Zoom, Cisco Web Ex, Google Meet, Microsoft Team etc. (Education 4.0) became the need of hour which is bridging the gap between teachers and learners amid the COVID-19 crisis.

Exponential technology is helping in redefining the skill sets of students, creative thinking, problem solving capabilities, collaboration, communication skills etc. Digital technology used in education sector has eventually got much relevance at all the levels of education (Korkmaz et al. 2020). Unlocked technology is redefining the role of academicians contributing to realization of their true potential, to reconsider the current delivery and pedagogical methods in schools and colleges by incorporating e-learning models.

The outbreak of this pandemic situation is an important cause for optimism on focusing substitute means to deliver information. Earlier the entire education system was not so flexible in terms of incorporating modern digital tools to its core but this pandemic has transformed the entire Indian Education System by unlocking technology and redesigning the entire education system. As COVID-19 pandemic is not yet over, therefore universities and colleges will keep using distance education which will eventually lead to a permanent change in education sector after the pandemic (Yilmaz et al. 2020).

## Methodology

Research Methodology is a science of studying how research work is done scientifically. Research methodology starts with the origin and development of a research idea till the analysis of data followed by findings.

*Design and Sampling:* This was descriptive and applied research carried out in India. Descriptive research design focuses on particular dimension or aspect of the problem. It includes what the study is all about, what techniques of gathering data will be adopted, how much material will be needed, where can the required data can be found and with what time period should the data be related, processing and analysis of data and lastly, reporting the findings.

Primary data was collected through Questionnaire. Simple statistical studies such as averages, percentages etc. are used in descriptive studies. After descriptive research, analytical research was done, primarily concerned with testing hypothesis and interpreting relationships. Analytical study employs advanced statistical techniques. Structural equation modeling has been used in this paper.

A snowball sampling technique was used. Snowball sampling or chain-referral sampling is defined as a non-probability sampling technique in which the samples have traits that are rare to find. This is a sampling technique, in which existing subjects provide referrals to recruit samples required for a research study. An online structured questionnaire was developed using Google forms. The link of the questionnaire was sent through e – mails, Whats App, Facebook and other social media platforms. The participants were encouraged to roll out the survey to as many teachers as possible. Thus, the link was forwarded to teachers apart from the first point of contact. After receiving the link, they clicked that link and were auto directed to the information about the study.

*Data Collection:* An online self-reported questionnaire was developed by the invigilators contained 16 questions including three sections. First section is concerned with demographic characteristics of the respondents (Gender, Age, Educational organization and specialization). Second section is concerned with online teaching related questions (Online teaching before corona, during corona and technological tool used). Third section is concerned with teachers

satisfaction related questions (Helpfulness factors, Complication factors, Role of Institution factors and future scope factors). This was online study. Teachers answered the questionnaire anonymously on the internet from 26/04/2020 to 10/05/2020.

*Processing of Data:* Intermediary stage of work between collection of data and interpretation or analysis of data is processing of data. Generally, data gathered through questionnaire was collected in a large volume, therefore, data was formatted in a data format so that we can use modern analyst software i.e. SPSS. Data were clearly defined at this stage so that proper editing, coding, tabulation as well as diagrammatic presentation can be done.

Data collected was firstly edited so that missing values were set to standardized values, entry was made at right place etc. Then coding is involved which is a process of assigning numerals or symbols to the answers. In this research work, coding was done at the time of designing of questionnaire which proves to be very helpful in tabulation of data.

*Data Analysis Method:* After the collection of the data, SPSS version 20 and AMOS version 19 was used for analysis of data. Descriptive statistics (Frequency, mean, SD) was used to describe demographic characteristics and online teaching related questions. Inferential statistics (Structural Equation Modeling) was used for finding the impact of Helpfulness factors, complication factors, Role of Institution factors, future scope of unlocking technology factors on teacher's satisfaction towards unlocking technology for education purpose during the phase of COVID-19 Pandemic. Also, to find the impact of current satisfaction levels of teachers towards unlocking technology for education purpose during the phase of COVID-19 Pandemic on continuation of usage of unlocked technology for education purpose after COVID-19 Pandemic.

*Proposed Model:* For the purpose of this study, thus, it is imperative to examine the relationship between helpfulness factors, complication factors, Role of Institution factors, future scope of unlocking technology factors and teacher's satisfaction towards unlocking technology for education purpose during the phase of COVID-19 Pandemic. Also, this model examines the relationship between current satisfaction levels of teachers towards unlocking technology for education purpose during the phase of COVID-19 Pandemic and continuation of usage of unlocked technology for education purpose after COVID-19 Pandemic.

*Construct Measurement and Reliability:* The variables used in the proposed model are shown in Table 1. Helpfulness factors, Complication factors, Role of Institutions, Future scope, teacher's satisfaction towards unlocking technology for education purpose during the phase of COVID-19 Pandemic and continuation of usage of unlocked technology for education purpose after COVID-19 Pandemic were measured using Likert type scale: 1 – “Strongly Disagree”, 3 – “Neutral” and 5 – “Strongly agree”.

Mean scores for all variable statements have been obtained by adding all the scores given by the respondents in each statement and then divided by the total number of respondents. Mean score for helpfulness factor is highest for the item “Helpful in completing the syllabus” i.e. 3.89 which indicates that maximum teachers considers unlocking technology by redesigning education system is helpful in completion of their syllabus during the phase of COVID-19 Pandemic lockdown. Mean score for complication factor is highest for the item “Poor net connectivity” i.e. 4.12 which indicates that maximum teachers considers problems in internet connectivity as the main obstacle in redesigning education system during the phase of COVID-19 Pandemic lockdown. Mean score for Role of Institution factor is highest for the item “Provides regular guidance” i.e. 3.68 which indicates that maximum teachers considers proper training and guidance provided by the institutions are contributing effectively towards unlocking technology by redesigning education system during the phase of COVID-19 Pandemic lockdown. Mean score for Future scope factor is highest for the item “Brings flexibility” i.e. 3.82 which indicates that maximum teachers considers adjusting themselves with the situation and understanding the need of the hour contributes effectively towards unlocking technology by redesigning education system during the phase of COVID-19 Pandemic lockdown.

Cronbach's alpha index is used to measure the internal consistency of questions. Internal consistency means that some questions have been taken into consideration to measure a common concept. In practice, they have also similar scores. The results are displayed in the Table 1. This analysis has been performed using SPSS20 software. Cronbach's alpha value should be greater than 0.70, the obtained Cronbach's alpha value of the variables is higher than 0.70.

Table 1. Model Variables, Their Mean and Reliability

<i>Variables</i>	<i>Items</i>	<i>Mean (N = 250)</i>	<i>Reliability (Cronbach's alpha index)</i>
Helpfulness Factors	Helpful in completing the syllabus	3.89	0.85
	Better quality of Content	3.47	
	Reducing communication gap with students	3.29	
	Diversifying your knowledge	3.82	
	Better utilization of your time	3.80	
	Develops students problem solving skills	3.33	
Complication Factors	Time consuming	3.27	0.82
	Requires technical skills	3.87	
	Lack of proper facility	3.78	
	Poor net connectivity	4.12	
	Invade my privacy	3.34	
	Lack of motivation among students	3.52	
Role of Institution	Provides regular guidance	3.68	0.86
	Providing supporting environment	3.52	
	Has clear vision towards new technique of teaching	3.67	
Future Scope	Brings flexibility	3.82	0.88
	Quality oriented future	3.72	
	Augmented with classroom teaching	3.64	
	Career improvement in future	3.72	



*Hypothesis:* The objective of the study is to identify the relationship that exists between teacher's satisfactions towards unlocking technology for education purpose during the phase of COVID-19 Pandemic and its four determinants. Also, to identify the relationship that exists between current satisfaction levels of teachers towards unlocking technology for education purpose during the phase of COVID-19 Pandemic and continuation of usage of unlocked technology for education purpose after COVID-19 Pandemic. To this end, five hypotheses have been developed based on the relationships identified in the previous section:

- H1: Helpfulness factors are positively related to teacher's satisfactions towards unlocking technology for education purpose during the phase of COVID-19 Pandemic.
- H2: Complication factors are positively related to teacher's satisfactions towards unlocking technology for education purpose during the phase of COVID-19 Pandemic.
- H3: Role of Institution factors are positively related to teacher's satisfactions towards unlocking technology for education purpose during the phase of COVID-19 Pandemic.
- H4: Future scope factors are positively related to teacher's satisfactions towards unlocking technology for education purpose during the phase of COVID-19 Pandemic.
- H5: Current satisfaction levels of teachers towards unlocking technology for education purpose during the phase of COVID-19 Pandemic is positively related to continuation of usage of unlocked technology for education purpose after COVID-19 Pandemic.

## Results

Frequency distribution of demographic variables and online teaching related question is shown in Table 2. 52.40% of teachers were female and 47.60% of teachers were male. 46.40% of teachers were between age group 22 – 30 Years, followed by 42.40% of respondents between age group 31 – 40 Years. 87.60% of teachers were working in Higher education organization (student's age above 18 Years).

52% of respondents were specialized in management, economics, finance, and engineering etc. 68% of teachers were not involved in remote teaching alternatives before COVID-19 Pandemic lockdown. But, 84.8% of teachers have shifted to online teaching platform i.e. unlocking technologies by redesigning in people education system during COVID-19 Pandemic lockdown. 59.20% of teachers were using PowerPoint presentation as a technological tool for interacting with students.

Table 2. Descriptive Analysis of Demographic Characteristics and Online Teaching Related Questions

<i>Items</i>	<i>Total</i>	
	<i>Population (N</i>	<i>Percentage</i>
		<i>= 250)</i>
Gender	Male	119 47.60
	Female	131 52.40
Age	22 – 30 Years	116 46.40
	31 – 40 Years	106 42.40
	41 – 50 Years	14 5.60
	51 – 60 Years	14 5.60
Educational Organization	Primary (5 – 12 Years)	14 5.60
	Secondary (13 – 18 Years)	17 6.80
	Higher education (above 18 Years)	219 87.60
Specialization	Arts / Humanities	31 12.40
	Education	18 7.20
	Law	7 2.80
	Medicine	1 0.40
	Science	23 9.20
	Social Science	40 16.00
	Other	130 52.00
Have you been teaching online before Pandemic COVID-19 Lockdown?	Yes	80 32.00
	No	170 68.00
After COVID-19 Pandemic lockdown, did you have to shift to the online teaching platform	Yes	212 84.80
	No	38 15.2

Power Point Presentation	Yes	148	59.20
	No	102	40.80
Photos	Yes	59	23.6
	No	191	76.40
Emails	Yes	70	28.00
	No	180	72.00
Video Lectures	Yes	149	59.60
	No	101	40.40
Google Classroom	Yes	144	57.60
	No	106	42.40
Zoom	Yes	119	47.60
	No	131	52.40
Others	Yes	38	15.20
	No	212	84.80

In order to examine the relationship between teacher's satisfactions towards unlocking technology for education purpose during the phase of COVID-19 Pandemic and its four determinants, and also, to identify the relationship that exists between current satisfaction levels of teachers towards unlocking technology for education purpose during the phase of COVID-19 Pandemic and continuation of usage of unlocked technology for education purpose after COVID-19 Pandemic, Structural Equation Modeling is used. The proposed SEM model was tested using AMOS (Analysis of Moment Structure), software developed by IBM SPSS (see Figure 1). AMOS reports various goodness of fit measures that were tested for developed models which are summarized in Table 3. In this research, all fitness indices for the measurement model had achieved the required levels i.e. the value of CFI, TLI, NFI, GFI should be closer to 0.9. Also, the value of RMSEA should be less than 0.08 and the value of  $X^2 / df$  should be less than 5.0. Thus, we can accept the model.

Table 3. Goodness of Fit for Models

Measures	$X^2 / df$	CFI	GFI	TLI	NFI	RMSEA
Values	2.296	0.86	0.89	0.88	0.83	0.07

In this model, Helpfulness factor, Complication factor, Role of Institutions factors and future scope factors are employed as exogenous latent variables and teacher’s satisfaction as well as continuation of unlocked technology as endogenous latent variables. Path analysis was done to test the model and used maximum likelihood method of parameter estimation and was performed on the variance – co variance matrix.

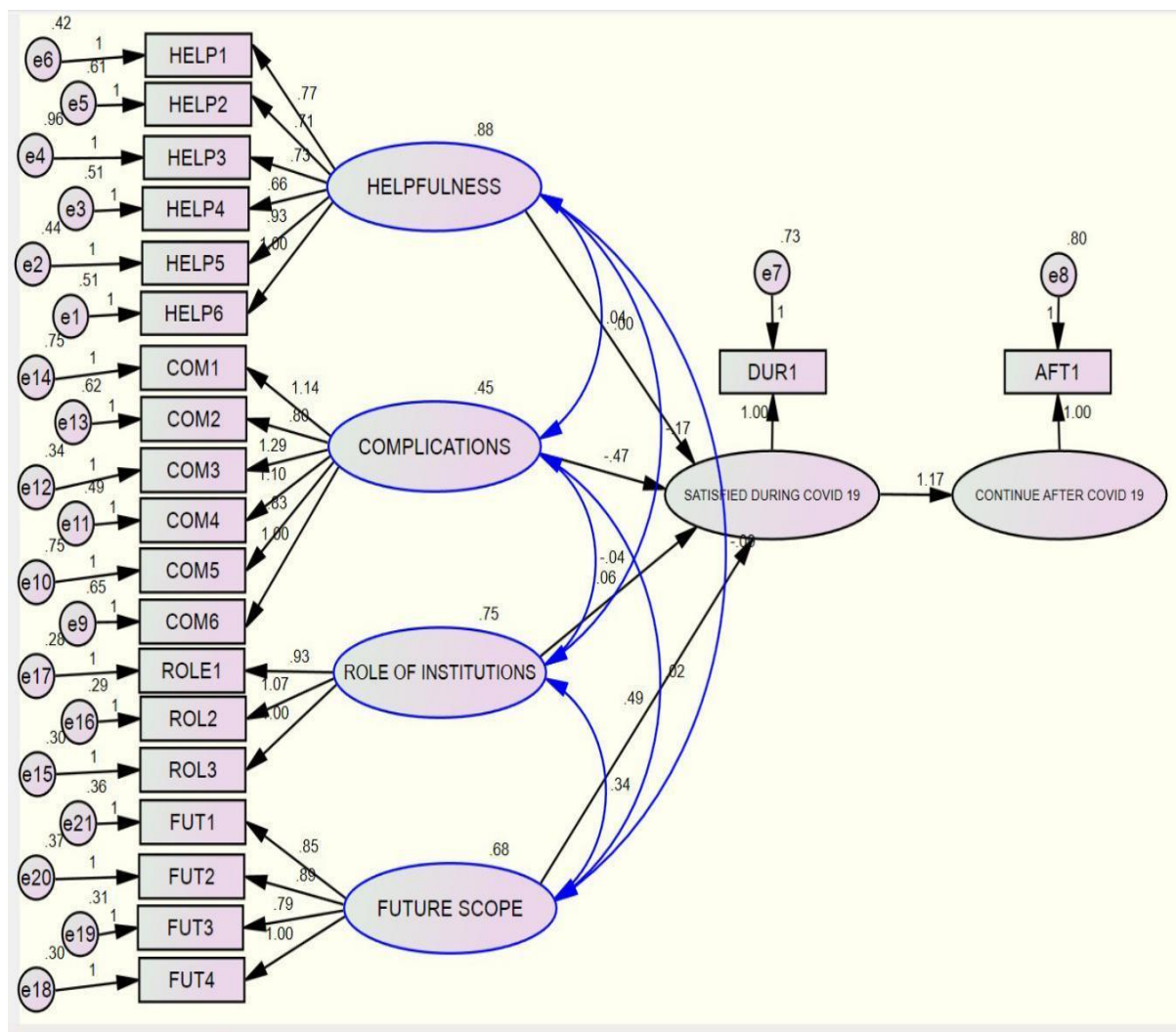


Figure 1. Proposed Model

The standardized regression weights were used as they allow the researcher to compare directly the relative effect of each independent variable on the dependent variable. Table 4 presents the standardized regression estimates and allowed us to examine the direct association between the studies constructs. Since the level of significance is based on the critical ratio (CR) of the regression estimate, when CR value is greater than or equal to 2.58, it indicates a 99% of level of significance.

Table 4. Parameters Estimated In SEM for the Proposed Model

			Estimate	S.E.	C.R.	P	Standardized Estimates
Satisfied during COVID 19	<---	Helpfulness	.002	.045	.050	.960	.004
Satisfied during COVID 19	<---	Complication	-.465	.082	-5.670	***	-.593
Satisfied during COVID 19	<---	Role of Institution	.064	.057	1.116	.265	.105
Satisfied during COVID 19	<---	Future Scope	.486	.074	6.550	***	.763
Continue after COVID 19	<---	Satisfied during COVID 19	1.170	.173	6.753	***	1.000
B11.6	<---	Helpfulness	1.000				.795
B11.5	<---	Helpfulness	.933	.073	12.846	***	.798
B11.4	<---	Helpfulness	.655	.064	10.306	***	.655
B11.3	<---	Helpfulness	.731	.082	8.906	***	.574
B11.2	<---	Helpfulness	.706	.069	10.186	***	.648
B11.1	<---	Helpfulness	.773	.065	11.962	***	.747
B15	<---	Satisfied during COVID 19	1.000				.524
B16	<---	Continue after COVID 19	1.000				.566
B12.5	<---	Complication	.833	.114	7.334	***	.542
B12.4	<---	Complication	1.095	.118	9.273	***	.725
B12.3	<---	Complication	1.293	.128	10.095	***	.830

		on					
B12.2	<---	Complicati on	.802	.106	7.580	***	.563
B12.1	<---	Complicati on	1.136	.132	8.628	***	.660
B12.6	<---	Complicati on	1.000				.640
B13.3	<---	Role of Institution	1.000				.845
B13.2	<---	Role of Institution	1.070	.069	15.601	***	.864
B13.1	<---	Role of Institution	.928	.061	15.115	***	.835
B14.4	<---	Future Scope	1.000				.832
B14.3	<---	Future Scope	.793	.061	12.901	***	.760
B14.2	<---	Future Scope	.890	.068	13.089	***	.769
B14.1	<---	Future Scope	.854	.066	12.951	***	.762

Note: N = 250; The C R (Critical Ratio) is the commonly recommended basis for testing statistical significance of SEM components with C.R. values beyond  $\pm 2.58$  establishing significance at  $p < 0.01$  level. \*\*\* indicate a highly significant at  $p < 0.01$ .

## Discussion

The objective of the present study was to evaluate the level of teacher's satisfaction about unlocking technology by redesigning education system. Also, to examine the impact of teacher's satisfaction on their views regarding continuation of unlocked technology even after lockdown period. For this purpose, a questionnaire has been designed to study the impact of helpfulness factor, complication factor, role of institution and future scope factors on

teacher's satisfaction and the reliability of Cronbach's Alpha test has been examined by the software SPSS 20 which is concluded to be 0.85, 0.82, 0.86 and 0.88 respectively. This value is greater than 0.70 so the questionnaire has reliability.

The path coefficients in the SEM are shown in Fig. 1 and the result of the hypothesis testing are summarized in table 4. The path coefficient between teacher's satisfaction towards unlocking technology by redesigning education system and helpfulness factor is 0.002 ( $p > 0.01$ ), which is positive but not significant relation indicating that helpfulness factor has no significant positive impact on teacher's satisfaction towards unlocking technology by redesigning education system. This confirms that H1 is not supported. The path coefficient between teacher's satisfaction towards unlocking technology by redesigning education system and complication factor is  $-0.462$  ( $p < 0.01$ ), which shows significant relation but is negative indicating that complication factor negative impact on teacher's satisfaction towards unlocking technology by redesigning education system. This confirms that H2 is not supported. The path coefficient between teacher's satisfaction towards unlocking technology by redesigning education system and role of institution factor is 0.004 ( $p > 0.01$ ), which is positive but not significant relation indicating that role of institution factor has no significant positive impact on teacher's satisfaction towards unlocking technology by redesigning education system. This confirms that H3 is not supported.

The path coefficient between teacher's satisfaction towards unlocking technology by redesigning education system and future scope factor is 0.484 ( $p < 0.01$ ), which is positive and significant indicating that future scope factor has significant positive impact on teacher's satisfaction towards unlocking technology by redesigning education system. This confirms that H4 is supported. The path coefficient between continuation of unlocked technology after COVID 19 Pandemic and teacher's satisfaction towards unlocking technology by redesigning education system is 1.170 ( $p < 0.01$ ), which is positive and significant indicating that teacher's satisfaction towards unlocking technology by redesigning education system has positive impact on of unlocked technology after COVID 19 Pandemic . This confirms that H5 is supported. The inferential statistics suggest that the future scope of using unlocked technology has a significant impact on teacher's satisfaction levels which includes bringing flexibility, better quality future, and career improvement. It was also found that teacher's current satisfaction positively affects their views on continuation of unlocked technology future also.

## Conclusion

Corona virus is an unprecedented public health crisis that is quickly becoming an unprecedented economic crisis. COVID-19 Pandemic has put the Indian Economy into a tailspin. This obstreperous situation has affected all the corners of Indian Economy and made it the talk of the town. The COVID-19 Pandemic has driven Indian Economy into a downside risk. It is evident that Indian Economy is grinding to a halt. The repercussions will be visible in all the sectors of an Indian Economy. Education sector is affected by this pandemic situation too. The COVID outbreak has slowed the pace and changed the pattern of delivering knowledge to learners. E learning became a new normal situation for the delivery of education through integration of technology in the existing education system (Ananga, 2020).

The transition from offline teaching to online teaching was reactive rather than proactive. The study by Criffield, Kracl, McKelvey, Obasi and Vu (2020) revealed that despite of smooth transition to online / remote platform, it was felt that online teaching or learning was compromised. When the results of the research are examined, it has been revealed that the helpfulness factor and complication factor has negative impact on teacher's satisfaction towards unlocking technology by redesigning education system. Teacher's view was that although unlocking technology proves to be helpful in completion of the syllabus, providing better content to learners, diversifying knowledge, better utilization of time and solving problems, lack of proper communication became hurdle for smooth transition of education system from brick and mortar to online method. It was also found that requirement of technical skill, lack of proper resources, poor internet connectivity, privacy issues negatively affects teacher's satisfaction towards unlocking technology by redesigning education system.

Paudel (2021) emphasized the importance of initiatives to be taken by institutions to make blended learning implementation adequate to learner's needs, levels and interest. When the results of the research are examined, it has been revealed that the role of institutions has negative impact on teacher's satisfaction towards unlocking technology by redesigning education system. In-spite of providing regular guidance, supporting environment and clear vision towards new technology of teaching, teachers are facing numerous problems which is ignored by educational institutions. Also, the resources provided by these institutions are not



sufficient. The basis for dissatisfaction is low - quality materials (Hebebcı, Bertiz, & Alan 2020).

Due to out of the blue COVID situation, online learning has gained popularity. We couldn't close our eyes to the truth that unlocking technology in the education sector has wider future scope. Quality oriented future, augmented with classroom teaching, career improvement in future and bringing flexibility are some of the factors which enhances the importance of this new normal situation. Teachers are satisfied with this unlocking technology and are satisfied with continuation of unlocked technology in future also.

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## CHAPTER 10: CHALLENGES AND RESPONSIBILITIES DURING SCHOOL REOPENING POST-COVID-19: A STRATEGIC APPROACH

Gokuladas V.K. , Baby Sam S.K. 

### Chapter Highlights

- School reopening procedures after the COVID-19 lockdown has been one of the challenging tasks for educational institutions across the world.
- Developing and implementing a strategic plan for the physical reopening of schools is the need of the hour.
- This study proposes a strategic model for the successful reopening of schools post-COVID-19-lockdown.
- The theoretical strategic model explained in this study takes into account various dimensions of school operation vis-à-vis the stakeholders in the system.
- This article explains the duties and responsibilities of various stakeholders in the educational system before, during, and after the reopening of schools post-lockdown.
- This study comprehensively covers each aspect of the educational institution that will require attention during the physical reopening of schools.

## Introduction

The current pandemic has its devastating spread across the nations despite considerable awareness programs among the people. It has been observed by Chandra, Fishman, & Melton (2020) the economy would come back to normal only if it overcomes three major constraints i.e., health care capacity, testing capacity, and certification capacity of each country or region. Carucci (2020) asserted that fear of getting sick was the major concern of people who could not return to work, followed by the usage of public transportation and childcare concerns. Amidst these concerns, it becomes all the more difficult for children to get back to school as they are considered as a vulnerable group as far as this pandemic is concerned. UNICEF (2020) identified that major concerns of parents while sending their wards to schools in the post-COVID-19 scenario would include the safety of their children, precautions to be adopted as preventive measures while sending them to school, ways to deal with the learning difficulties of children, and the challenges involved in getting children back to school mode. Even though teachers were quick in adapting to technology-assisted teaching, they felt the lack of spontaneous responses from students due to non-authentic interaction with them (Niemi & Kousa, 2020). Restricted interaction and lack of equipment & infrastructure also aggravated the pressing need for face-to-face learning by reopening the schools physically (Hebebcı, Bertiz, & Alan, 2020).

There have been instances in the recent past in various parts of the world wherein the governments reopened schools in an uncontrolled experimental manner in the wake of the reduced spread of this pandemic in those countries. Such efforts should have been carried out in close collaboration involving government machinery, schools, scientists, and hospitals (Chandra, Fishman, & Melton, 2020). Even though monitoring self-anxiety, improving patience & flexibility, managing expectations, etc., are the need of the hour to keep one rejuvenated at this juncture (Carucci, 2020), it also remains a matter of concern as to how such a mindset could be inculcated among children. American Academy of Pediatrics (2020) identified that factors such as physical distancing, personal hygiene, limiting classroom movements, cleansing & disinfecting, temperature testing, etc., could be vital to ensure that the schools remain safe for children. Even though there have been confirmations from different parts of the world that the younger generation has a reduced risk of infection and transmission (Science, 2020), the school reopening will remain as the greatest challenge unless the concerns of parents are appropriately addressed by the school management.

Therefore, it is imperative that a safe and secure plan for reopening the schools is put in place to ensure that the schooling system is back to normal in the most effective manner. This chapter is purported to bring out a theoretical view about various challenges that reopening of schools could pose to the school-authorities post-lockdown. This article also explains various dimensions of the school environment that could be addressed by different stakeholders in the system so as to ensure that that reopening of schools rolls out successfully.

### **Strategic Plan for Reopening of Schools**

The current scenario of the educational sector necessitates the schools to adopt a detailed plan of action before, during, and after reopening the school regardless of the financial or infrastructural facilities available at schools. Such efforts will not only ensure that the school meets the necessary norms stipulated by authorities for reopening but also instill a sense of confidence among the parent fraternity regarding the safety of their children. However, the fact that each school has its own uniqueness in terms of students' strength, facilities, staff strength, etc., further adds complexity to the process of formulating a common policy for all schools on the subject matter. The absence of unified plans at the national level further aggravates the confusion and uncertainty amongst schools regarding the strategies for physical reopening (ElSaheli-Elhage, 2021).

It has been observed that all processes related to reopening of schools need to be carried out in consultation and in association with all stakeholders because any omission of responsibility on the part of any of the stakeholders will be detrimental to the safety of our children (Couzin-Frankel, Vogel, & Weiland, 2020). Therefore, creating a highly collaborative environment of all stakeholders through transparent communication and effective awareness is imperative at the juncture of reopening the schools. With the support and efforts of all stakeholders in the system, it is hopeful of successfully reopening the schools at the appropriate time with adequate safety precautions. In line with the UNESCO's COVID-19 responses regarding education prepared by the International Institute of Educational Planning (2006) and through the input received from various schools, the following dimensions of the educational institution need to be provided with adequate attention while reopening the schools: a) Academics, b) Facilities, c) Financial measures d) Human Resources ,and e) Communication. All the above dimensions are to be fully adhered to by all stakeholders of the institution so as to ensure that no stone is unturned as far as the

safety of children and staff are concerned. The following stakeholders have an immense scope of contribution to the above cause: a) Students, b) Parents, c) School Management Committee (SMC), d) School Administration, and e) Teachers.

### Strategic Model for Reopening of Schools

In view of the above-mentioned discussion, a model has been developed and proposed in this article under the intricate nature of the relationship among different stakeholders vis-à-vis the dimensions as given in Figure 1. Each of the stakeholders will have their own role in ensuring a safe and healthy learning environment vis-à-vis each of the above-mentioned dimensions in the successful reopening of schools. The details of their roles and responsibilities are as provided in the succeeding tables.

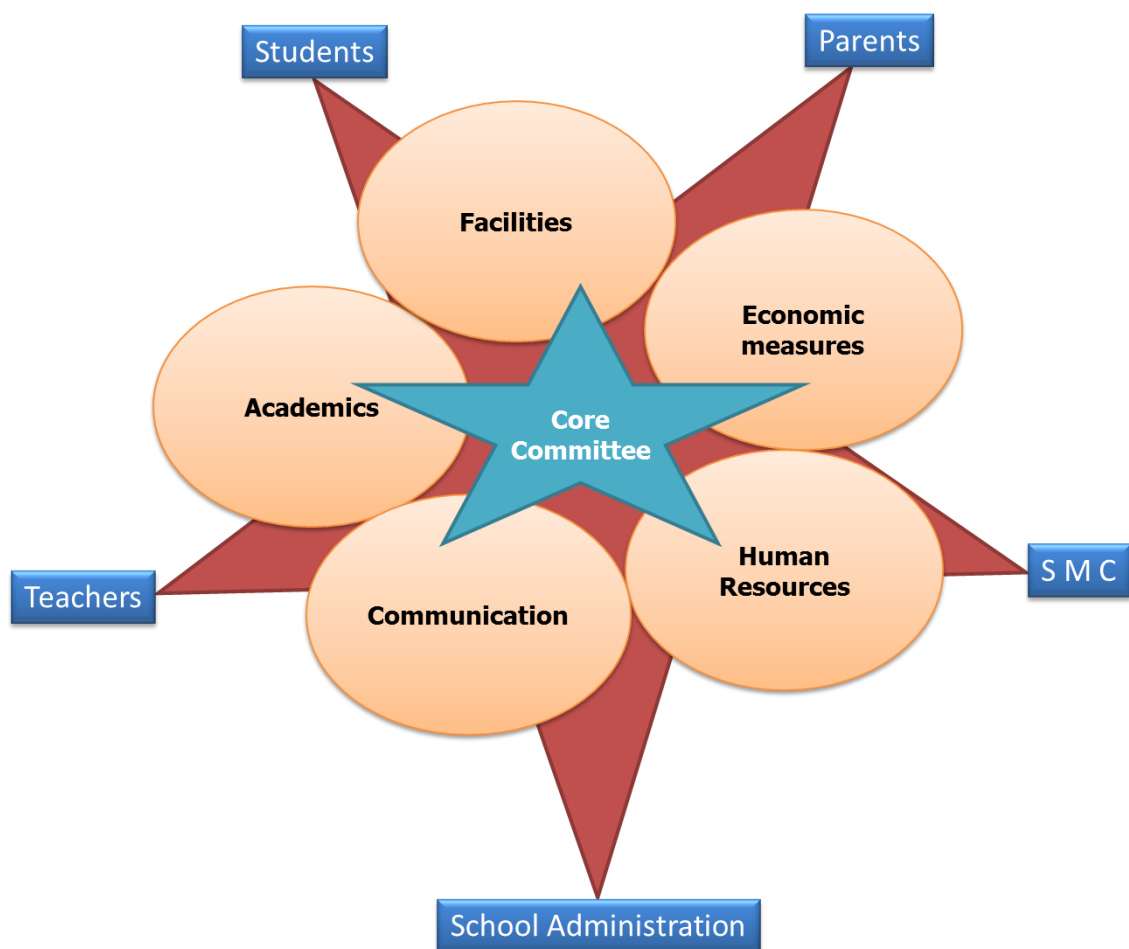


Figure 1. School Reopening Model

### Strategic Process of Reopening

In order to manage the whole affairs of day-to-day monitoring and guiding the entire process, a **Core Committee** will be constituted at each school. This committee will take stock of the post reopening situation on a daily basis, and brainstorm & decide on measures to identify & correct gaps in the process. The detailed functioning of the Core Committee is in give in Figure 2.

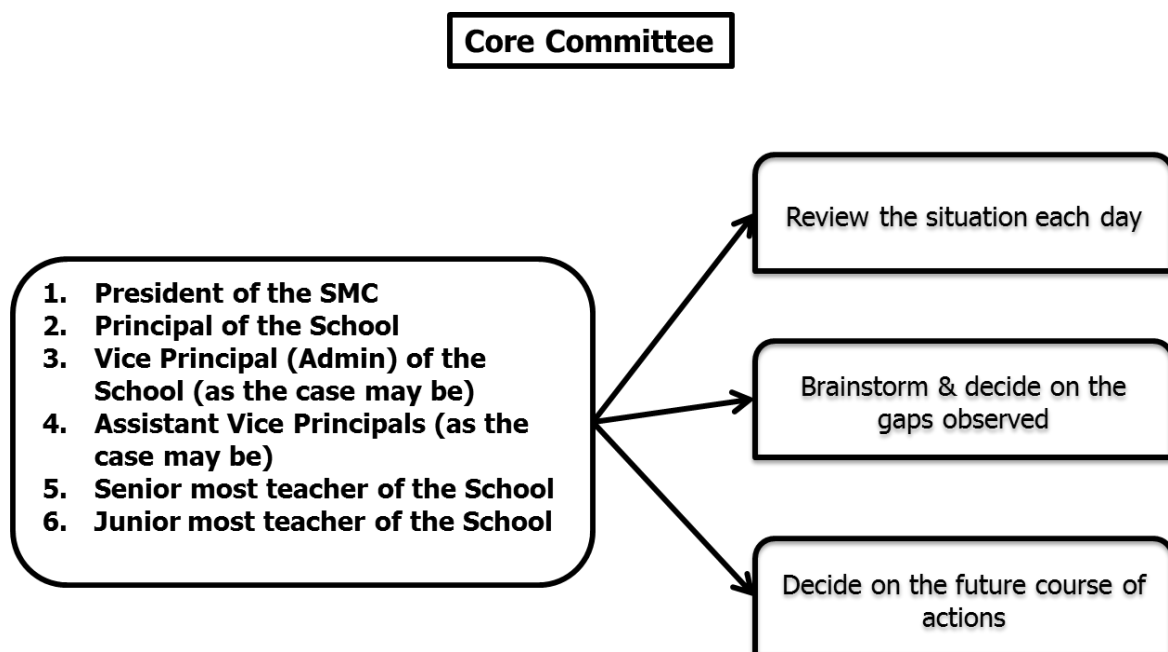


Figure 2. Core Committee Functions

As mentioned earlier, each of the stakeholders will execute their role to make sure that the reopening of the school ensures maximum safety and security to the children and staff. The major duties and responsibilities of these stakeholders are as follows.

### *Roles & Responsibilities of the School Management Committee*

School Management Committee has a pivotal leadership role to play at this point in time. Being part of the community who offer selfless service to the society, each SMC member should rise to the occasion at this juncture to ensure that students are returning to the schools with more confidence and enthusiasm. The SMC should spearhead the process of reopening the school by providing strategic direction and unconditional support to the school



administration. The following are the major but not limited functions that SMC would execute to ensure the safety and security of students and staff when school reopens.

### *Academics*

- Entrust the Academic Committee of the SMC to chalk out plans in close consultation with the School Administration for imparting education as per the guidelines of the authorities;
- Institutionalize a robust Learning Management System that would be handy in providing blended learning;
- Develop innovative methods of imparting education without any discrimination to any section of students for the want of facilities;
- Develop an orientation plan for teaching fraternity to instill the importance of the precautions to be adopted upon reopening;
- Encourage and motivate teaching fraternity with more autonomy to ensure that they execute their responsibility in the best possible manner;
- Assist the School Administration by providing guidance on the utilization of resources to manage the reduced number of students in each class.

### *Facilities*

- Ensure that the entire school campus is ready for the blended learning process by providing appropriate hardware and networking facilities;
- Ensure strict compliance with the instructions from authorities such as the Ministry of Health, Ministry of Education, and local civil & police authorities regarding the safe operation of the school during post-lockdown;
- Ensure that necessary medical equipment and allied apparatuses are available at all times at the stipulated places to ensure the prevention of any unforeseen incident;
- Ensure that adequate support staff is available at the school to manage the hygiene in the entire premise;
- Ensure that only trained personnel are utilizing the facilities related to diagnosing the potential symptoms of COVID-19;

- Ensure that proper transportation hygiene is practiced by those who are handling school transport (if any).

### *Economic Measures*

- Short-term budgeting is the need of the hour so as to ensure that all immediate needs/requirements are meticulously achieved. Therefore, prepare a half-yearly budget for the entire schooling process;
- Put on hold all projects in the pipeline until the financial viability of the school is restored to a great extent;
- Cut short all expenditures on all accounts so as to ensure availability of adequate cash balance in the system;
- Defer all payments which are of not urgent nature by negotiating with respective vendors;
- Put on hold all functions that were planned as part of the school activities prior to the lockdown till financial viability is achieved;
- Put on hold all major purchases/renovation/refurbishing till adequate funds are made available to meet such expenses;
- Make efforts to collect outstanding fees that would ensure continuous cash flow into the system;
- Be considerate of those who are financially stricken during this time and allow more opportunities for them to support the system.

### *Human Resources*

- Treat all employees at par without any discrimination at this trying period;
- Treat all employees with respect and dignity as their high morale would immensely contribute to the creation of a safe learning environment;
- Provide support to the School Administration in utilizing Human Resources optimally so as to ensure that school affairs are run at the minimum cost;
- Have empathetic consideration towards each employee for their issues and try to resolve it in the most beneficial manner to the employee;

- Provide adequate training to all those staffs who are specifically allotted for the COVID-19 prevention program at school;
- Avoid frequent changing of manpower from their respective duties as it would not only necessitate frequent training programs for the incumbents but also disturb the established processes of handling the issues effectively.

### *Communication*

- Communicate regularly with parents, teachers, and students about the issues involved in the reopening of schools and seek their support in this direction;
- Use different channels of communication to inform parents, students, teachers, and staff about various measures adopted by SMC to reopen the school;
- Make every effort to convince parents as they are the stakeholders who might have the maximum concerns before sending their wards to the schools;
- Make appeals to various stakeholders, community leaders, and well-wishers to disseminate only accurate and duly verified information on the reopening process;
- Make every effort to correct misinformation by issuing corrective measures which will put any public fear or doubt to rest;
- Be considerate and empathetic in your communication with the rest of the stakeholders;
- Be transparent and be clear about what you wanted to convey to others;
- Develop the attitude to listen to the stakeholders' concerns and take a collective approach to resolve such issues.

### *Roles & Responsibilities of the School Administration*

There are various factors that potentially make the physical reopening of schools successful. One such factor is the readiness on the part of the School Administration. Nnebedum, Obuegbe, & Nwafor (2021) observed that Principals complied with the guidelines issued by the governmental agencies with respect to measures to be adopted while reopening of schools post-lockdown. School Administration is headed by the Principal and supported by other senior members of the teaching fraternity. It is this team of experienced professionals who are going to meticulously plan and execute the day-to-day functions of the school activities when the school reopens. Therefore, it would be of immense importance for the members of this

team to collaborate and sync with each other to ensure that respective teams at different levels in school are executing the reopening plan efficiently and effectively. The following are the guidelines but not limited that the School Administration would implement so as to ensure that the school reopening process is a successful one.

### *Academics*

- Ensure that they receive the revised syllabus for all sections of students;
- Ensure that the revised syllabus could be covered within the time left over during the current academic year;
- Make plans for blended learning as this process is going to be future pedagogy;
- Make sure that all teachers are adequately trained on the pedagogical approach to managing the blended learning process once the school is reopened;
- Provide adequate preparation time for the teachers to formulate and deliver their sessions;
- Bear in mind that teachers are the backbone of the schooling system and make every effort to ensure that they keep up high morale during these trying times;
- Plan effectively to ensure that synchronous and asynchronous learning avenues are available for both face-to-face (F2F) and online mode of teaching;
- Plan and allocate F2F and online mode in accordance with the facilities available at your school premises.

### *Facilities*

- Take into account the number of students, sections, and levels while planning varied timing for students of various levels to arrive at and depart from school after their classes;
- Ensure that adequate time gap is provided for the entry and exit of different categories of students to and from the school;
- Plan the timing for each such category of students in such a manner to ensure that there is no congestion of traffic at any point in time;
- Preferably, use different entry points for different category of students which are adjacent to respective classrooms;

- Make sure that each entry point is provided with adequate apparatus as stipulated for diagnosing COVID-19 symptoms and trained personnel are deployed to operate these devices;
- Ensure that strict compliance with adequate safety measures such as wearing a mask, using sanitizer, maintaining social distance, etc., are observed by all when they are in school premises;
- Ensure that entry/exit points are manned at all times;
- Ensure that hygiene facilities such as washrooms, toilets, bathrooms, etc., are sanitized at appropriate intervals and are provided with adequate hand washing facilities coupled with provisions of running water, soap, hand wash, disposable napkins, etc.;
- Keep all those places in the school which are prone to gatherings closed so as to ensure students' safety. This could include the cafeteria, indoor games area, etc.;
- Mark all facilities with appropriate signs/labels to ensure that users maintain a safe distance from each other;
- Provide safety and security posters at places to ensure that awareness becomes part of the lifestyle.

### *Economic Measures*

- Review the school's activity chart and put on hold all those functions/ activities that are not essential at this juncture;
- Take measures to ensure that usage of all stationery items in the school is minimized to the core;
- Since blended learning is going to be adopted, ensure that all learning materials are made available to the students electronically which also ensures saving stationaries;
- Take adequate measures to educate and train the employees regarding the reduction of wastages, be it electricity, water, or other related assets of the school so as to reduce operational expenditures;
- Plan the sessions in such a manner that would considerably reduce the usage of school resources;
- Follow up on the collection of outstanding fees so as to ensure uninterrupted cash flow into the system;
- Take adequate steps to motivate the parents not to default on the fees;

- Devise plans to ensure that the financial burden of parents is reduced such as installments in payment of fees, reduction of developmental fees, etc.

### *Human Resources*

- Maintain the morale of the staff at a high level so as to ensure that they execute their work effectively and efficiently;
- Take feedback from teachers and staff regarding their preference for various allied duties that they would be undertaking during this period and depute them as per their preference as far as possible;
- Train teachers to monitor and identify those children who are experiencing particular difficulties when they are back in school;
- Train the students to carry out peer-counseling those who are found psychologically affected during this pandemic;
- Train the students about class management with a reduced number of students as well as with social distancing discipline in the classroom;
- Draw out the procedure for letting the students go for bio-breaks;
- Chalk out a detailed handing / taking over plan to ensure that the students are monitored at all times by the teachers in the classroom;
- Make sure that standby provisions are implemented for all jobs in the school.

### *Communication*

- Communicate regularly with SMC, parents, teachers, and students about the precautionary measures adopted by the school for reopening so as to instill confidence in them;
- Communicate almost on a daily basis to all stakeholders through different means of communication to update them about the learning environment and its safety;
- Communicate with parents in a continuous manner to ensure that they remain supportive of the system;
- Convey to parents their role in ensuring the safety of their wards and pledge the unconditional support of the school administration to their initiatives in this direction;

- Make parents aware of misinformation and take corrective measures to clear any concern of parents that arose because of the misinformation;
- Train the teachers to maintain the utmost care while communicating with parents through the dissemination of factual information;
- Develop the skills of teachers to maintain good interpersonal relationships with parents so as to ensure that the latter gains confidence in the process adopted by the school;
- Listen patiently to the concerns of all other stakeholders and make every effort to ensure amicable solutions to their issues;
- Be open to constructive criticism by other stakeholders and take appropriate corrective actions to ensure that the system gets strengthened.

### *Roles & Responsibilities of Teachers*

Teachers are the backbone of the schooling system. The school learning environment flourishes only under the relentless efforts of the teaching fraternity. During this pandemic, it is the adaptability and the tenacity of teachers that proved to be the main factors behind the successful implementation of online learning. However, it is expected that the responsibilities of teachers are bound to multiply as they would be dealing with yet another changed learning environment especially when they need to rotate between F2F and online teaching. Following are some of the guidelines, but not limited for the teachers to practice when the school reopens.

### *Academics*

- Take stock of the stipulated portions of the syllabus completely to understand the target.
- Accept the reality that blending learning is going to be the future mode of learning wherein teachers become experts in both face-to-face and online mode of teaching.
- Prepare lesson-plans by identifying those sessions which are apt for face-to-face and online teaching separately.
- Be a self-learner for life-long with the necessary skills to adapt oneself to the dynamic learning environment.

- Develop abilities to create online communities effectively, become more students' centric, change from the role of Knowledge-Provider to Knowledge-Embedder, and quite often, from the sage on the stage to the sage on the screen.
- Prepare lesson-plans so as complete the stipulated syllabus within the time frame through F2F and technology-assisted teaching.
- Provide additional support to all those students who are struggling to achieve academic objectives because of the pandemic.
- Update and assimilate with technology-assisted learning so as to ensure that one remains accessible to students even beyond classrooms.

### *Facilities*

- Undergo training & development programs to effectively manage the classrooms with a lesser number of students while maintaining social distancing at all times.
- Always handover the charge to the incoming teacher with a necessary briefing before leaving the classroom after the session.
- Spend time to educate students aware of the safety precautions during this period.
- Utilize the technology to communicate with students effectively in order to support them.
- Understand and utilize the Learning Management System effectively so as to ensure that teaching & learning become more effective.

### *Economic Measures*

- Ensure that the school resources are utilized optimally so as to reduce wastage.
- Reduce dependence on stationery items by adopting technology-assisted teaching and learning.
- Update and develop knowledge and skills through online programs and webinars that could substantially reduce staff costs.
- Plan classroom sessions in such a manner that would reduce the operational cost considerably.
- Maintain good rapport with the parents so as to have an effective follow-up on fee collection.



### *Human Resources*

- Maintain high morale among students by appropriately identifying and addressing their needs.
- Encourage students to be more responsible for the actions that could in turn inculcate a sense of maturity in them.
- Provide more autonomy to students to support their creative nature.
- Move from a prescriptive method of teaching to an inductive approach in the classroom so as to ensure that students relate the concepts to respective practical applications.
- Treat students who look psychologically affected during this pandemic with lots of caution and care.
- Be sensitive to the current state of affairs and treat students and colleagues from an empathetic point of view.
- Wholeheartedly accept and execute the allied assignments provided by the school to ensure the safety and security of all stakeholders.
- Develop and implement specific activities in the classroom itself which could eventually result in students' psychomotor and social skills while maintaining hygiene and social distancing.

### *Communication*

- Be in regular touch with parents and students and address their concerns appropriately.
- Develop a healthy interpersonal relationship with the parents and students.
- Communicate all school-related activities effectively to the parent and students.
- Educate parents on the kind of support that the school would be expecting from them such as bringing and picking up children at the stipulated time, educating the children on social distancing & hygiene, follow-up on the observation of teachers on the behavior of their wards, etc.
- Brief the students from time to time regarding their behavior during these trying times and obtain their constructive feedback about their current experience in the classroom.
- Communicate with school administration regarding concerns/issues being experienced during the reopening.

- Follow both top-down and bottom-up approaches of communication so as to ensure that every stakeholder is aware of the activities and outcome of classroom sessions.

### *Roles & Responsibilities of Parents*

Yet another important stakeholder in the schooling system is the parent fraternity. Even though parents do not generally interfere with the affairs of the school, the current pandemic has created greater safety concerns in their minds. School reopening poses a greater challenge from their point of view unless such concerns are effectively tackled by the school administration while reopening the school. Therefore, taking parent fraternity into confidence is the foremost task of the school management & administration at the time of reopening the school. The following are major roles & responsibilities that the parent fraternity could execute during the time of reopening. These roles & responsibilities should be conveyed to them through various means of communication by respective SMC, School Administration, and teachers that are appropriate to their level of interaction with the parents from time to time. Such communication will in turn infuse confidence among parents about the learning environment in the school.

### *Academics*

- Provide adequate facilities for children to undergo academic activities both online and face-to-face.
- Provide mental support to children at this trying time since most of them are deprived of social interaction, an indispensable factor for personal growth.
- Ensure that the children are free from all other family engagements when the online sessions are being imparted.
- Keep close monitoring of online learning activities so as to keep track of children's academic objectives.
- Keep motivating children with positive vibes as there could be personal disturbances to them due to a lack of interaction with other members of society.
- Be in constant touch with the teacher to get updated on the academic progress of children.

- Be cooperative with the teachers and school administration since everyone is going through a tough time.

### *Facilities*

- Ensure that children are educated by parents on personal hygiene measures.
- Ensure that adequate protective measures such as wearing the mask, gloves, sanitization of hands, etc., are undertaken while sending children to the school.
- Make sure that children are instructed to consume their own food and water so as to combat the spread of this pandemic.
- Make sure that the conveyance through which children are sent to and brought back from school is safe and secure as far as the prevention measures for COVID-19 are concerned.
- Follow stipulated timing and designated place for dropping /picking up the children in case they are dropped at school by parents themselves.
- Educate children frequently about social distancing to be maintained while at school.
- Train children to follow the instructions of teachers and school administrators meticulously while at school.

### *Economic Measures*

- Be prompt in paying up the fees since school fees are the only revenue generation factor for the majority of the schools to operate.
- Discuss with school authorities for possible alternatives in case parents face financial difficulty during this period.

### *Human Resources*

- Be patient while with the teachers and school administration since everyone in the school is committed to ensuring the safety and security of the children.
- Be considerate to children since they are also equally undergoing emotional stress and are in need of support.

- Monitor and make professional counseling available to children in case of any emotional distress among them.
- Be in frequent conversations with children to ward off any misinformation about the current pandemic.
- Always try to provide children with authentic information to keep away from alarming rumors.

### *Communication*

- Be open in communication with children, teachers, and school administrators.
- Do not believe or circulate misinformation about school reopening.
- Clarify all doubts and concerns with the class teacher.

### *Roles & Responsibilities of Students*

The most important stakeholder for the successful reopening is the student fraternity. They are the people on ground zero to learn in a differently structured learning environment. As such, they are the category that would be under tremendous adaptation need to cope up with the inevitable changes. Ozkara and Cakir (2018), students preferred F2F communication as motivating even though they tended to have a positive attitude towards remote learning. Such a positive attitude is achieved through familiarity that in turn resulted in a progressive reduction of anxiety towards online learning (Unger & Meiran, 2020). Therefore, this category of stakeholders needs more attention from all corners so as to ensure maximum safety for their well-being while they are at school. Following are some of the guidelines which other stakeholders such as School Administrators, Teachers, and Parents need to continuously instill in the minds of students so as to roll out the successful reopening of schools.

### *Academics*

- Develop an attitude to adapt to the changing needs of learning.
- Be positive in approach towards studies so as to ensure that the academic goals are achieved.

- Approach concerned teachers in case of any difficulty in different modes of learning.
- Be a self-learner as this attitude will help to tide over many hurdles in the future.

### *Facilities*

- Educate the self to use the facilities in the school as per instructions.
- Take appropriate precautions while using lavatories and ensure that hygienic cleanliness through proper hand-wash and sanitization.
- At all times, strictly adhere to the new way of life at school so as to keep safe and healthy.

### *Economic Measures*

- Develop a positive attitude towards conservation of energy such as switching off lights and fans when not in use, report water leakages if any, etc.
- Reduce wastage of resources and develop an inclination towards reusing things that otherwise would have gone as wastage.

### *Human Resources*

- Be patient in the approach towards others as everyone else is also going through a tough time.
- Believe in the strength of unity and develop a positive attitude towards life.
- Listen and adhere to the instructions that ensure safety in the school.
- Treat friends with more compassion as everyone is in need of social and emotional support.
- Always bear in mind that safety at this juncture is one's own responsibility.

### *Communication*

- Openly communicate concerns with near and dear ones.
- Make it a point to talk to friends/teachers/parents about various concerns in case of any mental stress due to this pandemic situation.

- Check for negative signs such as difficulty in sleeping/eating, nightmares, being withdrawn or aggressive, stomach pain/headache without physical reason, decreased interest in playful activities, being sad for no reason, etc., and seek professional help.

## Conclusion

The above strategic approach has been proposed to ensure that each and every stakeholder in the educational system has equal responsibility and opportunity to contribute to the well-being of students. This accountability will not only prepare the system to proactively develop its own coping mechanisms but also strengthen the mindset of all stakeholders by instilling confidence in their minds about the schooling system. However, as mentioned earlier, this process could succeed only if all the stakeholders execute their own responsibilities towards the implementation of the proposed strategic plan. The model proposed in this study is strategic in nature because of the fact it brings the overall school environment under the purview of each and every stakeholder with a view to ensure their participation and confidence in the educational system. The adaptation of this model in the face of the current pandemic would instill a sense of acceptance of responsibility by respective stakeholders which will go a long way in ensuring that the educational institutions reiterate their commitment to the community.

It has also been observed from the professional experiences of authors in the community schooling system that this model leads the stakeholders to own the responsibility of the consequences of their own actions since the accountability is embedded across all dimensions of school management. The application of the proposed model in those schools with different organizational structures is feasible depending upon the uniqueness of each such hierarchy. It is felt imperative that there should be a form of collective responsibility among various stakeholders in order to successfully roll out the reopening process irrespective of the organizational structure of the institution. Let us all hope that everything will come back to the normal course of action through these consistent and dedicated efforts to ensure that our children remain safe wherever they are.

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## CHAPTER 11: TRANSITIONING FROM FACE-TO-FACE TO ONLINE LEARNING: STUDENTS' ACHIEVEMENTS AND PERCEPTIONS OF LEARNING CALCULUS DURING COVID-19 PANDEMIC

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### Chapter Highlights

- In spring 2020, and due to the spread of the novel Coronavirus (COVID-19), many universities around the globe were forced to move from face-to-face to remote instruction.
- As a result, the Department of Mathematical Sciences in UAEU started implementing the use of BlackBorad Ultra as the Learning Management System (LMS) for remote instruction.
- This study investigated the effects of the transition from face to face to remote learning on students' perceptions and achievements.
- Sixty college students enrolled in a Calculus I course participated in this study. Data were collected using two tests and a survey.
- The results indicated that students had a positive experience using the online format; most of them felt confident using it and even expressed that it allowed them more interaction than the face-to-face modality.
- Students also indicated that even though they needed to put more effort into their learning, they perceived the new approach as flexible, useful, and helpful.

## Introduction

In the middle of the Spring 2020 semester and due to the spread of the novel Coronavirus (COVID-19), faculty members at the United Arab Emirates University (UAEU) were forced to move their teaching modality from face-to-face to a remote (distance learning) modality. As a result, new questions emerged:

- Do all students have the necessary technology for distance learning such as computers, iPads, and high-speed internet?
- Are faculty members ready to use this pedagogical model?
- Do students and faculty members have enough support from the university to implement this sudden transition?
- What are the attitudes of the students and instructors toward such pedagogical model?
- How are students adapting to the use of this new model?
- Will students be willing to engage in this kind of learning?

All these questions and others were a big challenge to students, faculty members and universities.

With the growing demand for remote learning and the rise in online course offerings, online learning has become an integral part of college and university instruction. Over the past years, several studies compared between face-to-face and online classes. Some of these studies examined students' attitudes and perceptions of the advantages and disadvantages of these classes (Beard et al., 2004; Edwards, 2013; Kirtman, 2009; Lim et al., 2008; Serhan, 2010; Smart & Saxon, 2016; Smith, 2005; Sorensen, 2012).

The research studies found the following advantages of online learning: flexibility of time and place, self-tailored learning, the ability of students to learn according to their own pace and in the comfort of their environment, increased access to materials, efficiency, and ability to participate in a relatively stress free environment. On the other hand, research studies reported the following disadvantages of online learning as perceived by students: lack of self-discipline, inability to manage time effectively, technological difficulties, lack of face-to-face interaction with instructor and classmates, more work than face-to-face classes, and lack of sufficient time to complete assignments. Even with these disadvantages, the majority of students in these studies indicated their willingness to enroll in online classes.

Over the past few months, new studies emerged focusing on teaching and learning during the COVID -19 pandemic (Abbasi et al., 2020; Agarwal & Kaushik, 2020; Bao, 2020; Demuyakor, 2020; Giovannella, 2020; Hamilton et al., 2020; Ioos & Gallicchio, 2020; Murphy, 2020; Özer, 2020 ; Toquero, 2020). Many studies focused on students' and teachers' perceptions and attitudes towards teaching and learning during the COVID-19 pandemic (Angelova, 2020; Hebebcı et al., 2020; Marpa, 2021; Niemi & Kousa, 2020; Paudel, 2021; Serhan, 2020; Tümen Akyıldız, 2020; Unger & Meiran, 2020).

Abbasi et al. (2020) conducted a study to explore students' perceptions of e-learning during the lock down. They collected data from 382 students (137 males and 245 females) using a 23 item, 5-point Likert scale questionnaire. The scale ranged from 1-5; 1- strongly disagree, 2- disagree, 3- Somewhat agree, 4-agree, 5- strongly agree. The questionnaire consisted of the following: five items that covered demographics, one item investigating the choice of gadgets used for e-learning, and 17 items that covered students' positive and negative perceptions of e-learning. The data indicated that most students (77.4%) had negative perceptions towards e-learning. The researchers concluded that students preferred face-to-face instruction over e-learning instruction during the lockdown.

In their study, Agarwal and Kaushik (2020) and due to the COVID-19 pandemic all their face-to-face classes were replaced with 40-minute Zoom lectures for 12 days. They obtained responses from 77 students about their perceptions at the end of the lecture series. Ninety-seven percent of the students indicated that the sessions were relevant to their learning needs and clinical practice and 99% perceived that the sessions were tailored to their level of learning. All the participants suggested that online classes should be made part of the medical postgraduate curriculum. The researchers concluded that online teaching should continue to be part of the postgraduate training when the pandemic is over.

In her paper, Bao (2020) identified the following five high-impact teaching practice principles for online education:

- (a) appropriate relevance between online instructional design and student learning,
- (b) effective delivery of online instructional information,
- (c) adequate support provided by faculty and teaching assistants to students including timely feedback, tutoring and email guidance after class;

- (d) high-quality participation to improve the breadth and depth of student learning, and
- (e) contingency plan to deal with unexpected incidents of online education platforms.

Demuyakor (2020) investigated Ghanaian international students' level of satisfaction of online learning in higher educational institutions in China due to COVID-19. A total of 315 students participated in the study, 69.1% were males, and 30.9% females. The researcher found that students supported the implementation of online learning programs and that they were satisfied with the online teaching and learning instituted by various educational institutions of higher learning. In addition, students perceived online learning as effective. However, the results indicated that students who participated in the courses while outside China spent a lot of money to secure internet data for online learning. For students living in dorms in various institutions in China, the internet connectivity was very slow.

Giovannella (2020) conducted a study in Italy exploring the effects of Corona virus pandemic on students after they transitioned from face-to-face instruction to a virtual one. The participants in the study were 101 students enrolled in an educational science course. The students completed a 40-question questionnaire that included qualitative, quantitative, and multiple-choice questions. The results of the study showed that even though the students missed the traditional face-to-face class settings, they were able to positively absorb the sudden change in educational settings.

Serhan (2020) investigated students' attitudes towards the use of Zoom as a remote learning moderm and their perceptions of its effects on their learning and engagement in comparison to face-to-face learning. Data were collected from thirty-one university students using a 5-point Likert-type survey. The results indicated that students had a negative attitude toward the use of Zoom and perceived it as having a negative effect on their learning experience and their motivation to learn. Students listed flexibility as a main advantage to using Zoom for learning.

As educators and students in schools across the United States were forced to make extraordinary changes to teaching and learning because of COVID-19 in spring 2020, Hamilton et al. (2020) surveyed nationally representative samples of K–12 USA public school teachers and principals after the transition from FTF instruction to a remote one. The goal was to document the delivery of instruction, the support, and services that the

participants needed as well as expectations and plans for the 2020–2021 school year. The researchers found that educators needed additional resources that included the following:

- access to technology for students,
- remote instruction training for teachers,
- strategies for motivating students in the new remote setting,
- strategies to support students' social and emotional needs, and
- adequate support for students with disabilities and homeless students.

Researchers also identified disparities in the quality of instruction and school resources according to different student populations. Their study suggests that the inequities during the pandemic might get worse.

In their study, Ioos and Gallicchio (2020) gathered data on the effects of COVID-19 on healthcare practice, medical and pre-medical educational experiences. They concluded that the pandemic has affected the medical field. For example, medical schools put extra limitations on students' contact hours with patients and postponed their spring exams, which will result in delaying their graduation. Physicians have turned to telemedicine to reduce exposure and possible disease transmission. The impact of COVID-19 extended to pre-medical students who were unable to participate in many of the activities required by medical schools as part of the acceptance process including shadowing and volunteering opportunities.

As reported by Means and Neisler (2020) Digital Promise and Langer Research Associates developed and administered their *Survey of Student Perceptions of Remote Teaching and Learning* to a random national sample of 1,008 undergraduate students who were enrolled in courses that moved to online instruction in March due to the COVID-19 pandemic. The goal was to summarize students' experiences during this transition period. The following is some findings of the study as reported by the researchers:

Students' Satisfaction:

- Student satisfaction with the course dropped down: The percentage of students who indicated that they were very satisfied with the course dropped from 51% to 19% after the move to online instruction. The majority of students (59%) were at least somewhat satisfied with their courses after the shift to remote instruction.

- Student satisfaction with their instructor: Most students did not blame their instructors for what they perceived as a drop in course quality. More than a third of students (37%) said they were very satisfied with their instructor's preparation, and (39%) said they were somewhat satisfied with their instructor's preparation for teaching the course post-COVID-19, which indicates that 76% of students were satisfied with their instructors.
- Student satisfaction with their learning: Only 17% of students said they were very satisfied with how well they were learning post-COVID-19. Still, fewer than half of the students expressed dissatisfaction with their learning after their course went online.

#### Challenges Students Faced in Learning Remotely:

- Motivation to do well in the course after it went online: 79% of students viewed the shift to online as a problem, 42% indicated that it was a major problem, and 37% perceived it as a minor problem.
- Finding a quiet place to work on the online course (55%).
- Fitting the course in with family/home responsibilities (54%)
- Not knowing where to go for help with the course (54%)
- Feeling too unwell to participate (45%)
- Fitting the course in with a work schedule (31%)

Specific aspects of the course that students suffered from after moving to remote instruction were:

- Opportunities to collaborate with other students on course work; 65% thought opportunities were worse or much worse online.
- Staying interested in the course content; 57% found that their level of interest was worse or much worse
- Feeling included as a member of the class; 50% found that this feeling of being included got worse or much worse).

Özer (2020) reviewed the Turkish Ministry of National Education educational policy in response to the COVID-19 pandemic. The researcher found that the Ministry of National Education established an extensive distance education by strengthening the infrastructure of digital educational portal, collaborating with Turkish Radio and Television Corporation to establish an effective distance education system and established a psychosocial support system to help students cope with the negative psychological effects of COVID-19.

As COVID-19 affected institutions of higher education cross the world, thousands of schools turned towards remote learning, Toquero (2020) encouraged researchers to document the effects of the present pandemic on educational systems worldwide. She called on institutions to adjust their pedagogical practices to adapt to the learning needs of the students beyond the classroom walls. The Department of Mathematical Sciences in UAEU implemented the use of BlackBoard Ultra as the platform for conducting math classes online. For Calculus I class, students learned content online by watching video lectures on BlackBoard and then completed their assignments online using WebAssign and Mathematica. In addition, tests were proctored using The LockDown Browser and the Respondus Monitor. This study investigated the effects of the transition from face-to-face to remote instruction on students' experiences and achievements in a Calculus I course due to the Coronavirus (COVID-19) pandemic. The focus was on comparing between students' achievements in the face-to-face model and the online learning model. In addition, the study investigated students' perceptions of this transition.

### *Research Questions*

Due to the spread of novel Coronavirus (COVID-19) and the transition from face-to-face learning to remote learning, the aim of this study was to answer the following two questions:

1. Is there a significant difference between students' achievements in face-to-face vs online instruction?
2. What are students' perceptions of the transition from face-to-face instruction to online instruction in terms of their interactivity and confidence, effort, effectiveness, preferences and advantages and disadvantages?

### **Method**

#### *Participants*

The participants in this study were students at the College of Science and the College of Information Technology (IT) enrolled in a Calculus I class at the United Arab Emirates University in Spring 2019/2020. Sixty students participated in this study. The students in this



course used the *Calculus Early Transcendentals* textbook by Stewart (2017). The textbook covered many topics including limits, continuity, differentiations, and integrations.

The student learning outcomes for this class were:

1. Explain some important concepts of Calculus (such as limit, continuity, derivative and integral).
2. Compute limits, derivatives, linear approximations, and integrals using various techniques.
3. Apply Calculus to geometry and to real world problems (such as graph sketching, optimization, related rates, area computation)
4. Justify some general results in single-variable Calculus from a theoretical point of view.

### *Procedure*

During the first half of the semester, the class was conducted using the traditional face-to-face approach. Due to COVID-19 pandemic, the university decided to teach remotely. Instruction was moved to the BlackBoard Ultra platform. During the face-to-face instruction, the following topics were covered: limits, continuity, and rules and applications of the derivative. After the transition to remote learning, the following topics were covered: more rules and applications of the derivative, areas, Riemann sums, and integrations by substitution.

After the transition to online instruction, students were informed about the study and were asked to participate voluntarily. Data were collected from Test 1 that was conducted during the face-to-face instruction, as well as from Test 2 after the transition to online instruction. Test 1 consisted of nine short answer questions focusing on limits, continuity, and differentiation.

While Test 2 consisted of nine questions, a mix of multiple-choice and short answer questions, focused on differentiation, integration, and area. In addition, data were collected from students' responses to a survey that was given at the end of the semester to provide an answer to the second research question investigating students' perceptions of the transition from face-to-face to online instruction. The following were the survey questions:

1. Describe your interactivity and confidence during the online instruction period.
2. Describe your efforts in the online format in comparison to the face-to-face one.

3. Describe your perceptions towards effectiveness of the online format.
4. Which modality do you prefer: online learning, face-to-face learning, or mix between the two (hybrid)?
5. Describe the advantages/ disadvantages of the online instruction.

## Results and Discussion

This study investigated the effects of the transition from face-to-face instruction to online instruction on students' learning in Calculus I class due to the spread of the novel Coronavirus (COVID-19). The focus was on students' achievements in the face-to-face modality in comparison to their achievements in the online learning modality. The study also investigated students' perceptions toward of this transition.

In this section we discuss the results to provide a response to the research questions regarding students' achievements due to the transition from face-to-face to online instruction and their perceptions of the transition of face-to-face to online instruction.

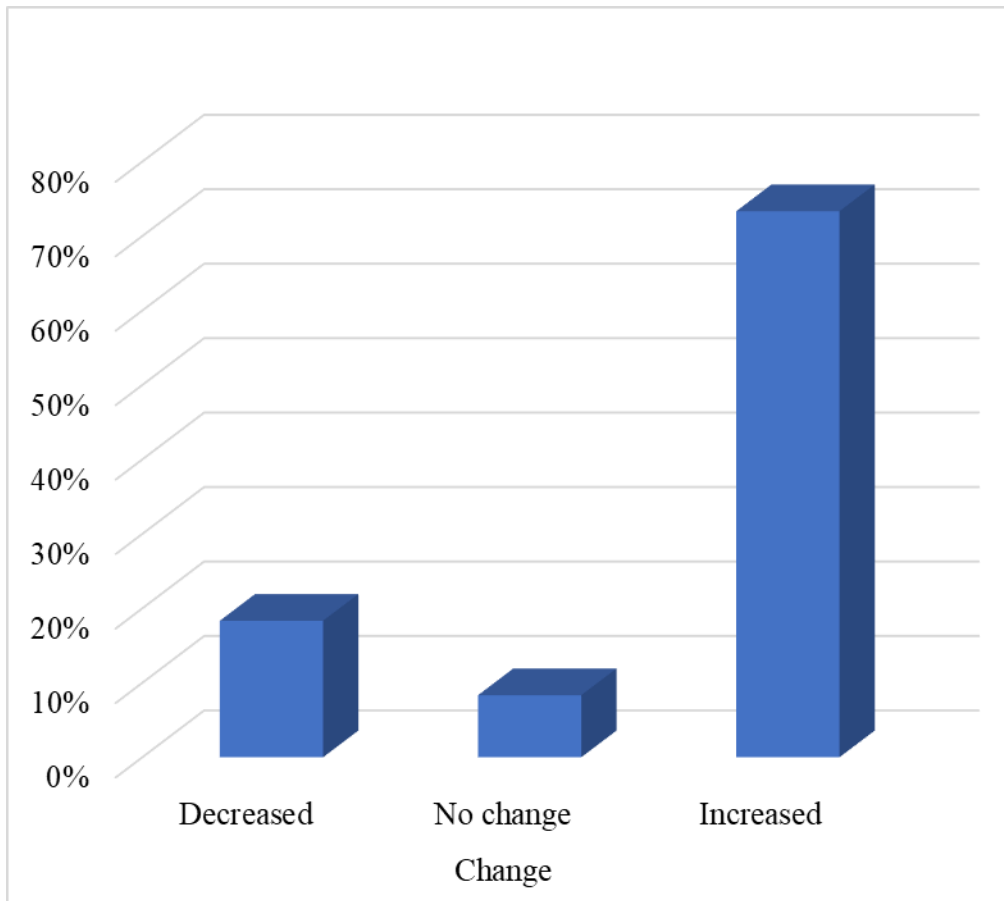
To answer the first research question about students' achievements due to the transition from a face-to-face to an online instructional modality, a statistical analysis was conducted to answer the first question. Table 1 shows that there was a significant difference between the means of Test 1 and Test 2. In addition, 73.3% of the students had a higher score in Test 2 compared to 18.3% whose score decreased after the transition to online instruction (see Graph 1).

Table 1. Two Tests Statistical Analysis

	Test		Mean Change	P-value
	Test 1	Test 2		
Mean	12.62	15.92	3.3	<0.001
SD	5.33	2.99		

The findings of this study disagree with what Williams and Cambiano (2005) found in their study. Their results indicated no significant difference between the face to face and the online

format. Similarly, in a study that compared the effectiveness of online vs. traditional instruction in an environmental studies class, Paul and Jefferson (2019) found no significant difference between students' performances in online vs face to face courses.



Graph 1. Students' Score Change between Test 1 Score and Test 2

To answer the second question regarding participants' perceptions of the online instruction in comparison to face-to-face instruction, participants' responses were categorized into five categories: interactivity and confidence (see Table 2); effort (see Table 3); effectiveness (see Table 4); preferences (see Table 5); advantages and disadvantages (see Table 6).

As can be seen in Table 2, most students (73%) indicated that they felt more confident learning online and 70% of them perceived the online environment to be more interactive in comparison to the traditional face-to-face one. Similar results were reported by Bathe (2001); students perceived their online courses in a more positive light than the face-to-face courses. They reported the following as advantages: increased access to materials, efficiency of the courses, and ability to participate openly without embarrassment.

Table 2. Online Students' Interactivity and Confidence

Category	Yes	No	Not sure	Total
Interactivity	42	14	4	60
Confidence	44	13	3	60

In regard to student effort, 50% of the students indicated that they had to put more effort in the online class, while 42% of them reported that they put less effort online in comparison to the traditional face-to-face class (see Table 3). Similarly, participants in Bathe (2001) and Dobbs et al. (2009) studies reported that online classes required more work and more time to complete assignments than face-to-face classes.

Table 3. Comparison of Students' Effort between Online and Face-to-face

Category	More	Less	same	Total
Effort	30	25	5	60

In regard to the effectiveness of the online modality, the majority of students (70%) indicated that it was effective, 42% indicated that it was helpful, while only 30% indicated that it was easy to use (see Table 4). Similar findings were reported by Dobbs et al. (2009); students in their study perceived traditional face-to-face courses to be easier than online courses.

Table 4. Effectiveness of the Online Format

Category	Yes	No	Not sure	Total
Easy	18	36	6	60
Effective	42	12	6	60
Helpful	25	26	9	60

In relation to students' preferences in terms of face-to-face (FTF), online (OL), or a hybrid mix between the two (Hybrid), the majority of the students (43%) preferred online, 37% preferred face-to-face and 20% preferred a hybrid mix between the two (see Table 5). Bathe (2001) reported that most students in his study had a positive experience with online courses

and were willing to enroll in future online classes. However, Brockman et al. (2020) found that most students preferred a blend of online and in-person hands-on laboratory activities.

Table 5. Students' Preferences: OL, FTF, Hybrid

Class Format	Number of Students
OL	26
FTF	22
Hybrid	12

The participants mentioned two main advantages (see Table 6) of the online format in comparison to the face-to-face format: flexibility (87%) and saving time (90%). Technical difficulties were the only disadvantage reported by the students (50%). The advantages listed by students in this study agree with the findings in other research studies.

Table 6. Online Learning Advantages and Disadvantages

Category	Yes	No
Technical problems	30	30
Saving time	54	5
Flexibility	52	6

For example, in Serhan's study (2010), 77% of the study participants listed learning flexibility (learning at any time and in any place) as a major advantage and reason for taking online classes. O'Lawrence (2006) reported similar results; students in the study reported that flexibility and self-tailored learning were the main benefits of online learning. This flexibility allowed students to save valuable time they would have spent commuting to and from school. It also allowed them to conveniently manage their study and work time. The disadvantage reported by students in this study agrees with the findings in many other studies where students found technical difficulties to be a main disadvantage to online learning (E.g., Bathe, 2001; O'Lawrence, 2006; Serhan, 2010).

## Conclusion

The results of this revealed that the participants had a positive experience learning online. The majority of students felt confident about the online format and they found the online format to be more interactive than the face-to-face one (Table 2). However, half of the participants reported that they had to put more effort after the shift to the online format (Table 3).

Although they had to put more effort, they perceived online learning to be flexible, useful and helpful to their learning. While students reported facing technical difficulties, they still perceived the online format as less time consuming which is similar is to the findings in other studies (Demuyakor, 2020). There was a very close difference between students' preferences for online vs face-to-face instruction (43% preferred online, 37% preferred FTF).

These findings are the opposite of the ones in the Abbasi et al. study (2020). In their study, most of the participants (77.4%) had negative perceptions towards e-learning and students preferred face-to-face instruction over e-learning. On the other hand, the findings of this study agree with the ones in the Agarwal and Kaushik (2020) study were the participants preferred online instruction.

With the ongoing pandemic, educators (administrators and faculty) are stepping up their plans to provide a high-quality education experience for all students. Students need a learning plan that is welcoming, creative, flexible and one that takes into account the daily hardships that many students and families might face due to COVID-19 in the coming school year. With all the possibilities out there, this will be an exciting yet challenging experience. There is a need for future studies that examine the effects of gender, age, *socioeconomic* status, and tech savviness on students' attitudes toward the transition from face-to-face to online learning.

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## CHAPTER 12: RETURNING TO CAMPUS DURING THE COVID-19 PANDEMIC: PERCEPTIONS OF CALCULUS STUDENTS IN FLORIDA

Barry J. Griffiths 

### Chapter Highlights

- This qualitative study looks at why some students at the University of Central Florida decided to choose face-to-face sections of calculus rather than online alternatives during the fall 2020 semester, at a time when the number of COVID-19 cases was still extremely high.
- It explores their motivations, their concern about the virus, and how the enforced experience of online instruction during the spring 2020 semester affected their decision.
- More general opinions of online instruction are provided by the participants, along with their predictions about how the pandemic will affect the modality of university instruction in the future.

## Introduction

By the end of August 2020, the number of positive cases of COVID-19 reported in the United States was approximately 6 million, with a death toll approaching 200,000. Both figures were considerably higher than in other countries, with Florida being one of the hardest hit states. As a result, universities in the state gave students several options regarding their mode of instruction during the fall 2020 semester, with a large majority choosing to stay off-campus and be taught online. However, face-to-face classes were offered, and this paper looks at the underlying motivations of undergraduate students selecting sections of multivariable calculus that were taught on-campus by the author at the University of Central Florida.

The COVID-19 pandemic has already given rise to a large number of studies looking at its effect on education, with many naturally focusing on the increased number of online classes and the associated challenges for students and teachers alike. Some have reported a successful transition, with Agarwal and Kaushik (2020) considering the perceptions of 77 medical students in India who received online instruction during the spring 2020 semester. They found it to be cheap and easily accessible, and that it boosted the morale of the students by taking their mind off the ongoing crisis. Similarly, Gonzalez et al. (2020) found that student confinement due to COVID-19 led to higher scores among undergraduates in Spain when compared with previous years, suggesting that the government lockdown caused them to study on a more continuous basis, which improved their efficiency.

At the same time, a growing number of studies have pointed out the drawbacks to online classes. Prior to the pandemic, the results of a large-scale study in 2018 by the Educause Center for Analysis and Research involving 40,000 students and 9500 faculty in the United States found that, among students, 70 percent said they preferred a face-to-face learning environment. The instructors surveyed agreed, with 73 percent preferring in-person instruction (Gierdowski, 2019). Despite this, approximately half of both students and faculty indicated some degree of preference for course delivery that combines aspects of in-person and online education. For example, many more student respondents expressed support for turning homework in digitally than for watching lectures online or having online conferences with their instructors. This indicates diminishing returns regarding the use of technology, as suggested by Griffiths (2015). Pitt (2020), writing in the student newspaper at the University of Alabama, described how “When I heard the news that students should not return to campus

and that they should complete their work online, my heart shattered. Tuscaloosa has become my home, and I wanted nothing more than to finish my freshman year the same way I started: in a big lecture hall with all my friends and that one professor we all love. When at home and not in a school setting, people tend to unwind and become lazy since they have the comfort of their own property. Online learning requires much more discipline and self-motivation to stay on task.”

More specific aspects of online classes were quickly investigated by researchers once the spread of COVID-19 became global. At the tertiary level, the sudden transition to digital classrooms brought issues of exam proctoring into focus, with widespread cheating reported (Bilen & Matros, 2020; Eaton, 2020) as universities struggled to implement effective proctoring in a short time period. At the primary and secondary level, Mailizar et al. (2020) found that online learning can be less effective, especially in poorer countries, due to students not having the access to technology or the experience of e-learning to successfully make the transition. In a study conducted in Indonesia by Bahasoan et al. (2020), 99 percent of the tertiary level participants mentioned facing obstacles with regard to network reception and data quotas. Adnan and Anwar (2020) discussed how online learning leads to an absence of traditional classroom socialization that are necessary for growth and learning.

This study is characterized by the fact that it puts student perceptions to the fore, rather than those of teacher and administrators. Hill and Fitzgerald (2020) published one of the first such papers, looking at the perspectives of two students in Ireland taking a one-year nursing course while the health crisis was ongoing. The students found the reduced engagement and disrupted learning a challenge but welcomed being able to work self-paced in a comfortable environment. Ng et al. (2020) asked Chinese students about their preferred modality after being forced to take calculus remotely during the pandemic. Of the 20 students who responded, 17 students preferred face-to-face classroom lessons compared to remote learning. Only one student preferred online lessons, while two students did not have a preference. The reasons given by those in the majority included better focus, less interruption by family members, less trouble caused by internet connectivity, and ease of communication when in the classroom. Cortez (2020) performed a larger study, with 342 high school students in the Philippines using a 5-point Likert scale to determine their thoughts on whether a virtual classroom using video conferencing applications is as effective as the usual classroom setting. While the Agree/Disagree ratio was 2:1, the Strongly Agree/Strongly Disagree ratio

was 1:2, suggesting that although some students like online learning to a small extent, many others dislike it to a large extent.

## Method

In order to gather the perceptions of undergraduate students who opted for face-to-face instruction, an open-ended online questionnaire was created (see Appendix A). Participants were asked about their motivations, their concern about the virus, and how their enforced experience of online instruction during the spring 2020 semester affected their decision. More general opinions of online instruction were asked of the participants, along with their predictions about how the pandemic will affect instructional modality in the future.

The web link to the survey was distributed via email in August 2020, one week before the semester began, to 145 students taking face-to-face sections of multivariable calculus at the University of Central Florida taught by the author, with initial demographic questions asking students for their major, gender and status as domestic or international student. 107 students completed the survey (a 74 percent response rate), with 75 male participants, 32 female participants, 103 domestic students and 4 from overseas. Most of the students who responded (86 percent) were majoring in engineering or computer science, with the others coming from physics, statistics, chemistry, and mathematics.

Upon completion of the data collection, a qualitative data analysis was conducted, which followed the guidelines suggested by Taylor-Powell and Renner (2003). Responses to the open-ended questions were fully transcribed and organized by the author around the predetermined categories of student motivation to study face-to-face, along with a more general category of student experiences and perceptions of online study. Emergent themes within these categories were identified, before the results were interpreted in a manner consistent with the phenomenological approach advocated by Åkerlind (2012), whereby the interviews were analyzed in an iterative manner, with repeated reading of the transcripts to find the underlying intentions expressed, along with the variations and commonalities between participants.

## Results

### *Motivations for Choosing On-Campus Instruction*

Several clear themes emerged when participants were asked to explain their motivation for choosing a face-to-face section of calculus rather than an online alternative. A belief that they are better able to learn the material in-person was the primary response, with the positive aspects of greater interaction, meeting classmates, and the ability to develop a relationship with the instructor also being stressed.

“I have always taken face-to-face math classes and find the opportunity to ask questions and meet classmates enriching and important to completing the class successfully.”

“I tend to learn much better in-person, and I like developing relationships with my professors, which is made more difficult by taking courses online. Also, because the class is in the morning, it forces me to get up and be productive instead of sleeping in and wasting the day.”

Participants also alluded to their negative perceptions of online classes, namely how they lead to a lack of motivation and focus, along with the distractions they face at home.

“There are too many distractions at home when doing an online class. I lose focus and concentration, which impedes my learning. In face-to-face classes I can be in an environment that is more interactive and where I am more focused.”

“Since the start COVID-19 pandemic, I have taken the second half of Calculus 1 and an entire summer semester of Calculus 2 online, and was not able to achieve the grades I wanted because working from home proved to be difficult. I constantly had distractions such as siblings to take care of and other household responsibilities. To avoid all the distractions that home life provides, I’d rather take Calculus 3 face-to-face to ensure a proper learning environment.”

Interestingly, many participants indicated that the nature of mathematics made them more inclined to take the class in-person rather than online.

“I feel that for a subject as intricate and complicated as calculus you just can’t get the various learning advantages offered with a face-to-face lecture from a virtual experience.”



“When it comes to learning mathematics, I have a very hard time learning it online. I like to ask questions and approach the professor for clarification.”

### *Concerns about the Coronavirus*

Participants were then asked to state how concerned they were about the coronavirus, despite having chosen face-to-face instruction. Here the results were mixed, with 41% of the students indicating a high level of concern, 27% indicating a moderate level of concern, and 32% indicating little or no concern about the virus, though some in the latter group expressed concern about the possibility of passing it on to family members. In all categories, the students expressed trust in the university to maintain appropriate safety measures.

“I am very concerned. I have been at home for as long as possible and minimizing contact with people as much as I can. Although this class is face-to-face, I have decided that my studies cannot be held back because of this and this is the best way for me to learn. I plan on maintaining my careful ways on-campus.”

“I am concerned about the coronavirus, although I trust that the university is taking the necessary precautions and steps to ensure that we are safe as we start face to face instruction. So long as everyone is wearing masks, staying a safe distance from each other, and the classes are sanitized, I feel good about coming to class.”

“I trust the university and the measures they are taking. I am more concerned about how many students will actually follow the rules. I do have a 70-year-old family member at home, so there is some concern.”

Several students alluded to the risk involved in coming back to campus but felt that it was worth taking to advance academically.

“I am very concerned about the coronavirus, but I am willing to take some risks to make sure that I receive a proper education. I will be taking precautions to ensure my own safety and that of my peers.”

“I am certainly cautious, but I believe that everyone should be able to make their own health decisions. I believe that, in this case, considering the class is only about an hour long each day, the risk is worth it.”

### *Perceptions of Online Classes*

Participants were asked whether their experience of online classes during the spring semester affected their decision to choose face-to-face instruction in the fall, given that all classes moved online after the mid-semester break. 66 percent responded by saying that it did, with the difficulties of working from home being cited, along with a lack of motivation and a feeling of being disconnected.

“There was a decline in interest and in participation with my classes once we moved online during the spring. I got through the classes but did not feel as though I did as well as I could have if I was still on-campus. I lost motivation once I started taking classes at home.”

“I started to fail my classes as soon as they went to remote instruction because I do not do well in an online setting. I knew that if I needed to take more classes, it would have to be in a physical setting for me to succeed.”

This was followed by a question asking participants for their general opinion of online classes. Here, the results were more varied, with 24% expressing a purely positive sentiment, 30% expressing a purely negative sentiment, and 46% expressing mixed sentiments, acknowledging that there are several factors involved. Those speaking favorably of online classes often mentioned the time saved by not having to travel to the campus.

“I find online classes helpful, as commuting to campus is not necessary which gives me more time to focus on my schoolwork. I think that it also allows students to feel more comfortable reaching out to their instructor, as there is less pressure from peers, and just an overall sense of comfort that comes with working from your own home or office.”

Other participants were of the opinion that while online classes could be good, they are not best suited to STEM subjects, and vary greatly depending on the quality of the instructor.

“Online classes can be done right or be done wrong. It depends on the effectiveness of the instructor and the resources provided. I have had plenty of experience in high school with online instruction and believe that I spent my time wisely. However, even a student who is great at time management and organization can be let down by a poor teacher.”

“Although some instructors try to mitigate how hard the transition to online classes can be, others do not. It is very difficult for STEM classes to be taught in an online format because essentially it becomes self-taught. Online classes are fine for simpler, introductory classes, but higher-level courses should not be taught online.”

Those against taking online classes spoke once more of the distractions they face off-campus, the reduced interaction with their instructor, and the greater discipline and time management skills required to succeed. Issues related to student evaluation and cheating were also mentioned.

“I am not a fan of online classes. A classroom environment allows for me to be more engaged and focused on the subject. Being in my room with more distractions is not helpful.”

“Online classes are not as effective as face to face classes. Professors are not able to properly evaluate a student online due to the lack of interaction, and a lot of students cheat when they take online exams.”

### *Predictions for the Future*

The final question asked participants whether they believe the current health crisis will have a long-term effect on how students take college classes. Many discussed how the proportion of online classes offered will change and the associated repercussions for both students and faculty.

“The way that students and professors have had to adapt how material is taught and learned will likely have a significant effect. This health crisis has shown that many of the options that were once deemed to be not possible are actually viable. For example, having most courses offered online and working from home.”

“When classes go back to being in-person, the teachers will likely be much more tech savvy due to this period of online classes and I think it will benefit the students. There are many creative and helpful online resources that teachers haven’t taken advantage of before this time.”

Others mentioned the residual effect that the pandemic will have on students taking classes in-person, particularly how issues of health, safety, and cleanliness will continue to be considered.

“I don’t believe that things will be the same as they were before COVID-19. Health and safety will continue to be a priority for both the students and the university. Everyone will have adapted to keeping themselves and others safe, so they will be more self-conscious and assess the risks involved in their daily activities.”

## Discussion

The COVID-19 pandemic has temporarily forced administrators in tertiary education to offer most of their classes using an online format. However, it was only two years ago that a survey of leaders at prominent universities by Times Higher Education found that they believed online education could not match the face-to-face experience of being on-campus (Matthews, 2018). At that time, Lino Guzzella, president of ETH Zurich, asserted that “meeting people, interacting with peers, students and supervisors – in short, a real university environment – is the key to deep understanding,” while an Australian vice-chancellor said that “face-to-face interaction will never be matched in quality by other modes of communication” – even if current “fads temporarily appear to be tilting the balance towards non-human interaction”.

This study indicates that many students continue to agree that in-person classes represent a better way of learning, and that this perception is heightened with regard to mathematics. While it could be viewed as surprising that so many participants singled out mathematics as a subject that is better suited to face-to-face learning, given that online modalities often allow the student to slowly absorb complex material by repeatedly watching the lectures, a study by Awofala et al. (2020) found that pre-tertiary children also believe that mathematics has characteristics that make it best taught in a traditional classroom setting.

A difficulty in maintaining focus and the lack of interaction with friends and faculty were cited as the primary drawbacks to taking classes online, which is in line with the findings of Serhan (2020), but it is worthy of note that the desire to return to campus has been shown to be markedly different for undergraduates, who are less inclined to learn independently, and postgraduate students, who are often engaged in research projects and self-study. Ebell et al. (2020) found statistically significant differences in the perception of risk and desire for online learning versus in-person learning between undergraduate and graduate students. Surveying 212 undergraduates and 228 graduate students in the state of Georgia, they found that

graduate students are significantly less likely to return to campus, more likely to perceive themselves as high risk, and were more likely to prefer all classwork to be presented online.

The concern of the participants regarding the coronavirus was very noticeable when reading through the responses, and not surprising given that they were about to return to campus while the state and national rates of infection were still very high. Sullivan et al. (2020) note that “All classrooms have students who are more anxious than others, and while the time closeted with the family might have moderated the anxiety, it is likely to re-emerge once students return to school.” However, Oerther and Peters (2020) caution that those taking classes online share the same fears, and that instructors of online courses should also take into account the anxieties of the students caused by the pandemic, adding in a manner echoed by several of the participants that being socially isolated at a family home does not replicate student life regardless of how the course material is received.

It was clear from the responses that many students have a negative opinion of online classes based on their experiences during the spring 2020 semester, when they abruptly switched modalities due to the onset of COVID-19. That being said, Hodges et al. (2020) caution that it would be incorrect to equate the emergency remote teaching required by the COVID-19 situation and well-planned online learning experiences. Many students in this study seem to acknowledge this by stating that the success of online courses can vary dramatically from course to course and from instructor to instructor.

Finally, looking to the future, participants believed that even after the pandemic is no longer an issue, online classes will continue to be offered in far greater numbers than before, and that instructors will eventually become more proficient with their delivery as a result. This will require a commitment to training on the part of institutions, with Jones and Sharma (2020) cautioning that “Teachers who are very good at capturing the attention and engagement of students in the physical classroom will not suddenly transform into similarly great online instructors.”

## Conclusion

While some face-to-face classes offered during the fall 2020 semester were forced to move online due to outbreaks of COVID-19 (as happened after one week at the University of North

Carolina and the University of Notre Dame), this study nonetheless gives insight into why students want to get back to on-campus instruction, their concerns about the virus, and their thoughts about online education, including their own experiences and their predictions for the future. The results indicate that a significant proportion of undergraduate students still believe that on-campus instruction offers the highest level of education, and that this is especially true in mathematics. It would be false to suggest that students returning to campus are either unaware or underestimating the severity of the virus by choosing the face-to-face option, and have instead made a balanced decision that takes into account their personal situation and their educational preferences. Many of the participants believe that they were adversely affected by the sudden transition to online classes during the spring 2020 semester, and this played a part in their choosing to avoid them in the fall. However, the students appear to be more positive about the role that online classes will play in the future, as faculty adapt and improve the delivery. Further study can be done to assess differences in student perception based on demographics and academic subject, along with similar studies that consider the perceptions of faculty. Follow-up investigations could then be done at the end of the semester to assess whether, with the benefit of hindsight, students and faculty believe that they made the correct decision in returning to campus.

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## Appendix A. Survey Questionnaire

The participants were asked to answer the following questions.

1. Please specify whether you are male or female.
2. Please specify whether you are a domestic or international student.
3. Please specify your major.
4. Please describe (in as much detail as you can) why you selected a face-to-face section of multivariable calculus this semester rather than an online section.
5. Despite having chosen a face-to-face section, how concerned are you about coronavirus?
6. Did the experience of taking online classes during the last six weeks of the spring 2020 semester affect your decision to select a face-to-face section?
7. What is your general opinion of online classes?
8. Do you believe the current health crisis will have a long-term effect on how students take college classes?

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The collection of chapters in this special book examines educational practices during the COVID-19 viral outbreak. This special book brings together a variety of studies and scholars in an effort to exemplify how the COVID-19 shapes the learning and teaching processes in different countries. The twelve chapters selected for this special book present diverse vantage points on the circumstances that influence students, teachers, parents, and schools. The focus of this book is on education, but in the context of broader global effects. Education processes, practices, and outcomes in the time of COVID-19 do not occur in a vacuum. Disruptions to the normal processes and practices of education associated with the novel coronavirus are directly tied, among other considerations, to the societal risk of having students congregating in close quarters, the economic problems encountered by their families, difficulties of food availability, and loss of family cohesion due to death, illness, and lack of proximity and diminished support structures due to social distancing. Any return to "normal" education opportunities and the hope for improving (or at least sustaining) positive student outcomes likely will be impossible without a vaccine that is available worldwide at low or no cost, together with effective repair of the global economy, and the ability of students and adults to engage in larger-group activities. Until that situation becomes reality, many children will be unable to learn effectively and will not be equipped to realize their potential. In summary, the twelve chapters cover the topic of educational practices during the COVID-19 viral outbreak. The chapters are authored by scholars from 10 different countries: the United States, Turkey, the United Kingdom, Spain, Bhutan, Indonesia, Morocco, India, Oman, and the United Arab Emirates. The chapters provide readers with a wide range of international perspectives on educational practices during the COVID-19 pandemic. The reported studies involve research findings from students, teachers, parents, and school administrators at different levels of students' education experience.

