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International Research Exposure: Impact on Early-Career, Undergraduate Engineering Students

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Abstract: The Texas A&M University (TAMU) Louis Stokes Alliance for Minority Participation (TAMUS LSAMP) office provided funding to the Texas A&M University College of Engineering to support student participation in the Engineering Learning Community Introduction to Research (ELCIR) program. ELCIR is a two-week, study abroad, research program implemented in a learning community pattern. ELCIR has three purposes: (1) to expose sophomores to research, (2) to introduce students to cultural differences and global challenges, and (3) to provide students with the basic tools to prepare them for future research involvement. Participation is limited to first-generation college students and/or students from underrepresented populations. The external evaluator for the TAMU System LSAMP developed a survey for students to complete following their participation in the ELCIR international experience. Survey questions were designed to identify the impact of participation in ELCIR on students and gather participant suggestions for improvement of future LSAMP-supported international research experiences. The evaluator compiled information gathered from 91 LSAMP-supported participants during five years of ELCIR programming. This paper describes the participants' self-reports of experience with and continued interest in study abroad programming, interest in another similar experience, subsequent involvement with undergraduate research, and ELCIR's impact on their confidence regarding international travel, their awareness of, interest in, and plans regarding graduate school, their education and career plans, and interest in employment outside the United States. Increases in confidence regarding international travel and increases in interest in study abroad programming, in continued involvement with research, awareness and interest in graduate school, and willingness to consider employment outside the United States were found. Less than half of participants felt their ELCIR experience impacted their career plans and programming did not appear to have a pronounced immediate impact on student involvement with undergraduate research. The respondents reported concern about their ability to afford graduate study but that they felt their families would be supportive of plans to attend graduate school. No significant differences were found by gender, ethnicity, or race for any of the queries. These findings can inform engineering education programming for first-generation and minority students, an area of national need, at institutions across the United States.

Keywords: engineering, first-generation students, underrepresented minorities, study abroad, STEM

Introduction

The Texas A&M University System (TAMUS) received funding in fiscal year 2013 from the National Science Foundation (NSF) for the continuation of a Louis Stokes Alliance for Minority Participation (LSAMP) project entitled "Sustaining the Progress." The institutions participating in TAMUS LSAMP during the period under

consideration were Texas A&M University, Prairie View A&M University, and Texas A&M University – Corpus Christi. As part of LSAMP activities, the Texas A&M University project office provided funding to the Texas A&M University (TAMU) College of Engineering (COE) to support student participation in the Engineering Learning Community Introduction to Research (ELCIR) program. ELCIR is a two-week, study-abroad research program implemented in a learning community pattern. Ten days of international instruction are completed at the Anahuac Mayab University in Merida, Yucatan; a university that has a partnership with the TAMU COE and the Texas A&M Engineering Experiment Station. ELCIR has three purposes: (1) to expose students to research early in their academic careers, (2) to introduce students to cultural differences and global challenges, and (3) to provide students with the basic tools to prepare them for future research opportunities within TAMU's College of Engineering research internship programs, especially study abroad internships. Participation is limited to first generation college students and/or students from underrepresented populations who are associated with the Access and Inclusion program in the College of Engineering. There have been 150 students, or more, who fit these qualifications in each year of the project.

The ELCIR Program engages students at the beginning of their engineering education in four sets of experiences: (1) a hands-on research class, allowing students to identify their own research problem with the support of faculty and researchers, (2) international travel and two-week residence outside the United States, (3) engagement with highly experienced researchers and well-known research centers, and (4) a poster presentation of their research proposal results to peers, faculty, and administrators. This combination includes six high impact practices: common intellectual pursuits, a learning community, collaborative assignments, undergraduate research, plus global and community-based learning (Association of American Colleges and Universities, n.d.). Another high impact category applies for many participants, a first-year experience, as the majority of ELCIR programming occurs across the spring and summer semesters of their freshman year culminating in the fall of their sophomore year.

The intention of ELCIR is "for underrepresented first generation ethnic minority students to be engaged in a research course" (Garcia et al., 2017, p.2). Participant selection is based on the student's status as an underrepresented minority and/or as a first-generation college student, his/her grade point average and resume, and a response to a question about what s/he expects to gain from participating in the project. A letter of recommendation from a faculty member is also requested and considered as part of the participant application. In its first year (2015), ELCIR received applications from 55 students and was able to accept 17 as participants. In the second year (2016), 70 students applied for 30 slots. In 2017, the third year of the undertaking, 44 students applied and 25 were accepted followed by 80 applicants with 66 accepted in 2018 and 60 applicants with 36 accepted for 2019. The average acceptance rate was 56.3%.

The ELCIR program did not include course credit in 2015. However, a one-credit course, ENGR 291 – Engineering Learning Community Introduction to Research, was added in 2016 in response to a suggestion from the TAMU Dean of the COE. Inclusion of course credit has been maintained since that time. The initial course consisted of workshops regarding research, global competency, and travel preparation that were conducted with the ELCIR cohort in the spring of their freshman year. It has since been expanded to include more specificity in some areas and to accommodate several additional topics. These include "introduction of the ELCIR Program purpose and goals, introduction to research topics, introduction to LSAMP/NSF sponsored responsibilities, research and research abroad expectations, [a] seminar on cultural competency, expectations [regarding] living with host families, [and] traveling/departure official documents" (Garcia et al., 2017, p. 3).

The two-week international experience is a trip to Merida, Mexico where participants attend an introduction to research seminar (two hours per day), make visits to research sites and participate in research expeditions, receive hands-on experience in research labs, conduct their own research, visit cultural sites, and participate in cultural learning activities. The research course in the summer experience has been taught by "Dr. Medina-Cetina and the vice president for research of Universidad Marista" (Garcia et al., 2017, p. 4). Zenon Medina-Cetina is an Associate Professor of Civil Engineering at TAMU. Participants can select from a group of topic areas in which to conduct research. These are "energy, coastal dynamics, logistics, aquifers and early warning system[s]" (Garcia et al., 2017, p. 2) which were chosen because faculty from TAMU collaborate with researchers in Yucatan in these areas.

Upon return to the United States, participants complete research reports and create research posters based on their investigations in Merida, Mexico. An online community is maintained as part of the project and used as a

resource for exchanging materials, offering guidance, and then providing critiques when students are developing their research papers and presentations. Research posters are presented at TAMU COE in September each year.

The West Texas Office of Evaluation and Research (WTER), the TAMUS LSAMP external evaluators, developed a survey for LSAMP-funded students to complete after their participation in the ELCIR international experience. Survey questions were designed to identify the impact participation in the research experience had on students and to gather participant suggestions for improvement of future LSAMP-supported international research experiences. Following five years of ELCIR programming, WTER compiled information gathered from the participants. This paper describes participant self-reports of interest in similar experiences, the impact of ELCIR on personal confidence, and regarding educational and career plans. These finding come from survey responses gathered from the 91 of 115 participants in five distinct cohorts (79.1% response rate).

Pertinent Literature

First-Generation Students

The ELCIR project exists to prepare underrepresented minority and/or first-generation college students for international research experience during their first year in college and to facilitate that experience in the summer between students' freshman and sophomore years. As such, literature regarding the characteristics of and best practices for first-generation students is reviewed here.

In 2000, Thayer wrote "The dimensions of under-representation of students from low income, first generation, and ethnically diverse backgrounds in colleges and universities are still enormous" (p. 3). Unfortunately, this remains the case as "low-income and first-generation students are still less likely to go to college than their more privileged peers" (Engle & Tinto, 2008, p. 5). While the enrollment rate for these students doubled in the 30 years between 1975 and 2005, it still lags behind college-going high-income students (54% compared to 81%) (Engle & Tinto). And first-generation students who reach college do not fare as well as their peers. A US Department of Education study in 1988 found "first generation students persisted and attained credentials at lower rates in both four-year institutions and two-year public institutions" (Thayer, 2000, p. 5). This was also reported by Ishitani in 2006 and again by Pratt, Harwood, Cavazos, and Ditzfeld in 2017. Even when controlled for mitigating factors, first-generation status "still had a negative effect on educational attainment" (Thayer, p.5) at every type of institution of higher education. First-generation students obtain bachelor's degrees in six years at rates lower than students with at least one parent who attended college (Engle and Tinto, 2008). When considered as an aggregate of all institutions, the graduation rates are 11% for students who are both first-generation and from low-income families, 26% for students who are either first-generation or low-income, and 55% for their peers who do not have these characteristics.

First-generation college students have been and remain less likely to be academically prepared for college (Thayer, 2000; Atherton, 2014; Mangan, 2017) and more likely to discontinue study in college (Choy, 2001; Engle and Tinto, 2008), often in their first year (Choy, 2001; Ishitani, 2006; Pratt, Harwood, Cavazos & Ditzfeld, 2017). They are more likely to be from low-income households, to be racial minorities (Lee, at al., 2007; Atherton, 2014; Zinshsteyn, 2016), and to attend college part time (Hsiao, 1992; Choy, 2001; Tym et al., 2004). First-generation students are also less likely to participate in on-campus social groups and academic support programming (Tym et al., 2004; Choitz & Reimherr, 2013; Pratt, Harwood, Cavazos & Ditzfeld, 2017) and more likely to work while in school (Lang, 2015; Mangan, 2017; Sanacore and Palumbo, 2015).

The families of these students may question the need to attend college (Thayer, 2000; Tym et al., 2004) and are unable to provide guidance regarding college-going processes or advice about academic and practical concerns in the college environment (Swecker et al., 2013; Mangan, 2017). "Although families may offer encouragement and financial support, their inability to understandably relate to the college experience creates a unique and difficult situation for some students" (Longwell-Grice et al., 2016, p. 41). This is manifested as limited cultural and social capital (Tym, et al., 2004; Atherton, 2014; Lang, 2015) and can result in a sense of discomfort, isolation, or feeling that one does not belong in college (Atherton, 2014; Longwell-Grice et al., 2016). As reported by Longwell-Grice, students experienced "a type of cultural dislocation and referred to feeling lost and at times marginalized… 'I feel like there's [sic] unwritten rules of a culture and it takes a while to really adapt to them, and I feel like even now I haven't really caught all of 'em'" (2016, p. 37). A program director at Boston

University who was a first-generation undergraduate and graduate student stated for an interview in the Chronicle of Higher Education:

> I think I'll always feel like a first-generation student, even though I've now been part of academia for over a decade. There are still components that seem very new to me or that I don't understand. I don't know if it ever leaves you, the feeling that the system wasn't necessarily set up for you (Zamudio-Suarez, 2016, p. 13).

This can be exacerbated by well-intentioned faculty and staff whose communication can include unintended biases (Lee, 2016), who assume students understand the culture of higher education (Lee, 2016), that students' values align with the expectations of the system (Johnson, 2016). It is, in fact, possible for "first-generation students [to] get the message that they are not only less typical members of their college communities, but also less legitimate ones" (Lee, 2016, p. 30).

Researchers and student service professionals have sought means to address these circumstances. As noted by Thayer, "While it may be possible to improve retention rates by attending only to the selection process or only to the learning environment, the greatest gains will result from addressing both at once, and connecting the two processes together" (2000, p. 4). This will require, as Doubleday stated, institutionalization of "a commitment to first-generation students" (2013, p. 20) in the form of a truly nurturing environment (Sanacore and Palumbo, 2015). As two administrators said separately to Zinshsteyn (2016) and Mangan (2017), the concern should be whether "the university [is] ready for the student" (p. 4 and p. 7, respectively). The following practices are advocated as reflecting this orientation and being efficacious in respect to first-generation students.

1. Establishing a means of purposefully identifying, recruiting, and tracking first-generation students (Doubleday, 2013).
2. Proactive use of information to assist students (Zinshsteyn, 2016; Sanacore & Palumbo, 2015).
3. Bringing first-generation students to campus early for introductions, orientation, and support programming (Gullatt & Jan, 2003; Doubleday, 2013).
4. Creating a first-year student program for first-generation students (Tym et al., 2004).
5. Focusing on the "distinctive features of first-generation students" (Doubleday, 2013, p 20) in order to "use the backgrounds of incoming students to support their [development of] 'cultural capital'" (Sanacore & Palumbo, 2015, p. 26) necessary to navigate higher education.
6. Nurturing first-generation students "through a consistent and cohesive support system" (Sanacore & Palumbo, 2015, p. 26) that includes "a variety of programs that meet students' continuing needs" (Doubleday, 2013, p. 20).
7. Working through a system of relationships…
   a. …in and through careful monitoring of students and proactive advising (Swecker et al., 2013; Zinshsteyn, 2016; Sanacore & Palumbo, 2015).
   b. …through mentoring (Doubleday, 2013), internships, and other forms of interaction with faculty (Longwell-Grice et al., 2016).
   c. …through peer group cohorts or networks (Tym et al., 2004; Longwell-Grice et al., 2016) including learning communities (Engle and Tinto, 2008).
8. Focusing on building community and promoting engagement while maintaining fun (Doubleday, 2013).
9. Providing practical assistance by…
   d. …guiding "students to register for courses that reflect a balance of their abilities" (Sanacore & Palumbo, 2015, p. 26) and that are "rigorous…with clear goals [and that] that offer students readily accessible and adequate support" (Sanacore & Palumbo, 2015, p. 26).
   e. …emphasizing "to students how crucial it is to attend class" (Sanacore & Palumbo, 2015, p. 26).
   f. …organizing panel presentations such as "juniors and seniors from different backgrounds to discuss how they adapted to college life… [and] pursued resources and people to help guide them in decisions" (Sanacore & Palumbo, 2015, p. 26).
   g. …supporting writing skill development through modeling, one-on-one or small group practice and feedback, and commenting on drafts of students' written assignments prior to submission (Sanacore & Palumbo, 2015).
10. …working to "acknowledge, and ease when possible, financial pressures" (Doubleday, 2013, p. 20).
11. "Keeping track of your success and failures" (Doubleday, 2013, p. 20) and seeking to learn from them.

12. Involving the families of first-generation students but doing so with realistic expectations (Doubleday, 2013).

International Experiences for Undergraduates Studying Engineering

"A study conducted by three researchers with the Center for International Business Education and Research found that almost 40% of U.S. companies surveyed missed international business opportunities because of a lack of internationally competent personnel" (Garcia et al., 2017, p. 1). Conversely, Fortune 500 companies and the Carnegie Foundation, have stated that engineers of the 21st century will spend appreciable portions of their careers in environments rich with global connections (Borri et al., 2007). This is the case as "95% of consumers live outside of the United States" (Daniel et al., 2014 as cited by Garcia et al., 2017, p.1). To function in such a setting, engineers need to have a global mindset and be prepared for the global job market (Chan & Fishbein, 2009). In light of these facts, "engineering colleges must develop strategies that provide global perspectives and international experiences to help their students prepare for the current engineering work place and responsibilities" (Borri et al., 2007). "Research abroad, internship abroad, and study abroad, are some of the ways universities have found to provide a global perspective to students" (Garcia et al., 2017, p.1). However, there is very little extant literature regarding study abroad programs for first-generation and minority students (Chang, 2017). In preparation for this discussion, no articles were found about study abroad programming with first-generation and minority students that had a focus on engineering other than Garcia, Alves, Pariyothorn, Myint, and Hardman (2017) which also discusses the TAMU ELCIR program.

Undergraduate Research in Engineering while Studying Abroad

Undergraduate research (UR) is broadly accepted as an advantageous means of educating students in science, technology, engineering, and mathematics (STEM) including students from underrepresented groups (Hernandez et al., 2013; Carpi et al., 2017). It is supported as a modality in federal grants funded by the US Department of Education, the National Science Foundation, and the United States Department of Agriculture and is increasingly common in the field of Engineering (Berger & Bailey, 2013).

Authors like Coker and Porter (2016) have considered study abroad as one of a set of experiential education options at American universities. Others, like Chang (2017), have considered impacts of study abroad experiences for specific subsets of American university students. Yet, a limited number of publications exist describing study abroad programming based in research experiences specific to engineering students.

Parkinson (2007) completed a review of the types of study abroad programs available to engineering students and generated categorical labels. He found eight varieties and his label for the pattern practiced in ELCIR is research abroad. A small count of articles exists describing "research abroad" initiatives for engineering students. For example, Dibiasio and Mello (2004) report on outcomes for students in a program at the Worcester Polytechnic Institute. They describe a variety of outcomes, including those relevant to accreditation, and found that post-participation the students "satisfy our important educational objectives at higher performance levels than non-participants" (p. 250). Olson and Lalley (2012) describe a "short-term study abroad program for business and engineering students at the end of their freshman year" (p. 325), a pattern similar to ELCIR. The authors report on participant continuation with study abroad and language study and former participants' interaction with international students and activities. Yet, neither focuses on minority or first-generation college students. Only Garcia, Alves, Pariyothorn, Myint, and Hardman (2017), which also discusses the TAMU ELCIR program, isolates information specific to minority and first-generation engineering students engaged in completing research in a sort-term international experience. Thus, very little is known about the impact of international research experiences on minority and first-generation college students who are study engineering.

Literature Describing the ELCIR Project

Analysis of ELCIR outcomes has been published by Garcia, Alves, Pariyothorn, Myint, and Hardman (2017) with the American Society for Engineering Education. They conducted a mixed methods investigation using pre- and post-participation surveys with the 2015 and 2016 ELCIR cohorts. They showed ELCIR participation yielded "positive results related to students' retention…desire to do research and/or pursue further higher

education, and global competency development" (p. 4). They "also observed an improvement [in]…GPA and retention" (p. 4). These outcomes parallel some of the measures taken in the ELCIR project evaluation survey but do not cover all the concepts students addressed in the post-participation survey upon which this article's material is based. Garcia, Alves, Pariyothorn, Myint, and Hardman's (2017) data is also limited to two cohorts while this article addresses data from five annual cohorts.

The information presented herein will address a gap in the literature. There is limited extant information related to study abroad by minority and first-generation engineering students. None found by the authors, with the exception of Garcia, Alves, Pariyothorn, Myint, and Hardman (2017) which also considers ELCIR, includes students in these categories conducting undergraduate research in an international setting. Thus, this discussion of five years of material from the TAMU ELCIR project supplies material new to the literature regarding study abroad experiences and provides the basis for further investigation of the impacts international research experiences have on specific subsets of undergraduate engineering students.

Research Focus and Questions

The survey administered included questions about the impact the study abroad and research program had on participants' interest in similar experiences, on their personal confidence, and regarding their educational and career plans. The research questions investigated were: Does participation in a two-week, study abroad program which focuses on improving understanding of engineering research while providing research and cultural experiences impact:
1. Participant interest in other international experiences?
2. Confidence about international travel?
3. Interest in graduate school?
4. Career choice?

And, is there a difference in impact based on gender, ethnicity, or race?

Method

The ELCIR experience involves, as described above, preparatory workshops in the spring, a two-week study abroad program, an online learning community following the study abroad experience, and summary of research results including an individual poster presentation. Near the end of fall semester, the project team asks each of the participants from the previous summer's cohort to complete an IRB-approved survey. The post-participation survey had 18 closed-ended questions that employed five-point Likert scales and four open-ended, short answer questions. There are also four demographic questions: year in school, gender, ethnicity, and race. Four of the closed-ended questions, two sets of two questions, were retrospective pre- and post-participation queries in which the students relayed recollection of their understanding prior to participation and their assessment of their post-participation understanding. These retrospective question sets were used to gather information about student awareness of and interest in graduate school. The 2015 survey was administered online using the Qualtrics platform. The surveys were administered in physical form in 2016 through 2019, to increase response rate, and then mailed to WTER for data analysis and reporting. One hundred and fifteen students participated in ELCIR during the four years under consideration. Of these, 91 completed anonymous post-participation surveys, a 79.1% response rate. This is within the 95% confidence level at a 5% margin of error.

WTER utilized descriptive and inferential statistics with the quantitative data and open and axial coding (Kolb, 2012) with the qualitative data to analyze the survey responses. No pre-participation data was gathered making comparison with pre-participation understanding and perspective impossible for all but two queries. Only the two retrospective queries facilitated pre- and post-participation comparison. A control group was not defined therefore comparisons to non-participants could not be made.

The material that follows describes responses from the post-participation survey completed by five different sets of participants following ELCIR participation in the summers of 2015 to 2019. None of the students repeated the experience resulting in 91 unique individuals completing the survey in the five-year period.

Description of Respondents

Demographics

All the students had an interest in engineering and had been recruited from the TAMU College of Engineering Regents' Scholars program for first-generation college students. While envisioned as a program for students transitioning from freshman to sophomore year, there were several older students in the respondent pool. Of the 91 respondents, 80 classified themselves as sophomores (87.9%), one was a freshman (1.1%), eight were juniors (8.8%), and one was a senior (1.1%). One additional participant did not provide an answer to this question on the survey (1.1%). Most of the older students, six of the nine, participated in 2019 (five juniors and one senior). The remainders were three juniors, two in 2018 and one in 2015. Since ELCIR recruiting, orientation, and initial programming takes place in the spring of the academic year, the international experience occurs in the summer, and the summarizing programming occurs in the fall, the survey respondents who were freshman and sophomores, 89.0% of the total group, would have freshmen upon entry into the program.

There were 44 females 45 males, almost an exact 50/50 split between females and males, and two persons who did not specify a gender in the sample (Table 1). This represents a slight shift toward females when compared to the overall cohort. The ethnic identity of the survey respondents was similar to that of the overall cohort, the majority of the respondents (89.0%) identified as Hispanic, which shows there was a slight oversampling of non-Hispanics.

Table 1. Comparison of Cohort and Sample Demographics

Characteristic	Cohort		Sample		
	Female	**Male**	**Female**	**Male**	**No Answer**
Gender	50	65	44	45	2
	Hispanic	**Non-Hispanic**	**Hispanic**	**Non-Hispanic**	**No Answer**
Ethnicity	107	8	82	8	1
	African-American	**Asian**	**Hawaiian/ Pacific Isl.**	**Native Amer./ Alaska Native**	**White**
Race (distribution in cohort)*	5	1	1	17	83
Race (distribution in sample)**	7	-	-	6	69

* Twelve students did not respond to this question. ** There were also seven responses of Other, four individuals who did not respond, two students who selected two races, and one who wrote in "Mexican."

The distribution across races was similar but with a slight variation between the entire cohort and the sample for African Americans and a moderate variation for Native American/Alaska Native. The majority of the cohort and the survey respondents were Hispanic, 93.0% and 89.0%, and identified as White, 77.6% and 77.5% respectively. Overall, the sample parallels the cohort with limited variation which was most pronounced in proportion of females to males, 5% more females in the sample, and in respect to underrepresentation of persons identifying as Native Americans/Alaska Natives.

International Travel Experience and Prior Study Abroad Experience

Students were asked to respond to a set of prompts about their international travel and study abroad experience. Forty-one had no prior experience with international travel. Forty-seven had traveled internationally. Three noted prior study abroad experience. They were two sophomores and a junior who were all female Hispanics who identified as White. This was a small enough group and there was sufficient variation in the responses from them to other queries to prevent bias in the survey findings resulting from prior experience in study abroad programming.

Results

Propensity to Engage in Undergraduate Research

Participants were asked in two ways whether the ELCIR experience encouraged an interest in continuing involvement with research. One question asked about interest in another international research experience and the second about the impact the ELCIR experience had on interest in continued involvement with research. Responses to both questions were positive. In respect to another experience like ELCIR, 87 of the 91 respondents either agreed or strongly agreed. There was one student, a female junior whose ethnic identity was Hispanic and racial identity was White, who submitted a response of Strongly Disagree. However, this was an outlier value as no other student submitted a response lower than Neither Agree or Disagree and all the other upper level students submitted responses of Strongly Agree. There were no significant differences, in fact there was little difference at all between responses when disaggregated and compared by gender, ethnicity, and race.

Table 2. Interest in Another Study Abroad Opportunity and Continuing Research Involvement*

Survey Statement	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
I would like to participate in another international research experience like this one supported by LSAMP.	1	0	3	20	66
My LSAMP international research experience made me want to continue my involvement in research.	1	1	11	40	37

* Responses do not total 91 as one student did not answer these survey questions.

This response pattern was supported by the qualitative comments gathered from participants many of which noted appreciation for the experience, change of perspective, and hope that ELCIR will persist so that others might have the opportunity to participate. Students felt that ELCIR participation "enhanced…global competence, and it allowed me to see things as a bigger picture." This was accomplished by "expanding…cultural awareness," encountering "perspectives from different people with different experiences," learning about self ("I learned a lot about myself and my ability to adapt to an unfamiliar environment"), forming new understandings like a "culture of sustainable thinking….Always practicing 'green'" or "understanding of how the US and Mexico are connected and interdependent," facilitating ethnic and cultural connections ("connect with the roots of my ethnicity;" "where my parents are from;" "learned about Mexican culture"), and learning regarding the field of engineering ("how engineers work towards solving issues of ocean erosion in relation to Mexico and issues faced elsewhere around the world;" "learn more about what is going on in other parts of the world in regards to both culture and academics;" "even in developing countries there are great strides toward making discoveries and useful applications with a means of research"). As one of the purposes of the ELCIR project is to prepare students for research internships, especially in international settings, these are very positive outcomes.

The impact on interest in continuing with research is strong and positive but with Agree as the median score rather than Strongly Agree and two students submitting negative responses (Table 2). The answer of Strongly Disagree came from the same student who strongly disagreed with desiring another similar experience. Like with the preceding question, there were no statistically significant differences between groups when the responses were disaggregated by gender, ethnicity, and race although the responses were less favorable and included some disagreement.

The final question regarding propensity to engage in research asked whether the student had participated in another undergraduate research (UR) undertaking in the time between their summer experience and the administration of the survey in the late fall. The n for this query was 81 persons as it was not asked in 2015. Sixty-six of the respondents had not become involved in another UR project while 15 of them did including the young woman who strongly disagreed with interest in another international research experience and that ELCIR impacted her interest in continuing with research endeavors. Apparently, she had a less than positive experience in the Yucatan but even that did not dampen her interest in research. It should also be noted that ELCIR programming extends into the fall, a factor that has the potential to dampen interest in another UR undertaking. ELCIR participants have project summaries to prepare at the beginning of the fall semester and are mentored in

research poster preparation. This culminates in a poster presentation by each student on the campus of TAMU during the fall semester. The continuing involvement with ELCIR could dampen immediate interest in a second commitment to UR in the fall.

Participant testimony, which was consistent across gender, ethnicity, and race, was that ELCIR elicits interest in another similar experience, impacts, but at a slightly lower level, desire to have a continuing involvement with research, and did not appear to have a pronounced immediate impact on student involvement with undergraduate research. The final statement must, however, be taken in context. The students had a continuing commitment to ELCIR activity in the fall. Fifteen of 81 respondents indicated they did add a UR commitment in that time period. That is 18.5% of the respondents which is only slightly lower than the average for the entire engineering student pool at TAMU. Approximately 25% of TAMU engineering students participate in UR prior to graduation (Garcia et al., 2017). No source indicating when the majority of them initiate this process was available but having 18.5% begin in the fall of their sophomore year while completing summer research programming is a strong response when the overall average is 25% during a four-year degree program.

Confidence in Travel Abroad

ELCIR participation appears to increase participant confidence regarding travel outside the United States. Eighty-seven of 90 students who responded selected Agree or Strongly Agree when asked whether their ELCIR experience had increased their confidence in traveling abroad. Two students selected Neither Agree or Disagree and one did not reply to this question (Table 3). With such a large percentage of the respondents providing a positive response, there were no significant differences found when responses were disaggregated by gender, ethnicity, or race.

Table 3. Impact on Confidence in International Travel*

Survey Statement	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
The LSAMP international research experience increased my confidence in my ability to travel abroad.	1	0	2	20	67

* Responses do not total 91 as one student did not answer this survey question.

The one student who submitted the response Strongly Disagree was the same person who submitted that response in respect to interest in another international experience like ELCIR and whether participation in ELCIR had impacted her interest in continuing to have an involvement with research. This pattern and the divergence of these responses from those of the rest of the cohort confirms that the individual's experience during the program and therefore, her perspective, was an outlier.

Graduate School

The evaluation survey asked about student awareness of and interest in graduate school, their plans for graduate school, their perspective regarding the affordability of graduate school, and the likelihood that their family would be supportive should they decide to attend graduate school. A related question was the highest degree a student intended to obtain.

Awareness of, Interest in and Plans to Attend Graduate School

Of the survey questions concerning graduate school, two were retrospective queries which asked students to compare their present perspective with what had been their perspective prior to participating in the ELCIR programming. The first of the retrospective questions asked about awareness of graduate school and the second about interest in attending graduate school. Responses were solicited on a customized five-point scale. The possible responses were, listed from lowest to highest, "Never heard anything about graduate school," "Only had a little information about graduate School," "Had some basic knowledge about graduate school," "Had

some understanding of graduate school," and "Had a good understanding of graduate school." Only four years of data is available for this question as it was added to the survey in 2016.

The response pattern for the awareness of graduate school prior to program participation was an almost perfect bell curve with 36 responses at the midpoint, "Had some basic knowledge about…," and a nearly evenly balanced response pattern around it (Table 4). There were 19 and 16 responses each for "Only had a little information about…" and "Had some understanding of…," four responses of "Never heard anything about…," and six for "Had good understanding of…." The responses skewed strongly in a positive direction following ELCIR programming with the median value moving up one category, 80.2% of responses occurring in the top two categories, no responses in the lowest category ("Never heard anything about…"), and only one response of "Only had a little information about…."

Table 4. Students' Awareness of Graduate School Before and After Participation in LSAMP-Supported International Research Experience

	Never heard anything about grad school	Only had a little information about grad school	Had some basic knowledge about grad school	Had some understanding of grad school	Had good understanding of grad school
Before their LSAMP international research experience*	4	19	36	16	6
After my LSAMP international research experience*	0	1	15	34	31

* n = 81 as this question was not asked in 2015.

A query regarding interest in graduate school, also added in 2016, demonstrated a pattern similar to awareness of graduate school. Answers skewed positive toward interest in graduate school post-ELCIR (Table 5). Prior to ELCIR participation, three students had "Never heard anything about graduate school" while 29 were "Not at all interested in graduate school." The remainder of the students, 49 in total, were split 30 "A little interested," 12 "Interested," and seven "Very interested in graduate school." Following the international research experience, all students had heard about graduate school and only six were "Not at all interested…" in graduate school, a reduction by 28.4 percentage points. The remaining 75 were "A little interested" (n=22), "Interested" (n=29), or "Very interested" (n=24) which represent increases of 125% for interested and nearly 250% for very interested. The customized scale and specifically the unknown value difference between "Never heard anything about…" and "Not at all interested…" made conversion of the responses to numeric values and statistical analysis of difference between the means impossible.

Table 5. Students' Interest in Graduate School Before and After Participation in LSAMP-Supported International Research Experience

	Never heard anything about grad school	Not at all interested in grad school	A little interested in grad school	Interested in grad school	Very interested in grad school
Before their LSAMP international research experience	3	29	30	12	7
After their LSAMP international research experience	0	6	22	29	24

* n = 81 as this question was not asked in 2015.

Another survey question added for the 2016 summer experience and used following it asked whether the students would be attending graduate school. The prompt for the question was "Which of the following best describes your plans regarding graduate school?" There were six possible answers on an idiosyncratic scale: (1) "Not go," (2) "Might go," (3) "Probably will go," (4) "Go right after graduation," (5) "Go at some time in the

future," and (6) "Other" which, when elected, was followed by a text box in which the respondent was asked to describe the pattern they anticipated. Six students responded they were "Not at all interested in graduate school" following ELCIR (Table 5) and seven indicated that they would not go to graduate school (Table 6). All seven had answered they were "Not at all interested in graduate school" prior to participating in ELCIR. Four submitted that description to characterize their interest following their ELCIR experience and three said they were "A little interested in graduate school."

Table 6. Students' Plans for Graduate School

Not Go	Might Go	Probably Will Go	Go Right After Graduation	Go At Some Time in Future
7	26	13	22	13

* n = 81 as this question was not asked in 2015.

The student who submitted the Strongly Disagree responses noted in Tables 2 and 3 was not a part of this group. She intended to "Go right after graduation." A total of 91.4% of the participants felt that they might, probably would, or would go to graduate school and 43.2% stated they would go immediately after graduation or at some time in the future. When disaggregated by gender, ethnicity, and race, there was no indication of differences in response patterns. For example, the seven students identifying as African-American/Black reported they fit in four different categories. The programming and experiences in the ELCIR project appear to increase interest in attending graduate school for students (Table 5). This is confirmed by the pattern of change in the responses (Tables 5 and 7). Only a small percentage of the students, 7.4%, entered the program "Not at all interested in graduate school" and maintained that stance. All the other students persisted at their existing level of interest or became more interested and none of the students had their level of interest decrease.

Table 7. Shift in Responses Regarding Interest in Graduate School

Prompt	Same Response	Moved Up One Category	Moved Up Two Categories	Moved Up Three Categories
Never heard anything about graduate school	-	-	2	1
Not at all interested in graduate school	6	16	5	2
A little interested in graduate school	4	18	8	-
Interest in graduate school	5	7	-	-
Very interested in graduate school	7	-	-	-

* n = 81 as this question was not asked in 2015.

Affordability of Graduate School and Likelihood of Family Support When Attending

The students participating in ELCIR were asked about the affordability of graduate school and whether their family would be in favor of their attending. Their responses show similar patterns (Table 8) with the median and peak responses for both being Agree although the first question was worded in the negative.

Table 8. Affordability of Graduate School and Likelihood of Family Support

Survey Statement	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
I would like to go to grad school, but I just don't see how I can afford it.*	2	7	23	34	24
My family would be supportive of my going to grad school.*	3	3	9	39	36

* n = 90 as one student did not answer this question.

For this group of students, 93.3% of whom are at least a little interested in graduate school, the concern about affording that interest exists but is paralleled by slightly stronger certainty that their family would be supportive of them attending graduate school. Like has been the case with all other queries, there were no statistically significant differences in the responses between groups when disaggregated by gender, ethnicity, or race.

Highest Degree Planning to Seek

The ELCIR participants were asked about the highest degree they planned to pursue. The question stem was "Which of the following best describes the highest degree you plan to obtain?" Responses possible were: (1) bachelor's degree, (2) master's degree, (3) PhD, and (4) other professional degree (MD, LL, etc.) (Table 9). The responses were slightly misaligned with the expressed interest in graduate school, intention to attend graduate school, and family support for attending graduate school (Tables 5, 6, and 7). Twenty-two students indicated that they would stop study upon completion of a bachelor's degree (Table 9) while only seven, 8.6%, indicated they would not go to graduate school (Table 6). This difference may be related to the 13 students who indicated they would attend graduate school in the future (Table 6). They might have responded based on their intention to pause between undergraduate and graduate degree study. It might also be a product of the youth of the respondents and a recent shift in perspective. It is possible that an increase in interest experienced in the preceding months had not yet caused some of the mostly early-career students to modify the specifics of their long-term educational plans.

Table 9. Highest Degree to be Sought

Bachelor's Degree	Master's Degree	PhD	Other Professional Degree (MD, LL, etc.)
22	46	12	1

* n = 81 as this question was not asked in 2015.

Career Choice and Interest in Employment Outside the United States

ELCIR participants were asked whether they would "consider a job in another country" because of their experience in the ELCIR program. Only three students disagreed with this statement (Table 10) and one of the informants who strongly disagreed was the same party who strongly disagreed that she would like another international experience like ELCIR (Table 2), that participating had increased her interest in continuing in research (Table 2), and had increased her confidence in traveling abroad (Table 3). This is further indication that her experience may have been negatively impacted in some idiosyncratic manner. That 77.8% of the students agreed or strongly agreed is a positive result since engineering careers are increasingly "internationalized" (Borri et al, 2007; Chan & Fishbein, 2009).

Just under 50% of the students, 47 of 90 respondents, agreed that the "LSAMP international research experience helped in [their] career choice" (Table 10). While shifted in a positive direction, this was, understandably, the lowest level of impact for any of the areas queried. One short-term international research experience may not provide sufficient depth and breadth of exposure to information about career potentials and forms of professional engagement to influence students' career goals.

Table 10. International Employment and Career Choice

Survey Statement	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
Because of my LSAMP international research experience, I would consider a job in another country.*	1	2	17	23	47
My LSAMP international research experience helped me in my career choice.*	3	12	28	24	23

* n = 90 as one student did not answer this question.

Differences by Gender, Ethnicity, and Racial Identity

The sample was predominantly individuals who began participation in ELCIR in their freshman year and completed summer programming prior to their sophomore year of college (89.0%) and minorities (91.1%). Most of the participants and informants identified as Hispanic (93.0% and 89.0% respectively). The gender ratio among informants was 45 males to 44 females and two persons who did not provide a gender. To the extent possible, comparisons of response patterns, male to female or between ethnic and racial groups, were made. No significant differences in response patterns related to gender, ethnicity, or racial identity were note.

Discussion

The LSAMP-funded ELCIR participants were first-generation college students who were predominantly minorities (93.0%). Finding means of encouraging students of this type to persist in college, to pursue and complete STEM degrees, and advance to graduate school is a significant concern in higher education (Thayer, 2000; Engle and Tinto, 2008; Mangan, 2017; Zinshsteyn, 2017). The outcomes realized in the ELCIR project suggest that UR projects that are encapsulated in a short-term study abroad program have the potential to impact persistence, STEM activity, and consideration of graduate school (Garcia et al., 2017). This may have been the case as the ELCIR project includes many of the best practices in programming for first-generation students noted above. Students become involved in ELCIR during their first academic year, are integrated into a cohort, hear from older students about their experiences, are provided close, personal guidance by faculty and staff, are mentored in research, writing, and presentation, receive scholarship funds (applied to travel), and are provided intellectually, socially, and culturally engaging opportunities that are all integrated as part of a "consistent and cohesive…system" (Sanacore and Palumbo, 2015, p. 26). Several of these are also noted as being high impact practices in higher education (American Association of Colleges and Universities, n.d.).

The ELCIR programming had a broad set of notable impacts beyond those reported by Garcia et al., (2017). This is summarized in the positive response received regarding participation in another experience like ELCIR. When coupled with statements participants made about areas of impact the project had, the value for undergraduates of study abroad programming that includes research is strongly evident. Students describe personal learning, improvement in cultural competency, expansion of perspective and understanding, opportunity to have experiences that will influence their thinking about their chosen discipline and in other areas, and forming connections to people and another culture. In the case of ELCIR, some of the Hispanic participants were able to connect with the culture of their parents or extended families. Confidence in one's ability to travel abroad is, logically, a factor in student willingness to study abroad. That ELCIR showed marked increases for participants in this area is also a strong general benefit.

Student awareness of and interest in graduate school increased in the ELCIR cohorts. While the shift in awareness, and to some extent the shift in interest, can be attributed to the information sessions included in the programming, this should not be considered a simple artifact from distributing information. Students provided comments indicating that their perspectives were changed and horizons expanded through the international experience. It may be the simultaneous combination of providing information and related perspective-altering experiences that produced the strong response. There was a small inconsistency in reports regarding plans to attend graduate school and the highest degree to be obtained. This can be explained by two factors. Thirteen of the participants felt they would attend graduate school but would not go directly after completing their undergraduate degree. Second, the data shows attending graduate school involved the formation of a new intention for some of the students and strengthening of it for others. That a small group of early career undergraduates reported altered intent regarding the future but had not yet cognitively extended it to include next steps is plausible. Failing to transfer learning or intention from one area to another is common and the relative youth and inexperience of the respondent pool, sophomore first-generation college students, may have contributed to the inconsistency in response.

The responses regarding international employment and ELCIR impact on career choice may also reflect the youthfulness and inexperience of the informants. While 77.8% of the students said ELCIR participation increased their willingness to consider employment outside the United States, slightly less than 50% said ELCIR participation had helped them refine their career goals. These results may reflect the life stage of the informants. They were almost exclusively college sophomores. Students at that age may not have permanently settled on a

major and defined a set of career objectives. It is understandable that they would experience a sense of enthusiasm for a general concept without being able to apply it to the same degree in career planning.

The student respondents reported concern about their ability to afford graduate study but that they felt their families would be supportive of plans to attend (83.3%). The second characteristic stands in contrast to the common conception that families of first-generation and minority students are less supportive of pursuit of advanced degrees than their majority peers (Tym, McMillion, Barone & Webster, 2004; Longwell-Grice, Adsitt, Mullins & Serrata, 2016). While an isolated finding from a study with a small sample, this contrast is worthy of further study to determine whether it is site or population specific, represents a shift in perspective, or is an anomaly.

Conclusion

Overall, the programming pattern in the ELCIR project, as demonstrated by Garcia et al (2017) and in the findings from evaluation survey discussed above, had multiple positive impacts on STEM majors who, in this case, were also almost entirely from minority populations and all of whom were first-generation college students. While further and more detailed investigation is necessary for strong assertions of efficacy and generalizability to be made, the two investigations conducted suggest that UR programming encapsulated in a two-week study abroad program is an intervention worthy of consideration for increasing minority and first-generation college student persistence, success, and graduate school enrollment in engineering and, potentially, other STEM fields.

Acknowledgement and Disclaimer

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ICT Competence in Social Sciences: Designing Digital Resources for Teaching and Learning Cultural Heritage

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Abstract: Currently, the use of technology in education has become more popular. Special attention has been given to the adaptation of computer technology into the teaching-learning process for effective learning and increasing students' achievement. In recent years, it has been realized that there is an immense benefit in applying computer technology in the social studies classroom in the context of the high school. The first purpose of this study is to investigate the degree of application of these technologies in the social studies classroom, specifically it application in the discipline of archaeology. The second purpose is to show the use of different technologies in order to replace the traditional process of archaeological documentation with a digital one. In this contribution it is presented the methodology used for recording archaeological data in the excavation and in the laboratory, which consist on online database system for field recording and photogrammetry as a means of graphical documentation for the development of the excavated trenches.

Keywords: novel technologies, archaeological documentation, digital resources, high education

Introduction

There is an increasing research on the efficiency and profit of the implementation of computer technology in education in the last years. Sheffield (1996) stated that as a result of the recent evolutions in technology, computers and the Internet have become more relevant teaching instruments in the social studies classroom. As Vanfossen (2001) points out, some of the benefits of technology integration in the classroom could be the ability to break down the classroom's physical limitations and the spread of the students' experiences, the development of students' exploration and analytical skills and the extension of the students' experiences with visual devices. For that, it is considered that technology is the most important support for the students learning progress and the computers are the main technology support for effective learning and teaching process (Isman et al., 2004; Usun, 2004).

Furthermore, computer technology helps to change the traditional role played in the classrooms. Nowadays the process of teaching and learning should be centered on acquiring, constructing and producing knowledge in accordance with emergent needs and not in the memorization of a huge and ever-increasing volume of information. The use of information and communication technologies in higher education presupposes the use of information technologies in order to change what to teach and how to teach, i.e. content and methods of teaching within the traditional face-to-face form. Information technologies, as noticed Zhaldak (2003), can be considered as a sum of methods and technical means of collection, organization, storage, processing, delivery and presentation of information that extends human knowledge and develops their opportunities to control technical and social procedures.

Nevertheless, there are many problems with ICT competence formation that deal with the process of informatization, the building of a properly system of teacher's work with students, the teaching methods and the provision of learning process with courses and learning resources (Chen et al., 2017). Thus, the main purpose of this paper is to show a case of study for teaching and learning Social Sciences through the use of novel technologies for designing digital resources. This is focused on students of high education of the degree of Archaeology and History, but also might be extended to students of teacher training degrees.

ICT in Social Sciences

Digital competence is the most brand new concept relating to technology expertise. In the last years, several terms have been purposed to define the skills and competence of implementing digital technologies, such as ICT skills, technology skills, information technology skills, 21st century skills, information literacy, digital literacy, and digital skills. These terms are also often adopted as synonyms; e.g. digital competence and digital literacy (as an example, see Adeyemon, 2009; Krumsvik, 2008; Ilomäki, Kantosalo & Lakkala, 2011; Namyssova et al., 2019). The extensive collection of terms shows not only the quick development of technologies but also diverse areas of interest, such as library studies or computer science (Jones-Kavalier & Flannigan, 2008).

In the most extensive definitions, based on policy-related papers and reports, digital competence consists on digital skills and social and emotional features for using and understanding digital tools. The European Commission (see Punie & Cabrera, 2006) has defined digital competence as involving the certain and essential use of Information Society Technology for work, leisure and communication. Digital competence is composed of basic skills in ICT, i.e. the use of computers to retrieve, assess, store, produce, present and exchange information, and to be in touch and to take part in collective networks through the Internet (Dockstader, 1999).

Social Science investigation consists on the methodical procedure of finding a solution to a problem (Bhattacherjee, 2012). This task involves the moving back and forth between theory and observation in the science of people, behaviors, societies and economies. In this sense to document a specific site properly through graphical and textual data is crucial for the advance of scientific theories and to justify and to give meaning to an archaeological context. Archaeological artifacts and their explanation are the basis of the archaeological discipline. In this way, the 3D reconstruction of a context includes the textual and graphical information of the records.

Social Sciences deal with social phenomena that are sometimes difficult to express, explain and describe effectively without the support of pictorial, graphic, audio and audio-visuals. In view of the limitations of the traditional method of teaching social science subjects which leaves no opportunity for learners' active participation in the classrooms, social science educators and researchers are deeply concerned about producing teachers who are inadequately prepared for challenging integrative and active teaching (Thornton, 2001). Van Hover, Berson and Swan (2006) remark that social science educators tend to use the same teaching technique (textbooks, lecture method and body language) over the years and yet expect to experience unprecedented positive changes in learning outcomes, whereas the input has not changed to ensure improvement in such expected output.

ICT have effects on many aspects of social science investigation. They can be divided into three groups which include: ICT application in pre-data analysis (how ICTs are used in activities of social science research before reaching the state of data analysis), in data analysis (how ICTs are applied on activities during the stage of data analysis and can be divided into quantitative data analysis and qualitative data analysis), and in post-data analysis. ICT application in pre-data analysis refers to examples (how ICTs are applied on activities of social science research after completing the stage of data analysis which covers: references and bibliography compilation, article and thesis / dissertation's discussion among researchers, supervisors, plagiarism detection and journal manuscripts submission).

This work focuses on developing new tools and methods to register, model, and visualize archaeological work not only the field, but also in the laboratory in order to create digital resources used for learning purposes. So that, following the previously classification ICT is applied on pre-data analysis activities as well as on data analysis activities.

Method

The Forvm MMX Project and the Archaeological Site of Castulo (Linares, Jaén)

These actions have been taken within the framework of the projects *Forvm MMX (2010-2014)* and *Cástulo Siglo XXI (2014-2020)*, which they have conceived from the perspective of the field of Humanities, combining the team´s particular interest in historical and archaeological research and our professional commitment to the

preservation and interpretation of historic heritage assets using different disciplines (conservation, museology, architecture and history). At the same time, as the practice of archaeology has social and symbolic dimensions and it is always materially composed, the team has planned to include researchers from the physical and biological sciences. Moreover, as we expected to deal with particularly complex documentation, we have explored different possibilities afforded by information technology. Since 2011, these projects have mobilized additional resources around research and conservation of heritage assets, their activities have been marked by public and private convergence, creativity, and efficiency.

Its scientific goals are centered on the historical reconstruction of a relevant historical period, the constitution of the Roman Empire, which in its day meant the cultural and political union of a considerable region around the Mediterranean Sea. The recovery of the forum (the public square) of the Ibero-Roman city of Cástulo informs directly about this cultural heritage.

At the socio-political level, these projects rely on the cooperation of many scientists who come to perform studies of materials excavation activities and to be personally responsible for the development of the research. At the same time, a large part of the citizens of the city of Linares have been especially active as "volunteers for culture" in recent years in the realization of these archaeological tasks. Therefore, the reconstruction through research of the physical space of the forum will also involve the recovery of this heritage for the citizens of the 21st century, and in fact give exceptional value to the archaeological records.

The fortified settlement of Cástulo is one of the largest known from the Iberian Peninsula in antiquity. Its extent has been estimated at more than 50 ha. The settlement is located on a hill facing south, situated above the right bank of the Guadalimar River. This archaeological site includes an extensive suburban environment estimated at more than 1.800 ha., where cemeteries, roads, workshops and a port from the Ibero-Roman period (ca. 700 BCE – 300 CE) have been found, in addition to other settlements belonging from the Prehistoric until the Middle Ages.
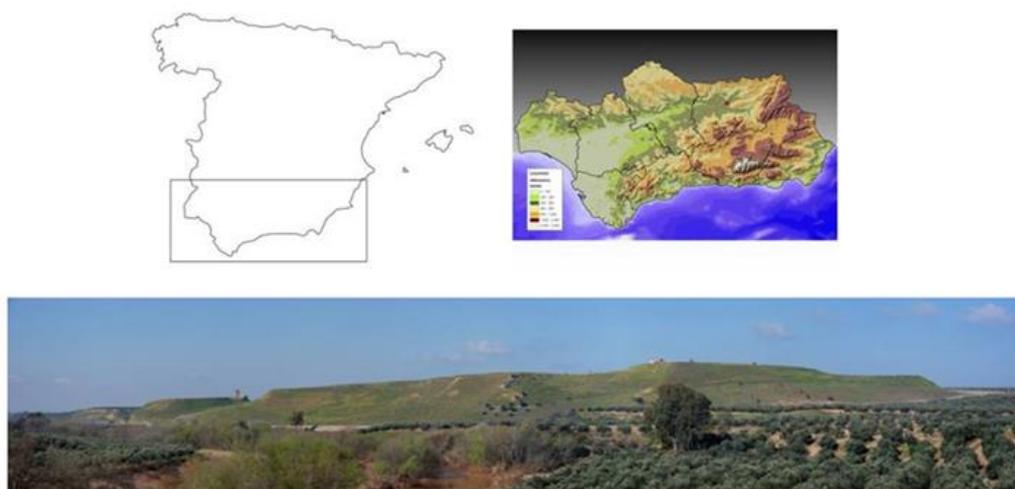
Figure 1. Location of the Ancient City of Cástulo

The importance of Cástulo is exceptional. It was the most frequently mentioned Iberian city in classical texts after Tarraco (modern Tarragona). Also, it was one of the most important mining centers of Hispania, and the last fluvial port on the route from the Mediterranean coast (García-Gelabert and Blázquez 1994). This archaeological site is significant because also lies in its origins and in the continuity of occupation over more than a thousand years. This is due mainly to its strategic location that gives it clear visual control of the Guadalquivir valley and the north area. The intensity of occupation through the centuries, and the various archaeological interventions carried out in recent years, together give us a great deal of knowledge of its successive phases of occupation (Martínez-Carrillo et al., 2012).

Registration of the Textual Information and Its Associated Graphical Information: The Creation of a Data Base and a GIS

The documentation produced by the archaeological works can be of different classes: fieldwork data, analytical documentation, administrative reports and scientific publications (Sprague, 1982). From these, the data collected in the fieldwork must be highlighted as the basis for building the others. Fieldwork documentation usually includes sketches of the investigated area, maps and plans at different scales, inventories of materials, structured forms to describe their relationships, forms to describe the stratigraphy, photographs, videos, etc. These documents contain contextual and relational data needed to construct the historical sequence and to test scientific hypotheses, and are therefore of vital importance in archaeological research.

The practical nature of the fieldwork often means doing something else at the same time as recording data. Usually, this activity is intimately connected with the observation or measurement itself. Archaeological observation proves to be very complex to model in database terms as it presents a broad variety of analytical objects, concepts and actions that are related in an extraordinary variety of ways (Madsen, 2003). During the research process, both relationships and object definitions require re-adjustments as new conceptual categories (e.g. a broader stratigraphic group or phasing) emerge during the interpretive process. Furthermore, typological constraints and uncertainty about basic material properties (e.g. colour or chronology), caused either by the differences in excavation recording methods or simply the subjective nature of archaeological description by different team members, make the task of defining archaeological units and their characteristics even more complex.

For this reasons, the implementation of an excavation data model within a georelational data framework requires advanced linkages between textual and graphical information (D'Andrea, 2003). Fieldworkers need to spend as much time as possible in observation, and have only a limited capacity of attention to deal with recording, be it on a paper form, a tape recorder, a camera or a handheld computer.

Once excavation units are geometrically modeled, it is possible to refer them within a trench or the entire archaeological site; to handle them in various ways (zoom, rotation, translation); to perform 3D spatial analysis on them, such as volumetric calculus or intersection computation; to make various kinds of queries, such as to find out excavation units that have a certain number of artifacts; to generate sections anywhere in the 3D model; and, finally, to publish it. In addition to improving data analysis techniques, if this 3D modeling operation can be done during the excavation, it can greatly help archaeologists to plan their daily excavation strategy more efficiently.

First we are interested in recording an archaeological excavation in progress, where different teams are working at the same time in different areas of the site (see Figure 2). For that, we have designed a field inventory system called *Imilké* (the Iberian princess who married with the Carthaginian general Hannibal). The main objective of this system for recording information in the field is to systematize and standardize the information that can be obtained from an archaeological intervention. The importance of standardizing the information lies in the need for it being reinterpreted retrospectively, allowing data to be accessed by different researchers and enabling the development of new hypotheses about the same historical space. This system allows the capture of textual and related graphical information during the fieldwork. For this task, different forms have been designed for recording aspects such as the type of deposit, the documented materials and the excavation process.

The first unit defined is the volume. A volume is defined by coordinates (X, Y) to which levels are associated with a vertical coordinate (Z), which are formed by strata in their different sequential levels. This formula distinguishes the various documented volumes as surface levels, division by construction, and complete or arbitrary division of space. To each of the registered levels it is possible to associate an image of the same. The X,Y,Z data capture is carried out using a total station.

The surfaces that make up the volumes can also be described in this system. The information collected from them is the associated volumes and levels and a graphical scheme that offers a first approach to its shape. The surfaces are also defined by measurements and photographs and serve to define the exact position of the layer within the volume.
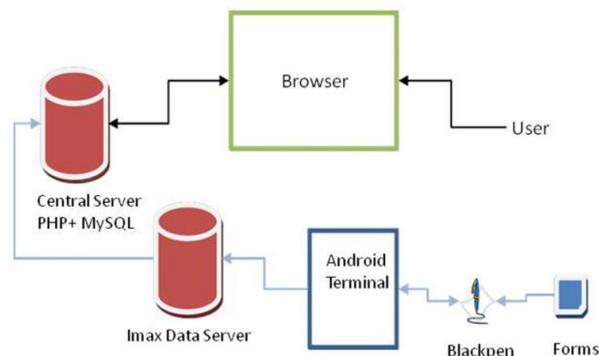
Figure 2. *Imilké* Computing Approach Schema

The computerization of the data collected in these forms is carried out as follows: data are collected on paper forms which are completed with Black Pad, using a digital scanning pen, and sent via internet to be interpreted by OCR and stored in a database where the data are available for consultation, edition and export for use in external applications. Therefore, for this data-collection work in the field, traditional inventory sheets of paper are replaced by electronic tokens stored on a mobile device. Through the use of computerized data on a mobile device the majority of the information is codified and structured, thus streamlining data collection in the field. The stored information goes directly into a database accessible online, allowing the correction of erroneous records and the combination of data from different teams working simultaneously in one excavation area (Hofer & Swan, 2008).

Recording Materials in the Laboratory: DM Codes and 3D Models

Recording material from sites is an essential task in archaeological work (Renfrew & Bahn 1991). The need to identify each artifact individually is a standard practice for archaeological sites. One advantage of having identifiers for every archaeological item is that by using techniques such as artifact refitting in the horizontal and/or vertical directions, the resolution and internal coherence of archaeological contexts can be analyzed and inferences about formation processes or activity areas can be made.

The identification of each object and its manual description involves a considerable investment of time and work in the inventory of an assemblage, especially when it consists of thousands of pieces. Errors habitually occur in the course of this manual process which, although difficult to quantify, must affect any subsequent research. In order to limit problems of this kind, we use a system of recording using digital systems, specifically data matrix (DM) codes. Labeling, that is, the application of codes, which identify each individual artifact, is a fundamental step in this research strategy, since the accurate definition of an archaeological level depends to a great extent on the proper identification of the elements that it comprises.

Codification of the site name, provenance unit, and inventory number supplies a complex network of data from which contextual information about the artifact can be recovered. Its temporal, cultural or material attributes and implications can be evaluated and eventually possibly even be refuted by subsequent studies. The lack or loss of this codification deprives us of basic information that could lead to the formation of new hypotheses or to evaluate the validity of old inferences. If the archaeological item lacks an individual label, the artifact irretrievably loses much of its explanatory potential (Martínez-Moreno *et al*., 2011).

We have used a method based on the use of DM codes to label archaeological pottery material in the laboratory. These codes have a two-dimensional structure consisting of square cells that store numeric and/or alphanumeric data. The quantity of information that they can contain depends on their size, but is sufficient to identify an artifact. In our study, this information corresponds to the codes for the site name and the inventory number. These identifiers enable reconstruction of the spatial positioning of the recovered artifact once its context has been excavated. DM codes can be different sizes. They can be attached directly both on to a bag and to the surface of individual pottery sherds, thus reducing the possibility of loss or errors while handling objects during analysis, or mixing identification codes on containers. DM codes also support advanced coding systems that allow all information to be recovered from the code even if part of it is damaged.

In our case we have use two different sizes of DM codes (see Figure 3):
- DM codes of 3 x 3 cm. for identifying the bags which contain ceramic material.
- DM codes of 1x1 cm. for identifying the fragments of pottery findings.
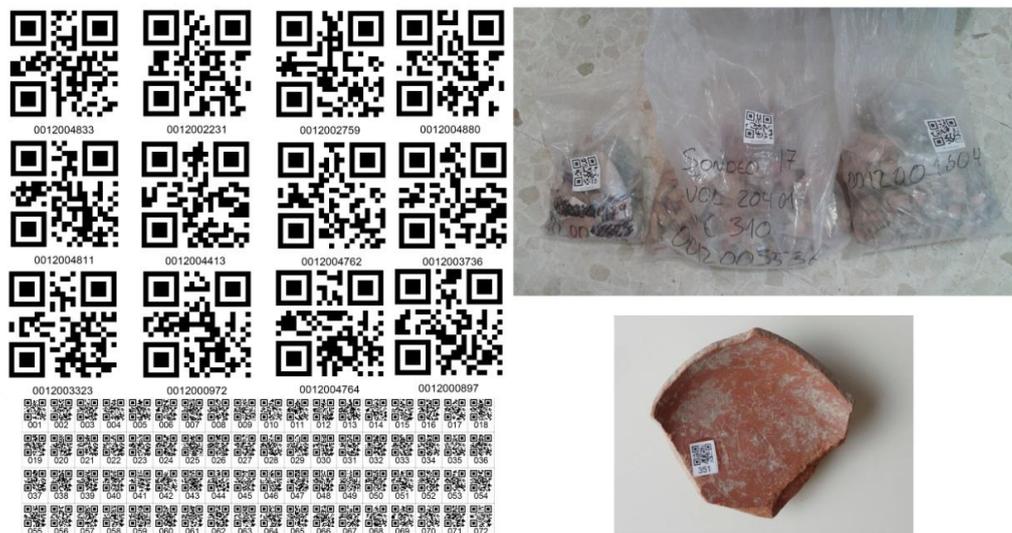
Figure 3. Types of DM Codes Used and Their Applications in Bags of Materials and Pottery Fragments

On the other way, although 3D digitization is commonly addressed today in the archaeological domain, research efforts are still focused on establishing affordable and efficient pipelines for producing digital 3D replicas of artifacts. Based on the requirements, specifications, and the financial plan of a digitization project, various methodologies can be applied. All of them involve the use of hardware and software. The usability and quality of the 3D data in terms of geometrical and colour information are only some of the key factors that lead a project team to select a particular digitization methodology. In this sense, image-based 3D-digitization methodologies offer the option of reconstructing an object by a set of unordered images that depict it from different viewpoints. As their hardware requirements are narrowed down to a specific digital camera and a computer system, they arrive at an attractive 3D-digitization approach (Gonizzi Barsanti & Guidi, 2013).

Over the last years numerous image-based 3D-reconstruction solutions have been made available. Some of them are based on combining Structure-From-Motion (SFM) with a Dense Multi-View 3D Reconstruction (DMVR) algorithm. This is a relatively new approach and it is purely based on the continuous increase of the average computer's processing power. The SFM algorithm reconstructs a sparse point cloud of a stationary scene or object that was captured from an arbitrary number of unordered images taken from different viewpoints. SFM mainly uses the corresponding features that are visible in different images that depict areas from different viewpoints, in order to calculate the intrinsic and extrinsic parameters of the digital camera (Dellaert, 2000).

Agisoft LCC created PhotoScan, which provides a SFM–DMVR solution that is able to automatically align unordered image datasets and reconstruct the content of the dataset in 3D by merging the independent dense depth maps of all images (Koutsoudis, Vidmar &Arnaoutoglou, 2013). The data processing has been carried out with the Agisoft Photoscan package, a semi-automatic software in which both the camera orientation and the internal calibration are made, requiring little input from the user. Some choices can be made during image orientation, where the operator may set: alignment accuracy level, possible control points and image masking for hiding possible misleading portions of the area surrounding the main subject.

At the mesh-generation stage, the software permits the selection of the accuracy and the polygon count of the final 3D model. The software implements image orientation and mesh generation through methods and dense multi-view stereo-matching algorithms. After processing with Agisoft, the models are saved with image texture in .obj format. The result is then imported into Blender software to correct possible topologic errors and to close gaps and lacking data omitted due to the environmental constraints.

Table 1. Digitized Objects Using Photogrammetry

Heritage asset	Material	Measurements (length-width max)	Nº Photographs
Lion sculpture	Stone	51cm - 28 cm	108
Pendant	Quartz	3,6 cm -2 cm	60
Key	Iron	8,4 cm - 2,9 cm	72
Tool	Bone	4, 5 cm- 1,3 cm	40

Moreover, the realization of these three-dimensional models has been used to test our proposed methodology on different types of materials. Thus, we have digitized objects of different sizes and materials to understand the limitations of this methodology.
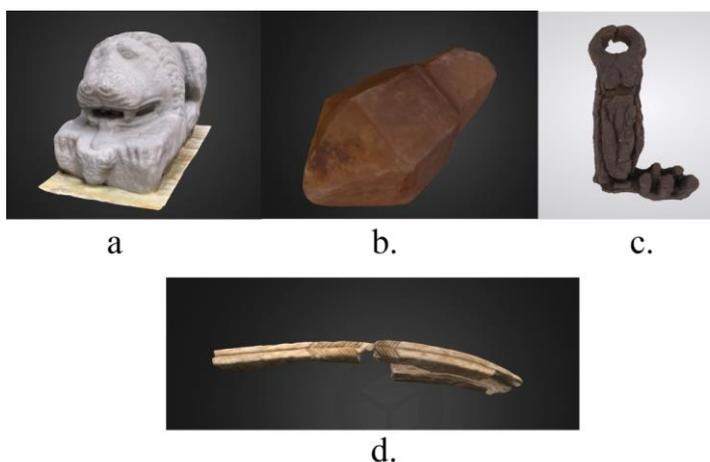

Figure 4: 3D Model Generation in Agisoft Photoscan

The final phase of our work consists of transforming 3D models into a format that is accessible to users via Internet. For dissemination purposes of these models we have chosen an online viewer, Sketchfab, which allows annotations for a better understanding of the model. Nevertheless, we are exploring other online viewers such as p3D.in. Another way to obtain an open and standardized format in which visualize 3D models is the PDF format. Since 2005 (Acrobat 7) Adobe has been expanding the 3D capabilities of its Acrobat suite.

Results

The first point of note is the importance of documentation and preservation of information during the registration work in the field. *Imilké* registration system has been designed so that information from an archaeological intervention is made simpler and more objective. Through this system we can obtain a highly accurate graphical description of the components that form the archaeological context (volumes, surfaces, layers of materials and records). This detailed recording enables further 3D virtual reconstruction, since the exact positions of the elements have already been noted. Another advantage of this system is its easy accessibility. All data can be readily accessed by researchers over the Internet.

This work shows not only the importance of recording of the spatial features in archaeological fieldwork, but also the creation of a computer system for unifying all the contextual information (textual as well as graphical). The evolution of computing plays an important role here, since in the fieldwork phase it can accelerate the registration and processing of data and, at the same time, the information collected can be applied to the overall strategy of the excavation. For the subsequent laboratory work, the new methodology allows easy control of the recorded data and a qualitative improvement of the general entries. On the other hand, an improvement in the analysis of data makes the relationship between various data sets easier. In short, computerization of archaeological records preserves a certain dynamic in the excavation files and ensures their conservation at the level of document archives.

A common instructional strategy used among social studies teachers is database development. According to Berson (1996), databases are especially useful for managing the extensive knowledge base in the social studies; they also foster students' development of inquiry strategies through the manipulation and analysis of information. Likewise, Rice & Wilson (1999) states that "database development aids constructivism by encouraging collaboration in problem solving, the use of higher-order thinking skills to develop and test hypotheses, the construction of knowledge by the students who relate learning to their own experiences". As Garcia & Michaekis (2001) assert, making databases help to build skills in locating, organizing, indexing, retrieving, and analyzing information.

Although teachers have become more capable in using the database software programs, it is still not enough for teachers to integrate these programs into their classroom (Vanfossen, 2001). In fact, a national survey in the United States indicated that only 11.3% of social studies teachers listed databases as a mainly used teaching strategy among computer-based strategies (Northup & Rooze, 1990). Likewise, Pye and Sullivan (2001) did not find a significant increase regarding social studies teachers' database use. Although there is a significant improvement in software technology in the last decades, the data showed that there is only a slight increase (approximately 3.5 %) in social studies teachers' database use.

The study showed that only 14.7 % of social studies teachers used databases in their classrooms. Thus, it seems that teachers still are not proficient enough to apply these programs into their classrooms. Concerning the use of DM codes for cataloguing material with, the present study demonstrates that use of this system is viable in terms of parameters such as its speed, reliability, and its compatibility with fieldwork routines. Furthermore, the current evaluation has found that these digital systems are not subject to the habitual errors that commonly occur in manual labelling, and which lead to the irreversible loss of contextual information.

Moreover, DM codes can be used as part of a wider procedure related to artefact recovery, recording, analysis, and storage. With the help of the appropriate instruments and purpose-made software, it is possible to link, on a more reliable basis than traditional procedures, objects with their contextual information, both for their study and permanent storage. From this viewpoint, DM codes are a major advance, and should be considered an important alternative, not only for archaeological fieldwork, but also for the provenance and management of collections held in museums and archaeological storage facilities.

At the end, the implementation of 3D models in this information system clearly shows that multimedia technologies significantly influence on students' learning by broadening their scope of learning and knowledge. Three-dimensional models have served to disseminate unique materials to the general public, but can also be used for research purposes, since they are performed at a high resolution. In the light of above, it is said that multimedia technology can provide an alternative to the traditional teacher-centered learning and it enables students to enjoy a richer constructivist learning environment. It can support students to become active learners rather than memorizing knowledge and display their ideas and information in terms of the multimedia format and use their higher order thinking skills like analysis, synthesis, and evaluation (Mai Neo & Ken Neo, 2003).

In this sense, Hobbs (1998) proposed using audiovisual media relevant to the subject of the discipline, with activities specifically designed to force students to analyze the content as 'text', using reasoning and debates based on questioning that help students to see critical eye multimedia resources. So that, integrating three-dimensional virtual worlds, educational platforms and web 2.0 tools in university training tasks currently plays an important role in the teaching-learning process, as is shown by studies and recent experiences in strategies and educational action in immersive worlds 3D (Chau, Sung, Lai, Wang, Wong, Chan & Li, 2013). This registration system has been taught to volunteers' students who have been collaborating during the summer excavation campaign.

Conclusion

This contribution aims to cope with the definition and uses of some ICT concepts in order to diversify the meaning of digital competences. In this approach ICT competence has been implemented in archaeological documentation, which is composed of the use and management of data bases, the recording and labeling archaeological materials through DM codes and the graphical registration of the material through 3D models.

All these actions can improve accuracy and completeness of an archaeological research as evidenced in this ICT application areas e.g. qualitative data collection and analysis as well as in the field documentation.

Nevertheless there is still need for research in the field of technology and social studies, particularly how the usage of new and innovative ways of integrating technology into the classroom impacts outcomes of learning. Also, to implement the methodology carried out in Cástulo into the curriculum of Archaeology and Humanities degrees plays a crucial role because until now we only have been taught in an informal way. In conclusion, technology integration requires teachers' read incessant, flexible ability to incorporate technology into teaching activities with a high level of teaching skills based on curriculum knowledge, knowledge of students' abilities, students' needs and reasonable level of technology literacy.

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Latinos: Higher Education Intervention

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Abstract: This paper will include details on knowledge and ambition levels found between Latino-ethnic K-5 students located in a Southern Region of Texas from a college going culture presentation. The purpose is to understand how ambition and knowledge about higher education was influenced among Latino-ethnic K-5 students in impoverished areas. A low-income public school located in South Texas was included in this study. An open-ended questionnaire was provided to 26 teachers. 511 students were targeted for a presentation with information about college, universities, degrees, careers, and income facts. Teachers documented ambition levels before and after students received a college-going presentation. Wilcoxon signed-rank test was used to analyze the responses for 10 pre and post surveys. Findings indicate ambition and knowledge was increased with a higher education presentation among Latino-ethnic K-5 students in highly impoverished areas. Recommendations were made to continue to research the Latino-ethnic impoverished population and variables that influence higher education success rates. Results, discussion, limitations, and future recommendations were elaborated on.

Keywords: Latinos, higher education, K-5

Introduction

Latinos and Higher Education Intervention

Low-income schools, with many students being of Latino-ethnic descents, face many disadvantages especially when it comes to achieving a higher education (Welton & Williams, 2015). The purpose of this comparison study is to understand if there is a correlational difference in higher education ambition among Latino-ethnic students in K-5 grade levels before and after higher education presentations. Several researchers have concluded

the need to serve Latino-ethnic students to increase the higher education rates (Franco & Hernandez, 2018; Ortiz & Tajalli, 2018). Ortiz and Tajalli (2018) found Texas institutions have mad outreach initiatives in an attempt to increase higher education enrollment among the Latino-ethnic population. Although, the enrollments rates did not decrease, the rates did not increase either. Franco and Hernandez (2018) found a need to incorporate an institutional approach to understand the climate and needs for the Latino-ethnic population in order to increase their success rates in higher education. This research study needs to consider many factors, such as the main disadvantages low-income schools face such as the lack of resources available to the students (Hicks, Linderman, & Strumbos, 2018). Additionally, motivation is an important factor to study because motivation encourages participation (Imbrisca & Romania, 2020). Currently, researchers have focused on other approaches that increase ambition levels to attain a higher education in K-5 students (Acosta & Acosta, 2017; Botchwey & Hunter, 2017; Dotson, LaBadie, & Overbey, 2018). Past attempts to increase higher education rates typically focused on connecting elementary students with colleges and universities through projects (Botchwey & Hunter, 2017; Dotson, LaBadie, & Overbey, 2018). Lastly, because electronic presentations have been found to increase knowledge (Ferreira, Santos, Serpa, 2018), this factor must be considered for this study as well. Due to the Latino-ethnic students being at a disadvantage when it comes to achieving higher education success rates (Welton & Williams, 2015), a pre-survey and post-survey was used to gather data to understand the dynamics involved that may prevent students from attaining a college-going culture. To understand the differences in low-income schools and ambition for attaining a higher education by K-5 Latino-ethnic students, the researchers used conflict theory to explain the variables and the effects.

Literature Review

The purpose of this comparison study is to understand if there is a difference in higher education ambition among Latino-ethnic students K-5 grade levels before and after higher education presentations. It is important to examine a "college-going" culture in minority groups who have high poverty levels (Welton & Williams, 2015; Ostrander, 2015). Ostrander (2015) found unequal and low levels of educational opportunities for minority children. Welton & Williams (2015) reveal that scholars indicate significantly higher dropout rates in schools with large minority groups and schools with high poverty rates. These data indicate the importance in understanding influential variables for impoverished minority groups and higher education ambition. Researchers have suggested there are educational institutions that are not organized to support students in achieving academic success due to inadequate college advisement (Hicks, Linderman, & Strumbos, 2018).

Franco and Hernandez (2018) go on to explain low success rates in higher education among Latino-ethnic students is an institutional issue. The institution must take on an initiative to understand the climate in Hispanic Serving Institutions, involve appropriate departments such as Institutional Research departments, and continue a methodological approach to understand barriers for Latino-ethnic students on a continuous basis. These data indicate the importance of understanding influential variables in the higher education institution. Other research findings indicate an increase in enrollment in the Hispanic population (Ortiz & Tajalli, 2018). However, the Hispanic graduation rate did not rise with it. Indicating a need to variables that play a role in graduation rates among the Hispanic population. Motivation is a factor that is increased through being involved (Bucur, Maiorescu, Sabou, & Zota, 2020; Imbrisca & Romania, 2020; Shelley & Purzer, 2018). Specifically, Bucur et al. (2020) found students in higher education were most likely motivated to get involved in projects in higher educational institutions related to gaining experience and projects that add value to their curriculum vitae.

Imbrisca and Romania (2020) also contribute the development of higher education through getting students involved in social responsibilities activities, which increase motivation. In other words, the personal values of students in higher education increased their motivation and in turn sustained the higher education institutions through their involvement. Furthermore, researchers have linked good academic advising to the success and motivation of students, that increase chances of graduating (Donaldson, Lee, McKinney, & Pino, 2016; Garcia & Hatch, 2018). Garcia and Hatch (2018) show a variety of research data that emphasized critical advisement procedures and the link of advisement to student persistence and ambition to attain a college degree. Past researchers focused on increasing higher education ambition have focused on connecting universities to elementary students through projects (Botchwey & Hunter, 2017; Dotson, LaBadie, & Overbey, 2018; Namyssova, 2019).

Some researchers focused on curriculum based assessments of readiness levels for higher education attainment (Acosta & Acosta, 2017). Kirk and Watt (2018) found that social and cultural networks are successful factors

among Mexican ethnic students who graduate. Regardless of the different approaches taken to understand the factors involved to better support the Latino-ethnic student in higher education to graduate, a need to understand these factors still is evident (Franco & Hernandez, 2018; Ortiz & Tajalli, 2018). It is important to further understand the different factors that play a role on higher education success rates among the Latino-ethnic K-5 students (Welton & Williams, 2015). In addition, in this study the higher education ambition level among K-5 Latino-ethnic impoverished students will be explained through conflict theoretical perspective.

Conflict Theory

Conflict theory, as explained by Karl Marx, is a concept in which society lies predominantly under relentless conflict regarding the inequality of resources among its contrasting social classes (Henslin, 2015). Conflict theorists would proceed to express interconnecting rationalities between students attending affluent and highly impoverished schools by identifying their contrasting knowledge of essential guidance concerning post-secondary education (Henslin, 2015). As a result, such opportunities remain beneficial for the advancement of students attending affluent schools; diametrically opposed to students attending impoverished schools under oppressed circumstances (Henslin, 2015). In this study, conflict theorists would consider students from lower class as the proletariats. The barriers proletariats receive that are supported by institutions would serve to keep the lower class status. The capitalists would proceed to receive resources and education from elite educational institutions. These differences would support the conflict between the two groups competing for scarce resources, that maintain the elite group in power. Although both aspects of symbolic interaction theory and functional theory explain a student's post-secondary educative progress or regression, these theories refrain from explaining the dynamics involved in this study as well as conflict theory.

Method

Research Design

The Wilcoxon test was the best test for this research study. A pre-and post-survey were administered to teachers to gather data on the differences before and after the presentations provided to students between K-5 grade levels. The Wilcoxon's test determined the difference between the pre- and post-survey differences in student's ambition to go to college, attain a college degree, and knowledge of college and degrees. Reliability and validity were determined by allowing a survey research facilitator to create the survey questions and a curriculum and instructional doctorate also double checked the survey questions. Demographic items determined, average income, grade levels, enrollment rates, and attendance. Participants included elementary students attending Kinder to 4th grade. These students were from an elementary school that serviced an impoverished area, and who were primarily of the Latino-ethnic background.

Population and Sample

The population for this study was selected from a southern region of Texas. Three elementary schools servicing highly impoverished and Latino-ethnic areas were identified on the school districts website. These three sites were contacted, via their principal, and invited to participated in the study. Only one site responded and participated in this research study. These sites were appropriate since the resources are limited to impoverished areas (Tanno, 2003). The purpose of this comparison study is to understand if there is a correlational difference in higher education ambition among Latino-ethnic students in K-5 grade levels. A convenient sample was retrieved from the targeted sites contacted.

Based on a g-power analysis for a t-test matched pairs sample targeted, at least 45 teachers were needed to run a t-test analysis. Being that a convenient sample was accessible only 26 teachers were available to participate from the only site willing to participate. A consent form, pre-survey, and posts-survey were provided to all 26 teachers available in the only site willing to participate. Only 13 surveys were retrieved after presentations were provided to all students available at the participating site. This convenient sample included students from Kinder to 4th grade. One teacher from Kinder, one teacher from 1st grade, two teachers from 2nd grade, two teachers from 3rd grade, and four teachers from 4th grade. Three pre-surveys and post-surveys were excluded due to lack of information. After cleaning the data, the sample provided included 10 classrooms which provided usable

surveys, 4th grade level classrooms accounted for the highest level of response rate, kinder and 1st grade level classrooms accounted for the lowest response rates, classrooms typically had 17 and 20 students enrolled, and classrooms typically had 17 students present.

Materials/Instruments

A survey was created to collect demographic information, ambition, knowledge about college and degrees, and careers. Questions were open ended to gather unique responses as they arose from Kinder to 5th graders. A survey research facilitator created the questions to measure the outcomes related to the hypothesis. In addition, a curriculum and instructions Doctorate reviewed the questions to double check the survey questions measured the hypothesis question and were feasible questions for the grade levels targeted. Responses could be tallied for ordinal entry to run a Wilcoxon signed-rank test. The significance level was set at p.05 level. Please see appendix A.

Data Collection and Processes

A survey was created to collect demographic information, ambition, knowledge about college and degrees, and careers. Questions were open ended to gather unique responses as they arose from Kinder to 5th graders. A survey research facilitator created the questions to measure the outcomes related to the hypothesis. In addition, a curriculum and instructions Doctorate reviewed the questions to double check the survey questions measured the hypothesis question and were feasible questions for the grade levels targeted. Responses could be tallied for ordinal entry to run a Wilcoxon signed-rank test. The significance level was set at p.05 level.

Results

The influential higher education ambitions among Latino-ethnic students in K-4 grade levels were analyzed as such. The data gathered for college, associate's degree, bachelor's degree, master's degree, and doctorate's degree attainment were measured for the pre-survey to compare to the post-survey. The pre-survey and post-survey differences were measured as dependent variables and the presentation provided to students from K-5 students represented the independent variable. Since there was a small sample size the Wilcoxon Signed-Rank Test was used to analyze the data.

The p-value was set at p.05. Results indicated for K-4 students, since 5th grade level data was not retrieved, ambition levels to go to college were significantly higher after (Mdn=15.50) the Higher Education Intervention presentation than before (Mdn=13.50), z=-2.05, p<.05, r= -0.46. This indicated a medium effect size (r=-0.46, which is above the .3 criterion that met a medium effect size standard) for college ambition after the K-5 Higher Education Intervention presentation was provided. In addition, results indicated for K-4 students, having no knowledge about a bachelor's degree were significantly lower after (Mdn=2.5) the Higher Education Intervention presentation than before (Mdn=7), z=-2.81, p<.05, r= -0.63. This indicated a huge effect size (r=-0.63, which is above the .5 criterion that met a large effect size standard) for no knowledge about a bachelor's degree after the K-5 Higher Education Intervention presentation was provided.

Furthermore, Table 1 shows results indicated for K-4 students, having no knowledge about a Master's degree were significantly lower after (Mdn=2.0) the Higher Education Intervention presentation than before (Mdn=10), z=-2.43, p<.05, r= -0.54. This indicated a huge effect size (r=-0.54, which is above the .5 criterion that met a large effect size standard) for no knowledge about a Master's degree after the K-5 Higher Education Intervention presentation provided. In addition, results indicated for K-4 students, ambition levels to attain a doctorate degree were significantly higher after (Mdn=9) the Higher Education Intervention presentation than before (Mdn=5), z=-1.96, p<.05, r= -0.44.

This indicated a medium effect size (r=-0.44, which is above the .3 criterion that met a medium effect size standard) for a doctorate attainment ambition after the K-5 Higher Education Intervention presentation provided. Moreover, results indicated for K-4 students, having no knowledge about a doctorate's degree were significantly lower after (Mdn=1.5) the Higher Education Intervention presentation than before (Mdn=8), z=-2.66, p<.05, r= - 0.59. This indicated a huge effect size (r=-0.59, which is above the .5 criterion that met a large effect size

standard) for no knowledge about a doctorate's degree after the K-5 Higher Education Intervention presentation provided. Type I error is when a researcher fails to reject the null hypothesis when it should be rejected and Type II error is when the null hypothesis is rejected but shouldn't have been (Creswell, 2009). Setting the p-value at .05 was set to address this issue. Since the sample size is small, n=20 for both the pre-survey and post-survey the data was skewed, this led to limited inferences to the population. However, the data provided insight otherwise not known about this convenient sample.

Table 1. Masters No Knowledge Pre and Post Analysis

Variables	N	Mean Rank	Sum of Ranks
Negative Ranks	1	2.00	2.00
Positive Ranks	8	5.38	43.00
Ties	1		
Total	10		

Z -2.43
Asymp.Sig.(2-tailed) .015

College, Associates, Bachelors, Masters, Doctorates, and Careers

The results for the Wilcoxon Signed-Rank Test yielded significant results for the data collected from the sample. Data indicated students had higher ambition to attend college and attain a doctorate's degree after a K-5 Higher Education Intervention presentation. Also, data indicated knowledge about a bachelor's degree, master's degree, and doctorate's degree increased after the K-5 Higher Education Intervention presentation. Effect size was larger in the knowledge gained through the K-5 Higher Education Intervention presentation compared to the medium effect size on ambition to attend college and attain a doctorate's degree. Differences were noted in the pre-surveys and post-surveys in careers mentioned by K-4 students. Careers in the pre-survey mentioned included fourteen students who wanted to be a doctors compared to thirteen in the post-survey. Police officers were sought out as a career by thirteen students in the pre-survey and twenty-one students on the post-survey. Eleven students chose teaching as a career in the pre-survey and fourteen students chose teaching as a career in the post-survey. Ten students chose being a veterinarian as a career in the pre-survey and nine students chose being a veterinarian in the post-survey. Eight students chose being a soldier as a career in the pre-survey and six students chose being a soldier as a career in the post-survey. After our presentation and introduction to some careers such as FBI agent, professor, principal, and others, students' ambition to be an FBI agent increased by four students, students ambition to be a professor increased by one student, and one student's ambition to be a principal increased as well (see Figure 1).
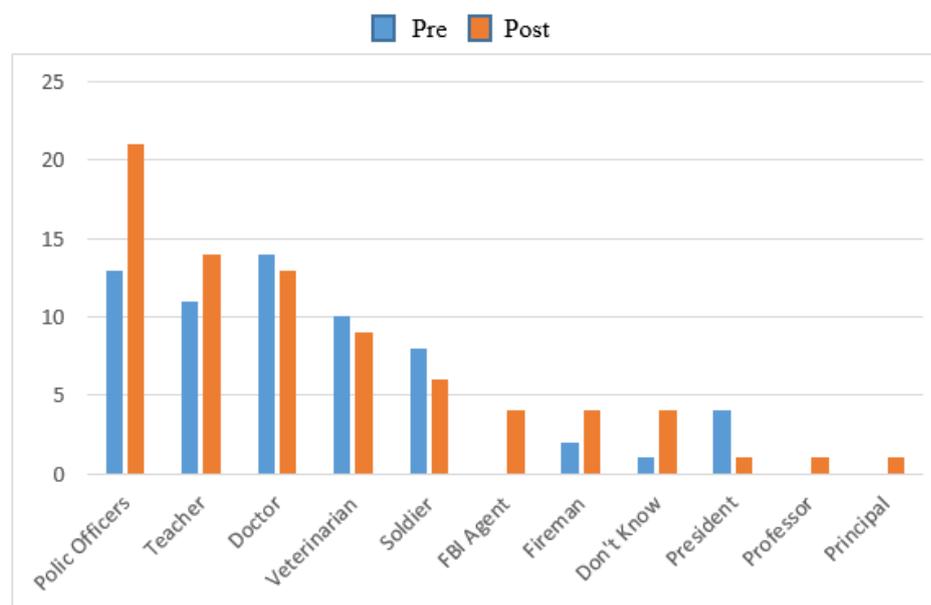

Figure 1. Career Ambition Pre and Post Presentation

Discussion

The focus of this research study was to better understand Latino-ethnic K-5 students' ambition and the influence on higher educational goals before and after a higher education presentation. In general, the ambition and knowledge level of K-4 students increased with a simply Higher Education presentation. These findings compliment data indicating a connection between higher education institutions and K-5 students are needed to increase their knowledge about Higher Education (Botchwey & Hunter, 2017; Dotson, LaBadie, & Overbey, 2018). Botchwey and Hunter (2017) found collaborations between K-12 and universities increase knowledge and learning experiences. Dotson, LaBadie, and Overbey (2018) found collaborations aren't only beneficial but necessary to connect experts in the STEM field with libraries and in return libraries can connect experts with children. These are valuable ways to increase knowledge through collaboration and exposure. Additionally, suggestions have been made to include powerpoint presentations to increase knowledge and the learning process (Ferreira, Santos, & Serpa, 2018; Okawuiro & Onivehu, 2018).

Hanif and Puspitarini (2019) specifically suggest to incorporate technology when trying to enhance the learning experience in elementary students. Much like these groundbreaking research projects, this research study attempted to connects K-4 students with Higher Education information through a presentation. As a result, ambition and knowledge was gained. The implication here is, with the increase of motivation, from activities in the presentation, so would be the increase of successful outcomes in higher education (Imbrisca & Romania, 2020). This outcome compliments Imbrisca and Romania (2020) results indicating personal values motivate students to become more involved in social responsibility activities which in turn sustained the higher education through the support from students and faculty involvement. In other words, success rates such as gaining an education are enhanced through activities that support the values of the student, which in turn increases the knowledge of students and sustains Higher Educational goals. This research study demonstrated that through activities in a presentation to elementary students, knowledge and ambition was gained, which led to an increase in ambition in attaining higher educational degrees and knowledge about higher educational goals.

The purpose of this comparison study is to understand if there is a correlational difference in higher education ambition among Latino-ethnic students in K-5 grade levels. First, a time limitation was encountered due to having five hours a week dedicated to this research project. Secondly, lack of site participation provided a limitation. The researchers reached out to three elementary schools and only received one invitation to present. Third, financial funding was a limited. Presenters included a group of six undergraduate students whom were unable to travel outside the Rio Grande Valley to collect additional data. Thus, it limits access to only a small population. Fourth, funds limited analysis procedures to the PSPP program, which is a free statistical program similar to SPSS. Lastly, assumed resources available by the site being studied influenced survey responses.

Conclusion

The purpose of this comparison study is to understand if there is a correlational difference in higher education ambition among Latino-ethnic students in K-5 grade levels. Impoverished schools are lacking efficient resources (Hicks, Linderman, & Strumbos, 2018). The researchers utilized a survey to better understand this phenomenon. The results for the data collected were significant and indicated students had higher ambition to attend college and attain a doctorate's degree after a K-5 Higher Education Intervention presentation. Limitations that were encountered included lack of time, resources, and site participation. Including more schools in impoverished areas and different grade levels, obtaining more funding and resources, and using Survey Monkey to administer surveys are all recommendations for future researchers.

Recommendations

There are several recommendations for future research. The first recommendation is to extend the research to include more schools in impoverished areas, schools that are categorized as middle class, and schools that are categorized as upper class. In addition, a comparison between elementary, middle school, and high school would elaborate on the correlational difference in higher education ambition among Latino-ethnic students in all grade levels. Another recommendation is to spend more time developing a presentation and survey that is better suited for each grade level studied. Furthermore, obtaining funding for materials and resources to expand any

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research project focused on these variables would assist profusely. Specifically, the Survey Monkey software should be used in future studies. Also, administering and collecting the pre-survey prior to the presentations is recommended as well as administering and collecting the post-survey after the presentations. Recommendations also include increasing sample size to run a T-test. This may allow researchers to compare data between students who had knowledge of college and who didn't have knowledge of college which would provide insight. Overall, these recommendations would help achieve the purpose of this comparison study.

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Appendix A: Survey Instrument

Pre-Survey___
Post-Survey___
Classroom Code: ___

Teacher Name:_____
Grade Level: _____
Average Income: _____
Total Students Enrolled: _____
Total Students Present: _____

    1.   How many students want to attend college?___
1B. How many students did not know what college was when asked? ___

    2.   How many students want to complete an Associate's Degree ONLY?___
2B. How many students did not know what an Associate's Degree was when asked? ___

    3.   How many students want to complete a Bachelor's degree ONLY? ___
3B. How many students did not know what a Bachelor's degree was when asked? ___

    4.   How many students want to complete a Master's degree ONLY? ___
4B. How many students did not know what a Master's degree was when asked? ___

    5.   How many students want to complete a Doctorate's degree ONLY? ___
5B. How many students did not know what a Doctorate's degree was when asked? ___

    6.   What kind of careers do the students want to work in? List all careers mentioned please.
Comments:

Perceptions, Reflections, and Actions of the Teacher in the Classroom: An Instrument of Analysis

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Abstract: For decades researchers have considered as the main functions of the teacher in the classroom to be the teaching of the content and classroom management. Taking this concept of the dual role of the teacher in the classroom, the ideas of regarding the didactic-pedagogical triangle and aspects of Charlot's theory of the relationship to knowledge, we constructed a 3x3 matrix (table) called the Teacher Matrix as an instrument for analyzing teachers' perceptions, reflections, and actions in the classroom. The instrument was applied into the interviews of two teachers in activities in a teacher education program. The instrument was very interesting for identifying teachers' characteristic movements, as well as their perceptions, reflections, and actions from their speeches.

Keywords: Relationship to knowledge, Didactic-pedagogical triangle, Teacher's actions, Teacher Matrix, Teacher Education.

Introduction

Research on teacher practice in the classroom has been in evidence since the 1980s. In general, questions such as "What does it take to teach?" "What happens when the teacher teaches?" or "What actions does the teacher perform to instruct and educate the children?" (Gauthier, 2006) have been the starting points for studies that aim to understand teachers' actions, the knowledge necessary for their professional practice, and their relationship with effective learning in the classroom. Doyle (1986) points out two larger tasks that the teacher needs to accomplish in the classroom. One refers to the teaching of content, while the other relates to the functions of classroom management. Similarly, Shulman (1986) also points out two types of tasks or programs to be negotiated. The first deals with the organizational, interactive, social, and management aspects of class life. The second concerns school tasks, class content, and program. Gauthier (2006) and Tardif (2002) point out these two tasks as fundamental pedagogical functions exercised by the teacher. In a systematic study of published papers based on reports by the Holmes Group (1986, 1990, 1995) and the Carnegie Task Force, Teaching as a Profession (1986), Gauthier (2006) refers to these two functions of classroom management and content management as the very core of the teaching profession (Gauthier, 2006; Tardif, 2002). With the advancement of research regarding this dual function, we can observe the development of two lines of research: one includes studies that involve teachers' knowledge necessary for teaching (Shulman, 1987), where there was and still is intense production (Verloop, Driel, & Meijer, 2001; Tardif, 2002 and Gauthier, 2006). Likewise, classroom management studies have become one of the preeminent research lines (Evertson & Weinstein, 2006). Using the ideas of classroom management and content management proposed by Gauthier (2006), we propose that class and content management can be interpreted as the management of teacher relations with knowledge (content),

teaching, and learning within a triangular classroom model (didactic-pedagogical triangle). For this purpose, we based our work on the theory of the relationship to knowledge (Charlot, 2000) and on the didactic system (didactic-pedagogical triangle) concept presented by Chevallard (2005) and Houssaye (1988, 2007). Considering the studies and foundations described above, we constructed a theoretical-methodological instrument for the analysis of teachers' perceptions, reflections, and actions in the classroom called the Teacher Matrix (Table 2) (Arruda; Lima & Passos, 2011)[1]. To present the fundamentals and construction of the Teacher Matrix, as well as its application, this work is organized as follows. Some concepts of content management and classroom management are presented initially. In the following section, some conceptions of the classroom, the didactic-pedagogical triangle, and Charlot's theory of relationship to knowledge are presented. Next, we present the Teacher Matrix as an analytical instrument and, in the methodological procedures, an application of the instrument is carried out from an interview with teachers. Finally, some considerations are pointed out.

Some Concepts Of Content Management And Classroom Management

In general, classroom management refers to the actions teachers take to create an environment that supports and facilitates students' academic and socio-emotional learning (Evertson & Weinstein, 2006, p. 4). Similarly, Gauthier et al. (2006, p. 240) point out that classroom management refers to a "set of rules and arrangements necessary to create and maintain an orderly environment conducive to both teaching and learning." The author further adds that classroom management involves maintaining order in the classroom by planning rules, disciplinary measures, establishing routines, and developing responsibility etc., which aim to make the learning environment conducive to learning (Gauthier et al., 2006, pp. 240–273).

Gauthier et al. (2006, p. 138) define content management as "the set of operations organized to lead the student to learn the content." This would be the task of "giving the program, of ensuring that students master the various elements of content, of instilling a taste for the study of diverse subjects, etc.," which may include content planning, activities, objectives, strategies, evaluations, and so on (Gauthier et al., 2006, pp. 196–240). To conclude, both Tardif and Gauthier consider content management and classroom management to be "the very heart of the profession" (Tardif 2002: 219), yet, by emphasizing only the management of content and class, they seem to forget that the teacher—as a person and subject—"must also manage his own learning, his own development," so he must be included among the tasks that structure the teacher's actions in the classroom (Arruda, Lima, & Passos, 2011, 143). It is necessary to rethink the tasks of the teacher in the classroom to find a way to include the task of managing one's own development.

A possible way to do this can be realized based on the concept of the didactic-pedagogical triangle of Chevallard (2005), Houssaye (1988, 2007). Therefore, it is proposed that the teacher's tasks go beyond these two functions: more about managing epistemic, personal and social relationships with knowledge (Arruda, Lima, & Passos, 2011) and relationships with disciplinary content, teaching and student learning. As we explain below some concepts about the classroom, the relationship with knowledge and the conception of the didactic-pedagogical triangle, it becomes clearer the main ideas and foundations for the construction of the theoretical-methodological instrument that we call the Teacher Matrix.

The Relationship to Knowledge In the Classroom and the Didactic-Pedagogical Triangle

The classroom itself has a range of complicated situations that are inherent to the complex conjunctures that make up the educational environment. At all times, there is an incredible amount of visually complex information that teachers need to process to understand what is occurring. Teacher assignments in the classroom involve observing student behavior, monitoring student interactions, keeping pace with instruction, making quick decisions about how to intervene in classroom disruptions, and other pedagogical concerns (Wolff et al., 2016, p. 244). Faced with the numerous actions to be carried out by the teacher, it is fundamental to establish models for a better understanding of relationships and pedagogical activities in the classroom. For example, for Doyle (2006, p. 98), a typical classroom is, from the ecological perspective, " an environment in which, typically, 20 to 30 students—a class—are gathered with one or perhaps two adults (teachers) to engage in activities, which have educational purposes and outcomes for the students." In the ecological perspective, which most recently dominated research on classroom management, the central idea is "habitat, the physical niche or

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[1] An initial version of this analytical instrument is presented in Arruda, Lima, & Passos (2011).

context with characteristic purposes, dimensions, features, and processes that have consequences for the behavior of occupants in that setting." (Doyle, 2006, p. 98). From the ecological point of view, behavior in everyday life is limited by the particular setting in which a person is situated at a given time (Doyle, 2006, p. 98).

Another possible representation of the classroom is what we refer to as the didactic-pedagogical triangle (Arruda, Lima, & Passos, 2011; Arruda & Passos, 2017), also known as the didactic system (Chevallard, 2005), the didactic triangle (see Friesen & Osguthorpe, 2018, p. 256), or pedagogical triangle (Houssaye, 1988, 2007; Meirieu, 1987, Friesen & Osguthorpe, 2018). The didactic-pedagogical triangle has Platonic origins (Gauthier; Tardif, 2013) but was represented and structured in several ways via different approaches by various authors. This representation that we call the didactic-pedagogical triangle consists of three "places" and their interrelationships (Figure 1), where T represents the teacher, S refers to students, and K is related to knowledge and their inter-relations.
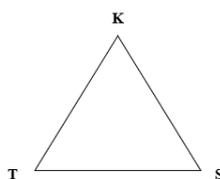

Figure 1: Didactic-Pedagogical Triangle

Friesen and Osguthorpe (2018) refer to it as a pedagogical triangle and point out that the triangle is an elementary heuristic structure that can be used to analyze specific interrelationships and interactions between the teacher, students, and knowledge (content) in a given pedagogical situation. Contrary to how authors such as Chevallard, Houssaye, and Friesen and Osguthorpe have interpreted the didactic-pedagogical triangle, for us the didactic-pedagogical triangle can be considered a system of relations with knowledge, which involves the teacher (T), the students (S), and knowledge or content (K).

The relational model of the classroom inserts a didactic-pedagogical triangle, made up of the ideas of Charlot, (the physical environment, the included knowledge); a subject (the teacher); and the other (the students). With the classroom as a relational system, the behavior, or rather, the conduct of the actors involved, is more complex, since it considers subjectivity (the self) and society (the other). We consider that S is the subject that learns, which can be a classroom, a group of students, or a single student; T is the subject that teaches, that is, the teacher, the monitor, or a student teacher during the professional stage; K is the knowledge to be taught and can be a discipline, content, a concept, etc. With this in mind, we assume the following interpretations and definitions for the edges of the triangle:
- S-T (or T-S) indicates the relationship between the teacher and students and represents teaching.
- S-K (or K-S) indicates the relations between the students and knowledge and represents students' learning.
- T-K (or K-T) indicates the relationship between the teacher and knowledge and represents teachers' learning.

On the other hand, we can also reinterpret classroom management and content management as relationship management, because, as previously described, the didactic-pedagogical triangle can be understood as a system of relationships to knowledge in a standard classroom where they are present, in which S is the "student group," K is the "knowledge to be taught," and T represents the "teacher." In this way, the main tasks of the teacher (T) in the classroom can be thought of in terms of three types (Arruda, Lima & Passos, 2011, p. 147):
1. Management of the T-K segment: which concerns the management of teacher relations with content;
2. Management of the T-S segment: which is related to the management of the teacher's relationship to teaching;
3. Management of the S-K segment: when we consider the management of teacher relations with learning.

This interpretation of the didactic-pedagogical triangle as a set of relations to knowledge in the classroom leads us to commune with the theory of Charlot (2000) on the relationship to knowledge. For Charlot, the question of knowledge originates in an original anthropological condition: the human being is born inscribed in a world (symbolic) in which he or she is subjected to the necessity or obligation to learn, since subjects can only exist if the human being is learning about, appropriating, and relating to the world (Charlot, 2000, p.59–62, 2005, 57).

The relationship to knowledge is defined, fundamentally, as "a form of relation to the world" (Charlot, 2000, p. 77) by Charlot, who describes it as,

> [a] world in which I find myself as a human being and driven by my desires, occupying a position in a social space and endowed with a history that defines my singularity and way of giving meaning to this world. (Charlot, 2000, p. 33)

That is:

> The relationship with knowledge is the relation of the subject to the world, to himself and to others. It is the relation to the world as a set of meanings, but also as a space of activities, and it is inscribed in time. (Charlot, 2000, 78)

If we consider the classroom as the focus of research, we can understand the relationship with the world as the relation of the subject to the school world, that is, with a specific purpose— the field in which school knowledge and other actors of this environment are present such as the students, the subjects who will learn such knowledge; the teachers, who are dedicated to teaching and transmitting this knowledge; the directors, supervisors, pedagogues, etc., and all the physical aspects of this world (buildings, classrooms, portfolios, etc.) (Arruda & Passos, 2017). For this specified world, we can adapt Charlot's (2000) definitions of epistemic, identity, and social relations to knowledge (Charlot, 2000, pp. 68–74) as specified in Table 1:

Table 1. Epistemic, personal, and social relationships to knowledge

A.	The epistemic relationship to knowledge: Refers to the relationship to knowledge as an object of the world to be appropriated and understood; knowledge endowed with independent objectivity, consistency, and structure; knowledge "existing in itself," "deposited in objects, places, and people," and immersed in a "universe of knowledge distinct from the world of action, perceptions, and emotions" (CHARLOT, 2000, p. 69).
	Subjects demonstrate an epistemic relationship with the school world when they use purely intellectual or cognitive discourses on teaching, learning, and events occurring in this universe, expressing themselves in general through oppositions of the "I know / do not know" type, "I know / do not understand," and "I understand / do not understand," etc.
B.	The personal relation to knowledge: Refers to the "relationship of identity to knowledge"; knowledge as an object that makes sense, which is part of the subject's personal history, and his or her life and expectations (CHARLOT, 2000, p. 72); it is knowledge as object of desire, of interest; the knowledge that the subject "likes" and that mobilizes the subject in his or her search.
	Subjects demonstrate a personal relationship with the school world when they use speech that refers to feelings, emotions, senses, desires, and interests, expressing themselves in general through oppositions of the "I like / dislike" type, "I want / do not want," "I feel / do not feel," etc.
C.	The social relation to knowledge: Refers to the fact that the subject is born inscribed in a social space and occupies an objective social position that defines the initial context in which it is related to knowledge; in this medium, knowledge has value given by the community in which the subject lives, receiving the impact of the expectations and aspirations of others in relation to him- or herself (CHARLOT, 2000, p. 73).
	Subjects demonstrate a social relation with the school world when they use discourse that involves values, agreements, precepts, beliefs, and laws that originate inside or outside the school world, expressing themselves in general by means of oppositions of the "I value / do not value," "I should / should not," and "I can / cannot (I am or not authorized to do)," etc.

Considering the didactic-pedagogical triangle and the epistemic, personal, and social relations to knowledge, we constructed the Teacher Matrix, which is described next.

The Teacher Matrix, an Analytical Instrument

When we apply epistemic, personal, and social relationships as defined in Table 1 to the classroom now represented by the didactic-pedagogical triangle as shown in Figure 1, the triangle becomes a prism (Figure 2), which we call the didactic-pedagogical prism.
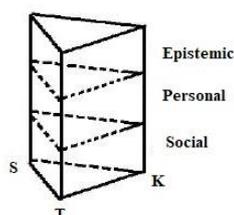

Figure 2: Didactic-Pedagogical Prism

The didactic-pedagogical prism is configured as an instrument of interpretation of the relation to knowledge, teaching, and learning that develops in the classroom. However, its true dimensions become more apparent

when unfolded in the matrix that is associated with an operation that in geometry could be called "planning." In fact, if we open the prism on its vertical faces, we obtain what we call the Teacher Matrix (Table 2).

Thus, in addition to being an instrument of interpretation of the relation to knowledge, teaching, and learning in the classroom, the Teacher Matrix provides us with classroom management and content management that can be thought of as relationship management in the classroom. From the application of the didactic-pedagogical triangle and epistemic, personal, and social relationships with knowledge and keeping in mind the rethinking of the functions of the teacher in the classroom in terms of classroom management and content management, we can construct Table 2 described below, called the Teacher Matrix[2] (when we consider the internal cells, in this case, the "Sector" cells).

Table 2. Teacher Matrix.

New tasks of the teacher Relationship of teacher Relationships with knowledge	1 Management of the T-K segment Content	2 Management of the T-S segment Teaching	3 Management of the E-S segment Learning
A **Epistemic**	Sector 1 A It concerns content as an object to be understood by the teacher and the epistemic relationship of the teacher to the content; the quest to understand it more and more; the relationship to objects, people, and places that can contribute to improving their understanding of the content such as books, journals, videos, internet, libraries, universities, etc.	Sector 2A It concerns teaching as an activity to be understood by the teacher and to the epistemic relation of the teacher to the teaching; the quest to understand it more and more; the relationship with objects, people, and places that can contribute to improving their understanding of the teaching such as books, journals, videos, internet, libraries, universities, etc.	Sector 3 A It concerns learning as an activity to be understood by the teacher and to the epistemic relation of the teacher to the students' learning; the quest to understand it more and more; the relationship with objects, people, and places that can contribute to improving their understanding of learning such as books, journals, videos, internet, libraries, universities, etc.
B **Personal**	Sector 1B It concerns content as a personal object and the personal relationship of the teacher to the content; the sense that the content acquires for the teacher and how much it determines his or her professional identity; how much the teacher likes and gets involved with the subject he or she is teaching; how the teacher evaluates his or her own understanding of it, etc.	Sector 2B It concerns teaching as a personal activity and the personal relationship of the teacher to the teaching; the sense that education acquires for the teacher and how much it determines his or her professional identity; how much the teacher likes and engages in the act of teaching; how the teacher evaluates his or her own pedagogical activity, etc.	Sector 3B It concerns learning as a personal activity and the personal relationship of the teacher to the students' learning; the sense that learning acquires for the teacher and how much it determines his or her professional identity; how much the teacher likes and engages with the students' learning; how the teacher evaluates the learning of his or her students, etc.
C **Social**	Sector 1C It concerns content as a social object and to the values of the teacher in relation to the content that he or she teaches; how much the teacher shares in a community of educators and their exchanges and practices regarding content; the teacher's talks with the administrative authorities regarding the content that he or she teaches.	Sector 2C It concerns teaching as a social activity and to the values of the teacher in relation to the teaching that he or she practices; how much the teacher shares a community of educators and their exchanges and practices regarding teaching; the negotiations of the teacher in administrative instances with respect to teaching practices, etc.	Sector 3C It concerns learning as a social activity and the values of the teacher in relation to the students' learning; how much the teacher shares with a community of educators and their exchanges and practices regarding learning; teacher negotiations with administrative authorities regarding student learning, etc.

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[2] It can be observed from the didactic-pedagogical triangle represented by Figure 1 that the relations established in the classroom can be seen and analyzed from three points of view: Teacher, Student, and Knowledge. Three analysis matrices are generated: The Teacher matrix, Student matrix, and Knowledge matrix. The three instruments were developed. For now, we will present the Teacher Matrix, which is the first of them. More detail can be found in the reference Arruda & Passos (2017) (in the Portuguese language).

The Teacher Matrix is used as an analytical instrument by applying it to the semi-structured interviews of two teachers, seeking to analyze their perceptions, reflections, and actions during the activities performed in the classroom, as we will see below.

Methodological Procedures and Research Context

The research was developed in a teacher education program in the context of the development of a Scientific Initiation Project in a city in the North of Paraná, Brazil. Participating in this project were teachers who developed activities based on the perspective of inquiry-based learning with fifth-year elementary school students. The training consisted of three stages.

The first stage of the project refers to a training course for pedagogical coordinators, principals, and some teachers, for a duration of four hours, to structure the research stages developed by the students.

In the second stage, the coordinators reviewed the guidelines received in the training course for teachers who could not be present at the training.

Then, the teachers planned and developed research activities, in which students defined research problems, developed, and carried out research, and completed their work, which will culminate in the presentation and communication of the studies developed.

After closing the activities, we conducted semi-structured interviews (Clandinin & Connelly, 2000) with the teachers participating in the program activities, and the triggering questions for the collection were: "Tell us a little about your professional life history." "How was participating in the project for you?" However, once the teachers gave their testimony, other questions were formulated with the intention of deepening the discussion and detailing their comments, perceptions, and reflections regarding participation in the project and execution of the proposed activities. Due to the large amount of data obtained and the limited space for the presentation of the data, we considered the interviews of only two teachers, called teacher T1 and teacher T2. The interviews were categorized according to the usual procedures of content analysis (Bos & Tarnai, 1999; Bardin, 2007).

The data were used in the processes of interpretation and analysis, the excerpts from the T1 and T2 responses were categorized from the Teacher Matrix (assuming the matrix sectors as a priori categories), showing the distribution in terms of the matrix descriptors in the sequence. These results were analyzed and systematized to reveal teachers' perceptions and reflections on experiences with the development of the proposed activities in the teacher education.

Presentation and Analysis of Data

For the presentation and analysis of the data from interviews with the teachers in the research, designated T1 and T2, we adopted the following procedure:
1. We initially present the transcription of a part of a speech, for each research subject; the sentences are formed by phrases, each indicated by a number.
2. Next, we present a version of the Teacher Matrix (Table 2) for each subject, with sectors filled in with the numbers of the sentences, according to our interpretation.
3. Next, an analysis with a brief commentary on the characterization of the subject from the distribution of their sentences is performed.

Teacher T1

I lived in City A. I worked in City A 6 years as a temporary teacher. (1) I then took the contest in Cty B, and I am working for 4 years and I am also working for 1 year in City C. (2) I have a degree in Pedagogy and a postgraduate degree in inclusive education and psychopedagogy. (3) In City C I worked at Santos Dumont School with the Science project (4). It was very rewarding and I really enjoyed developing the project. (5).

It was a challenge, a very big challenge (6). At first, there was some fear and insecurity about what the project would be (7), but from the moment the project began, it sparked the children's interest (9), so, in the end, it was very gratifying—very much so—(10) to see their interest in the research, to ask (11): "No teachers; people were missing, but tomorrow, let's ask again!" (12) For example. The students that did the research interviewing the teachers. Wow! Their interest! (13) It was very gratifying indeed! (14) Seeing them seeking information, (15) chasing after it and if it didn't look good, and doing it again! (16) "Teacher! Come help us! "(17) Sitting with them and helping them was really great! (18) I think it was a very nice growth for me too. (19).

The course was very good because it provided a base (20). We got a little scared because it was new (21), but we already knew what it would be (22), so it provided a basis (23). Then, we started (24) and knew more or less how it would be (25), what the final product would look like (26), what type of guidance people would provide (27), Was very good! (28) The positive point was this growth both for me as a teacher (29) and for the students as well. This involvement, this growth, (30) this way the student became closer to the teacher. (31) It was very good! It was very rewarding indeed! (32).

 It was busy, time went fast, (33) in the research. You helped a lot, the emails etc. (34) This support you gave was important, very important (35). However, it is a question of time (36). There is some anxiety as a teacher (37) because that was a short time (38), and we want to see the end result soon (39) but with more calm (40). This support you gave was reassuring and very reassuring.

If I would participate? Yes, I would participate! (41) Because seeing this growth of the students, (42) this involvement, being closer, (43) researching together, (44) this growth, both of them (45) and ours as well. (46) Because you gave support, (47) it was really good. (48) We had the confidence to be doing and growing together. (49)

I tried to start from the content we were working on (50) and from their reality (51). Then, we talked to them (52) and resumed some of the content that was being worked on (53). They asked questions (54) based on their interests (55). From there, we were already planning (56). They organized the team. (57) They even put team´s name. (58) It went well! (59) I was leaving them choose and chose then the names also. (60) I went to look and said, I want teams like that. (61) A student was getting lonely, so I said no, there's this group here. (62) So, at first I left and then I started to mediate the activities (63), but I left them there (64). I suggested, I said: group 1, group 2, "And if it has a name?" (65) Wow, that's where they went, so they wanted to draw (66), so I got involved with them (67). I got organized (68), but from the content that we had, I went to work (69) from some themes (70). There were children who brought some information from home because they went searching. (71) Already had content that had been worked. (72) Students were pointing, "I googled about candy!" "I googled about food!" (73) Some brought it from home research and (74) we also tried here at school, (75) but due to problems with the internet, we couldn't do it in class. (76) Then we ended up bringing some papers to them, (77) to complement the research done. (78) Each group had the texts (79). They read and scratched out (80). It was not only one paper, there were more papers (81), so they read and rephrased (82), then talked among groups (83). There was information that was found in one place and in other places. (84) There was information that matched, which matched in some papers, (85) and they said, "this one does not have on mine". (86) There were children who sought something else (information, content) from this paper and brought it into the classroom. (87) The students were writing the work. (88) Later, from this initial text, they were already developing and writing (the research text) (89) and also had the logbook. (90) In this diary the theme was chosen, and they wrote down everything. (91) After each step they took, they scratched, wrote again, and called me to show it. (92) Was worked a lot in groups, each one in its group. (93) They called me I went from group to group (94) answering, doing everything with them, (95) and at each moment of the research they registered. (96) In this way, even conclusions they wrote, (97). Sometimes, they wrote in sketches and later in the logbook (98), because one was writing, the other was writing, each one wrote (99). Then they read, summarized, and joined, (100) so it was good teamwork (101). They went on helping each other (102): one read a text and said, "I don't get it!" (103) There, they changed the text, (104) then I said no, you can change it (105): one team member can help the other (106), and you must learn to work together (107). That was cool (108) for them too (109).

It was based from what they wanted to choose, (110) so they raised the subjects. For example, illness, (111) pain, gastritis, arthritis, etc. From there, we narrowed the search. (112) But it was based from what they wanted to be researching. (113) I was helping with the topics, to not get too broad, (114) but always from what the team would like to research. (115) So first, it was workout on the board, (116) then they jotted down (117) and it was between 2 subjects, and from those 2 it was chosen. (118) It was pretty hard to choose too. (119) Then, to define

the problem, I also had to help them. (120) Because one spoke, another also spoke. (121) So, I directed. But let's think. What can we do? (122). Then, it was always with them from there (123), sometimes on the board, sometimes on the paper sheet. There, I went back to the board again (124). Because of that, the team sometimes voted between them (125), but it was cool like that (126) because they were getting along (127).

We started in June and ended in July (128). It was held in a month! (129) One class passed by my lab three times a week, and the other passed two times (130), so what did I do? (131) For example, in this class I gave less work and I exchanged with another class. (132) I asked the teacher to be with a class to that I provided the most work and service. (133) I asked to change, so that I could develop the activities of 3 out of 3. (134) After a while I was more in the individual service, (135) each working on his/her writing. (136) So I took group by group. (137) Because when they were with me in class, each one in their group and I attended individually. (138) They said, "Teacher!" (139) Read it. How was it? (140) While I was attending a group, the others were doing their work. (141).

We develop the activities as follows. While each was inside still the working on something they had not yet finished, and they kept working to finish. (142) Then if I am working with a group and they are not done. (143) I asked, what is the relation? (144) Linking a little with what we had learned in the classroom and then we continued the development of the activities. (145) We seek to do such work this way. (146) I was reading and after the group that was last, we asked: how this reading is linked to what we learned? (147) Then they commented on it. (148) This was for those who had not done all the reading of the content. I was doing like this way. (149) This way of working I did when I was at the end of the activities. Some groups had already finished. (150). Classes were one hour long (151) in the beginning. They were a little shorter in June (152), but then in July, when I came back, it was one hour (153). There were five classes reduced to four classes in the period (154); they occurred three times a week, and each lesson lasted one hour (155). It was a good time (156) before when there were five classes; they gave 50 minutes of class (157), ours was well … (159) but they were already forming the group and knew what was going on (159), then so, only in the very first days, but then they already ... (160) They said, "But, is it over, teacher? Change the class!!" (161) They wanted to stay like this ... (162).

If there was learning? There was learning, (163) especially like this, when they were going to talk about their work, (164) the conviction they were talking about. (165) When some of them presented the work to their friends, I realized that they got very nervous (166), and we talked like this: "Talk your way!" (167) So, the first time here is ours ... I said, "Be calm, people!" (168) "Let's introduce the class!" (169) Then, it was quieter (170). "Oh my god," they said (171 When they presented and a little friend stopped talking, the other kept saying "We did not do it that way, and we summarized our research the other day!" (172) It was amazing when the friend (student) was presenting (the research), you realized that they were paying attention to what others (colleagues) were presenting (173). As it was a subject about food, they commented: "we could have put that part of the content in ours too!" (174) It was very cool (175), both for them and for the other classes they presented (176). The other classes wanted to do it too (177); they said, "When are we going to do it from there?" (178) "How did you do the research like this?" "When are we going to do it?" (179) So, I said, "Look, in the fifth year you will be performing" (180). "Wow, but only in the fifth year?"

I believe so (there was learning). (182) Looking into their reality. (183) Let's think. The science content (they have contact) only here at school? (184) No, it came out of here (this conclusion that the content of the science subject is not present only at school), let's say so. (185) They saw that food is on daily life, in people's daily lives, (186) so they (learned it). I believe so. I thought to myself, "Look the kids know, they have this knowledge !!" (187) It was very cool! It is as if they were researchers, (188) and they were working there, investigating, it was very cool. (189) Brought knowledge, professional growth, experience (to me). (190) They felt very important, (191) it was very good that they went there and presented (the search results). (192) Because when they had the presentation here at school for their parents, they wanted to be presenting (they wanted to present). (193) They could stay there (place the posters were presented as a result of research), they would pass by (looking, watching). (194) At the time they were setting up (poster placement structure), they would say, "Can we stay here alreadyt?" (195) It was very good (196).

Table 3. Allocation of the narrative excerpts of Professor T1 in the Teacher's Matrix sectors

New tasks of the teacher Relationship of teacher Relationships with knowledge	1 **Management of the T-K segment** **Content**	2 **Management of the T-S segment** **Teaching**	3 **Management of the E-S segment** **Learning**	
A **Epistemic**	**1 A** 23, 26, 50, 51, 53, 69, 70, 72, 74, 76, 77, 78, 85, 91, 96, 110, 112, 113 118, 174, 183, 184, 185.	**2 A** 6, 19, 22, 33, 36, 38, 41, 46, 56, 61, 63, 64, 65, 68, 75, 90, 104, 105, 107, 114, 116, 120, 122, 124, 128, 129, 130, 131, 132, 135, 136, 137, 138, 140, 143, 146, 147, 149, 151, 152, 153, 154, 155, 157, 167, 168, 169.	**3 A** 12, 13, 15, 16, 42, 45, 66, 71, 79, 80, 82, 87, 88, 89, 92, 97, 98, 99, 100, 103, 106, 111 117, 121, 127, 142, 145, 148, 150, 159, 161, 163, 164, 165, 171, 172, 173, 177, 186, 187, 191, 193.	60%
B **Personal**	**1B** 21, 25, 28, 29, 119.	**2B** 1, 2, 3, 4, 5, 7, 10, 14, 32, 37, 39, 40, 48, 108, 156, 158, 190.	**3B** 8, 9, 11, 18, 30, 43, 44, 55, 59, 109, 126, 162, 166, 170, 175, 182, 188, 189, 192, 196.	24%
C **Social**	**1C** 20, 27, 34, 47.	**2C** 31, 35, 49, 52, 54, 67, 94, 95, 123, 133, 134.	**3C** 57, 58, 83, 93, 101, 102, 115, 123, 125, 141, 176.	16%
	18%	38%	44%	100%

When finding the interview fragments in Table 3, the presence of these fragments is evident in all sectors of the Teacher Matrix. The reflections and perceptions of T1 on their actions during the activities developed are predominantly in the columns referring to the teaching taught (column 2) and student learning (column 3), thus expressing their concerns, difficulties, and successes in the development of their practices, and especially student learning, which has the largest number of excerpts characterized in this column (column 3). A lower incidence of speech is identified regarding the reflections and perceptions about content taught or the knowledge developed by the teacher (column 1). When we look at the lines that concern the epistemic (A), personal (B), and social (C) relations, a greater number of sentences are identified with the epistemic relations of the teacher, with a predominance of the reflections of the teacher in the relations epistemic with the act of teaching (2A). There are also many passages from the speeches characterized as epistemic relations with learning (3A).

We then observe that some reflections presented with relatively higher incidence in terms of personal relations with learning (3B) and teaching (2B), expressing interest and a taste for the development of the activities. Finally, it is possible to observe a lower incidence in the sectors of the matrix associated with the relation of the social to knowledge, with emphasis on sectors (3B) and (3C), presenting perceptions and reflections about social relations with teaching and learning.

Teacher T2

I have been here in the network of ... since January 2015, so this year, I am new here and new to the profession (197). I had worked already but in early childhood education, so the first contact with elementary school was here in the municipality of ... (198). I graduated 3 years ago, will complete 4 years. My education is in pedagogy, and I have a master's in education (199) in Early Childhood Education from a private network school (200).

For me as a person—I'm going to talk as a person—I loved it (201). When we went to the meeting, I did not know the proposal, and when we started talking, we got anxious (202) because of working (203) as a professional I've always been in this environment. For me, it was very good (204). It was very good because I had already worked for a long time with Scientific Initiation (205), so I kind of passed on to children my passion

for initiation (206), for this work. I think it was what helped facilitate the process (207), but I do not know if it was because we did it in the fifth year (208). I had no difficulty while the children were able to keep up with the work, and it was quiet (209).

On the strengths (of the project). I consider the following points first: the work differently, inserting children into this research environment (210). In the classroom we cannot do this, daily life does not allow (211). So, do in the laboratories, where the all-day schools have this possibility (212). Working differently in the classroom (213), involving children in things they are not used to (214), or even know that existed (215). So, prepare them for the future (216), because today more and more people are seeking higher education (217). In this way, they will already be used to it (research), as well as knowledge (218). They research, they build their knowledge (219), do we help? They are there (doing the research) step by step. It is not a thing (a way) that I transmit knowledge already produced (220), and they get there and absorb the knowledge, and everything is fine (221). They built, they saw and interacted (222). There were some things that didn't work out and they got upset (223) but understood that it's part of the process (224). So, for us as teachers it was a gain (225), but for them it was a lot more (it was a bigger gain) (226).

Only thing I think is the question of time (to implement and execute the project activities). The time to do the work (227). I understand. I know it was a new idea of the activities to applied on the system (county education system), when we went there on the course, and then we went back to school. I started working with the students (228). But we stagnated at the beginning (there was no progress of the activities), because we did not receive the information of the dates and deadlines, and when it arrived the information, it almost no time (229). We had not done the research yet (230). We used the Interviews, because we choose to use interviews as data for research (231). So, it got busy (232) and I had this class with them once a week only. (233). If there was a possibility to have more time, it would be more elaborate work (234). It was a little fast (235), but it went well. But if I had a longer time .... I don't know if it possible to change the number of classes in the class, spend more time (per week). If it was a longer period. I think it would be better (236). I would certainly participate because I like research work (237), I saw that it worked (238), the children liked it (239), and it was a pleasant job for the teacher (240) and for the students (241).

When I returned the school, I showed the children the material we took in the course, and I said to them that the other children had done research (242). I showed the other children's subjects as example and let them choose (243), (later) I didn't let them choose too much so that they wouldn't stir away (from the content), because things might start to emerge (subjects that aren't part of the content) (244). .. So I delimited a few things. I showed them what could be researched and what would be too broad for us (245). I talked with them about it and did the methodology with my science class and here in the computer lab (246). We worked together, then did research (247). When I chose a theme I started to plan (248). A difficulty of the school is that there's the internet, there's the lab, there are computers, but there's no internet, so it made it a bit difficult, too. What did I do? When they chose a theme, I would go to my house to search for articles (249) and bring them to them. Then, they would join each group, read the text, and summarize it in computer class (250). I have been working with this material (251). I worked with tables, with graphs, then I set up slides, and I showed them to them here in room (252). In the notebook they recorded what they had understood of each item. Then, when we finished this phase, they understood each part and produced summaries (253).

We began writing, uniting the two (activities done in science classes and activities in the computer lab), wrote here (science classes) and wrote there (computer lab) the research itself (254). In the beginning, I brought texts to them of research and elaboration of research— step by step texts (255). I was showing here and they were reading there and making brief not to get a little confused (256), me teaching one thing (activities and tasks) here (science classes) and them doing there (computer lab) something else (activities and tasks) (257). It was when they understood that the research had several stages and they had to write and do each of these parts (258). When we started, I brought the texts of each of the themes, and they sat in a group. Everyone had to read, based on their own dynamics: in one group, one member read and discussed, while in another, everybody read and organized themselves (259); that was quiet, and from there, we worked that way (260).

 When I suggested the subjects. I didn't suggest! When I showed the topics that (other) children researched with the other teacher (261). They were already interested in some (262), so I said they could not be the same. To find different ones, I sat with each group and gave them a science book, the journal of Children's Science Today (263), to inspire some themes (264). While the other groups were thinking, I would sit in one group and say, "Let's work like this. Food? What about food? As? What are you thinking?" (265) So, they talked about a lot of

things, and it was like that. I went from group to group and we closed all the issues and problems (266). This was done with three classes of three groups each. Each class was held once a week, but they had two classes. each class lasted 1 hour and (did the research activities) a little bit in each class. But in the computer lab, the teacher didn't just work on it (the research activities). Here it was just that (research activities). When she worked (the teacher of the computer lab) they had 2 classes, when it wasn't just me (only one class) (267). While I was developing the research, they did not develop other content, but the themes were within the contents. They didn't stir from it (the subject). One group talked about feeding, while another discussed ultraviolet rays, a topic also included in the content. That way it didn't stir too much (from the theme) and until you sent the schedule with the dates, I was working like this (268). Because there are 2 classes, right. A part of the class I worked with contents and the other with research. When the dates were sent, the deadlines, the time left (for the deadline) was short. I said, "let's work only on the research until it's over," so we developed it this way (269), so I think if there is more time, we can reconcile the two (content and research) (270). Because [...], what if a research is not linked to the contents. We would have to work with both of them anyway. No problem! (271).

I remember, we worked we worked without the return (information) of deadlines for about a month, but nothing concrete, we had not even started, I was in this process of teaching the parts and doing the resumes (272). When the deadlines came, it was another one month, so let's say two months until the delivery for the preparation (of the posters of the research presentation). It was short! (273)

The very day I saw (the posters with the survey results) was at the presentation, I think it was a milestone (meaningful to me) (274). I saw them explaining; we got anxious (275). I said, "They will not succeed (276). We're afraid, right? They will not make a mess." We get more nervous than them. I was anxious and that, but when I saw them explaining, how cute!! (277) And the other students also from the other schools and they were convinced, right, "I did! I learned it!" (278) So, at that moment, I saw that the work was really worth it (279), because while you're in the room, they're talking, they're still involved (280), and there's a little friend to help (281). When I read the texts (to evaluate and revise). I was there with them, and there was always another (colleague, friend of them) to help (282). So, when they sat down (at the location of the presentation), and they were in front of people who didn't live with them and started explaining to people without reading the supporting text, I said, "Oh they learned!" (283).

I realized (that they learned). When we were finished with the research, and I returned to the contents of the class. Everything I was going to talk about the subjects of the class. Everything we said (in class) they mentioned and discussed: "Look, teacher, you can search!" (284) Do you know they were already thinking of this as researchers (285): "The teacher was able to do an interview!" So, with everything we said, they were always pulling something from scientific initiation (286); it was a milestone (287). We had the presentation of papers here last week, and they wanted to present it again. I hung up the banners, and they said, "So we'll introduce? Let's introduce a teacher; let's introduce ourselves!!" (288) So, I saw it is already present in their lives (289). If you continue the work, if there in the state one day you have this dynamic, they will ... You will like it! (290) And How was something (a knowledge) that built step by step (by them). Do not forget T! (291) They were researching, we were ... I would go, I would sit with each group explaining. They read, so it was something they built, and I think they will never forget it! (292).

As was observed for teacher T1, T2 also presents many speeches related to reflections, perceptions, and actions related to learning (column 3) and teaching (column 2), even more predominantly than observed in T1. Only one speech of T2 was characterized in column 1 as being related to content: specifically, in sector 1A of Table 4, the epistemic relation to content. Most interview fragments focus on the sectors (2A) and (3A) of Table 3, characterizing the epistemic relationship to teaching and learning, demonstrating a reflexive movement of the act of teaching and perceptions and reflections about the learning of students. A smaller number of interview fragments are observed in the (2B), (3B), and (3C) sectors of the matrix, being the relationship of the personal to teaching, the personal to learning, and the social to learning. No fragment was allocated to sectors (1B), (1C), or (2C), that is, the relationship of the personal to content, social to content, and social to teaching.

Table 4. Allocation of the narrative excerpts of Professor T2 in the Teacher's Matrix sectors.

New tasks of the teacher Relationship of teacher Relationships with knowledge	1 Management of the T-K segment Content	2 Management of the T-S segment Teaching	3 Management of the E-S segment Learning	
A Epistemic	**1 A** 249	**2 A** 197, 198, 199, 200, 204, 205, 211, 212, 213, 220, 221, 225, 227, 228, 229, 232, 233, 234, 235, 236, 238, 242, 243, 245, 246, 248, 251, 252,254, 255, 257, 259, 261, 267, 268, 269, 270, 272, 273	**3 A** 203, 208, 209, 210, 214, 215, 216, 217, 218, 219, 222, 224, 226, 230, 231, 244, 253, 256, 258, 271, 276, 278, 280, 281, 282, 283, 284, 285, 286, 289,291	74,70%
B Personal	**1B**	**2B** 201, 202, 206, 237, 240, 279.	**3B** 223, 239, 241, 260, 262, 264, 265, 274, 275, 277, 287, 288, 290	20%
C Social	**1C** .	**2C**	**3C** 247, 250, 258, 263, 266.	5,30%
	1,05%	47,30%	51,65%	100%

Final Considerations

In this work, we present an instrument to analyze the reflections, perceptions, and actions of teachers in the classroom. We consider as a starting point that the classroom is a didactic system (didactic-pedagogical triangle), that is, an open system, in contact with society, consisting essentially of the teacher, the students, and the knowledge. Relationships must be maintained among them to produce teaching and learning (Author2, Author1, & Author3, 2011). The didactic system or didactic-pedagogical triangle can be considered a system of relations to knowledge in a classroom, which involves the teacher (T), students (S), and knowledge or content (K). We re-interpret classroom management and content management as relationship management, and the didactic system can be understood to be a system of relations to knowledge in a standard classroom, where S is the "student group," K is the "knowledge to be taught," and T represents the "teacher." From Charlot, the relations of knowing would be of three types: the epistemic relation to teaching knowledge (disciplinary, pedagogic, and didactic), which would be more related to the processes of understanding; the personal relation, which would have more to do with feelings and the formation of a sense of this knowledge for the teacher; and the social relation, associated with the fact that the teacher is immersed in a community of educators (elementary school teachers, university professors, researchers, administrators, etc.), as well as parents and students.

These ideas were then synthesized and schematically structured in the Teacher Matrix indicated in Table 2. We then applied research in science teaching. The instrument was used in the organization and date interpreted from interviews with teachers working in elementary education on the development of activities based on research teaching in a continuing teacher training program. As a result, we obtained a profile of each of the interviewed teachers and characteristic movements, identifying aspects of their reflections and perceptions regarding content, teaching, and learning, as well as the epistemic, personal, and social relations associated with managing the relationship to knowledge in the classroom.

The obtained results indicated that the reflections and perceptions of the interviewed teachers showed their concern with students' learning during the development of the activities and their teaching and actions as teachers. Finally, it is possible that Table 2 can be used as an instrument for diagnosis and planning in teacher education and in teacher planning in the classroom.

Acknowledgements or Notes

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Assessment in Vocational Education and Training Aligned to the Intent of Underpinning Units of Competency – An Australian Application Overview and Use Case to Competency Based Training

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Abstract: This article explores approaches to assessment of competence against nationally recognized units of competency and considers these approaches with regard to the intent of the underpinning units of competency and the notion of compliance with the Standards for Registered Training Organizations (RTOs) 2015, in particular Clause 1.8. Specifically, the review investigates whether components of units of competency, such as performance criteria and performance evidence should be used as observation criteria for performance assessment tasks used to determine competence. The article concludes that the intent of a unit of competency is embodied in its components, and that units of competency outline competency standards. Given that units of competency provide a benchmark for assessment, they should be used as such. The benchmark can then be used for consistent approach to assessment and any assessment tool review or validation activities and can thus potentially limit the amount of non-compliances experienced in the vocational education and training sector. In order to do so, assessment tools should, for practical observation tasks include observation criteria that duplicate the performance criteria and performance evidence of a unit of competency together with robust task definitions. Using common benchmarks increases the likelihood that another Assessor would make the same judgement, based upon the same evidence.

Keywords: vocational assessment, units of competency, observation criteria, assessment methods, performance assessment

Introduction

Australian Skills Quality Authority (2019a) outlines Clause 1.8 of the Standards for Registered Training Organizations (RTOs) 2015 require that a Registered training Organization (RTO) must implement an assessment system that ensures that assessment that complies with the assessment requirements of the relevant training package or Vocational Education and Training (VET) accredited course and is conducted in accordance with the Principles of Assessment and the Rules of Evidence. Principles of assessment are summarized as Fairness, Flexibility, Validity and Reliability. Australian Skills Quality Authority (2019) describe Fairness as inclusive of consideration of an individual learner's in the assessment process and the provision of reasonable adjustments to take into account the individual learner's needs. They also state that RTO's are required to inform learners about the assessment process and provide the learner with the opportunity to challenge the result of the assessment and be reassessed if necessary. Flexibility entails reflecting the learner's needs; assessing competencies held by the learner no matter how or where they have been acquired; and drawing from a range of assessment methods and using those that are appropriate to the context, the unit of competency and associated assessment requirements, and the individual. Validity requires assessment against covering the broad range of skills and knowledge that are essential to competent performance. It also requires the integration of assessment of knowledge and skills with practical application and that assessment is based gathering evidence that demonstrates that a learner could demonstrate these skills and knowledge in other similar situations. A further aspect of validity is that judgement of competence derived from assessment is based on evidence of learner performance that is aligned to the unit/s of competency and associated assessment requirements.

The Rules of evidence are summarized as Validity, Sufficiency, Authenticity and Currency. Validity relates to assessing the skills, knowledge and attributes as described in the module or unit of competency and associated

assessment requirements. Sufficiency outlines the need for quality, quantity and relevance of the assessment evidence to enable a judgement to be made of a learner's competency. Authenticity assures that the evidence presented for assessment is the learner's own work and Currency assures that the assessment evidence demonstrates current competency.

These Principles of Assessment and Rules of evidence must be integrated into all assessment activities undertaken by RTOs to determine competence of an individual against training package derived units or qualifications or VET accredited course. These principles and rules ensure assessment is provided in the context of workplace, take into account individual needs and meet quality requirements. Australian Skills Quality Authority (2019a) further advises that performance evidence and knowledge evidence describe what a student must demonstrate in order to be considered competent. Performance and knowledge evidence are defined for each unit of competency and form part of the assessment requirements for the unit of competency. Units of competency are defined as the skills and knowledge to operate effectively and how they need to be applied to perform effectively in a workplace context (Australian Skills Quality Authority, 2019b).

Hodge (2014) illuminates that in Australian vocational education and training, the skills and knowledge deemed essential to perform in occupations covered by the VET system are identified by industry representatives and this content is recorded in competency standards. Hodge also highlights that it is the job of VET practitioners (designers, trainers, teachers and assessors) to interpret these competencies and design and/or facilitate learning and assessment on the basis of this interpretation. Determination of the intent of the unit of competency then is the responsibility of each of these practitioners. This interpretation of intent affects the assessment approaches and corresponding assessment tools developed. Hodge found that VET practitioners experience difficulties interpreting competencies and that many find the language of competencies difficult to decipher. Given the difficulties in interpretation identified in Hodge's study, where VET practitioners create observation criteria for assessment outside of the defined performance aspects of the unit, they introduce their own subjective interpretation to the assessment task, and potentially their own misconceptions. This is true of any competency-based system.

The Department of Training and Workforce Development (2013) describes that assessment tools are made up of a number of components including: the context and conditions for the assessment; the tasks to be administered to the student; an outline of the evidence to be gathered from the student; the evidence criteria used to judge the quality of performance, for instance, the decision-making rules; and the administration, recording and reporting requirements. Assessment is the process of collecting evidence and making judgments on whether competency has been achieved. Assessment tools used to ascertain competence generally consist of a scenario/outline of the situation, instructions for people involved in the activity/simulation, instructions for the student and the lecturer and an observation checklist. The evidence criteria used to judge the quality of performance, specified in the observation checklist for practical task assessments, are the focus of this discussion. Observation checklists, as best practice, should be backed-up with corresponding tangible evidence.

The discussion and conclusions drawn are based on a literature review together with definitions of the current practices in training and assessment of units of competency, utilized in the VET sector. This exploration considers the way units of competency are assessed to include a range of stakeholder requirements and aims to establish a basis for the use of observation criteria in practical assessments as utilized in assessment tools to establish competence. Conclusions are drawn based on the discussion with an objective to present a viewpoint.

Competency-based Assessment

The Standards for Registered Training Organizations (RTOs) 2015 aim ensure graduates meet industry expectations as expressed in training packages and VET accredited courses (Australian Skills Quality Authority, 2019a). The Standards require providers to deliver training and assessment that allows students both the opportunity and the time to develop their skills and knowledge and to practice and demonstrate their skills in a holistic and meaningful way. Australian Skills Quality Authority (2019a) outline that when developing assessment materials, developers should use the information from the unit or module elements, performance criteria and assessment requirements to determine what competence looks like. This requires a degree of interpretation by the developer of the assessment task and likewise the subsequent reviewer, such as a Regulatory auditor.

Competency-based assessment is the process of collecting evidence and making judgements about whether a person has achieved competency (Department of Education and Training, 2019). Competency-based assessment often described as a criterion-referenced process, as it involves people being assessed against fixed criteria or pre-determined benchmarks, such as those expressed in units of competency or accredited modules. Australian Skills Quality Authority (2019a), however, outlines that developers of assessment tools must also ensure that assessment tools are contextualized (or can be contextualized) to the student cohort to produce valid skills that are relevant to the student's industry or work context. On this basis the components of the unit of competency form the basis of the assessment's observable criteria and tasks must be developed to create context for the assessment. This approach meets the requirements, as specified by Australian Skills Quality Authority (2019a), for learners to be assessed against all of the tasks identified in the elements of the unit or module and to demonstrate they are capable of performing these tasks to an acceptable level in a range of contexts and environments. Assessment tools are utilized to achieve this objective.

Australian Skills Quality Authority (2019c) provides that an assessment tool includes the context and conditions of assessment, tasks to be administered to the student, an outline of the evidence to be gathered from the candidate and evidence criteria used to judge the quality of performance (i.e. the assessment decision-making rules). They also outline that Performance Criteria specify the required performance in relevant tasks, roles and skills to demonstrate achievement of the element. The onus, then, on designing assessment tools is on the RTO to specify the relevant tasks and assess performance in the task against the performance criteria whilst demonstrating the skills to be demonstrated relevant to the product and process as outlined in the performance evidence.

Throughout the Australian competency based training system, it is commonly appreciated that when contextualizing units of competency, practitioners, as stated by Fortress Learning (2020), must not must not remove the number and content of elements and performance criteria; may add specific industry terminology to performance criteria where this does not distort or narrow the competency outcomes; may make amendments and additions to the range statement, as long as such changes do not diminish the breadth of application of the competency and reduce its portability; and, may add detail to the evidence guide in areas such as the critical aspects of evidence or resources and infrastructure required, where these expand the breadth of the competency but do not limit its use. Contextualization is related to applying the unit of competency to a particular context, cohort or individual rather than changing the unit's content.

Assessment Tools for Performance Assessment Tasks

Performance assessment tasks, on this basis, must include observation criteria that are observed by the Assessor whilst the candidate undertakes the assessment task that duplicate the performance requirements and performance evidence of the underpinning unit of competency. Aside from performance assessment tasks, knowledge assessment tasks must be included to assess what the individual must know in order to safely and effectively perform the work task described in the unit of competency. A further consideration in the assessment tools utilized to ascertain competence is that of the Assessment Conditions. These specify any mandatory conditions for assessment and the conditions under which evidence for assessment must be gathered, including any details of required equipment and materials; contingencies; specifications; physical conditions; relationships with team members and supervisor; relationship with client/customer; and timeframe. They may also specify Assessor requirements, including any details related to qualifications, experience and industry currency.

An additional layer of complexity is added with the requirements specified in the Standards by Clause 1.5 and 1.6. These specify that the RTO needs to demonstrate that industry representatives (including employers) have contributed to the development of their assessment practices and resources (Australian Skills Quality Authority, 2019c). The purpose of said engagement with industry at the planning stage is to assist in identifying the most appropriate assessment methods an RTO should use.

The development of assessment tools therefore is a complicated activity given the range of stakeholders and Standards to be applied. For many units of competency there are additional third party regulatory requirements, for example such as those related licensed outcomes. A provider delivering and assessing the unit of competency TLILIC2016 License to drive a heavy rigid vehicle, must develop assessment tools to meet the requirements of the training package specified unit of competency, the requirements of the Standards for

Registered Training Organizations (RTOs) 2015, the requirements of the state or territory heavy vehicle regulator, the requirements of the National Heavy Vehicle Regulator where relevant, the requirements specified by industry through consultation and the requirements of state or territory work health and safety regulators where relevant. For a training provider, this can be an extremely difficult path to travel given the potential for the various stakeholders to conflict in their requirements.

There are two common threads that permeate through each of the stakeholders. The first is the intent of the unit of competency. In the case of TLILIC2016 License to drive a heavy rigid vehicle, this is to ensure that the individual successfully completing the unit has the skills and knowledge required to obtain a license to drive a heavy rigid vehicle including systematically and efficiently controlling all vehicle functions, monitoring traffic and road conditions, managing vehicle condition and performance, and effectively managing hazardous situations, as defined in the Application of the unit of competency. The second is the performance standard that the individual is required to work to. These are defined in the performance criteria and performance evidence specified in the unit of competency. On this basis, the most suitable observation criteria for a specified performance task are to duplicate or closely duplicate the performance evidence and the performance evidence requirements. This is on the basis that units of competency defines a competency standard and therefore a set of observable criteria.

Hale, Borys and Adams (2013) highlight that where two or more agencies regulate the same activity of a company, those regulations may overlap and even conflict and state "the regulator is as human as the regulated and will have difficulty processing large and complex sets of information about rules and regulated entities". The difficulty in managing the complex requirements of multiple regulators for an RTO can then lead to compromise in the quality of the training and assessment provided. Research by Ewing (2017) confirms that trainers are identified as having difficulties with interpretation, implementation and assessment of the competencies. To decide whether a person is competent, Assessors need a set of criteria or benchmarks against which to assess candidate's competencies (Department of Training and Workforce Development, 2016). It can be difficult for RTOs and their Assessors to navigate through all of these various, and sometimes conflicting, requirements.

In the VET sector, national competency standards, the smallest of which is a unit of competency, are the usual benchmarks against which a learner is assessed. Anything other than the inclusion of performance criteria and evidence as observation criteria in practical assessment tasks, removes the common benchmark defined by the competency standard that has been designed to be utilised by all stakeholders. Further, it makes it impossible for RTOs to create assessment tools that meet the requirements of the extensive range of stakeholders they must satisfy. These observation criteria are used in conjunction with the instructions to the candidate. The instructions the RTO provides to the candidate should outline the task(s) through which a learner can demonstrate competency and these instructions will prompt the learner to say, do, write or create something (Australian Skills Quality Authority, 2019c). This includes informing the learner of what they will do in the assessment and explaining to them what evidence they need to provide in response to the tasks. Observation criteria without a task specification are not an assessment tool and should not be used in this way. Practical assessment tools must include a task specification and observation criteria.

Given the observation criteria are attached to a specified task that requires a learner to say, do, write or create something, the observation criteria should not be limited to inclusion of performance criteria and evidence. Rather, they should include criteria to determine the quality of work, requirements of any health and safety standards and any other specific requirements, such as, for example conformance to the National Construction Code in building and construction units of competency. The observation criteria must allow for Assessor judgement as to how well the learner performed according to the standard expected.

It must be noted that, in accordance with the principles postulated by Hager (1995), that the narrower the base of evidence for the inference of competence, the less generalizable it will be to the performance of other tasks. This principle advocates use of multiple assessments for determination of competence, together with a range of assessment tools. Hager provides an example in that performance on paper-and-pencil tests alone would probably be too narrow a base for assessing competence in any occupation. He follows that equally, observation of performance on a sample of routine tasks would be too narrow a base for assessing competence in many occupations. The best approach then is one that utilises a mixture of the assessment methods for providing evidence on which to infer competence. The use of observation alone would not be sufficient to determine competence, particularly taking into account collection of tangible evidence of knowledge evidence

requirements of the unit of competency. This is in line with the notion presented by Baartman and Gulikers (2017), as presented in Gulikers, Runhaar and Mulder (2017), who outline that an assessment program should at least combine an authentic does/shows how-level assessment with a knows/knows how-level assessment.

Review into Australia's VET Sector

On 28 November 2018, the Prime Minister announced an independent review of Australia's vocational education and training (VET) sector to examine ways to deliver skilled workers for a stronger economy. The review was led by the Honourable Steven Joyce, a former New Zealand Minister for Tertiary Education, Skills and Employment. Mr Joyce delivered the final report to the Government in March 2019 (Department of the Prime Minister and Cabinet, 2019). The Joyce review details 71 recommendations forming the basis of a six-point plan to transform VET so it can provide students with skills that reflect the needs of employers. This plan centres on strengthening quality assurance, speeding up qualification development, simplifying funding and skills matching, providing better careers information, providing clearer secondary school pathways into VET, and providing greater access for disadvantaged Australians.

Joyce (2019) identifies that many training providers worry whether Australian Skills Quality Authority (ASQA) will treat them fairly and reasonably during the audit process and notes they have little understanding of the approach ASQA will take when it comes time for their next audit. Likewise, Jenkins (2019) illuminates that the Director of employment, education and training at the Australian Chamber of Commerce and Industry, Jenny Lambert, recently argued ASQA had become too focused on compliance and the VET sector's approach to assessment needed an overhaul. As such, both Joyce (2019) and Jenkins (2019) indicate that there is a potential issue based on an inconsistent interpretation of what assessment should entail. Where there is a high degree of interpretation required to develop assessment tools, there is a lot of room for potential non-compliances being identified in ASQA audits. These non-compliances may result from differences in interpretation between stakeholders in the VET sector. This quite likely, on the basis of not applying the components of the unit of competency as a competency standard and hence observable criteria.

Understanding what evidence is required for each unit is essential for the RTO to make valid judgements for each unit (Department of Training and Workforce Development, 2016), and a common benchmark is critical in determining the evidence requirements and avoidance of subsequent non-compliances. This, in particular, where instructions are well defined. Instructions for the learner and the trainer/assessor are an integral part of all assessment tools. Instructions should respond to questions regarding the 'what, when, where, how and why' of assessment processes (Department of Education and Training, 2019). This is consistent with the view presented by the Training Accreditation Council (2018) that in VET assessment there are fixed performance standards set to reflect industry needs. These are specified as units of competency, and all aspects (100%) of the requirements of the unit are required to be judged to be competent. These rigorous requirements maximize consistency, reliability and validity.

Assessment Tools and Benchmarks

Assessment tools, on this basis need to be designed to facilitate the tell aspect of knowledge evidence and the do aspect of performance evidence. As such, an assessment tool will have at least two components, one to collect evidence through questioning, either written or oral, and one to collect evidence through observation. The tell component should have a set of written benchmarks as examples of suitable responses from the candidate being assessed. These 'benchmark answers' indicate to the Assessor of typical acceptable responses such that assessment can be consistently applied to all candidates and quality in the assessment system can be maintained. Similarly, the observation criteria set the benchmark for observable tasks. The observations should not have benchmark answers as they are assessing a candidate's ability to do something within a workplace context, whether simulated or actual, and the context of the unit of competency requirements. There can and will be overlap between the two components in collecting evidence.

If, for example, we take a performance criteria such as "Construction hazards are identified and discussed" from the unit competency such as CPCCWHS1001 Prepare to work safely in the construction industry (Commonwealth of Australia, 2019), assessment lends itself to both observation and telling. Observation in that did the candidate identify construction hazards in a particular environment and did they provide discussion of

said hazards. In order to effectively assess this performance criteria in the context of a workplace, the candidate should for a worksite clearly identify hazards and orally discuss these. Written questions can be used for the knowledge evidence requirement "identify hazard" and "construction hazards" which also address in part the performance criteria. The hazards present on the site used for the assessment will be determined by the site in which the assessment takes place. These may, or may not include, asbestos, confined spaces, electrical: power lines, cords and equipment, excavations and trenches, including underground services, dust, falling objects, hazardous substances and dangerous goods, hot and cold work environments, manual handling, noise, plant and equipment operation, traffic and mobile plant, unplanned collapse, ultraviolet radiation, and working at heights, including scaffolding. Each of these hazards should be assessed using knowledge questions to ensure coverage and observation can be used where they may be present on the site.

This approach will maintain assessment practices against the intent of the unit in so far as establishing a person's competence against a competency standard. John (2018) highlights that a benchmark is an assessment standard or a set of standards that is used as a point of reference for evaluating performance or a level of quality. Observation tasks require operational benchmarks and these are defined in the performance criteria making up the elements and the performance evidence requirements specified in the unit of competency.

In the application of an assessment task, the Assessor needs to know exactly what they are looking for, what resources are needed, and any other issues that need to be taken into account (Department of Training and Workforce Development, 2013). They also need to know how to use the observation checklist. These requirements are specified within the instructions to the assessor and in the assessment tasks specifications and definitions. These can also be supported with which can be derived from the evidence guides in the unit of competency.

The designed tools must also adhere to the principles of assessment, which include the following: validity, reliability, flexibility and fairness (John, 2018). Validity is the extent to which evidence gathered can be supported from the design assessment tools. Reliability follows as the consistency that tools used for one set of candidates can be used to assess other candidates of the same competencies and generate the same results. Flexibility allows assessment candidates ample time to understand the terms of the assessment. Finally, the element of fairness means criteria should not discriminate against an individual or group of candidate. This can best be achieved by matching the unit requirements.

Conclusion

The intent of the unit of competency is summarized in its components and these components define the competency standard to say, do, write or create something in a workplace context. It is therefore reasonable to infer that these components should be directly observable when determining competence while using a performance assessment tool. Using competency standards in the manner they were and are intended, that is as a benchmark, will remove a great deal of confusion and misunderstanding amongst stakeholders in the VET sector, including Regulators, Industry and Industry bodies, RTOs, Assessors and those responsible for assessment validation activities.

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An International Partnership Workshop Report and Evaluation: Taibah University, Kingdom of Saudi Arabia and George Washington University, United States of America

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Abstract: This paper sheds light on one of the key phases in the service contract of the international partnership between TBU in Saudi Arabia and George Washington University (GWU) in the US to develop a doctoral program of philosophy degree (PhD) in educational leadership and administration. The aim of the research was to evaluate the first workshop that took place over six working days in TBU. The first part of the study provides an executive summary of the workshop. The second part analyses the data collected from a questionnaire distributed to all workshop attendees. On the basis of the data, a summary of the main themes that arose in the workshop is provided, and the action items and priority areas that require further deliberation are identified and analyzed. Most respondents expressed interest in participating in future workshops and other joint projects between the two universities, and only two negative comments were recorded throughout the data. After sharing the results with team members, they commenced work to improve the program in all its aspects on the basis of the feedback received.

Keywords: university partnership, TBU, George Washington University, workshop, joint project

Introduction

Like other countries, Saudi Arabia is currently investing a great deal of effort into developing expertise and providing the necessary resources required to address the various needs of all sectors. To move away from oil dependence, the country has launched 'Saudi Arabia's Vision for 2030' (2016) (Henceforth, Vision 2030) to support the development of a diverse economy by improving other key service sectors such as education, health, infrastructure, tourism, and recreation. For the education sector, there are various ways that the planned development can be achieved at different levels. One way is through the implementation of a list of 80 projects, one of which aims at elevating the status of at least five universities in Saudi Arabia to be ranked in the top 200 universities globally. To attain this objective of Vision 2030, many universities have begun taking various measures.

Internationally, universities have been partnering for quite some time now (Jie, 2010) with the last 20 years witnessing great expansion in these partnerships. A majority of universities in Saudi Arabia today are involved in at least one partnership. To achieve its mission, TBU believes that partnership agreement is the way forward in developing high quality postgraduate programmes. Thus, TBU partnered with George Washington University (GWU) in the US to develop a doctoral programme of philosophy degree (PhD) in educational leadership and administration. In previous research, Alhazmi (2018) provided the details regarding this partnership, the aim of which was to provide consultation research and help to TBU in two tasks: first, curriculum design for a Doctor of Philosophy degree (PhD) to be offered by the Educational Administration Department, and second, to collaborate in the implementation of a Post-master's certification programme (PMC) in educational leadership offered by GWU to eligible TBU students.

A service contract was signed between TBU and GWU to seal this partnership. To ensure its success, the partnership is to be implemented in several phases. One phase entailed holding workshops in both universities. This research aims at describing and evaluating the first workshop that took place in TBU in ALD in Saudi Arabia. The author was one of the key representatives of the programme and has been highly involved in all

phases of the contract. As such, she is a concerned stakeholder. This research evaluates only the first workshop held under the partnership between TBU and GWU. The second workshop will be covered in another study.

Evaluation is defined as the assessment of a program, project, or policy that is either completed or ongoing. It is conducted in a systematic and objective manner and is targeted at the design, implementation, and result of the project or programme. According to Umhlaba Development Services (2017), an effective evaluation provides information that is not only credible but useful in allowing the lessons gained to be factored into future decision making. This study aims at evaluating the first workshop to obtain feedback from all participants and by this means to improve the programme. To achieve this goal, this paper is divided into two main parts. The first part comprises an executive summary of the workshop. In the second part, the data collected from a questionnaire distributed to all workshop attendants are analysed. The questionnaire aimed at collecting participants' feedback on the partnership between the two universities and its chances of succeeding. The feedback findings are then incorporated into improving the programme quality to ensure that the partnership is successful and rewarding for both partners.

Executive Summary of the Workshop

The service contract between TBU and GWU indicated that the first workshop would be held with the aim of creating the PhD programme framework and providing a critical assessment of the content and standards that the PMC programme should meet. The first workshop was held from 5th to 11th December 2015 in Madinah Almunawwarah in Saudi Arabia. During the workshop preparation, all the activities were coordinated and facilitated by the design team. This document summarises the main themes that arose in the workshop as well as identifying and analysing the action items for priority areas that require further deliberation.

The first meeting with the team looked at creating the workshop framework and expectations as well as reflecting on the progress that had been made in the design of the course, mapping of the curriculum, and identification of the needs of TBU and PMC accreditation standards. The TBU team worked on preparations for the workshop for approximately three months. For the five working days of the workshop, the organizers aimed to encourage discussion between the various stakeholders, including postgraduate students, members of faculty, deans from the various educational colleges in different universities in Saudi Arabia, and the leadership of TBU. As described in section 3 below, the design and distribution of the questionnaire as well as the analysis of the collected data were conducted during the workshop. The data provided useful information for improving the programme.

Two members from GWU made two presentations on the facilities that the school and the PhD programme would require. The objectives of the workshop were as follows: establishment of a framework for the PhD in Educational Administration and Leadership and the Post Master's Certificate programmes; outlining the design of the programme and curriculum assessment; establishment of a timeline; reviewing standards and content; obtaining the input and experience of the various stakeholders including students, members of the faculty, and other educational leaders; and identifying the expertise and capacity that TBU has for programme collaboration in the design and implementation stage of the course design. The role of the researcher as a member of the partnership was to ensure that the workshop was conducted successfully and that members from all teams were facilitated in collecting sufficient information that was required in the programme development stages. To ensure that the team from GWU obtained a better understanding of schools in Saudi Arabia as well as general life in the area, the workshop concluded with visits to Saudi schools and a university college in Yanbu industrial city to help the team develop a programme that is both realistic and valid (see workshop schedule).

The workshop included various activities that facilitated the interaction of the attendees both orally and through questionnaires. The teams from both sides met before, during, and after the workshop and held discussions on the opinions gathered in the workshop to facilitate planning in the subsequent stages. An English language report was written by the team from TBU University and sent to the GWU team. In return, the GWU team provided feedback on the report. Deans of the education faculties of the various universities in Saudi Arabia were targeted by the workshop and were invited both to share their own experiences and to learn from the experiences of the GWU team. The GWU team was responsible for the Education Facility Clearinghouse (EFC), which is a project funded by the federal government of the United States with the aim of disseminating information on school buildings and equipment to researchers and experts. Because researchers in Saudi Arabia did not provide sufficient attention to school buildings and other facilities, the team from Saudi Arabia wanted

to take advantage of the experience of the GWU team and learn the various techniques for the improvement of school buildings and equipment.

The presentation consisted of the following:
- The presenters shared statistics demonstrating that 90% of Americans called for more investment in improving school buildings and other facilities.
- Safety and security standards for schools were also presented as they are essential elements in the hierarchy of human needs.
- The presentation also included the results of an empirical study that demonstrated a strong correlation between the quality of school buildings and pupils' cognitive achievement.
- It was also demonstrated that the new internal control and the safety of students may inform the development of green building standards that include areas such as means of transportation (safety specifications of the driver and vehicle) and the procedure to be adopted in cases of an external or internal safety threat to students.
- The importance of having medical staff in school so that they can always follow up the health of students and address such issues with high professionalism to ensure their safety was also presented. It was demonstrated that 60% of students suffer from diseases such as nausea, asthma, allergies, rashes, and sick building syndrome due to unhealthy school buildings. Other adverse impacts of unhealthy buildings include poor student learning and behavioural discipline issues.

Workshop Objectives

The objectives of the workshop are summarized below. To comply with the terms stipulated in the service contract and approved by the two institutions, the first workshop addressed the following objectives:

- Create a framework for the PhD in Educational Administration and Leadership and Post Master Certificate programmes;
- Develop an outline for the programme and assessment of the curriculum
- Establish a timeline
- Review contents and standards
- Gather the experience and input of students, faculty, and university leaders
- Establish the experience and capacity that exist among staff in TBU to facilitate the design and implementation of the course
- Hold a meeting between the TBU and GWU teams before, during, and after the workshop
- Take comments and points raised during the various discussions during the workshop
- Disseminate the questionnaire
- Analyse the questionnaire
- Generate an English written report by TBU team
- Generate a reflection report based on the response of GWT team on the TBU report.
- Create a timeline for the next stages of the service contract

Workshop Schedule

- Sunday - A meeting to establish the framework for the workshop is held between the two teams from TBU and GWU. A meeting with faculty from the Department of Education, administration and graduate students of the College of Education.
- Monday – meeting with the managerial staff of graduate studies including the Deans and Vice Deans and Vice President for Graduate studies and Research. A meeting is also held with faculty from the College of Education in TBU.
- Tuesday – A meeting with the design team comprising GWU and TBU staff for reflection, feedback, and final report writing guidelines. A meeting with other educational leaders including school principals, supervisors, and representatives from the Education Authority.
- Wednesday – A meeting with educational college deans in Saudi Arabia and departure for the Yanbu visit.
- Thursday – Visiting university colleges and schools in Yanbu Industrial City and return to Madinah

❖ Friday – Guests depart from Madinah to Washington, DC.

As a key member of the team, the researcher noted that the workshop objectives had been achieved and the evaluative feedback provided by the workshop attendees is provided in section 3 below.

Methods

Questionnaire and Sample

This study adopted a positivistic paradigm to analyse the numerical data obtained from the closed-and-open-ended questionnaires. This method was selected for practical reasons. The use of the questionnaire has certain advantages, such as allowing reliable collection of large-scale data using the systematic approach (Gay, 1992). Second, the use of a questionnaire allows data to be collected from many respondents within a short time and at a lower cost. Additionally, the level of interference by the researcher in questionnaire data collection is reduced (Sarantakos, 1998). It was also easy to distribute the questionnaire among all the workshop attendees. The perception of participants on the partnership between TBU-GWU could be ascertained through the data collected using the questionnaire. It was considered that the quality of both the programme and the courses would be significantly improved based on the feedback provided in the questionnaire and would thus lead to the success of the partnership.

Part one of the questionnaire collected demographic data on participants including their job (dean, faculty member, educational leader, university administration, student, and other). Part two of the questionnaire was split into six sections: Programme relevance, Programme pedagogy and approaches, Programme content coverage, Programme uniqueness (devoid of unnecessary duplication), Partnership model, and Contemporary topics covered during the workshop. Part two asked respondents to rate statements on a 5-point scale from 1=unacceptable to 5=excellent or exceptional. Part three of the questionnaire employed the open-ended approach that enhanced the closed-ended questions by allowing respondents to comment freely.

In designing the questionnaire, the Arabic language was first used, and it was then translated into English and shared with the GWU team. Before the questionnaire was tested, a careful and accurate review was conducted by teams from both universities, and this entailed reviewing all phases of the service contract between the two universities. Several questions in the questionnaire were modified before the researcher produced the final version that was distributed to the approximately 150 attendees. As mentioned, the attendees are drawn from different backgrounds, both inside and outside the university, and all had a post-graduate level qualification and valuable information and experience.

Data Analysis

The following statistical methods were used to analyse the data:

1. Frequencies and percentage.
2. Mean and standard deviation to measure either positive or negative responses, using a five-point Likert scale to indicate the degree of acceptance of statements:
   1- unacceptable
   2- poor
   3- acceptable or good
   4- very good
   5- excellent or exceptional

Table 1. Gender

|	Frequency	Percent	Valid Percent	Cumulative Percent
Male	42	65.6	65.6	65.6
Female	22	34.4	34.4	100.0
Total	64	100.0	100.0	
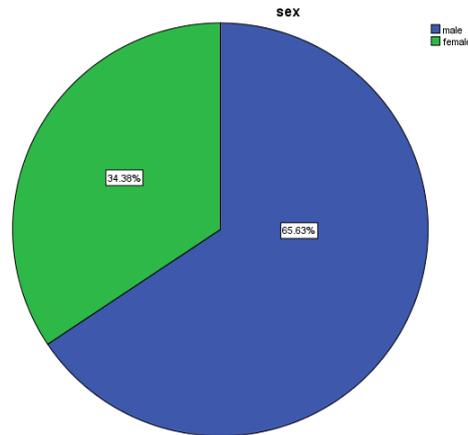
Figure 1. Gender

Table 1 and Figure 1 above show that 65.63% (42) of the participants are male and 34.38% (22) are female.

Table 2. Job

|	Frequency	Percent	Valid Percent	Cumulative Percent
Dean	6	9.4	9.4	9.4
Faculty Member	6	9.4	9.4	18.8
Educational Leader	1	1.6	1.6	20.3
University Administration	29	45.3	45.3	65.6
Student	20	31.3	31.3	96.9
Other	2	3.1	3.1	100.0
Total	64	100.0	100.0	
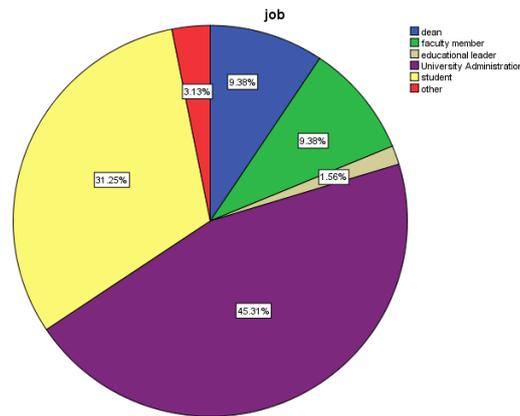
Fig 2. Job

Table 2 and Figure 2 above show that the majority of participants 45.31% (29) comprised university administrators, followed by 31.25% (20) who were students, and finally, an equal percentage of both deans and faculty members (9.38%).

Table 3. Program Content Coverage

|	Frequency	Percent	Valid Percent	Cumulative Percent
Unacceptable	4	6.3	6.3	6.3
Poor	4	6.3	6.3	12.5
Acceptable or Good	21	32.8	32.8	45.3
Very Good	28	43.8	43.8	89.1
Excellent or Exceptional	7	10.9	10.9	100.0
Total	64	100.0	100.0	
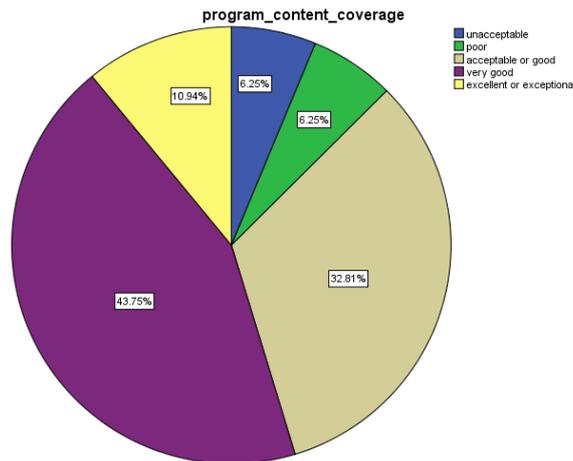
Figure 3. Program Content Coverage

Table 3 and Figure 3 show that nearly half of the participants 43.75% (28) agree that the programme content coverage is 'very good' while only 4 participants (6.3%) answered that it was 'unacceptable'.

Table 4. Program Relevance

	Frequency	Percent	Valid Percent	Cumulative Percent
Unacceptable	3	4.7	4.7	4.7
Poor	5	7.8	7.8	12.5
Acceptable or Good	20	31.3	31.3	43.8
Very Good	27	42.2	42.2	85.9
Excellent or Exceptional	9	14.1	14.1	100.0
Total	64	100.0	100.0	
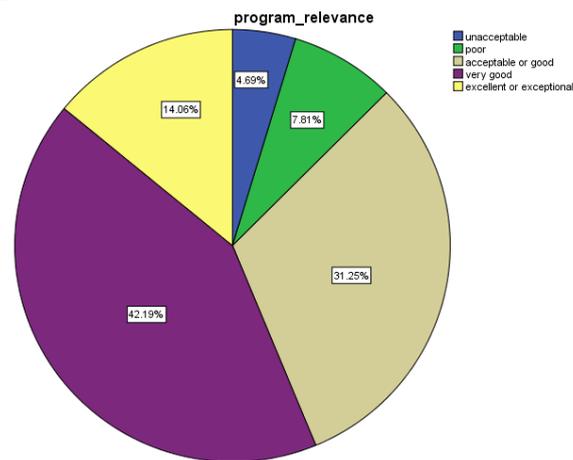
Figure 4. Program Relevance

Table 4 and Figure 4 above demonstrate that 27 respondents (42.2%) agree that programme content relevance is very good, followed by 20 (31.3%) who agree that is acceptable or good, and only 3 (4.7%) who disagreed and answered with unacceptable.

Table 5. Program Uniqueness

|	Frequency	Percent	Valid Percent	Cumulative Percent
Unacceptable	2	3.1	3.1	3.1
Poor	5	7.8	7.8	10.9
Acceptable or Good	23	35.9	35.9	46.9
Very Good	22	34.4	34.4	81.3
Excellent or Exceptional	12	18.8	18.8	100.0
Total	64	100.0	100.0	
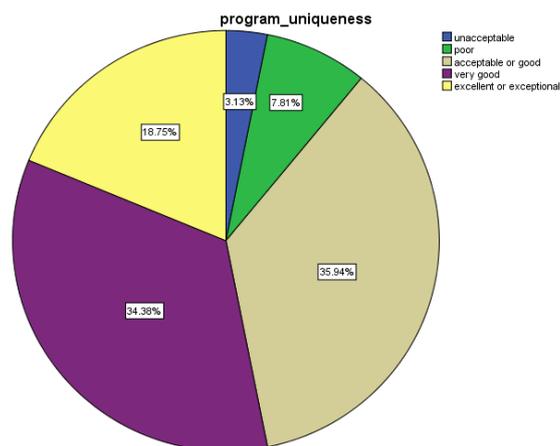
Figure 5. Program Uniqueness

Table 5 and Figure 5 above show that 23 (35.9%) participants agree found programme uniqueness to be acceptable or good, while and 22 (34.4%) found it very good.

Table 6. Program Pedagogy and Approaches

	Frequency	Percent	Valid Percent	Cumulative Percent
Unacceptable	2	3.1	3.1	3.1
Poor	5	7.8	7.8	10.9
Acceptable or Good	20	31.3	31.3	42.2
Very Good	27	42.2	42.2	84.4
Excellent or Exceptional	10	15.6	15.6	100.0
Total	64	100.0	100.0	
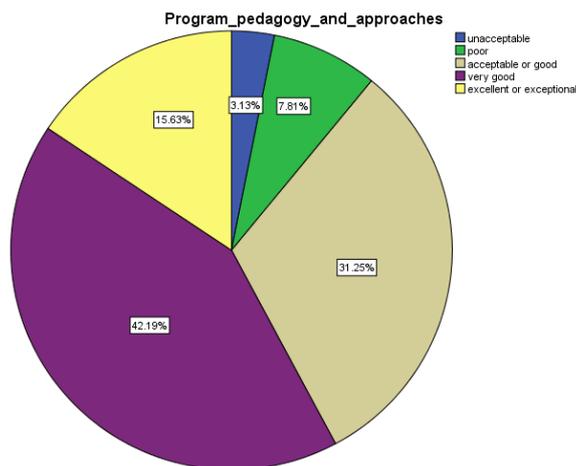
Figure 6. Program Pedagogy and Approaches

Table 6 and Figure 6 above show that 27 (42.19%) participants found programme pedagogy and approaches to be very good, while 20 (31.3%) of them found them to be acceptable or good.

Table 7. Partnership Model

|	Frequency	Percent	Valid Percent	Cumulative Percent
Unacceptable	2	3.1	3.1	3.1
Poor	4	6.3	6.3	9.4
Acceptable or Good	10	15.6	15.6	25.0
Very Good	22	34.4	34.4	59.4
Excellent or Exceptional	26	40.6	40.6	100.0
Total	64	100.0	100.0	
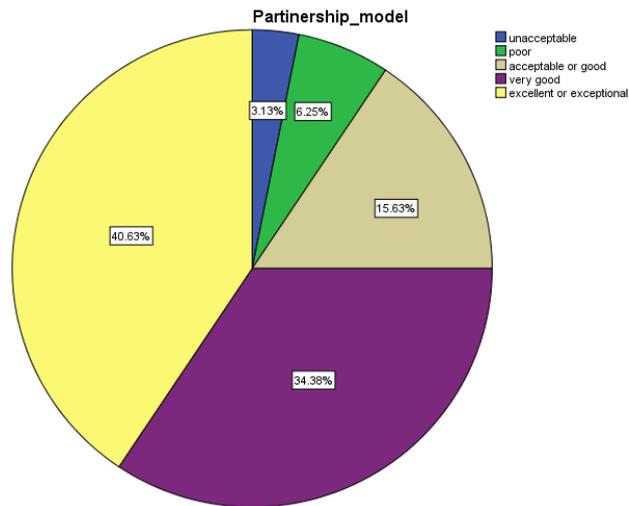
Figure. 7. Partnership Model

Table 7 and Figure 7 above show that 26 (40.6%) participants agree that the partnership model is very good, while 22 (34.4%) agree that it is excellent or exceptional. Table 8 and Figure 8 above show that 24 (37.5%) participants agree that the Contemporary topics covered are very good, while 17 (26.6) find them acceptable or good.

Table 8. Contemporary Topics Covered

|	Frequency	Percent	Valid Percent	Cumulative Percent
Unacceptable	2	3.1	3.1	3.1
Poor	10	15.6	15.6	18.8
Acceptable or Good	17	26.6	26.6	45.3
Very Good	24	37.5	37.5	82.8
Excellent or Exceptional	11	17.2	17.2	100.0
Total	64	100.0	100.0	
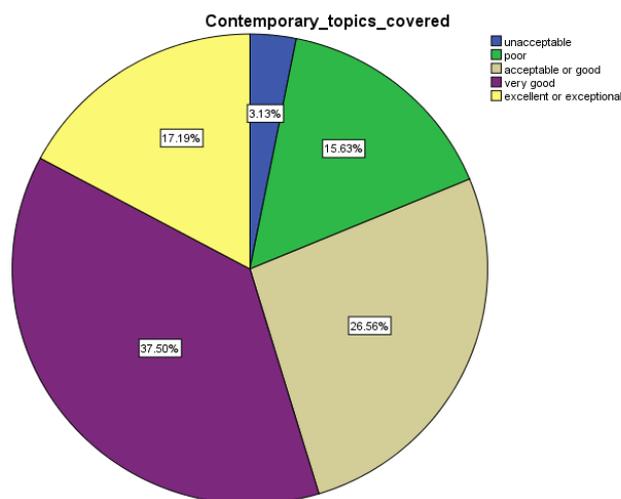
Figure 8. Contemporary Topics Covered

Table 9. The Mean and Standard Deviation for the participant agreement regarding the programme relevant to the KSA context (N=66)

Item	Excellent or exceptional		Very good		Acceptable or good		Poor		Un acceptable		Mean	STD.	Rank	Agreement Level
	F	%	F	%	F	%	F	%	F	%				
(1) Rate the uniqueness of the programmes in terms of providing knowledge, skills, and dispositions not addressed in the existing TBU program.	7	10.9	28	43.8	21	32.8	4	6.3	4	6.3	3.4687	.99153	6	Very good
(2) Rate the degree to which the programme is relevant to the KSA context	9	14.1	27	42.2	20	31.3	5	7.8	3	4.7	3.5313	.99153	4	Very good
(3) Rate the uniqueness of the programme in terms of providing knowledge, skills, and dispositions not addressed in the existing TBU program.	12	18.8	22	34.4	23	35.9	5	7.8	2	3.1	3.5781	.98890	3	Acceptable or good
(4) Rate how the instructional approaches used facilitate active learning among adults/professional educators.	10	15.6	27	42.2	20	31.3	5	7.8	2	3.1	3.5937	.95483	2	Very good
(5) Rate the viability of the partnership model in terms of supporting research, teaching, and exchange programmes between the two universities.	26	40.6	22	34.4	10	15.6	4	6.3	2	3.1	4.0313	1.05362	1	excellent or exceptional
(6) How do you rate the quality of topics and contents covered on key topics-facility planning; programme and course design, in terms of addressing topical issues for university faculty and administration?	11	17.2	24	37.5	17	26.6	10	15.6	2	3.1	3.5000	1.05409	5	Very good

Summary of Data

- In sum, 40% of respondents agree **found** the viability of the partnership model to be 'excellent' or 'exceptinal' in terms of supporting research, teaching, and exchange programmes between the two universities.
- 43.8% of respondents agree that the uniqueness of the programmes in terms of providing knowledge, skills, and dispositions not addressed in the existing TBU programme is **'very good'**.
- 37.5% of respondents agree **that** the quality of topics and contents covered on key topics-facility planning; programme and course design is **'very good'** in terms of addressing topical issues for university faculty and administration.
- 42.2% of respondents agree **that** the instructional approaches used to facilitate active learning among adults/professional educators are **'very good'**.
- 35.9% of respondents agree that the uniqueness of the programme is **'Acceptable or good'** in terms of providing knowledge, skills, and dispositions not addressed in the existing TBU program.
- 42.2% of respondents agree that the degree to which the programme is relevant to the KSA context is **'Very good'.**

Results

Thirty-three of the questionnaires included suggestions and comments, which were analysed using two methods:

1- Analysing comments inside each item from 1 to 6 separately.
2- Analysing comments from open-ended questions as themes. Seven themes were identified, and both ways of analysis can be summarized in the following table:

1. Comments from Each Item		
N	**Items**	**Comment**
1	Degree to which the programme content, both for PMC and PhD, covers the knowledge, skills, and dispositions required by educational leaders in KSA	- Adding some courses that are relevant to Saudi culture - Determine the principle's need in schools. - It seems that the programme covers all needs but it might be difficult to apply. - The programme does not mention learning English language.
2	Degree to which the programme is relevant to the KSA context (additional elements you would like to see to make the courses more relevant	- Concern about the differences of objectives between TBU and GWU - adding courses of change management - Programme should be related to the current power that is available to principles in Saudi schools. - the Ministry of Education should force principles to attend such programmes. - TBU must prepare all facilities to serve this programme. - Including a course that helps principles to deal with students' misbehaviour.
3	The uniqueness of the programmes in terms of providing knowledge, skills, and dispositions not addressed in the existing TBU programme.	- Consistency and cooperation between team members. - The programme added a new culture in our college. - The programme concentrates on the practical side while other programmes in TBU concentrates on the theoretical side.
4	How the instructional approaches used facilitate active learning among adults/professional educators.	- staff in the education sector have some facilities but they still require a training programme to use them effectively
5	The viability of the partnership model in terms of supporting research, teaching, and exchange programmes between the two universities.	Research is a vital point that both universities should think about.
6	the quality of topics and contents covered on key topics—facility planning; programme and course design, in terms of addressing topical issues for university faculty and administration	*'GWT do not add more details about the whole program'.*

2. Comments from Open-Ended Questions

N	themes	Comments
1	Course and programme development	- If the programme does not cover the English course, students may pay for this course as a major requirement for admission. - The courses provided in the PMC programme are interesting and useful. - Courses must be held in the afternoon. - Provide an optional course selected by students themselves based on their needs in the field. - Attract faculty members from different countries in the world. - Create a local advisory board to provide permanent feedback. - Assess the programme permanently. - Promote the concept of distance education - Educate all students regarding all details of the programme before they start. - Change the name of the course school law to 'Educational legislation' or 'educational ethics' - Add some courses such as: Human Resources Management - Performance Measurement system – Quality management - Economics of Education – and Crisis Management
2	Programme admission	- Increase the number of accepted students. - Students should be selected carefully in terms of quality and English proficiency. - Students should be originally principals.
3	Research	*'There should be research teams from both institutions (TBU&GWU) to promote publication; GWU can facilitate publishing and reviewing while TBU can provide the field data collection and administration of instruments and materials. Action research can then become part of this partnership program'.* - Collaborative research is a great point but both universities should have consistent standards. - It would be a good idea if students were involved in collaborative research. - Both universities should have a Permanent Committee for Research. - Published research from GWU should be translated into Arabic for TBU students.
4	Accreditation	*'I believe it is important to focus on the requirements of the NCAAA (National Commission for Academic Accreditation and Assessment) because it is the body granting accreditation in the KSA. CAEP standards and N-CATE standards are fine, but NCAAA is more important for the local level'.*
5	Advertisement	*'The demand for the programme would be for a PhD but I think students would not be exited to attend a PMC programme as it is not popular in Saudi education and its future is not clear in terms of career progress. Therefore, there should be more advertisements about the programme and its benefit to encourage them to attend'.* - Issue an annual book containing the programme requirements, its features and standards.

Conclusion

In conclusion, this paper has shed light on one of the key phases of the service contract in the international partnership between TBU in Saudi Arabia and George Washington University. It supports the objectives stated

in Vision 2030 for the Kingdom of Saudi Arabia. With the primary purpose of reducing the country's dependence on oil, Vision 2030 supports the development of a diverse economy by improving other key important service sectors for the country, such as education, health, infrastructure, tourism, and recreation.

In this respect, TBU partnered with GWU to develop a doctoral programme of philosophy degree (PhD) in educational leadership and administration. In previous research, Author (2018) provided the details about this partnership, which aimed at the provision of consultation research and helping TBU to design a curriculum to develop a Doctor of Philosophy degree (PhD) to be offered by the Educational Administration Department as well as to collaborate in the implementation of a Post-master's certification programme (PMC) in educational leadership offered by GWU to eligible TBU students. This research aims at describing the first workshop that took place in TBU within six working days. It provides an evaluation of the first workshop under this partnership that took place in ALD in Saudi Arabia. The author was one of the key representatives of the programme and is highly involved in each of the phases of the contract and therefore a concerned stakeholder. This research aims at describing the first workshop that occurred in TBU. It provides an evaluation of the first workshop under this partnership that took place in ALD in Saudi Arabia. The author was one of the key representatives of the programme and is highly involved in each of the phases of the contract and therefore a concerned stakeholder.

This study aims at evaluating the first workshop to obtain feedback from all participants in order to improve the programme. To achieve this goal, this paper was divided into two main parts. In the first part, an executive summary of the workshop was provided. In the second part, the questionnaire data from workshop attendants was analysed. The questionnaire aimed at collecting participants' feedback on the partnership between the two universities and its chances of succeeding. The feedback obtained will be analysed and the findings incorporated to improve the programme quality to ensure that the partnership is successful and rewarding to the partners.

 The first workshop involved the creation of the PhD programme framework and provided a critical assessment of the content and standards that the PMC programme should meet. During the workshop preparation, all activities were coordinated and facilitated by the design team. This document provides a summary of the main themes that arose in the workshop as well as identifying and analysing the action items to prioritise areas that require further deliberation.

Two members from GWU made two presentations on the facilities that the school and the PhD programme would need. The workshop had several objectives that included the following: establishment of a framework for PhD in in Educational Administration and Leadership and the Post Master's Certificate programmes; outlining the design of the programme as well as assessment of the curriculum; timeline establishment; reviewing standards and content; obtaining the input and experience of various stakeholders including students, members of the faculty, and other educational leaders; and identifying the expertise and capacity that TBU has for programme collaboration in the design and implementation stage of the course design. The role of the researcher as a member of the partnership was to ensure that the workshop was conducted successfully and that members from all teams were facilitated in collecting sufficient information that was required at the programme development stages. To ensure that the team from GWU obtained a better understanding of schools in Saudi Arabia as well as general life, the workshop concluded with visits to Saudi schools and a university college in Yanbu industrial city to help the team develop a programme that is both realistic and valid (see workshop schedule).

It can be said that all the objectives of the workshop that are summarized below were successfully achieved. A framework for the PhD in Educational Administration and Leadership and Post Master Certificate programmes were created; an outline for the programme and assessment of the curriculum were developed; a timeline was established; the contents and standards were reviewed; the experience and input of students, faculty, and university leaders were gathered; the experience and capacity that exists among staff in TBU to facilitate the design and implementation of the course was established, a meeting was held between the TBUT and GWU teams before, during, and after the workshop, the comments and points raised during the various discussions during the workshop were noted, the questionnaire was disseminated and analysed, an English written report was generated by TBUT team, a reflection report was generated based on the response of GWT team on the TBUT report, and finally a timeline was created for the next stages of the service contract.

Generally, it can be said that most respondents expressed interest in taking part in future workshops, and in other joint projects between the two universities. Only two negative comments have been found in the whole

data. the researcher, after getting all these results shared the team members who worked together to discusses the feedback of the first workshop. They concerned about all these points emerged from participants and based on that and on phases of the service contract they started working to improve the programme in all its sides. In addition, the two teams prepared a reflective report, which also established a timeline for the next phase of the service contract. They developed a plan for PMC course delivery, and agreed on the final courses for inclusion in the new Ph.D. programme in Educational Administration and Leadership. The team then prepared preliminary proposals for admission to the program, comparing the criteria for the Saudi National Accreditation with the academic standards set out at GWU. After this work, the framework for the doctoral programme was discussed among the two teams in preparation for its translation. Finally, a second workshop was arranged at GWU, and a report on the second workshop added to the partnership file. This workshop is explained in greater detail in the following section. Finally, the second workshop and the implementation of this partnership would be included in other research by the researcher.

Acknowledgements

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Investigation of University Students' Online Unethical Behaviors

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Abstract: Ethics is a philosophical discipline that has a very long history and deals with the compliance of individuals or avoidance behaviors entirely and has many subheadings. Ethical problems created by computer technologies are examined under computer or informatics ethics. Computer ethics is defined as a dynamic and complex field of study that analyzes the relationship between facts, conceptualizations, policies, values and instantly developing computer technologies. Computer ethics are generally categorized under the ownership, accuracy, access and privacy topics. This study aims to investigate the relationship between university students' online unethical behavior and their gender, educational status, and ethics course experience. A total of 530 university students, 269 female and 261 male, constitute the study group of the research conducted with the correlational study model. Research data were collected through the "Online Unethical Behaviors Scale." Independent samples t-test were used in the analysis of the data. The t-tests revealed a significant correlation between gender and online unethical behavior. It was also concluded that there was no significant correlation between online unethical behavior and ethics course experience and educational status. The findings were discussed within the framework of the literature, and suggestions were presented.

Keywords: online ethics, unethical behaviors, university students

Introduction

Rapid development in technology and the increase in information in online environments have led to a number of problems, as well as conveniences such as access to information independent of time and space. One of the most important of these problems is that the internet is not used safely and consciously within the framework of ethical rules. Especially with the widespread use of the internet, ethical behavior in online environments has begun to gain importance within the scope of information security (Erdoğdu, Gökoğlu, & Çakıroğlu, 2019). Therefore, it is seen that concepts such as computer ethics, information ethics, or technological ethics have been used in our lives since the 90s when computer technology began to be a part of our daily lives (Dedeoglu, 2006).

Ethics is a philosophy branch that examines and investigates what is good and right, what is bad and wrong, focusing on which elements a moral and virtuous life contains (Cevizci, 2008), and it has not only a theoretical but also a practical dimension (Buckinghans, 2012). Ethical rules related to the field are developed and attempted to be applied based on who or what are affected by these actions (Tosun, Geçer, & Kaşıkçı, 2016). The internet environment, which has a broad audience of users and data, is also an area with its own unique code of ethics. These rules are mainly about respecting other people in a virtual environment and reducing the negative aspects of the internet (MoNE, 2004).

Moor (1985) stated that the problems encountered as information ethics stem from the failure to determine the necessary principles regarding how computer technology should be used, and defined the informatics as "*Analysis of the nature and social impact of computer technology and the appropriate establishment and justification of the relevant principles for the ethical use of this technology.*" Mason (1986) stated that there were many problems to be solved in computer ethics, but identified privacy, accuracy, intellectual property, and accessibility issues as a particular concern.

When the literature was reviewed, it was seen that although the number of studies on online ethics is increasing every day, it is not sufficient. Ercan (2009), in their study, suggested that ethical problems were mostly caused by individuals using the internet. In another study, Söylemez and Balaman (2015) argued said that especially young people could easily express words that they cannot express face-to-face in a virtual environment. Yüce (2010) also stated that when it comes to informatics ethics and rules of behavior on the network, the young population can easily break these rules on the internet. Akyazı, Dilmen, and Kara (2008) expressed in their study that the subject of informatics ethics is a subject that should be emphasized insistently.

Purpose of the Research

In this study, the relationship between university students' online unethical behaviors and their gender, educational status, and ethics course experience was investigated. Information ethics is important in terms of issues such as the fact that information becomes more vulnerable to virtual attacks with the rapid advances in technology, the world has become an open market as a result of globalization, and the increase in the number of users of websites and web pages (Söylemez & Balaman, 2015). In this context, this study was conducted with the variables that can be examined in studies in the field of informatics ethics with the participation of the young generation called today's digital natives. In this context, the study seeks answers to the question, "Do university students' online unethical behaviors differ by their gender, educational status, and ethics course experience?"

Method

This study is descriptive research conducted in the correlational survey model that aims to determine the existence and/or degree of significance between two or more variables (Fraenkel & Wallen, 2009).

Study Group

The study group of this research includes a total of 530 university students, 269 female and 261 male, studying at the associate degree and undergraduate level. The applicable sampling method, as one of the random sampling methods, was used in the selection of the study group. The mean age of the study group is around 21.

Data Collection Tools

The individual information collection form developed by researchers to obtain demographic information such as age, gender, educational status of participants and the "Online Unethical Behaviors Scale" developed by Genç, Kazez and Fidan (2013), were used to determine the participants' online unethical behavior levels.

Data Analysis

Data obtained in this study, which examined university students' online unethical behaviors, were analyzed by means of the trial version of SPSS 21 statistical package software. Besides, whether online unethical behavior varies based on demographic information was investigated using the t-test.

Findings

Demographic Characteristics of the Study Group

The percentage and frequency values of the study group for gender, educational status, ethics course experience, and demographic data for the purpose of using the internet are given in Table 1.

Table 1. Demographic Data of the Study Group

	Variable	N	%
Gender	Male	261	49.2
	Female	269	50.8
Educational Status	Associate Degree	292	55.1
	Undergraduate Degree	238	44.9
Ethics Course Experience	Yes	248	46.8
	No	282	53.2
	Total	**530**	**100**

Based on the figures in Table 1, it is understood that the number of female (n=269; 50.8%) and male (n=261; 49.2%) participants in the study are close to each other. The number of students at the associate degree (n=292; 55.1%) is higher in terms of the distribution of the educational status. Additionally, it is seen that the number of students who have not previously taken an ethics course is higher (n=282; 53.2%).

Online Unethical Behaviors by Gender, Educational Status, and Ethics Course Experience

T-test results regarding the gender, educational status, and ethics course experience with regards to university students' online unethical behaviors are shown in Table 2.

Table 2. t-test Results of Online Unethical Behavior Scores Based on Gender, Educational Status, and Ethics Course Experience

Variables		N	$\bar{X}$	S	sd	t	p
Gender	Male	269	54.51	21.31	528	3.86	<.001*
	Female	261	62.18	24.29			
Educational Status	Associate Degree	292	57.43	26.33	528	.945	.345
	Undergraduate Degree	238	59.34	18.46			
Ethics Course Experience	Yes	248	57.29	20.31	495	.579	.563
	No	282	58.48	23.86			

p<0.05

Table 2 suggests that university students' online unethical behavior scores are significant in terms of gender ($t_{(528)}$=3.86, p<.05). It is also deduced that the scores of male students ($\bar{X}$=62.18) are significantly higher than female students ($\bar{X}$=54.51). This finding can be interpreted as online unethical behaviors differ by gender. According to the results of the analysis conducted in terms of the educational status, no significant difference is found between online non-ethical behaviors of students with an undergraduate degree ($t_{(528)}$=.094, p>.05). Similarly, the mean scores of the students who have previously taken the ethics course ($\bar{X}$=58.48) did not differ significantly from the mean scores ($\bar{X}$=57.29) of the students who have not previously taken ethics courses ($t_{(495)}$=0.57, p>.05).

Discussion

In this study, which analyzed the relationship between university students' online unethical behavior and their gender, educational status, and ethics course experience, it was found out that gender and unethical behavior differ significantly. According to the results of this study, male students are more likely to engage in unethical behavior online than female students. The reason for this can be explained in the form of the roles given to women in social terms and the expectations from them. In addition, it can be said that this result can also be

related to the time spent by male on the internet and computer. In the literature, there are different studies that conclude that men use computers and the internet more than women (Kelleci et al., 2009; Kulu, 2012). Salman (2019) also expresses that increasing internet usage time could lead to facing more unethical behavior and exhibiting more unethical behavior. In other studies carried out by Kiere and Cronan (1998), Lau and Yuen (2014), Virtue (2008), Sarikoc (2018), and Torun (2007), it was similarly concluded that male students exhibited more unethical behaviors than female students.

Considering the relationship between university students' online unethical behaviors and their educational status and ethics course experience, it was concluded that there was no significant difference between these variables. The reason for the lack of a significant difference regarding the unethical behavior at the associate degree and undergraduate degree may be due to the fact that the mean age of the study group is approximately the same. In the literature, it was stated that the unethical behaviors of individuals might differ based on their age since their cognitive levels change as they age (Salman, 2019). In this study, the close age of the study group can be considered as the reason for the lack of a significant result in relation to the educational status. Different conclusions can be drawn by repeating the study with different age groups. Erdem (2008) and Çelen (2012) also concluded in their study that unethical behavior does not differ by educational status.

The reason why there is no significant difference between ethics course experience and online unethical behavior might be because of the fact that the study group is a young population and the young population is also prone to computer and internet use, or the education provided is not efficient due to the lack of a theoretical framework. Zeybek and Beyhan (2014) underlined in their study that students who use the internet at a very good level show more unethical behavior than those who use it at a lower level. Genç, Kazez, and Fidan (2013) similarly concluded that there is no significant difference between ethics course experience and online unethical behavior.

Conclusions

This study was conducted with 530 students who are studying at different grade levels in different universities in Turkey. According to the results of the study, it was found that university students' online unethical behaviors differ significantly by gender as well as that there was no significant difference based on the educational status and ethics course experience. It should be kept in mind that the research findings are shaped in line with the opinions and preferences of the university students who constitute the research sample. Based on the results obtained, considering today's technological developments, it is seen that the issue of online ethics is an important point that should be primarily focused on. Therefore, internet users should be more informed about ethics. It can be ensured that the contents of the ethics course, which is given to teaching ethical behavior, are transformed into a theoretical framework, added to the curriculum as a compulsory course, and the content is redesigned in accordance with different educational levels. The study findings can be analyzed with different age groups and different variables and compared with the findings of this study. By conducting different studies with qualitative data, future studies can examine online unethical behavior and different demographics more deeply.

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Students at HSIs in Texas and New Mexico: An In-Depth Profile of Their Backgrounds, Commitments, and Perspectives

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Abstract: Hispanic-Serving Institutions (HSI) educate nearly two-thirds of the Hispanic/Latinx students who attend college. Yet little is known about the student populations they serve. Findings from two NSF-funded surveys completed with students at 14 HSIs in Texas and New Mexico in 2018 and four HSIs in TX in 2019 are presented. The combined sample was 1,293 students. A description of the backgrounds, commitments, experiences, and preferences of students at HSIs and differences found between responses from Hispanic/Latinx and non-Hispanic students are discussed. Primary topic areas are demographics, first-generation student standing, cultural orientation, primary language and fluency in Spanish, family and work commitments, relationship status, family support, living arrangements, means of financing college, course load, STEM identity, annual income of household of origin and of personal household, locus of control orientation, familism, and experience in college. The result is a thorough and up-to-date profile of the HSI student population in TX and NM. Statistical analysis revealed multiple significant differences between Hispanic/Latinx and non-Hispanic students attending the HSIs and the presence of several significant predictors for forms of activity and patterns of commitment. The findings are immediately applicable to process, program, student support, and instructional planning, implementation, and evaluation for over 120 HSIs in the region and, by extension, to hundreds more across the United States.

Keywords: Hispanic-serving institutions, Hispanic/Latinx, first-generation college students, culture

Introduction

The material presented provides an in-depth and nuanced perspective of the student population at Hispanic-Serving Institutions in New Mexico and Texas. Comparison of the characteristics of the sample and population found both samples to be representative and to be of sufficient size for a minimum of a 95% confidence level with a 5% margin of error. In addition, the 2018 and 2019 samples align well with each other. These factors make the results directly applicable to the 120 HSIs in New Mexico and Texas in the 2018-2019 school year (HACU, 2019) and generalizable to many others. A summary and brief discussion of the findings with

substantial evidence appears below grouped as topics related to demographics and general characteristics, acculturative stress, and culture-based understandings.

Demographics and General Characteristics

The ratio of females to males at the HSIs in the sample was approximately 60% to 40%, just slightly above the 2017 national average for females in college and below it for males (NCES, n.d.). The students in the samples were predominantly single and of traditional college age. Hispanic/Latinx students made up approximately 35% of the student populations of the HSIs while non-Hispanics accounted for approximately 65%. The two largest racial groups were White/European Americans and Hispanic/Latinx individuals approximately 53% and 35% respectively. Approximately 63% of the students lived off campus. Less than 20% of all respondents indicated they had English as their second language, but that figure was 36.8% for persons identifying as Hispanic and 4.8% for non-Hispanics.

Over 50% of the respondents were first-generation college students but Hispanics were significantly more likely to be the first in their family in college, 65.4% to 39.4% for non-Hispanics. Approximately 70% of the students were actively employed paralleling nationally reported figures (Carnevale, Smith, Melton & Price, 2015) with off campus work significantly more likely than on campus employment. These descriptive patterns will not surprise persons familiar with US higher education and the NM/TX region but having more than one-third of Hispanic/Latinx students note ESL standing as well as 4.8% of non-Hispanics has implications for programming and interaction with students. ESL support programming at colleges and universities in the region should not anticipate an entirely Hispanic population and, given the reported volume of ESL students, HSI personnel in all departments should be trained in effective interaction with persons whose first language is not English. This is also a concern in advising and mentoring assignments as students at the HSIs who identified strongly with Hispanic culture or had ESL standing noted significantly different preferences for mentors than their Hispanic/Latinx peers without these characteristics (Preuss et al., 2020b). In addition, making faculty and staff aware that 70% or more of their students are likely to be actively employed and encouraging practices that increase flexibility in instruction to facilitate success in study and work is recommended.

Among the students at the HSIs, the two most prevalent and strongly held ethnic identities where Hispanic/Latinx and White/European American. Yet, ethnicity did not prove significant in consideration of the number of years of college completed. Age was the only significant predictor with each additional year accounting for 0.141 years of college completed. Older students were also taking significantly fewer hours with every additional year accounting for a decrease of 0.21 credit hours. There are a number of possible explanations for this but it is likely related to the higher percentage of married and cohabiting students in the non-traditional student group, married students reporting significantly more hours of work than single students, older students working significantly more hours than younger students (an additional 0.618 hour for each year of age), as well as every non-traditional age student who reported having a child in their home also reporting being a caregiver for that child.

Findings that were statistically significant based on ethnicity highlighted patterns that have been associated with decreased persistence and success in college as being present for many of the Hispanic/Latinx students. Hispanic/Latinx students were far more likely to report having English as a second language. They were significantly more likely to take fewer hours with Hispanic/Latinx identity accounting for .937 fewer credit hours taken per semester. Hispanic/Latinx individuals were much more likely to be first-generation college students and the first in their families to complete a four-year degree. They were more likely to rely on Pell Grants and work study positions and come from households with lower incomes. There also appeared to be a connection between work commitment and the economic conditions of the state in which the students attended college.

Students in New Mexico reported working more hours per week than their counterparts in Texas (Ramos et al., 2020) and NM has more persons at or below poverty level than Texas (Moskowitz, 2019; Center for American Progress, 2020), had the highest child poverty rate in the nation in 2017 (New Mexico Voices for Children, 2017), has more Hispanics living in poverty than non-Hispanics (Moskowitz, 2019), and has had the highest rural poverty rate in the nation (Sapin, 2016). When the areas in which significant differences were found along ethnic lines are combined they form a substantial set of experiential, participation, and economic challenges that

should encourage faculty, staff, and administrators at HSIs in the region to establish or reinforce institutional efforts to employ best practices for aiding minority, first-generation, and low-income college students.

Several traditional patterns were found at the HSIs when considering means of paying for college like females, married persons, and non-traditional aged students being significantly more likely to receive assistance from their spouse or partner in funding study and single and traditional aged students being significantly more likely to receive assistance from their families. These analyses also confirmed that Hispanics/Latinx students were significantly more likely to employ Pell Grants and work study even when comparison of Latinas to non-Hispanic females and Latinos to non-Hispanic males were completed. That form of analysis also revealed that male Hispanics were more likely than male non-Hispanics to be working to pay for college. These findings aligned with the reports of income for household of origin and personal household. Hispanics and ESL students reported significantly lower income for their household of origin (persons with ESL standing were predominantly Hispanic/Latinx individuals in the sample). Hispanic students also reported significantly less personal income. This should also be a substantial concern for college administrators and personnel. When more than one of every two prospective students is more likely to come from an ESL background, be a first-generation college student, and come from a household of origin and personal household with lower income than their non-Hispanic peers at the same HSI, radically different patterns of reaching, informing, interacting with, and aiding students will be required.

Findings for identification as a STEM student ran counter to employment trends in terms of ethnicity but aligned for gender. There was no significant difference by ethnicity for identification as a STEM student even though Hispanic/Latinx individuals are underrepresented in those fields (Arellano, Jaime-Acuna, Graeve & Madsen, 2018; Pew Research Center, 2019). There was, though, a significant difference based on gender with females less likely than males to identify as a STEM student which does align with national employment patterns (Pew Research Center, 2019). While the first result may be seen as an encouraging finding, the pronounced need for workers in all STEM fields and having nearly two-thirds of Hispanic/Latinx college students educated at HSIs makes continuous and vigorous efforts in recruiting and training STEM graduates at HSIs essential especially since few HSIs offer STEM support programming targeted to serve Hispanic/Latinx students (Preuss et al., 2019).

Acculturative Stress

The Hispanic/Latinx students at the HSIs in New Mexico and Texas indicated with significantly greater strength than their non-Hispanic peers that every category of institutional representative listed on the survey did not understand their culture, including those with instructional responsibility. This is surprising even when one realizes that most of the persons working at HSIs in the region are not Hispanic (Preuss et al., 2019). The same students were also found to be statistically more likely to alter "their behavior when interacting with faculty and staff" (Preuss et al., 2020a, p. 222) and fully 23.0% of the 2018 respondents from 14 different HSIs agreed "Hispanics feel like outsiders in college." These findings indicate far more potential for acculturative stress for Hispanic/Latinx students at HSIs in NM and TX than might be anticipated. This is a substantial concern because of the large number of Hispanic/Latinx students who attend HSIs and because a welcoming environment has been recognized for decades to be a key component in student retention and academic success (Terenzini, Springer, Yaeger, Pascarella, & Nora, 1996; Tinto, 1987).

It is a clear example of the "common disconnection between institutional diversity mission and the lived experience of students on campus" (Chun & Evans, 2016, p. 9) and represents a call for immediate action on the part of the administrators, faculty, and staff of HSIs across the region. It will be necessary to move beyond "the assumption that the attainment of a diverse student body automatically leads to realization of the educational benefits of diversity" (Chun & Evans, 2016, p. 9) to "reframing the HSI narrative" as described by Garcia (2019, p. 115) and other authors (Castellanos & Gloria, 2007; Santiago, Taylor & Calderone, 2015).

Culture-Based Understandings

To be able to reframe an HSI, a framework will be necessary. This will, of necessity, include an orientation toward Hispanic culture. As was described above, Hispanic/Latinx students at the HSIs represented in the 2018 sample exhibited both a higher internal and external locus of control than their non-Hispanic peers. This is

consistent with persistence and prevalence of Mexican American culture among Hispanic/Latinx college students at Hispanic-Serving Institutions in New Mexico and Texas as the higher internal locus aligns with a cultural emphasis on hard work, personal responsibility, and confidence in one's ability to succeed present in Mexican American culture (Aoki, 2010; Arellano & Padilla, 1996; Knight et al., 2010; Luzzo, 1997). These were also recently confirmed as Hispanic cultural values by Hispanic/Latinx students, faculty, staff, and administrators at HSIs in NM and TX (Preuss et al., 2019; Preuss et al., 2020a). The higher external locus of control rating also aligns with values Hispanic/Latinx and non-Hispanic faculty, staff, and administrators at HSIs felt characterized Hispanic culture (Preuss et al., 2019; Preuss et al., 2020a) and studies in psychology (Diaz, Blanco, Bajo & Stavraki, 2015) and health (Roncancio, Ward & Berenson, 2011) that confirm fatalistic outlooks among Hispanics. The presence of both higher internal and external locus of control illustrates the need to move beyond common or even stereotypic understandings (Arciniega, Anderson, Tovar-Blank & Tracey, 2008; Falicov, 2010) to facilitate culturally relevant and educationally advantageous interaction with Hispanic/Latinx students.

A second key value confirmed as persisting among the students, familism (Preuss et al., 2019; Preuss et al., 2020a), should be a part of any Hispanic cultural orientation. The familial orientation of current Hispanic/Latinx students is less formulaic than is the common conception and should be viewed as the outworking of a central value rather than a set of dictates. The students reported stronger attachment to their families than their peers, the sense that their academic outcome will impact their family, that their family will "greatly benefit" based on their time and effort in college, an expectation that they would use their college experience to aid family members, and a stronger expectation that they would help at home while in college than their peers. That is a familial collectivist viewpoint (Champagne et al., 2016; Ruiz, Sbarra & Steffen, 2018) rather than a set of expectations and demands.

The more explicit and limiting statements of expectations of and demands from family listed on the survey, expectations regarding involvement with family events and concerns, financial support, and the impact of family income on college attendance, showed no significant difference by ethnicity. Thus, there was also a general finding that Hispanic/Latinx students felt as supported by their families regarding their educational goals and decision to attend college as their non-Hispanic peers and that they did not face significantly different financial expectations from their families than their non-Hispanic peers. These understandings of what constitutes the outworking of familism for Hispanic/Latinx students can clearly be employed to great advantage in higher education. Apprehending, appropriately emphasizing, and facilitating the realization of these cultural values in a student's college life and experience has the potential for multiple positive outcomes for the student, for the student's family, for the institution, and even for long-term sustainability of the institution.

It must also be noted that some cultural patterns should be acknowledged in order to create structures that will help students avoid pitfalls and to educate faculty and staff to recognize warning signs of a stagnated student. For example, it is possible for the emphasis on hard work, personal responsibility, and confidence in one's ability when combined with other factors like an orientation toward not being disruptive in social settings (Knight et al., 2010; Lorenzo-Blanco et al., 2012; Pina-Watson, Castillo, Jung, Ojeda & Castillo-Reyes, 2014) and "obedience, duty, and deference [to]…position within a hierarchical structure" (Castillo, Perez, Castillo & Ghosheh, 2010, p. 164) to limit a student. Other factors like first-generation student and ESL standing can also be involved (Dennis, Phinney & Chuateco, 2005; Wibrowski, Matthews, & Kitsantas, 2017). The ultimate result, though, can be too great a reliance on individual effort and persistence to learn elements of course content while new material appears each session. This can be accentuated by machismo and its counterpart marianismo which research has shown to be associated with patterns that are not conducive to help seeking (Arciniega, Anderson, Tovar-Blank & Tracey, 2008; Castillo, Perez, Castillo & Ghosheh, 2010; Nunez et al., 2016, p. 202).

A perception that Hispanic/Latinx student are reluctant to seek assistance was also confirmed in Preuss et al's study (2019) that included responses from faculty, staff, and administrators at up to 60 HSIs. The result of this combination of factors can be students who are falling behind while putting forth their best effort and exercising personal initiative. They face waves of new sequentially linked and scaffolded information and seek in relative isolation to power through to an understanding. Yet, researchers correctly caution against overgeneralization of some elements of machismo and marianismo as negative (Castillo, Perez, Castillo & Ghosheh, 2010; Falicov, 2010). The authors agree these are "wider and much more complex" (Falicov, 2010, p. 310) "multidimensional realities" (Falicov, p. 324) rather than characteristics that should be viewed as a deficit. It is therefore important to know these values exist, to understand the possibility for them to contribute to study approaches that are less productive but also to be aware that this is not a universal circumstance. It is also necessary to know that, in

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many cases, regular and open interaction with students can do much to forestall this challenge for those prone to it. However, faculty and staff need to be made aware that this potential exists and for whom. They cannot be expected to simply intuit an understanding of what researchers call a complex and multidimensional circumstance.

A professional development pattern focused on Hispanic culture, primarily Mexican American culture in most of NM and TX, and how it aligns with the culture of higher education should be enacted by HSIs to assist the faculty and staff in understanding and aiding students. Without this, it is likely that the perception among Hispanic/Latinx student that the institutional representatives of HSIs do not understand Hispanic culture will persist as, unfortunately, few HSIs currently offer professional development programming regarding Hispanic culture to their faculty, staff, and administrators (Preuss et al., 2019).

Conclusion

The broad set of queries incorporated in the surveys of students at HSIs in New Mexico and Texas resulted in a nuanced description of the institutions' student populations. These data provided significant insight into demographics, general characteristics, acculturative stress, and culture-based understandings that has multiple implications for practice. Above all else, these data illustrate the profound need for faculty, staff, and administrators at HSIs in NM, TX, and beyond to engage in "reframing the HSI narrative" (Garcia, 2019, p. 115). The findings presented and HSIs' responsibility to educate nearly two-thirds of the Hispanic/Latinx college students in the United States (Revilla-Garcia, 2018) indicate that effort must be immediate and thoroughgoing.

Acknowledgement and Disclaimer

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Determining The Sport-Health Belief and Life Satisfaction of Participants in Recreational Activities: A Research on Private Sector Employees

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Abstract: The purpose of this research is to examine the relationship between the sport-health belief and life satisfaction of the employees participating in recreational sports activities according to few demographic variables. The research is a quantitative study and was conducted in a relational screening model. The sample of the study consists of 118 employees working in different departments of Konya Şeker Industry Trade Inc. The data of the research were analysed by using statistical software program. For data analysis, arithmetic mean and standard deviation values were determined; t-Test and One-Way Variance Analysis (ANOVA) tests were used to determine the differentiation status of the scores obtained for the variables. In addition, correlation analysis was used to determine the relationship between variables, and regression analysis was used to test the predictive state of independent variables. As a result of the research; it was determined that the scores of the participants regarding the levels of recreational sport-health belief did not differ in terms of gender, age, marital status, monthly income, department, leisure time activity, participation in recreational activities and the type of participation, but there was a significant difference in terms of the professional seniority variable. According to life satisfaction scores; it was determined that there was only a significant difference found in monthly income variable. Overall, our study indicated that there were a positive moderately significant relationship between the participants' recreational sport-health beliefs and life satisfaction and this study emphasized that as individuals' perceptions of their recreational health beliefs increased, the quality of life satisfaction also increased.

Keywords: key health, life satisfaction, employees, recreational activities, private sector

Introduction

Health beliefs are cognitive judgments formed according to the general doctrines of the inner world and society in shaping the individual's attitudes and behaviors towards health. The Health Belief Model is basically developed on the value of being protected from an illness or being healthy for the individual and the individual's prevention and protection from illness, or expectations of having healthier life (Hochbaum, 1958, Nahcivan, 2007). Considering the integrity of the person and the environment together; health and health awareness have a direct impact on the individual's personal development and self-realization (Edelmen, 1998).The concept of health includes all aspects of life such as life satisfaction and quality of life, physical well-being, socialization, emotional capacities, and mental states.

The meaning of free time is that excluded from the time spent by individuals to maintain their lives for instance; eating, drinking, sleeping, and the simplest personal cleaning and the time spent for the continuity of their life such as making money, social responsibilities so on (Clawson & Kenetsch, 1971).

Free time and recreation are linked yet quite distinct concepts that are often used interchangeably (Torkildsen, 2005). Free time covers a broader domain than leisure and refers to the time that is free from mandatory activities. In order to understand the phenomenon of recreation clearly, it is necessary to examine the approaches related to leisure time. However, due to the fact that there are many different approaches to leisure time and these approaches are based on the infrastructure of the researchers' own disciplines thus the concept of recreation and leisure time cannot be clearly defined by one definition (Metin, Bıçak, Kodaş, 2013). The term of recreation derived from the Latin word "recreate" means regeneration, that is leaving the daily routine (Özil et al. 2016).

As it can be understood from the definitions made recreation can be expressed as activities that the individual freely chooses based on volunteering. It can be performed actively or passively in leisure time, and that gives the individual feelings such as relaxation and satisfaction as a result of the activity involved (Birol et al. 2014). Recreation has a different meaning for everyone because of its subjective characteristics rather than a symbolic meaning (Madrigal, 2006). Among recreational activities, the type of which is based on physical exercise or the application of various sports branches for recreational purposes and constitutes a large part of recreational activities is called sports recreation. The basis of sportive recreation is named as a physical exercise (Zora et al. 2008).

The concept of life satisfaction is defined as the cognitive aspect of subjective well-being and expresses the general evaluation of people's quality of life (Peterson at al., 2005). In the other meaning; life satisfaction has been described as a personal assessment of the overall conditions of one's life (Baur & Okun, 1983). Since participating sport activities provides the individual many opportunity and benefits, many evidence regarding both direct and indirect health effects of physical activity have been presented and reported previously in the literature (Hallal et al., 2006). In the light of the wide research area, it was investigated the relationship between the sport-health belief and life satisfaction of the employees participating in recreational sport activities in private sector according to few demographic variables and investigate the relationship between the sport-health beliefs and life satisfaction.

Method

Research Model

The research is a quantitative study and it was carried out in relational scanning model. In this study, it was examined whether there is a difference in terms of some demographic variables at the level of the relationship between health beliefs and life satisfaction quality of employees participating in sports recreational activities. In addition, the relationship between the health beliefs of the participants and the quality of life satisfaction and their predictions were tried to be determined. Approval was obtained from all employees participating in this study with the "Informed Volunteer Approval Form".

Population and Sample

The purposive sample of 118 employees working at different departments of Konya Şeker Industry Trade Inc. was used in the study. Since all employees in the research population were included in the research sample, no other sample selection was made. Participants were asked to fill in the scale forms online and manually, and thus, usable feedback was provided from 118 participants. 77.1% (n=91) of the participants included in the research sample.

Measurement

Sport Health Belief Scale

The version of the scale developed by Ertüzün (2013) into Turkish. Substances of scale are 7 point Likert type. Sports health belief scale sub-dimension are; perceived seriousness perceived obstacles, physical benefit, psycho-social benefit, self-efficiency. The scale is in the form of self-assessment consisting of such expressions "1" not satisfactory at all to "5" quite satisfactory. For reliability analysis; Cronbach's Alpha Internal Consistency coefficient was calculated as.88. In this study, internal consistency coefficient of Sports Health Belief Scale was found to be 88.

Life Satisfaction Scale

The original form of the "Life Satisfaction Scale" developed by Diener, Emmons, Larsen and Griffin (1985) is a self-assessment scale consisting of one factor, five items and 7-point rating in Likert type. The adaptan of scale was made by Koker (1991) into Turkish, 7 Likert type scale has been used by various researchers in Turkey.

Köker (1991) found that the test-re-test consistency coefficient of the scale is 0.85 after three weeks studying. Yetim (1991) calculated the corrected split-half value as 0.75 and the Kuder Richardson-20 value as 0.79. In this study, the internal consistency coefficient of Life Satisfaction Scale was found as .86.

Findings

Table 1. T-Test Results of Participants' Sports Health Belief Scale According To Demographic Variables

	Variables	N	$\overline{X}$	SS	sd	t	p
Gender	Male	91	3.78	0.54	116	-.74	0.941
	Female	27	3.79	0.58			
Marital Status	Married	86	3.80	0.52	116	.58	0.561
	Single	32	3.74	0.62			
Participation in sports recreational activities	Yes	86	3.84	0.48	116	1.74	0.085
	No	32	3.64	0.68			
Type of Participation in recreational activities	Individual	50	3.87	0.57	116	1.43	0.156
	Group	68	3.72	0.52			

(p<0,05)

As a result of the t-test in sports health belief scale scores, gender t (116) = -, 74; p <0.05., marital status t (116) = --.58; p <0.05., participation in sports and recreational activities t (116) = 1.74; p <0.05. and type of participating in recreational activities t (116) = 1.43; p <0.0. Table 1 result indicated that; there were no statistically significant differences found in the variables.

Table 2. T-Test Results of Participants' Life Satisfaction Scale Scores According To Demographic Variables

	Variables	N	$\overline{X}$	SS	sd	t	p
Gender	Male	91	4.09	1.26	116	-.54	0.588
	Female	27	4.24	1.10			
Marital Status	Married	86	4.17	1.18	116	.48	0.633
	Single	32	4.04	1.33			
Participation in Sports Recreational Activities	Yes	86	4.17	1.22	116	.58	0.563
	No	32	4.03	1.24			
Type of Participation in recreational activities	Individual	50	4.26	1.40	116	.95	0.347
	Group	68	4.04	1.08			

(p<0,05)

As can be seen in Table 2, as a result of the t-test, gender t (116) = - .54; p <0.05., marital status t (116) =, 48; p <0.05., participation in sports and recreational activities t (116) =, 58; p <0.05, and type of participating in recreational activities t (116) =, 95; p <0.05. There were no statistically significant differences found in the variables.

Table 3 was examined, as a result of the analysis made, the health belief scale scores of the participants include age (F = 2.60; p = 0.079), monthly total income (F = 2.60; p = 0.079), working department (F = 2.60; p = 0.079) and the way individual spending their spare time (F = 2.60; p = 0.079), there is no statistically significant difference was found according to those variables. However, a statistically significant difference was found in terms of professional seniority variable in the health belief scale.

Table 3. One-Way Analysis of Variance Results of Participants' Sports Health Belief Scale According To Demographic Variables.

	Variables	N	$\overline{X}$	SS	F	p	In-Differ Groups (Scheffe Testi)
Age	20-30 (a)	41	3.78	0.62	2.60	0.079	-
	31-40 (b)	51	3.69	0.52			
	41 age and over (c)	26	3.98	0.43			
Monthy Income	Less than 2334 TRY (a)	30	3.60	0.53	2.77	0.066	-
	2335 – 4000 TRY (b)	48	3.80	0.56			
	4001 TRY and above (c)	40	3.90	0.51			
Department	Sales Marketing+ Export (a)	42	3.85	0.54	.586	0.558	-
	Production + R.M (b)	37	3.72	0.54			
	Finance-Accounting, H.R (c)	39	3.77	0.56			
Seniority	Labour (a)	24	3.53	0.52	4.16	0.018*	c - a
	Officer (b)	50	3.79	0.57			
	Manager (c)	44	3.92	0.49			
How Do You Spend Your Free Time?	Home activities (a)	34	3.74	0.57	.135	0.874	-
	Participating Sport Activities (b)	48	3.79	0.62			
	Social and Culturel Events (c)	36	3.81	0.41			

*(p<0,05)

As a result of the Scheffe test conducted to determine among which groups the differences arise, sports health beliefs were found to be significant among those in the seniority of managers ($\overline{X}$ manager = 3.92, SSmanager = 0.49) compared to those in the worker seniority ($\overline{X}$ worker = 3.53, SSworker = 0.52). It seems to be high.

Tablo 4. One-Way Analysis of Variance Results of The Life Satisfaction Scale Scores of The Participants According To Demographic Variables.

	Variables	N	$\overline{X}$	SS	F	p	In-Differ Groups (Scheffe Testi)
Age	20-30 (a)	41	4.10	1.26	.960	0.386	-
	31-40 (b)	51	4.01	1.27			
	41 age and over (c)	26	4.42	1.04			
Monthy Income	Less than 2334 TRY (a)	30	3.69	1.33	5.87	0.004*	c - a
	2335 – 4000 TRY (b)	48	4.00	1.25			
	4001 TRY and above (c)	40	4.62	0.92			
Department	Sales Marketing+ Export (a)	42	4.00	1.44	1.78	0.173	-
	Production + R.M (b)	37	4.44	1.01			
	Finance-Accounting, H.R (c)	39	3.97	1.12			
Seniority	Labour (a)	24	3.96	1.17	.726	0.486	-
	Official (b)	50	4.07	1.26			
	Manager (c)	44	4.30	1.20			
How Do You Spend Your Free Time?	Home activities (a)	34	4.03	1.22	1.20	0.304	-
	Participating Sport Activities (b)	48	4.01	1.22			
	Social and Culturel Events (c)	36	4.39	1.21			

*(p<0,05)

When Table 4 was examined, as a result of the analysis performed, the participants' life satisfaction scale scores include age (F =, 960; p = 0.386), department (F = 1.78; p = 0.173), professional seniority (F =, 726; p = 0.486) and there is no statistically significant difference was found according to the variables of how you spend your leisure time (F = 1.20; p = 0.304).On the other hand, a statistically significant difference was found in terms of the monthly total income variable in the life satisfaction scale. As a result of the Scheffe test conducted to determine the differences between the groups, those who have an income of more than 4001 Turkish Lira(TRY) in terms of monthly total income variable in the life satisfaction scale ($\overline{X}$ 4001 + = 4.62, SS4001 + = 0.92) have an income less than 2334 Turkish Lira(TRY) ($\overline{X}$ 2334). - = 3.69, SD2334- = 1.33), it is seen that their life

satisfaction is significantly higher than those with. In order to determinate the relationship between participants 'health belief scale and life satisfaction scale: "Pearson Moments Multiplication Correlation Coefficient" technique was used and the relationship between the participants' health belief scale and life satisfaction result is given in Table 5 below.

Table 5. Correlation Results of Participants' Sports Health Belief Scale And Life Satisfaction Scale Scores

Scales	Life Satisfaction
Health Belief Scale	.319*

N=118

*p<.05

Table 5 states that there is a moderate positive relationship between the sports health belief scale scores of the participants and the scores of the life satisfaction scale (r = .32).

Conclusion

Demographic data of the study provides that 22.9% (n=27) participant are male;34.7% (n=41) are female and 72.9% (n = 86) were married, 27.1% (n = 32) were single. Meanwhile 25.4% (n = 30) of the participants have an 2.334 Turkish Lira(TRY) monthly income, 40.7% (n=48) 2.335-4000 Turkish Lira(TRY) and 33.9% (n = 40) more than 4001 Turkish Lira(TRY). In the study universe, 35.6% (n=42) of the participants work in Sales Marketing and Export Department; 31.4% (n = 37) in Production and Research Development, 33.1% (n = 39) in Finance-Accounting and Human Resources Departments; 20.3% (n = 24) are workers, 42.4% (n=50) are officer and 37.3% (n=44) are in managerial positions. While 28.8% of the participants (n=34) spend their free time with home activities, 40.7% (n=48) of them participate in sports activities and 30.5% (n=36) of participant spend their spare time by participating in social and cultural activities. As a result of the statistics obtained in our research; 72.9% of the participants (n=86) said ''yes'' to participating in sports recreational activities, while 27.1% (n=32) answered ''no'' to participating in sports recreational activities; 42.4% (n=50) preferred to participate in recreational activities'' individually'' on the other side 57.6% (n=68) of individuals chose to participate in recreational activities ''as a group''

The following results were obtained in this study, which aimed to determine the relationship between the sport health belief of individuals working in a private company and their life satisfaction:

In the first findings of the study; there were no significant difference in sports health belief scale scores and life satisfaction scale in terms of gender, marital status, the type of activity they participated in and the type of participation (see Table 1 and 2) based on the T test result. Those results showed that age, marital status, the type of activity they participated in and the type of participation were not a determining parameter.

According to one-way Analysis of Variance (ANOVA) specific to sport health belief scale scores; it was found that there were no significant differences in the variables of age, monthly income, working department and the way prefer to participate in recreational activities (see Table 3). Similar result inferred in life satisfaction scale that there is no significant difference was found in the variable of age, monthly income, working department and the way prefer to participate in recreational activities (see Table 4).

One of the significant findings of our research was on professional seniority. Based on the result it was concluded that the sports and health beliefs of the individuals work in the managerial position were significantly higher than the participants work in the worker seniority (see Table 3). Seniority is the length of time that an individual has worked for an organization. Seniority is important in all private sector establishments and among professions in achieving business goals and establishing successful relationships with other employees and creating a common business culture in the institutions. Supporting this present study shows that, thanks to their management skills and their extensive knowledge and experience, managers are more conscious of health problems due to their high professional competencies and educational foundations (p<0.05).

In the life satisfaction scale, there is significant differences were found of the participants according to the monthly income level (Table 4). The findings stated that those with a monthly total income of more than 4.001 Turkish Lira(TRY) have significantly higher life satisfaction than those who have an income less than 2.334

Turkish Lira(TRY) ($p<0,05$) According to these results, it can be said that individuals with high income levels have higher life satisfaction and develop more positive thoughts about life than individuals with lower income. Similar to findings conducted by Zora Raboteg-Sgric et al. (2008) on adolescents who have high socio-economic status and higher life satisfaction than adolescents with both middle and low socio-economic status. Moreover, Frijters et al. (2004) stated in their studies that higher real household incomes led to significant gains in satisfaction levels.

In the regression analysis; it was concluded that there were a positive, moderate significant relationship between the sports health belief and life satisfaction scale scores of the participants thus, life satisfaction increases as sport health beliefs increase. In order to bring better understanding to this context; health is an important component of life and individuals with high income and standard of living tend to have high levels of life satisfaction and happier life so individuals' perceptions and understanding of sports activities are expected to be high, as a result, their health belief levels are expected to be at a high level.

Recommendations

In this paper, it is broadly focused on the association between health belief and life satisfaction for private sector workers. In particular, examining the health beliefs and life satisfaction of individuals working in the same company, same managerial position with the same salary scale, was important in obtaining a clear comparison and result for the purpose of our research. In the future study, expanding universe of research can be more interesting in terms of reaching wider knowledge of these subjects.

Acknowledgements

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Hispanic Serving Institution: Gender, Major, and Technology Influences on Academic Success

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Abstract: The following research will assist in better understanding if gender, major, and technology use influences success rates among the Latino-ethnic undergraduate students in a Hispanic Serving Institution. The site chosen to be studied was located in a southern region of Texas and in a highly impoverished area. A previously administered instrument was administered after permission to use the instrument was sought out and granted. The Kolmogorov-Smirnov test was utilized due to its assumption requirements. A convenient sample was created. Findings indicate more females, criminal justice majors, who used technology at higher rates, had higher grade point averages. PSPP posed a limitation and future researchers should seek out mixed methods to better understand the variables that influence success rates among Latino-ethnic students in college. Specifically, how technology assists with success rates, how gender influences success rates, and how and why criminal justice majors have higher success rates in higher education institutions.

Keywords: Hispanic serving institution, Latino, higher education

Introduction

Variables that influence academic success at the college level must be better understood (Sanchez, Thorton, & Usinger, 2015). The need to further investigate processes and mechanisms between-group differences that increase college attainment is evident (Ovink, 2014). This research study will specifically attempt to better understand whether gender, major, and technology use influences academic success in a Hispanic Serving Institution. The study will include a survey used to gather data from undergraduate students in the Fall and Spring Semesters. To further understand the findings, conflict theory will be included to better understand the dynamics involved.

Literature Review

This research study will attempt to better understand whether gender, major, and technology use, by undergraduate students, influences academic success amongst students in a Hispanic Serving Institution. Gender is a positive influential factor on academic success rates (Brown, Holland, Kupczynski, & Uriegas, 2014). Additionally, stratified success rates can also be found when comparing students from different majors (Ghasemi & Hassani, 2016). Furthermore, knowledge and collaboration between students and faculty increase with the use of technology (Amemado, 2014). Despite research findings indicating gender, majors, and technology influence success rates, recommendations to further study students in Hispanic Serving Institutions and influences on academic success rates are still emphasized (Sanchez, et al., 2015).

Gender, Major, and Technology

Various researchers have found gender differences among academic success rates (Brown et al., 2014; Ovink, 2014; Olagbaju & Nnorom, 2019). Specifically, Ovink (2014) found women are more likely to succeed in college and attain higher degrees due to familial influences. Women are more likely than men to be influenced and become independent and successful due to the patriarchy system (Ovink, 2014). Brown et al. (2014) found the support system female Latinas attain from other undergraduate students benefit the academic success rates among Latinas students compared to the success rates among Latino students. Researchers continue to recommend further exploring to better understand the influence of gender among the Latino undergraduate's success rates (Brown et al., 2014; Ovink, 2014).

Continuously, Latino undergraduate students' academic success are influenced by the major they chose to pursue (Amaya, Betancourt, Collins, Corona, & Hinojosa, 2018; Tovar, 2015). Amaya et al. (2018) found certain majors, provided mentors for students in that major. The mentorship opportunities increased the confidence and a heightened awareness about majoring in certain fields. The academic success among Latino students was credited to the mentorship opportunities. Tovar (2015) suggests Latino students should pursue a major. Specifically, support programs and agents involved in attaining a degree contributed to academic success among Latino students and their academic success.

Latinos' academic success have been influenced by technology (Baterna et al., 2020; Bixler, 2019; Benitez & Dearo, 2004; Flores & Flores, 2018). A review of literature revealed a need to study technology and its relationship to Latino academic success rates (Flores & Flores, 2018). Regardless of the limited research in this field, Flores and Flores (2018) found more than half of the literature focused on Latino's success rates in college, included technology did contribute to Latinos' academic success rates. Benitez and Dearo (2004) specifically found e-portfolios allow a clear view of goals that then enhanced the learning experiences among Latino students. Further data must be collected to understand how to increase academic success rates among Latino students (Benitez & Dearo, 2004; Flores & Flores, 2018).

Recently, researchers that focused on gender have overall found female students are more successful in higher education institutions than their male counterparts. However, indications that parent's education level also influence the female students' success rates in higher education (Cerdeira, Nunes, & Reis, 2018; Engstrom, 2018). Additionally, researchers have recently found major does influence academic success rates. However, additional services such as Peer Supplemental Instruction (PSI) (Achat-Mendes, Anfuso, Awong-Taylor, D'Costa, Dekhane, Hurst-Kennedy, Johnson, Leader, Pinzon, Pursell, Runck, Savage, Shepler, Simmons, & Sudduth, 2020) or Enhanced Academic Success Experience (EASE) (McPartlan, Sato, Solanki, & Xu, 2019). Specifically, programs like EASE increased retention amongst students in the STEM field. Lastly, technology does play a role in higher education academic success. Researchers have found new methods of instructional web-enhanced technologies certainly does increase academic success rates (Brink & Ohei, 2020). Although, Duart, Hinojosa-Becerra, and Torres-Diaz (2018) stated technology does not increase academic success, they did find technology use for academic activities decreased the tendencies to plagiarize. Throughout literature very limited research was focused on gender, major, and technological impact on higher education success. That said, it was less likely to find research focused on the Latino-ethnic student population in higher education. Throughout recent research, mostly questionnaires were used to gather data about gender (Engstrom, 2018), major (McPartlan et al., 2019), or technology (Brink & Ohei, 2020; Duart, Hinojosa-Becerra, & Torres-Diaz, 2018). This research will attempt to study gender, major, and technology using one survey.

Conflict Theory

Theoretical frameworks assist researchers to better understand dynamics involved between variables through providing explanations or perspectives (Henslin, 2017). In this particular study, the focus was to better understand whether gender, major, and technology use influenced academic success amongst the Latino-ethnic students. Conflict theory explains any phenomenon as two macro groups fighting for scarce resources (Henslin, 2017). For example, higher education students who are financially stable have more advantages than students who are not financially stable (Henslin, 2017). Typically, students who are from the minority groups have more financial burdens than the majority counterpart (Henslin, 2017). Thus, these macro groups would be fighting to attain a degree in higher education to better compete for elite jobs requiring higher education degrees (Henslin, 2017).

Method

Research Design

This research study will assist in understanding whether gender, major, and technology use, influences academic success amongst the Latino-ethnic students. A previously developed survey will be used, please see appendix A. The researchers who developed the instrument were contacted and permission to utilize the survey was provided. This instrument was previously tested for validity and reliability, thus eliminating the need to do so. The instrument items measured college students in a Hispanic Serving Institute and gender, major, technology preferences, and grade point averages. Before contacting any participant, permission was attained from the Internal Review Board. This study will be guided by the following:

To what extent, if any, does gender, major, and technology use increase academic success among the Latino-ethnic students in higher education?
$H1_0$: There will be no difference between gender, major, and technology use and academic success among college students in a Hispanic Serving Institution.
$H1_a$: There will be a difference between gender, major, and technology use and academic success among college students in a Hispanic Serving Institution.

Population and Sample

The Latino-ethnic student population was sought out due to the recommendations made to further study variables influencing higher education success in the Latino-ethnic population (Flores & Flores, 2018; Sanchez et al., 2015). The population utilized for this study was targeted from a south region of the state of Texas. A sole institution was identified to have high rates of Latino-ethnic students enrolled. Faculty from different fields were contacted to assist with data collection and the research design was explained to increase participation rates. The instrument was sent out with two follow-up reminders. Data was analyzed using the Kolmogorov-Smirnov (K-S) Test using PSPP.

Results and Discussion

Gender for the Spring Semester showed on PSPP as, D(236) = 6.60, p < .001, Major for the Spring showed, D (237) = 4.22, p < .001. Grade point average for the Spring showed D (213) = 6.72, p < .001. Technology has a Positive Change on Students for the Spring showed, D (236) = 4.04, p < .001. Technology Helps the Learning Process for the Spring showed D (234) = 4.36, p < .001. These data demonstrate all variables were significant. Data were compared to histograms and normal distribution was not found.

The purpose of this study is to understand how gender, majors, and technology play a role in success rates among the Latino-ethnic students. These variables were measured and found to significantly influence the grade point averages. Based on the histograms measuring for normal distributions, more females, criminal justice majors, who used technology, had higher grade point averages of 3.0 or above. The data implies these variables are significantly influencing grade point averages in Hispanic Serving Institutions. This study administered an

instrument to a convenient sample and the results are not representative of the population. Future researchers should continue to research these variables and others to better understand how to help increase education rates among Latino-ethnic students in higher education. Future researchers should use random samples to better understand data that is representative of the Latino-ethnic population.

Limitations

Due to having only access to PSPP the Shapiro-Wilk test was not applied, which would have been great to substantiate the significance levels. The Shapiro-Wilk test has more power to detect normality differences (Field, 2009). PSPP only allowed for standard deviations in the output rather than degrees of freedom, so a hand calculation of the degrees of freedom was produced. The sample was large which must be noted, due to Kolmogorov-Smirnov being notorious for false positives with large samples. The representation of the data is limited to this sample alone, due to not using a random sample.
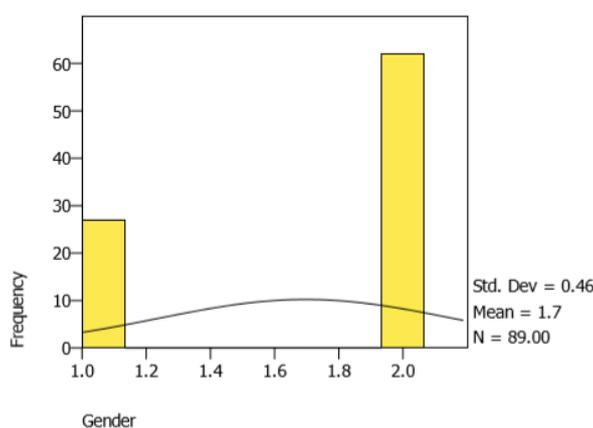
Figure 1. Gender Histogram

Conclusion

Despite the limitations, this research study was able to understand how gender, major, and technology influences Latino-ethnic students in higher education institutions. Researchers have attempted to understand these variables, separately, and to the general population (Brink & Ohei, 2020; Duart, Hinojosa-Becerra, & Torres-Diaz, 2018; Engstrom, 2018; McPartlan et al., 2019). The research used a questionnaire, as did many researchers in the past, but gathered data for gender, major, and technological use among the Latino-ethnic student population in a Hispanic Serving Institute. The Kolmogorov-Smirnov test was used to assess the data gathered. Data found the Latino-ethnic female, Criminal Justice majors, who used technology had high success rates.

Recommendations

Should finances allow, future researchers should use SPSS instead of PSPP to double check the significance levels. Also, a random sample would allow for better statistical testing and population referencing. Future researchers should consider different research methods when collecting data to understand what variables influence the success rates among the Latino-ethnic students. Focus groups and interviews would allow some insights. However, in order to measure the impact of significant relationships quantitative approaches continue to be needed.

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Appendix A: Survey Instrument

ICT Integration into Teaching Survey

This survey explores your perception and practice of ICT integration into teaching and your perception of ICT use to improve teaching. This survey will require 10 minutes or less of your time. Please note that this survey is completely anonymous and voluntary.

Section 1: Background Information

Please select an answer for each question.
1. Gender:
_____ Male
_____ Female

2. Teaching Discipline (check all that apply):
_____ Arts
_____ Business
_____ Humanities
_____ Health
_____ Social Sciences (Communications, Criminal Justice, Education, History, Political Science, Sociology)
_____ Natural & Applied Sciences and Engineering Technology
_____ Behavioral Sciences (Anthropology, Psychology)
_____ Other, Please Specify: _____

3. Average number of courses taught per semester at all colleges where you've taught
over the past three years (select one)
_____ 1
_____ 2
_____ 3
_____ 4
_____ 5
_____ 6+

4. Years of total teaching experience: (Please round to the nearest whole number)
_____

Section 2: Current Practice of ICT Use in Teaching

Please select the answer that best describes your current practice of technology use to support your teaching. (1) Never, (2) Sometimes (Few times per semester/quarter), (3) Often (1-3 times per Month), (4) Very Often (1-3 times per Week). ICT Tools/Applications

a. Productivity tools (e.g., Word Processing, Spreadsheet, Database)
_____ (1) Never
_____ (2) Sometimes
_____ (3) Often
_____ (4) Very Often

b. Multimedia presentation tools (e.g., PowerPoint, Flash, Video etc.)
_____ (1) Never
_____ (2) Sometimes
_____ (3) Often
_____ (4) Very Often

c. Internet, web applications
_____ (1) Never
_____ (2) Sometimes
_____ (3) Often
_____ (4) Very Often

d. Web Authoring Tools (e.g., Dreamweaver)
____ (1) Never
____ (2) Sometimes
____ (3) Often
____ (4) Very Often

e. Content specific software
____ (1) Never
____ (2) Sometimes
____ (3) Often
____ (4) Very Often

f. Podcasting/Vodcasting/Screencasting
____ (1) Never
____ (2) Sometimes
____ (3) Often
____ (4) Very Often

g. Reference software
____ (1) Never
____ (2) Sometimes
____ (3) Often
____ (4) Very Often

h. Drill and practice
____ (1) Never
____ (2) Sometimes
____ (3) Often
____ (4) Very Often

i. Games and simulations
____ (1) Never
____ (2) Sometimes
____ (3) Often
____ (4) Very Often

j. Desktop publishing
____ (1) Never
____ (2) Sometimes
____ (3) Often
____ (4) Very Often

k. Wireless handheld devices (e.g., PDA, iPhone, etc.)
____ (1) Never
____ (2) Sometimes
____ (3) Often
____ (4) Very Often

l. Course website
____ (1) Never
____ (2) Sometimes
____ (3) Often
____ (4) Very Often

m. Learning management system (e.g., Moodle, BlackBoard, WebCT)
____ (1) Never
____ (2) Sometimes
____ (3) Often
____ (4) Very Often

n. Imaging Devices (e.g., scanners, digital cameras, video cameras)
____ (1) Never
____ (2) Sometimes
____ (3) Often

____ (4) Very Often

o. Computer projection device
____ (1) Never
____ (2) Sometimes
____ (3) Often
____ (4) Very Often

p. Email or other Internet communication tool for assignment/project feedback.
____ (1) Never
____ (2) Sometimes
____ (3) Often
____ (4) Very Often

q. Teach in computer classroom
____ (1) Never
____ (2) Sometimes
____ (3) Often
____ (4) Very Often

r. Ask students to use technology to demonstrate learning
____ (1) Never
____ (2) Sometimes
____ (3) Often
____ (4) Very Often

s. Ask students to use technology for communication
____ (1) Never
____ (2) Sometimes
____ (3) Often
____ (4) Very Often

t. Ask students to use technology for collaboration
____ (1) Never
____ (2) Sometimes
____ (3) Often
____ (4) Very Often

u. Ask student to use technology to create content
____ (1) Never
____ (2) Sometimes
____ (3) Often
____ (4) Very Often

Section 3: Perception of ICT Use in Teaching

Please select the answer that best describes your perception of technology use in teaching: (1) Strongly Agree, (2) Agree, (3) Disagree, (4) Strongly Disagree.

a. Technology helps me to get more involved into teaching.
____ (1) Strongly Agree
____ (2) Agree
____ (3) Disagree
____ (4) Strongly Disagree

b. Technology integration is an important aspect of teaching career.
____ (1) Strongly Agree
____ (2) Agree
____ (3) Disagree
____ (4) Strongly Disagree

c. Technology can be integrated to foster effective teaching and learning environment.
____ (1) Strongly Agree

____ (2) Agree
____ (3) Disagree
____ (4) Strongly Disagree

d. Technology integration can be a positive change agent in student learning.
____ (1) Strongly Agree
____ (2) Agree
____ (3) Disagree
____ (4) Strongly Disagree

e. Technology integration provides greater access to learning resources.
____ (1) Strongly Agree
____ (2) Agree
____ (3) Disagree
____ (4) Strongly Disagree

f. Technology integration makes teaching and learning more exciting.
____ (1) Strongly Agree
____ (2) Agree
____ (3) Disagree
____ (4) Strongly Disagree

g. Technology integration makes teaching and learning more interactive.
____ (1) Strongly Agree
____ (2) Agree
____ (3) Disagree
____ (4) Strongly Disagree

h. Technology integration improves communication between students and instructor.
____ (1) Strongly Agree
____ (2) Agree
____ (3) Disagree
____ (4) Strongly Disagree

i. Technology integration disrupts teaching especially if the computer system crashes or there is general computer network congestion.
____ (1) Strongly Agree
____ (2) Agree
____ (3) Disagree
____ (4) Strongly Disagree

j. Technology integration creates learning problems, such as trying to find information from the World Wide Web (www).
____ (1) Strongly Agree
____ (2) Agree
____ (3) Disagree
____ (4) Strongly Disagree

k. Technology integration takes time away from actual classroom instruction.
____ (1) Strongly Agree
____ (2) Agree
____ (3) Disagree
____ (4) Strongly Disagree

l. Technology integration slows my teaching process for various reasons.
____ (1) Strongly Agree
____ (2) Agree
____ (3) Disagree
____ (4) Strongly Disagree

Section 4: Perceived Major Barriers that Limit Faculty Use of Computer Technologies:

For each statement, please indicate the extent to which you agree or disagree with the statement.
____ (1) Strongly Disagree

____ (2) Disagree
____ (3) Neither agree nor disagree
____ (4) Agree
____ (5) Strongly Agree

Some of the barriers that limit faculty use of computer technologies include:

1. Increase workload for instructors.
____ (1) Strongly Disagree
____ (2) Disagree
____ (3) Neither agree nor disagree
____ (4) Agree
____ (5) Strongly Agree

2. Lack of equipment and infrastructure.
____ (1) Strongly Disagree
____ (2) Disagree
____ (3) Neither agree nor disagree
____ (4) Agree
____ (5) Strongly Agree

3. Lack of software.
____ (1) Strongly Disagree
____ (2) Disagree
____ (3) Neither agree nor disagree
____ (4) Agree
____ (5) Strongly Agree

4. Lack of time of learning about computer technologies.
____ (1) Strongly Disagree
____ (2) Disagree
____ (3) Neither agree nor disagree
____ (4) Agree
____ (5) Strongly Agree

5. Lack of effective training.
____ (1) Strongly Disagree
____ (2) Disagree
____ (3) Neither agree nor disagree
____ (4) Agree
____ (5) Strongly Agree

6. Lack of technical support.
____ (1) Strongly Disagree
____ (2) Disagree
____ (3) Neither agree nor disagree
____ (4) Agree
____ (5) Strongly Agree

7. Lack of administrative support.
____ (1) Strongly Disagree
____ (2) Disagree
____ (3) Neither agree nor disagree
____ (4) Agree
____ (5) Strongly Agree

8. Lack of collegial support and interaction.
____ (1) Strongly Disagree
____ (2) Disagree
____ (3) Neither agree nor disagree
____ (4) Agree
____ (5) Strongly Agree

9. Lack of designing interaction activities between instructors and students in my course.
____ (1) Strongly Disagree
____ (2) Disagree
____ (3) Neither agree nor disagree
____ (4) Agree
____ (5) Strongly Agree

10. Lack of self-confidence.
____ (1) Strongly Disagree
____ (2) Disagree
____ (3) Neither agree nor disagree
____ (4) Agree
____ (5) Strongly Agree

11. Lack of personal interest.
____ (1) Strongly Disagree
____ (2) Disagree
____ (3) Neither agree nor disagree
____ (4) Agree
____ (5) Strongly Agree

12. Reduced course quality.
____ (1) Strongly Disagree
____ (2) Disagree
____ (3) Neither agree nor disagree
____ (4) Agree
____ (5) Strongly Agree

The Intelligence as a Mediator between Individuality Traits and Divergent Thinking in Russian Students

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Abstract: Most studies of the relationship between intelligence and divergent thinking and between personality and divergent thinking put in examination singly. Apparently, an integration of intelligence and personality would lead to finding a common source of their shared effects on divergent thinking. 425 undergraduate students at universities of Perm city (Russia) took part in this study. There were 298 women and 127 men aged 17 to 22 years. Three levels of the individuality traits were specified: the nervous system, the temperament, and the personality traits. The nervous system variables were measured by the Pavlovian Temperament Survey, the temperament by the Formal Characteristics of Behaviour – Temperament Inventory, the personality traits by the Big Five Inventory-2. Path models from individuality traits to fluid and crystallized intelligence to divergent thinking were tested in which the individuality traits were exogenous variables, the fluid and crystallized intelligences mediators, and the divergent thinking composite index the endogenous variable. Direct effects of the individuality traits on the divergent thinking were as follows. Nervous system and temperament traits produced no significant effects on the divergent thinking. Of the personality traits, Open-Mindedness, Conscientiousness, and Extraversion scores provided significant effects on the divergent thinking. When the individuality traits of different levels were combined, the Open-Mindedness and Agreeableness scores only revealed significant effects on the divergent thinking. The crystallized intelligence, in contrast to the fluid intelligence, mediated the specific indirect effects of some individuality traits on the divergent thinking. The total indirect effect of the individual traits through the fluid and crystallized intelligences as mediators on the divergent thinking was higher than that of the crystallized intelligence alone. When the individual traits of several levels were involved together in the model, the multileveled structure of the individuality traits was adjusted.

Keywords: individual traits, fluid intelligence, crystallized intelligence, divergent thinking, creativity

Introduction

Divergent thinking is a theoretical, objective and operational construct of creativity. It estimates and reconciles opposite forms of creative thinking (Acar et al., 2019). Seminal works of Guilford (1968) and Wallach and Kogan (1965) laid the foundation of a huge ensuing amount of research on divergent thinking (DT), as well as assessing parts of intelligence and individual traits to DT. The study of intellectual and personal characteristics related to creativity is one of the main areas of research in this field (Batey, Chamorro-Premuzic & Furnham, 2009; Batey & Furnham, 2006). Some studies examined the cumulative effect of intelligence and personality on creativity. The obtained results were ambiguous. For example, in the Furnham & Bachtiar (2008) research crystallized intelligence was significantly related to creativity, but none of the traits of the Big Five were found to be significantly related to creativity. Other studies have found that both personality and intelligence significantly relate to creativity (e.g., Batey, Chamorro-Premuzic & Furnham, 2009; Furnham & Bachtiar, 2008). Nevertheless, most studies of the relationship between intelligence and creativity (e.g., Benedek, Jauk, Sommer, Arendasy & Neubauer, 2014; Sternberg & O'Hara, 1999) and between personality and creativity (e.g., Eysenck, 1995; McCrae, 1987; Moutafi, Furnham & Tsaousis, 2006; Simonton, 1999) put in studies singly.

Apparently, an integration of intelligence and personality would lead to finding a common source of their shared effects on DT. This theoretical issue is so far examined poorly. Its operational definition and measurement do not clear to some extent, as well. Thus, how personality, intelligence and DT operate jointly is an issue which remains poorly examined.

The background of the current study is based on psychological theories of Russians Volf Merlin (1986) and Dmitry Ushakov (2011). Merlin developed the theory of integral individuality. It uses a multileveled principle. In particular, it specifies personality, temperamental, and nervous traits and consider them at different levels. They are both autonomous relatively and interrelated in a polymorphous way. Ushakov developed the structure-dynamic theory of intelligence and creativity, as well as their development in ontogenesis. This theory emphasizes links between intelligence and creativity with personality traits, high motivation to achievement, self-efficacy, and success. A unique configuration of personality traits should provide high intellectual and creative products.

We propose a cross-theoretical approach which suggests combining analytically the theories of Merlin and Ushakov. They were a theoretical basis to empirically study an investment of individuality traits and intelligence in DT. The second issue is to consider and convert intelligence and individuality traits effects on DT operationally. One can see there is a number of respective but various operational definitions. In this study, we reduce them to models in such a way: the intelligence is a mediator variable between individuality traits of several levels and DT. The main premise was that individuality traits provide both direct (passing intelligence variables) and indirect (through intelligence variables) investment in DT. The tasks of this study were as follows. 1. To examine whether personality, temperamental, and nervous traits enable DT (direct effects). 2. To examine whether fluid and crystallized intelligences enable DT. 3. To examine whether individuality traits through fluid and crystallized intelligences enable DT (indirect effects).

Method

Participants

425 undergraduate students at universities in Perm city (Russia) took part in this study. There were 298 females and 127 males aged 17 to 22 years (M = 18.6, SD = 0.9).

Measures

Three levels of the individuality traits were specified: the nervous system, the temperament, and the personality traits. The nervous system variables were measured by the Pavlovian Temperament Survey (Strelau, Angleitner, & Newberry, 1999; Russian adaptation: Danilova & Shmelev, 1988), the temperament by the Formal Characteristics of Behaviour – Temperament Inventory (Strelau & Zawadzki, 1995; Russian adaptation: Strelau et al., 2009), the personality traits by the Big Five Inventory-2 (Soto & John, 2017; Russian adaptation: Shchebetenko et al., 2020). DT was assessed by Alternate Uses test (Wallach & Kogan, 1965; Russian adaptation: Averina & Shcheblanova, 1996). Fluid intelligence was measured by the Raven's Progressive Matrices (Raven, Raven, & Court, 2012) and crystallized intelligence by the Universal intelligence test (Baturin & Kurganskiy, 1995).

Statistical Analysis

All analyses were performed using SPSS v. 22.0 and SPSS AMOS v. 22.0. Path models tested paths from the individuality traits to DT (direct effects), as well as from fluid and crystallized intelligences to DT (direct effects). In multiple mediator models, the individuality traits were exogenous variables, fluid and crystallized intelligences entered mediators, and the composite DT index was an endogenous variable. Multiple mediator models tested indirect effects of the individual traits through mediators on DT. The model fit indices included the chi-square statistic, the Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA). A bootstrap technique (the bias-corrected bootstrap confidence interval, bc.bci95%) was in use to assess indirect effects.

Results

Nervous system and temperament scores produced no significant direct effects on DT. Of the personality traits, open-mindedness, conscientiousness, and extraversion scores provided significant direct effects on DT (β_1 = 0.12, p < 0.016; β_2 = -0.12, p < 0.019; β_3 = 0.11, p < 0.036; respectively). Open-mindedness and agreeableness scores showed significant direct effects on DT (β_1 = 0.16, p < 0.001; β_2 = -0.12, p < 0.011; respectively). The fluid intelligence produced no significant direct effects on DT. In contrast, the crystallized intelligence score demonstrated a significant direct effect on DT (β = 0.16, p < 0.001). When both kinds of intelligence entered in the model, only the crystallized intelligence score revealed a significant direct effect on DT (β = 0.14, p < 0.006).

When individual traits of different levels entered together in the model, fluid and crystallized intelligences were mediators, its fit indices were as follows: $\chi^2(107)$ = 368.63, p < 0.001, CFI = 0.928, RMSEA = 0.076. The following results were obtained. The fluid intelligence as a mediator was non-significant. Use of the crystallized intelligence as a mediator led to some significant results. Among nervous system traits, the excitation score was significant (ab = 0.025, bc.bci95% [0.004; 0.061]). Among temperament traits, the activity score was significant (ab = -0.024, bc.bci95% [-0.057; -0.004]). Among personality traits, the conscientiousness score was significant (ab = -0.024, bc.bci95% [-0.056; -0.004]) and the open-mindedness score was significant (ab = 0.022, bc.bci95% [0.003; 0.051]).

The total indirect effect (the sum of indirect effects mediated by fluid and crystallized intelligences together) of the individual traits of different levels together on DT was significant and higher than the specific indirect effect of crystallized intelligence alone: for excitation score the total indirect effect was ab = 0.020, bc.bci95% [0.001; 0.005], for activity score – ab = -0.024, bc.bci95% [-0.057; -0.002], for conscientiousness score – ab = -0.026, bc.bci95% [-0.055; -0.004], for open-mindedness score – ab = 0.024, bc.bci95% [0.005; 0.052].

Conclusions

The main obtained results were as follows. Crystallized intelligence, in contrast to fluid intelligence, mediated the specific indirect effects of some individual traits on DT. The total indirect effect of fluid and crystallized intelligence was significant and higher than that of crystallized intelligence alone. When individual traits of several levels entered together in the model, the multileveled structure of the individual traits was adjusted.

The results obtained can be used in the pedagogical process to develop students' divergent (creative) thinking. Solving this problem, favorable factors are the individual traits of different levels, fluid and crystallized intelligences. However, notice that some individual traits contribute to, and others, on the contrary, inhibit divergent thinking, crystallized intelligence makes a greater contribution to divergent thinking than fluid intelligence, individual traits of different levels, fluid and crystallized intelligence make joint contributions to divergent thinking.

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The Effects of Virtual Museum Tools on Kinetic and Cognitive Processes

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Abstract: Re-considering 'space' has gained importance once again, especially in the context of virtual spaces that have developed in the last century. Virtual technologies aiming for a lifelike experience have tried to imitate the processes taking place in physical space and adapt them to virtual spaces. Just as in the physical world, spaces formed by interconnected areas bring the necessity of navigation. The importance of navigation increases in virtual museums in terms of systematic knowledge transfer as well as spatial experience. Navigation in virtual tours can be evaluated within the framework of the tools offered by the interface. Tools aiming to support cognitive processes should also be considered. The conducted research explores the effects of using virtual museum tools for navigational processes, focusing on Troya Museum virtual tour. In the field study performed with 20 people, the participants were given 4 tasks to complete. Besides participant answers, observational and verbal data has been collected during the fulfillment of the tasks. The outcomes revealed the inadequacy of the floor plan tool, Mattertag tool and the viewpoints in fully satisfying the cognitive processes of the users. Additionally, the limits of the 3D walkthrough and the absence of the zoom in-out tool are examples demonstrating the insufficiency of the kinetic tools effecting navigational processes. In the light of the outcomes, suggestions have been made to increase the adequacy of the tools in the context of kinetic and cognitive processes.

Keywords: virtual museum, navigation, way-finding, virtual museum tools, Troya virtual museum

Introduction

The concept of 'space' is greatly influenced by technological developments along with social, economic and political innovations. In the traditional sense, space has been defined within physical limits. The technological innovations of the recent years such as virtual spaces have made it necessary to reconsider the concept of space. Moreover, rethinking further concepts that gain meaning by space has also become crucial. 'Experience', 'travel-movement', 'navigation' are some keywords which are also important for the content of the research. For the occurrence of spatial experience, virtual spaces should be able to provide some features that physical spaces contain. The interfaces provided by virtual reality offer highly developed tools for imitating architectural spaces and modeling them in a realistic way (Henry & Furness, 1993).

In the book 'The View from the Road', the required criteria for perceiving motion are as follows: the movement of the user that expresses speed and direction, the movement of the field of view, and finally spatial features of the environment (Appleyard et al., 1964). Considering kinetic processes, the first two criteria are crucial to be fulfilled for the virtual spaces that offer spatial experience. Spatial character, on the other hand, effects processes such as way-finding and orientation to support the cognitive map formation.

Museums are places where kinetic and cognitive processes gain importance. Spatial arrangement and circulation in museums aim to provide the visitor with systematic information and sustain spatial experience. Museums aim to promote, offer experience and provide information to remote visitors under the name 'virtual museum' and/or 'virtual tour'. The interface realized in line with these purposes aim to shape the experience with the tools it offers.

Navigation processes of way-finding and orientation is provided by various tools offered in virtual museums. Could these tools support users' kinetic and cognitive experiences? What are the shortcomings?

The advancement in technology has made possible that physically non-existent spaces are virtually created, and that existing spaces are reproduced in virtual environments. For the purpose of the research, the focus will be on virtual museums that offer spatial experience. Within this sub-group, commonly used technology among virtual museums is QTVR which produces virtual panoramic views of existing space. Examining virtual museums offered by the Ministry of Culture of Turkey has shown that QTVR technology is being widely used. Compared to other museums, Troya Museum was preferred for the field study mainly due to the clarity of the circulation scheme of its physical spaces, as well as the historical importance of the embodied heritage. The aim of the research is to understand the effects of the virtual museum tools on kinetic and cognitive processes of the visitors while navigating the virtual space.

Navigation in Virtual Space

The Concept of Navigation

Way-finding practices may presumably develop in spaces that kinetic and cognitive processes are supported. A primary source in way-finding studies is 'The Image of the City' written by Kevin Lynch. In order to perceive the environment, human beings first tend to disassemble, then group the information obtained by the surroundings. Likewise, imageability of a city depends on the ability to break the city into elements and group them accordingly. Elements that make up the city such as paths, edges, districts, nodes and landmarks work in harmony to guide the user who travels in the environment (Lynch, 1960).

The user in motion collects experiential data by moving through relatively static elements of the environment. In the mutually developing process, the user gains familiarity with the environment resulting in the ease of movement. Therefore, navigation depends not only on the users' cognitive knowledge of the environment but also on the physical movement of the individual.

Sebok, Nystad, and Helgar (2004) summarize the cognitive and kinetic tasks performed during navigation: orientation, way-finding and travel. Before proceeding to detailed descriptions of the tasks, the relationship between navigation and way-finding should be interpreted. Navigation is the movement towards a target, containing the processes of travel and way-finding (Montello, 2005).

Going back to kinetic and cognitive tasks suggested by Sebok et al., orientation can be described as the realization of one's own position and direction, and additionally the preparation step for way-finding (Sebok et al., 2014). Way-finding is the ability of determining a destination and planning the steps to reach it (Montello, 2005). The final task of navigation is physically moving towards the destination.

Way-finding in large-scale environments rests on three elements: landmarks, route knowledge and spatial configuration (Siegel & White, 1975). As Lynch (1960) states, landmarks identify a location and form a reference point for the users of that area. The task of orientation is supported as the users identify their point in space with the assistance of landmarks. Route knowledge and way-finding contain similar processes that may improve as one gains experiential knowledge of that environment.

Grasping the position and distance of the objects in space result in the development of survey knowledge. Clearly labelled maps including place names along with a 'you are here' sign, can be considered as a fundamental source in the assistance of way-finding (Gibson, 2009). Apart from maps, symbols, signs and color usage are important micro-scale approaches to way-finding systems.

The mentioned tools introduce visual communication that aims to be a guidance for members that do not share a common language (Arthur & Passini, 1992; Gibson, 2009). The interconnected aspects that the research focuses on can be seen in Figure 1. Furthermore, numerous sources of information such as navigation devices, photographs and verbal information contribute to landmark, route and survey knowledge (Thorndyke & Goldin, 1983).
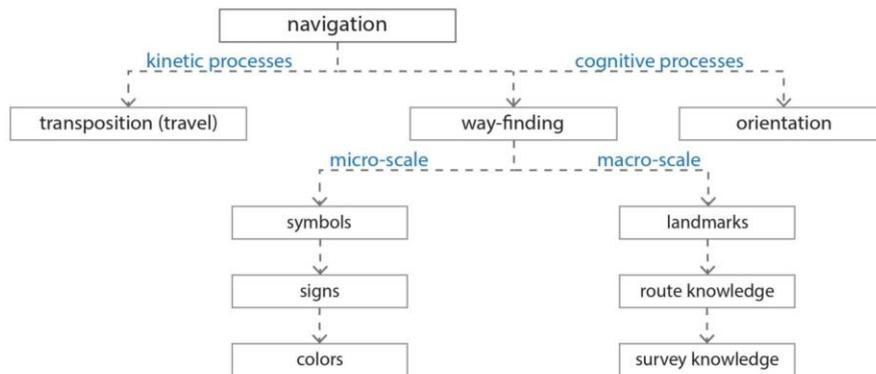
Figure 1. The Frame of Navigational Processes

Kinetic and Cognitive Processes in Virtual Space

Navigation in virtual space depends on one's ability to form a cognitive map as in the case of physical space (Darken & Sibert, 1996). Virtual space users should be able to obtain perceptual knowledge about the environment, determine a destination, generate a route and move towards it. As in physical space, virtual space also consists of cognitive and kinetic processes during navigation.

Spatial information in virtual environments relies primarily on landmark knowledge (Sebok et al., 2014). Landmark knowledge implies the increase in familiarity to surroundings, resulting in the development of route knowledge. The common technique used to emphasize landmarks in virtual environments is to place the predetermined viewpoints in a drop-down menu (Sebok et al., 2014). In this way, the destination can be reached by clicking on the viewpoint. This target-based process is generally carried out by teleportation. Although it may be perceived as a fast and easy way to get from one place to another, teleportation may prevent the user from forming a cognitive map of the environment (Bowman et al., 2001). A way to eliminate the shortcoming may be enabling the user to experience the transitional route (Bowman et al., 2001).

The field of view in physical space changes with every movement of the body and head resulting in data collection with every motion. An ordinary eye can scan a horizontal area of 120 to 140 degrees. However, field of view in virtual space changes between 60 to 100 degrees with larger degrees resulting in distorted or panoramic views (Ruddle et al., 1997). Narrow field of view reveals the need to turn constantly which may obstruct orientation. Certain virtual environments offer auxiliary tools such as a map that determine the user's position, orientation and movement in virtual space (Sebok et al., 2014; Gabbard, 1997).

Besides cognitive tasks, formation of a cognitive map of the environment necessitates kinetic processes in virtual space. It is quite difficult to gain knowledge about the surroundings when the user remains static (Darken & Sibert, 1996). Even small-scale environments may not be perceived from a single vantage point. Therefore, in order to be able to discover the surroundings, movement acquires great importance. In general, the tools enabling kinetic processes are motion in various directions, rotation, sweeping and zooming, with each tool having a particular speed. The main aim of virtual environments is to execute kinetic processes with minimum effort (Campbell, 1996). Navigation can be supported directly with the help of signs, maps and compasses or indirectly by the properties of the environment (Bridges & Charitos, 1997). Therefore, spatial knowledge can increase with the time spent in the setting and/or with the tools offered by the interface.

Troya Virtual Museum Tools

The Troya Virtual Museum interface produced by the company Matterport has been widely used to create virtual museum experiences of physical museums in Turkey and many other countries. The 3D Camera provided by the company is placed on scan points at approximately 2 meter intervals inside the physical museum space. After the scanning process is complete, a virtual walkthrough of the physical space is produced (Matterport, n.d). The field of view for the walkthrough is a panoramic vista estimated to scan 120 degrees on the horizontal plane. Furthermore, the company develops various tools that can be embedded in the interface. Although the tools in these interfaces are mostly similar, slight differences appear in several virtual spaces

created in countries other than Turkey. For instance, in Dali Theatre-Museum, a scaling tool exists that is not found in virtual tours of museums in Turkey (The Dali Theatre-Museum, n.d). This section will examine merely the tools that are available in Troya Virtual Museum where the field study has been carried out (Troya Museum, n.d).

The tools offered in Troya Museum virtual interface can be found either on the pull-down menu or directly placed inside the 3D walkthrough (see Figure 2). The pull-down menu presented in Troya Museum consists of viewpoints, floor plans, an axonometric plan tool and a floor selection tool. Compared to virtual museum examples in other countries, domestic museums including Troya lack in diversity of viewpoints.

The axonometric plan is a tool that enables the user to see all the floors at once from various angles that can be controlled. Floor plans, on the other hand, offer a top view of the selected floor. The user location is indicated by a small red point on the floor plan. The floor selection tool sorts a list of floors that the user can select from. When the selection is made, the user is transferred to the selected floor by a vertical movement. This vertical movement between floors occur without teleportation.

Figure 2. The Tools of Troya Virtual Museum

Tools that are placed inside the 3D walkthrough are mobility tools and Mattertags. Forward and backward movement is supplied by translucent white rings placed on the virtual museum floor (see Figure 3). These rings also indicate the positioning of the scan points where the 3D Camera was situated. Although movement can be achieved by clicking anywhere on the floor, the ability is relatively limited compared to the use of rings. Thus, it is foreseen that the user moves with the help of these rings. Movement in the vertical and horizontal planes occurs by swiping and rotation.

The zoom in and out tool is not available in Troya Virtual Museum, whereas it does exist in virtual museum examples in other countries created by Matterport. The last tool to be discussed is Mattertags. Although the virtual museums in other countries contain diverse types, in Troya Virtual Museum there are only two types of Mattertags separated by color codes (Mildrew et al., 2016). While purple Mattertags placed in-front of certain objects provide additional information about the objects; the red dots placed on the movement paths provide links that direct the user to another area inside the museum. This movement happens with teleportation.

The museum consists of various parts; a souvenir shop, workshop area, temporary and contemporary exhibition area and more. The virtual museum on the other hand is limited to only the permanent exhibition area on each floor and the immediate surroundings. The entrance and main circulation ramp can only be seen visually but the movement remains within the permanent exhibition area. The virtual museum situates the user to a point of departure on the ground floor as marked in Figure 4.
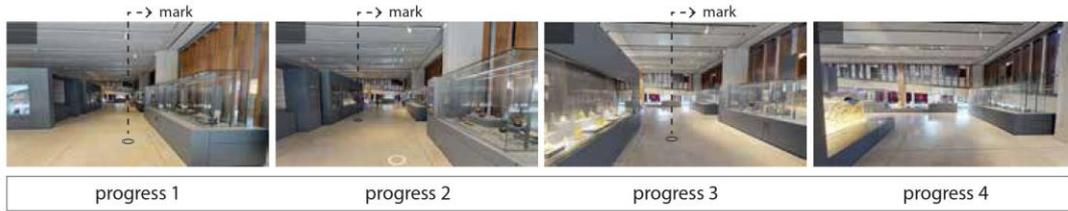
Figure 3. Movement in the Virtual Museum
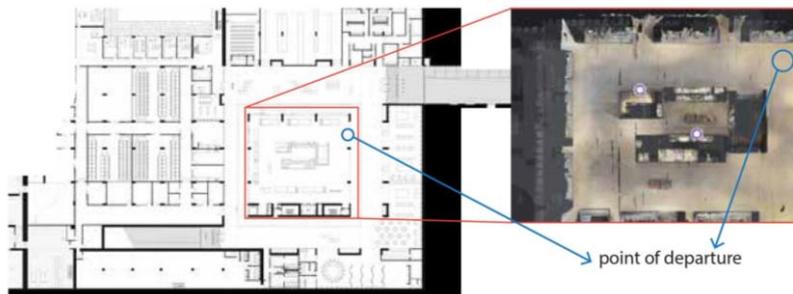
Figure 4. Virtual Museum Limits on the Ground Floor of Troya Museum

Method

The main purpose of the study is to investigate the effects of virtual museum tools on navigational processes. The field study was carried out with 20 participants. The participants were architects, urban planners and civil engineers; professions that are familiar with design and plan drawings. Four pre-determined tasks were completed by the participants where each task was aiming to investigate the effectiveness of tools during kinetic and cognitive processes.

The Steps Followed by the Field Study

The research was carried out on a one-to-one basis over the teleconference software Zoom. The participants were asked to share their screen during the process, enabling the researcher to obtain observational and verbal data. As a first step, the link of the virtual museum and the page containing the tasks were shared with the participants. The participants were expected to read the task, perform it in the virtual museum and move on to the next task.

The Content of the Tasks

The virtual museum locates the user to a point of departure on the ground floor as mentioned in the previous section. Gibson (2009) argues that way-finding strategies should be applied to a structure starting from the approach and entry of the space. Therefore, the perception of the departure point is estimated to be of great importance for the formation of a cognitive map. The first task asks the participants to detect their access point to the 3D walkthrough on a map. The interface lacks a tool that shows the users location in the virtual space, for this reason the tools that may substitute for cognitive processes will be investigated by means of the first task. The second task asks the participants to find the room that 'Troad Golds' are located and to get information about the golds (see Figure 5). The task requires the use of mobility tools as well as the purple Mattertag located inside the room.

| ground floor map | entrance to 'Troad Golds' | information on left panel | purple Mattertag in the room |
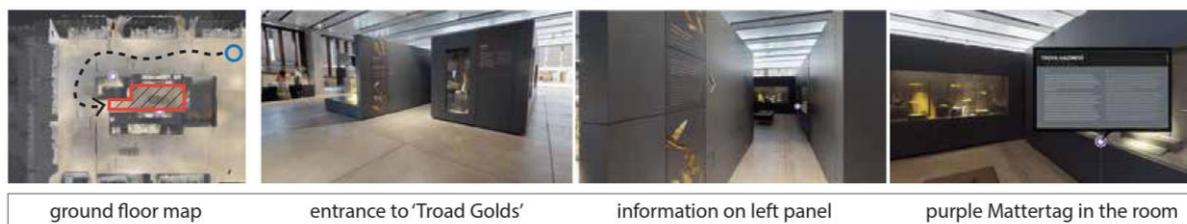
Figure 5. Accomplishment of Task 1

Task 3 and Task 4 aims to compare the effects of vertical movement and teleportation on orientation. In Task 3, the participants are asked to use the floor selection tool to reach the second floor and state the direction of 'Troad Golds' room that they had found in Task 2. Task 4, on the other hand, asks the participants to click the link given in the red Mattertag that teleports them to the fourth floor. Again, they were asked to state the direction of 'Troad Golds' room. As mentioned earlier, in the third task the participants are transferred between floors by a vertical movement; in the fourth task the participants are teleported to the destination. Two different kinds of displacement tools are compared in terms of orientation loss. Each task is assigned to primary navigational processes, and at the same time serve to evaluate other cognitive and kinetic processes (Table 1).

Table 1. Primary Navigational Processes Corresponding to Each Task

Tasks	Descriptions	Primary navigational process
1	Determination of the point of departure	Cognitive map formation
2	Finding 'Troad Golds' room and reaching information	Way-finding, kinetic processes and reaching information about the objects
3	Reaching the second floor using the floor selection tool (vertical movement)	Orientation
4	Reaching the third floor using the red Mattertag (teleportation)	Orientation

Results and Discussion

Task 1

Participants were positioned to a departure point within the virtual museum after opening the link, where the first task was to mark their position on a ground floor plan. The first few minutes were allocated to exploring the kinetic tools offered by the interface. During the fulfillment of the task, participants toured their immediate surroundings while realizing the limits of the virtual tour had restrained them to go beyond certain boundaries. Recorded verbal data consisted of sentences such as 'Where is the entrance?', 'I am not able to move', 'I cannot understand my location'. The general strategy used by the participants was to determine the entrance or a space that may indicate an entrance such as the cloakroom or lobby. The virtual museum presented a view of the entrance but the movement was limited. Thus, the tendency of the participants was to compare the direction of the entrance to the point of departure. Six participants used the floor plan tool to comprehend their position. Commuting between the given plan and the virtual tour a couple of times, the final answers were marked. The distribution of participant answers is concentrated at the entrance of the museum and the departure point of the 3D walkthrough (see Figure 6). The results reveal the tendency of the participants to position themselves towards the entrance.

The users' perception of the departure point is predicted to be of great importance in means of cognitive map formation. The fact that the virtual museum has chosen an undefined location as a point of departure for the 3D walkthrough has negatively affected the cognitive map formation, since the participants had difficulty in detecting their locations. As mentioned above, movement towards the museum entrance has been limited. Cognitive tools such as the floor plan has been consulted at the point where kinetic tools were incapable. Although the floor plan tool indicates the users' position in the environment, a diminutive red dot is used that was not perceivable by the participants.
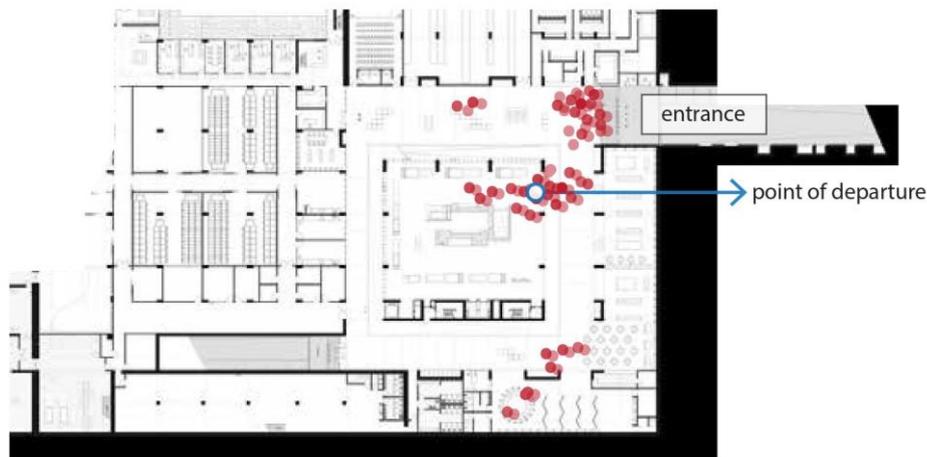
Figure 6. Distribution of Departure Point Estimates

Task 2

The second task aims to evaluate way-finding processes, kinetic abilities and accessing information by the use of tools. Starting from the departure point, the participants are asked to find the room on the ground floor that exhibits the 'Troad Golds'. After finding the room, the participants were asked to get information about the golds. Two kinds of information existed: the first one was a short paragraph located at the left panel of the rooms entrance, the second was the purple Mattertag tool located inside the room.

Finding the room required intensive use of rotation, forward and backward movement. Recorded verbal data contained sentences as 'The movement is very fast.', 'I can't find it.', 'I can't read'. The vast majority of the participants used the mouse and stated that movement became easy once they got used to it. At first, the transparent rings on the ground did not draw attention, thus the participants had difficulty in moving. One participant using a tablet and another using a touchpad had difficulty in moving throughout the whole virtual space. A participant who used the keyboard arrows stated that kinetic abilities of movement and rotation was quite easy. While searching for the room, each participant tried to read the panels located on the sides of the route, as a visitor would do in a physical museum. Almost none of the panels were readable due to the lack of the zoom tool.

Detection of the room has also posed difficulties for the participants. Observations showed that 14 participants out of 20 had passed-by the room without noticing the entrance. As mentioned earlier in the literature review, compared to the vision of the human eye in physical space, the virtual environment has a narrower field of view (Ruddle et al., 1997). In the case of Troya Virtual Museum, the angle was calculated to be around 120 degrees. Although the field of view is nearly the same with a human eye, the room was unnoticed. Some participants tried the floor plan tool which enabled them to locate the room. Participants who are unable to find the room, were supported by the help of the researchers' instructions. Three of the participants stated that the entrance of the room was not comprehendible at all and needed to be emphasized.

The panel on the left of the entrance was recognized and read by each participant. This was one of the few readable panels throughout the 3D walkthrough. The first part of accessing information about the Troad Golds was completed by each person. After entering the room, all of the participants approached the panels inside the room at first, but the panels could not be read. 13 of the participants noticed the purple Mattertag after not being able to read the panels. Figure 7 shows the usage of the two types of information sources included in the task.
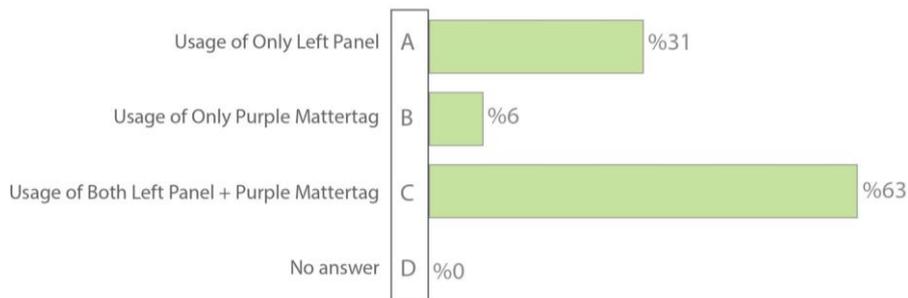
Figure 7. Usage of Two Types of Information Sources

Task 3 and Task 4

The comparison of Task 3 and Task 4 aims to reveal the effects of different displacement tools on user orientation. The participants are asked to use the floor selection tool in Task 3 to reach the second floor. The vertical movement can be experienced when changing floors, just as being in an elevator. Additionally, the direction of the user remains the same. After reaching the second floor, the participants were asked to state the direction of the room (Troad Golds) that they had found in the previous task. The virtual museum lacks a tool that indicates a direction such as a compass or a map. Therefore, the participants considered 'north' to be the direction they were facing.

Task 4 had requested the participants to use the red Mattertag that holds an additional link to the top floor. Contrary to the third task of vertical movement, Task 4 teleports the user to the destination. In most cases, the user direction is also changed after the displacement. The teleported user is asked to state the direction of the 'Troad Golds' room. During the task, the collected verbal data consisted of 'Where am I?', 'I lost my sense of direction.', 'I have no idea'. Three of the participants went back to their previous location and tried to understand how their direction changed. One user tried to use the floor map, unfortunately stating that it was not helpful in understanding the direction. Another participant used the floor selection tool to visit the ground floor where 'Troad Golds' room was located. Since the floor selection tool displaced the user without changing their direction, this participant easily answered the question. Another participant also correctly answered the question, but by guessing. All remaining individuals had great difficulty. The answers presented in Figure 8 clearly show that the participants were able to orient themselves after vertical movement. On the contrary, the comparison of the tasks demonstrates a loss of orientation after teleportation.
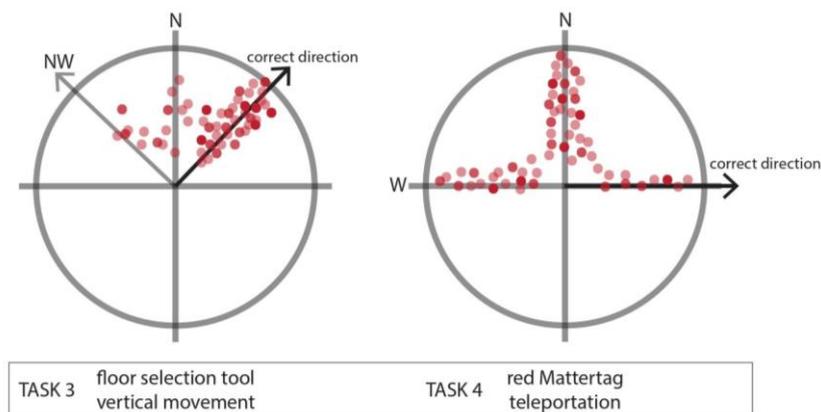

Figure 8. Orientation Loss after Teleportation

Conclusion

The conducted research investigated the effects of virtual museum tools on navigational processes of the users. Although the interface has been found to be sophisticated, the field study results showed that the tools remained insufficient in fully satisfying the cognitive and kinetic processes required for users to navigate in the

environment. It has been observed that the participants consulted cognitive tools whenever kinetic tools became insufficient. Thus, the cognitive and kinetic tools regularly supported each other.

The virtual museum interface has specified an undefined area as a starting point which has created confusion for the majority of the participants. The limits of the virtual tour also restrain the movement of the user, failing to satisfy kinetic abilities. The floor plan tool offered by the interface has been referred to while determining location. The tool was found to be incapable since the small red point indicating the user location was not noticed by the participants.

The tendency of every participant has been to try to read the panels in order to gain knowledge of the exhibited objects and the museum. Zoom in-out tool was not available in the interface of Troya Museum, preventing the user from getting closer to the panels. The purple Mattertag could not replace the panels since the tool was only used for giving additional information about a few selected objects. The panels on the other hand contained detailed information throughout the museum. Therefore, the common kinetic tool for zooming in-out has been found to be critical in gaining knowledge and supporting cognitive processes.

The previous section emphasized that the field of view dramatically decreased in a virtual environment. The fact that 'Troad Golds' room was not noticed may demonstrate a shortcoming of a narrower field of view. Nonetheless, this may not be the only reason whereas the 120 degrees' view field is nearly as extensive as a human eye.

The research clearly shows that teleportation has negatively affected the orientation of the participants while the vertical elevator-like movement had not caused any disorientation for the vast majority. As reported in the literature review, previous research indicates that instead of teleportation, the user should follow a route towards the destination (Bowman et al., 2001). Although the floor selection tool has achieved this ability, it has created confusion about another issue. Returning to Figure 2, it can be seen that the floor selection tool has named the ground floor as the first floor. The same acceptance does not exist for the viewpoints tool where the ground floor is named as it is. The situation has led to confusion in some participants, causing questions such as 'Which floor am I on?', 'Which floor was the Troad Golds room on?'.

Finally, observations show that the viewpoints tool consisting of pre-defined scenes from each floor was not referred to at all during the tasks. Compared to virtual museums produced by Matterport in other countries, Troya Museum accommodates a limited number of viewpoints in the pull-down menu. Since the viewpoints only consisted of one view for each floor, it acted as a floor selection tool instead.

Recommendations

The recommendations given below aim to improve the tools offered by the interface towards an enhanced experience of navigation:
- o The conducted research revealed the importance to fully perceive the entrance of an environment in order to fulfill the purposes of navigation. The importance of expanding the limits of the virtual environment to include the entrance of the museum has become crucial for the formation of a cognitive map. Moreover, the departure point of the virtual tour could be located at the entrance of the structure.
- o As demonstrated in the research carried out by Gabbard (1997) and also suggested by two participants, an additional cognitive tool such as a map showing the location, direction and movement of the user can be placed on the side of the screen.
- o The floor plan tool can be improved by replacing the unperceivable red dot with an attractive mark indicating the user location in space.
- o The purple Mattertag has been found to be beneficial in terms of accessing knowledge. Increasing the number of Mattertags could be recommended since only a few were provided on each floor. For the tags to be fully comprehendible, the signage 'i' could be placed inside the dot that indicates the purpose of the tool. The necessity of the zoom tool has also been revealed especially in museum spaces where the legibility of the panels is crucial.
- o Out of sight spaces/objects may require an additional indication that draws the attention of the users, such as an animated arrow.
- o Virtual spaces should be consistent in using the same naming among all the tools placed in the interface.

    o   Viewpoints should be used to indicate outstanding pieces of the virtual environment, supporting the cognitive processes of the user. The viewpoints in Troya Museum virtual tour could be diversified, focusing on important objects exhibited inside the museum.

Further Research

The conducted research aimed to understand the effects of virtual museum tools on kinetic and cognitive experiences of the user. The emphasis has been made on the methodology throughout the research. The content of the tasks aimed to provide an adaptable methodology for virtual environments that offer diverse tools, as well as alternative virtual spaces. Thus, the executed research aims to constitute a background for further research on the examination of virtual museum tools on navigational processes of the user.

Acknowledgements

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Employer's Expectations towards Digital Media and Storytelling Program Graduates (Case of Georgia)

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Abstract: The goal of this paper is to show the results of the study conducted with the Georgian media employers in order to explore their attitudes toward journalism and mass communication programs graduates. The main hypothesis of research: There is a gap between Georgian journalism schools curricula and the media industry. The main question of research: What knowledge and skills is required by the media industry in the era of digital media and visual storytelling? This research is based on the qualitative approach. A semi-structured interview method is used for this study (n=14). The interviews were conducted with editors, producers and journalists, who have at least five-year experience of working in the media industry and especially in online journalism. This study was carried out from 1th September 2019 till January 2020. According to the results of this study, the Georgian media labor market is oversaturated with journalists and very rarely new vacancies are announced. Nevertheless, there is a lack of specialists with practical skills in the digital media and multimedia journalism. As revealed by this research, representatives of the media industry face some challenges related to multimedia reporting and confirmed the hypothesis about the gap between the industry and academia. According to the research findings, were identified employers expectations, which knowledge and practical skills should the digital media and storytelling program graduates possess. On the one hand, they should have deep and systemic knowledge about current trends in the digital media and methods of digital storytelling, practical skills for multimedia journalism and, on the other hand, they should be equipped with deep and systemic knowledge about leading theories of the mass communication, innovative forms and methods of research, as well as audience engagement. As a results of this study was defined a set of specific, practical skills, which are necessary to possess for the graduates of the digital media and visual storytelling programs. Based on the results of this applied research, according to the American model (sharing experience of Loyola University, Chicago), a new MA program of digital storytelling and communication will be prepared and implemented in Georgia at IBSU.

Keywords: digital media and storytelling, media industry and higher education, Georgian media, employer's expectations

Introduction

The rapid transition to digital format poses challenges for media educators because they have to keep up with the demands of the employers and labor market. Today, in the era of digital media, convergence newsroom is popular in Georgia too. In the wake of the development of internet media, multimedia journalism is becoming more and more popular, which combines text and video or audio production. So, it is unimaginable to teach the media and communication without digital communications and web technologies. However, representatives of the media industry in Georgia, not rarely mention about the gap that exists between the modern industry and the academy.

It's interesting how well higher journalism education meets the modern requirements of the media industry, what knowledge and skills should graduates of the Master of Journalism and Mass Communication program have in the era of digital media and visual storytelling to be able to find employment freely? What are the labor market requirements? This is the purpose of this paper - to show the results of the study conducted with the Georgian media employers in order to explore their attitudes towards journalism and mass communication programs graduates.

This applied research will be a basis of a new master's program in digital media and visual storytelling, created at by my initiative at IBSU (International Black Sea University, Georgia). The graduate program "Digital Media and Communication" is developed through the "Media educational program" sponsored by the U.S. Embassy in Georgia and the module "Digital Media" is developed based on the analogous program of the Loyola University (Chicago, Illinois). Prof. Richelle Rogers, Program Director for the Master's in Digital Media and Storytelling, was actively involved in the development process. The digital media and storytelling syllabi were refined and fine-tuned according to her recommendations.

Literature Review

There are various studies conducted in different countries which present the expectations of employers about what practical skills should graduates of the master of journalism program have. Such studies were started in the previous century, but it should be noted that studies in this direction were conducted especially in the USA in 20th Century. Most studies have expressed concern that the media industry and academia are separated from each other and that there is a gap between them. For example, US scholars (Dickson, T., Brandon, W. 2000) from Missouri State University devoted special study to this topic. As other scholars (Brown, T., Collins, St. 2010) from University of Central Florida mentioned, "concerns about disconnect between the academy and the industry aren't new", and it started in nineties of the XX centuries. Wenger, D & Owens, L.C. professors of the Mississipi University emphasized that, "gaps between what journalism education provides and what employers demand make the case for more research to determine what skills are necessary to get jobs in today's newsrooms" (Wenger., D and Owens, L.C, 2013).

However, there are numerous scholarly papers that indicate the need to revise existing curricula in the wake of the modern changing media industry. Most of these studies are focused on the changing media industry and the changes that journalism school curricula needed to make in the era of the media convergence. Brown and Collins noted that: "the studies that have focused on the industry–academy connection have shown that professional journalists and educators often disagree about how much emphasis should be given to any particular type of skill or knowledge set" (Brown, T., Collins, St. 2010).

Massey analyzed US journalism program and as he pointed out, while demand for traditional journalism skills was still high, there was some increase in demand for newspaper reporters who are skillful in reporting across multiple platforms, particularly shooting video. According to his recommendation, journalism and mass communication programs are adapted to a middle-ground course of carefully pursuing convergence journalism but we have to make sure not to follow every industry whim (Massey, 2010).

As Hansen from Minnesota University indicated "both the media industry and educational institutions at all levels are struggling to understand and keep up with the technological changes that are challenging every assumption they have had for decade" (Hansen, 2005). When Deuze (2001) analyzed the question of educating "new" journalists, changes and challenges to the curricula in his article, he concluded that "near the start of the decade that although journalism educators appeared to understand that the media landscape was changing, they remained confused about the exact nature of the change and how best to respond" (Brown, T., Collins, St. 2010).

Australian researchers in their study tried to answer the question, "what skills and attributes do mainstream news employers say they would want in the perfect journalism or broadcasting graduate". (Callaghan, R & McManus, J. 2010). Other Australian researchers Tanner, O'Donnel & Green conducted qualitative research among news editors in order to study industry needs and journalism education. According to this study, editors agreed on the key roles of universities and as the authors concluded: "industry and universities need to work more closely, with a belief that industry could have broader input into program design and revitalization" (Tanner, S. J.., O'Donnell, M. and Green, 2014). Portugish scholars focused in their studies on the challenges of digital media and media education (Matos A.P., Festas M.I., Seixas A.M., 2016).

In terms of the age of digital media Jiang's & Rafeeq's comparative research which was conducted in 3 countries is also interesting. By examining the journalism curricula of journalism education programs in the USA, UK and UAE, as well as interviewing journalism educators, students and practitioners, this study "investigated whether and how efforts have been made to align journalism curricula to the needs of the industry" (Jiang. Sh., & Rafeeq, A., 2019).

The study of prof. Brigt, University of Georgia, is also noteworthy. This qualitative research refers to the revitalization of existing curricula in three US journalism/mas communication programs transiting to digital media. The author emphasized the role of a faculty in the movement towards a digital curriculum (Bright. A., 2018). In 2008 prof. Robin from Huston University suggested theoretical framework of digital storytelling technic as a powerful tool in a 21 centuries classroom and highlighted the emergence of digital storytelling, why it is important in modern classroom environment (Robin. R. B., 2008).

Huang and his colleagues from Indiana University conducted a national survey among US journalism educators and as well as professional journalists, news professionals, and editors. This study "found strong support for training generalists and teaching new technology while continuing to emphasize critical thinking in journalism schools. It concludes that dealing with media convergence in college journalism education is an urgent necessity" (Huang, E., Davison, K., Shreve, S., Davis, T., Bettendorf, E., & Nair, A. (2006).

According to Fahmy, a professor from Southern Illinois University, in today's discussions in journalism programs center on media convergence, a growing number of j-schools have incorporated the emerging multi-platform into their curriculum with varying degrees. The question remains whether the focus should be more on news content or technological innovations - wrote Fahmy one decade ago and concluded, that, "thus, while students should continue to learn about convergence to be familiar with the multi-platform reporting trend and how it will evolve, they should still concentrate on excellence in traditional journalism skills" (Fahmy, S. 2008). Professor of East Carolina University Clancy asked questions in his study: how closely do skills sets named in job ads line up with skills sets listed in university journalism syllabi? How closely do skills sets named in job ads line up with time spent on skills in journalism classes? According to this study, the "results suggest differences between the job ads and syllabi, notably for the skill of using social media journalistically. Areas of similarity include employers' desire for and instructors' teaching of multiplatform (e.g., convergence) skills, and such traditional skills as newswriting. The results suggest a need for more convergence instruction in certain skill areas" (Clancy, 2016).

As the literature review shows, while no one disputes the importance of innovation and new technologies implementation in teaching process, the debate still goes over how much traditional skills should be taught. No one disputes the development of written skills as it remains one of the most important skills for journalists and mass communication specialists. As for the Georgian context, the study of the employers, which was conducted by Georgian professors Gersamia and Toradze in 2017 is interesting. However, this study was focused on only young undergraduate journalists. According to the results of this study, "writing and editing skills" (88%) are the most important ones. Employers consider that "meeting deadlines" and "an ability to work with new technologies" are important skills as well (76%). (Gersamia, M; and Toradze., M. 2017).

Another study on journalism education conducted in Georgia (Tsomaia, T., & Keshelashvili, A., 2019) is also noteworthy. Although this research does not present the expectations of employers, but its purpose is to show the evaluation of the accreditation processes of media and communication programs in Georgia. Thus, this study, which examines the views of labor market representatives in relation to the master's program in digital media, storytelling and communication, can be said to be the first of its kind of research in Georgia. Exactly this presents novelty and currency of this study.

Main Hypothesis and Main Research Question

The main hypothesis of research: There is a gap between Georgian journalism schools curricula and the media industry.

The main question of research: What knowledge and skills are required by the media industry in the era of digital media and visual storytelling?

Method

To reach goal and explore this issue a social constructivism framework is used. This research is based on the qualitative approach. A semi-structured interview method is used for this study (n=14). It was a purposive

sample. The interviews were conducted with editors, producers and journalists, who have at least five-year experience of working in the media industry and especially in online journalism.

The questioned respondents are from the following media organizations: Online Newspaper "Netgazeti"; Online Magazine "Publika"; News Agency "On.ge"; Newspaper "Rezonansi"; Deutche Welle (Local Bureau); GPB (Georgian Public Broadcaster); TV Maestro; TV1; Online Magazine "Indigo"; Newspaper "Financial Time" (Local Bureau); Investigative Studio "Monitori; Online Platform "Media Checker".

This study was carried out from 1th September 2019 to January 2020.

Results and Discussion

Gap between Media Industry and Academia

As this research revealed, because of rapid changing of traditional media and moving it to in the digital platform, representatives of the media industry face some challenges related to multimedia reporting. Interviewees reported that the Georgian media labor market is oversaturated with journalists and new vacancies are advertised very rarely - only one or two every year because there are not enough jobs to employ the candidates. Nevertheless, there is a lack of specialists with practical skills in the digital media and multimedia journalism, confirming the hypothesis of a gap.

As most of respondents mentioned, in the media schools, journalism is mostly taught at a theoretical level and a big part of hired journalists studied this field in real practice in their newsrooms. "There is a big gap between journalism practice and j-schools. These are like two separate sides" (one of the TV interviewees). "Multimedia journalism is a cornerstone of modern media and there is a shortage of professionals in this field in the Georgian market. Therefore, training professionals in this field on a university basis, who will be able to develop skills through not only theoretical but also practical tools, is very important" (General producer TV Maestro).

Scarcity of Digital Media Specialists

As we mentioned above, there are too many journalists in Georgian labor media market. In spite of this fact there is a lack of practical specialists especially in the digital media and multimedia journalism. Accordingly, all the respondents agreed that there is scarcity of digital media specialists. "In the modern market there is really a shortage of staff which is needed for multimedia newsroom. Graduates in media organizations are practically unprepared to work in newsrooms and the employers have to train, teach, prepare staff to work independently, without the help of others". (news editor from 'Georgian Public Broadcaster').

One of the multimedia managers emphasized, "I have a lack of digital media and communication specialists and not only me. I have active communication with dozens of managers of various media organizations. They always complain about the lack of multimedia journalism staff; also complain about the fact that beginner journalists in their organizations need to acquire knowledge and skills in order to be able to work independently. So, there is a real shortage of competitive staff in the Georgian labor market".

As one of the respondents mentioned, high level knowledge of the digital media is extremely necessary for 21st century journalists, media researchers or media managers. One of the producers underlined that in order to eliminate this gap, in-depth study of digital media is essential, on the one hand for the development of the modern media market and on the other hand, for graduates at the individual level to be competitive in the modern media market.

"There is a shortage of multimedia journalists in the market, in this regard at different times in the services where I worked, we had to conduct trainings and invite specialists to have a more or less insight into the field. Until now, I do not remember (with rare exceptions) a journalist who would have perfect knowledge/skills to prepare a multimedia product" (General producer TV 'Maestro').

Today when there is a general crisis in the field of journalism and the process of its modification is on, the transition to digital format is going on rapidly, the teaching of journalism faces big challenges. As research

shows, in order to meet the demands of the modern media industry, journalism schools need to revise their curricula in line with media transformation tendencies or to develop and implement new programs. Thus, as it has been revealed by the results of this research, there is demand for digital media and communication specialists from Georgian employers.

The Goal of the Master Program

To our question of what should be the purpose of the master's degree in journalism and mass communication, the answers were divided – only a few respondents think that the goal of MA program is teaching journalism and mass communication studies, but most of the questioned journalists, editors and producers mentioned, that the main goal of teaching should be more focused on practice.

As the interviewees mentioned, both components are necessary, "of course, it is impossible to teach journalism and communication based only on practical courses, especially at MA level. I think, in this level, students should learn deeply theories, research methods and other disciplines which develop analytical thinking, but in modern rapidly changing media environment it is necessary to have practical skills of digital media and storytelling in order to compete with undergraduates with such degrees in mass communication or journalism. I think the ratio should be 50/50 between theoretical courses and courses based on practice" (editor one of the newspapers).

"The master's program should focus on practical components and include research elements, beginner journalists need more practice to develop their skills. Perhaps 70/30 should be the ratio between the training practical skills and knowledge of theoretical subjects (One of the TV producers).

"I think the program should cover both components – theoretical as well as practical. I believe that you can not be a good practitioner if you do not have in-depth theoretical knowledge and vice versa. I think these two components complement each other to be a good specialist of media and mass communication".
Some respondents underlined too that there is not lack of only multimedia journalists, but also specialists who have skills of media critics, researches and analyzing.

"Any person is free to criticize the media for this or that mistake, however, arguing and in-depth discussion of the issue is a problem. The above mentioned indicates the ignorance of the theoretical basis of media research and the scarcity of skills needed for research. In many cases criticism is mainly based on subjective feelings. So, I think besides practical skills of digital media and storytelling, it is essential to have deep knowledge of theory, argumentation, analyzes etc."

Most of the questioned interviewees mentioned the goal of modern MA program should be preparing media and communication specialists, who have on the one hand deep knowledge of modern tendencies of digital media, methods of digital storytelling, developing practical skills for multimedia journalists and on the other hand, they should be equipped with deep knowledge about main theories of mass communication, innovation forms or methods of research.
According to this study determined that the goal of this program is to prepare:

▸ Highly qualified, competitive specialists in compliance with the changing digital environment, who have deep and systemic theoretical and practical knowledge about digital media and communication.
▸ Graduates who have practical skills required of multimedia journalists and visual storytellers.
▸ Graduates who will continue lifelong learning based on the need of a rapidly changing digital media industry, gain current knowledge, refine and acquire the skills in the new technologies

Learning Outcomes

Any way what are the expectations of employers, what competencies, knowledge and skills should digital media and communication graduate have? According to the survey their expectations have been determined.

"In my opinion, graduates of this MA program should have the following skills: data processing and analysis, visual storytelling, multimedia reporting, ethical use of social networks, digital media management, media research, social media analytics and etc."

"I think, a graduate of this MA program should know the general principles of digital media, must have a thorough knowledge of manipulation techniques in the digital age, and should be able to verify information quickly and effectively in the digital world;

Should have appropriate storytelling techniques in digital media. But besides good technical skills, they should have deep knowledge of current trends and theories in digital media and mass communication, innovative methods of research, and an ability to engage key audiences" (an editor one of the online platforms).

"Graduates should have the knowledge and skills necessary for a journalist: theoretical basis, principles of media work, skills necessary for a journalist (storytelling/news writing techniques, ability to convey opinions coherently and accuracy in conveying facts and events, efficiency)" (an editor one of the newspapers).

At the same time, some respondents underlined, that modern digital media, in addition to traditional skills, creates new challenges for media professionals: to use modern technologies and skills in their work, the ability to make decisions quickly, the ability to work in stressful environment etc.

Almost all interviewees highlighted the knowledge of issues of the media ethic in the digital era and skills of critical thinking.

"I think, we must not forget that the rapid transfer of information increases the risk of errors. Issues of media ethics, risks of misinformation also remain as a challenge. Therefore, graduates are required not only the skills to convey information quickly, accurately and qualitatively, but also in-depth knowledge of media ethics and relevant regulations to protect them from making mistakes" (One of the producers).

Thus, according to the research findings, employers expectations were identified - which knowledge and practical skills should the digital media and storytelling program graduates possess. On the one hand, they should have deep and systemic knowledge about current trends in the digital media and methods of digital storytelling, practical skills for multimedia journalism and, on the other hand, they should be equipped with deep and systemic knowledge about leading theories of the mass communication, innovative forms and methods of research, as well as audience engagement.

As the results of this study, core competencies for digital media and communication specialists have been determine. A graduate of the program should possess the following field and general transfer skills:

Table 1. Learning Outcomes

Learning Outcomes:	
Knowledge and Understanding	_Graduate will have/acquire:_ Demonstrate deep and systematic knowledge of media and communication: about forms, theories, concepts and methods of the media, trends in digital media development, digital media law and digital media ethics; Has a deep and systematic knowledge about digital media and visual storytelling methods and forms; Understands the specifics of the work of digital media platforms; innovative ways of social media analytics and forms of distribution to digital media audiences; Critically analyzes and investigates new ways of solving current complex problems, including the latest advances in digital media and communication and creates the groundwork for developing new and original ideas; knows how to implement innovations by applying the gained knowledge.

Skills:	_Graduate will be able to:_ Search for information and create content; apply visual tools and technologies (text, photos, audio, video or web) required for digital storytelling; Produce multimedia products for different platforms and distribute to the target audience; Process and analyze data; present them through visualisation; Critically analyze difficult or incomplete information; synthesize innovation and evaluate; use appropriate methodology for research; conduct social media analysis and monitoring; make conclusions; Communicate effectively with colleagues and audiences across a variety of media platforms.
Responsibility and Autonomy	Graduate has knowledge of ethical norms; understands what it means to abide by ethical standards while pursuing a professional career and to demonstrate academic fairness. Has a professional responsibility to conduct his/her own studies lifelong independently of the needs of the digital media industry.

Conclusion

According to the results of this study, the Georgian media labor market is oversaturated with journalists and very rarely new vacancies are advertised. Nevertheless, there is a lack of specialists with practical skills in the digital media and multimedia journalism. As revealed by this research, representatives of the media industry face some challenges related to multimedia reporting and confirmed the hypothesis about the gap between the industry and academia.

According to the research findings, were identified employers expectations, which knowledge and practical skills should the digital media and storytelling program graduates possess. On the one hand, they should have deep and systemic knowledge about current trends in the digital media and methods of digital storytelling, practical skills for multimedia journalism and, on the other hand, they should be equipped with deep and systemic knowledge about leading theories of the mass communication, innovative forms and methods of research, as well as audience engagement.

The main goal of this MA program will be to train gradate according to labor market expectations, prepare highly qualified competitive specialists in compliance with the changing digital environment, who have deep and systemic theoretical and practical knowledge about digital media and communication; graduates who have practical skills required of multimedia journalists and visual storytellers; graduates who will continue lifelong learning based on the need of a rapidly changing digital media industry, gain current knowledge, refine and acquire the skills in the new technologies.

To summarize briefly, interviewees identified the following skills students should possess by graduation: a deep knowledge of current trends and theories in digital media and mass communication; innovative methods of research; an ability to engage key audience, and a mastery of equipment and techniques used in multimedia journalism. Thus, the purpose of program is to provide the modern digital media industry with highly qualified competitive specialists with the latest knowledge and relevant skills which are necessary rapidly changing digital environment. IBSU (International Black Sea University) used the results of this applied research for the development of a new MA program on digital media, storytelling and communication that is according to modeled Loyola University Chicago's program.

Notes

Acknowledgements

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Appendix 1. Main Discussions Questions for Semi-structured Interviews

1. In your opinion, what should the main purpose for teaching journalism and mass communication at the master's level be?

2. In your opinion, what knowledge, skills, and competencies should graduate students have?

3. How do you think, is there a gap between university education and the modern media industry?

4. In your opinion, is there a shortage of specialists who possess the practical skills needed for digital media in the modern Georgian media labor market, as well as a shortage of media and communication researchers?

5. What is your opinion, how important is in-depth study of digital media?

6. How do you consider, what competencies and skills should graduates of the Master of Digital Media program possess?

7. The aim of this master's program is to train media and communication specialists, who, on the one hand, will have a deep and systematic knowledge of modern digital media trends, will have developed practical skills and at the same time will be equipped with basic communication theories, innovative forms and systems. I wonder, in your opinion, as an employer, does this goal meet the requirements of the modern Georgian labor market?

8. Do you think that this master's program in "Digital Media and Communications" should focus mainly on the practical component or is there also an important research component so that the graduate can continue his/her studies at the next level - doctoral program?

9. How often do you advertise vacancies? How many journalists have you hired over the last year?

10. Is having digital media and storytelling skills one of the main criteria in selection process?

Justification for Developing a Bachelor of Manufacturing Technology Program

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Abstract: Top industries impacting Ohio and East Central Indiana's economies are 1) agriculture; 2) manufacturing; 3) IT; and 4) service. Without continuation of agriculture and manufacturing receipts, our people and communities will be unable to afford to critical services throughout our region (Aiman-Smith & Green, 2002, Deryn, 1989, Ditcher, 2001, Gianesi, 1998, Liker, 1997, Lozano, 2009, Minarro-Viseras Baines, & Sweeney, 2005, Ohio Economy, 2016). Collaboration and articulation agreements between Wright State University-Lake Campus (WSU-LC), the State of Ohio and our bordering Indiana counties have ensured local agricultural students will have the opportunity to increase skill sets as necessitated by regulations and agricultural innovations. Manufacturing has an equal, if not greater, need for increased manufacturing skill sets. As a regional college campus in the University System of Ohio, we propose to create a Bachelor Degree in Applied Manufacturing Science (BAMS). The curriculum developed will provide a solid core of foundational coursework complemented by applied technical courses industrial manufacturing disciplines. The technical courses will focus on the practical application of manufacturing knowledge and include the basics of applied mathematics, manufacturing safety, and understanding manufacturing symbols and blueprints. Advanced skills will include mastering basic electrical through automation systems, hydraulics and pneumatics, additive and subtractive manufacturing processes, including CNC mill and lathes, machining, welding and 3D printing. Other coursework will include management theory.

Keywords: engineering technology, program design

Introduction

WSU-LC has offered the SkillsTrac Industrial Maintenance Technician program since 2007. This program serves three general workforce populations: 1) incumbent workers in an Industrial Maintenance Tech role, incumbent workers looking to parlay their current job in manufacturing into a higher-skilled, higher-paid position, and students who are seeking an Associates in Technical Studies (ATS) with a SkillsTrac concentration. In 2016, we essentially replicated our program, costs, methodologies, etc., and established it at the John Jay Center for Learning (JJCL) in Jay County, Indiana. These nearly identical programs are regularly assessed by WSU-LC staff to maintain consistency.

The JJCL program is also geared towards the same three workforce populations and, in addition, those completing the applied tech training at John Jay can have articulated credit into the ATS degree at WSU-Lake with additional credit hours taken at WSU. In 2012, WSU-LC initiated an ABET-approved Bachelor's Degree in Mechanical Engineering. With the addition of a BAMS degree, we believe we will help solidify manufacturing stability in our area. WSU-LC will not only be able to provide trained engineers to research and design state of the art products, but will also have high-skilled technicians who have the hands-on technical abilities to bring conceptual projects to reality. Small, medium, and large companies all need technically-trained personnel who can work equally well with engineers and shop floor veterans alike.

Proposed Curriculum

The proposed degree has a majority of coursework in applied, technical, and regionally common manufacturing processes. The breakdown of course disciplines for the degree are shown in the following table. The curriculum includes WSU-approved General Education Courses (WSU Core) as well as a wide array of technical applied coursework in manufacturing processes, advanced electronics, mechatronics, pneumatics, robotics and automation.

These courses have significant hands-on skill validation components. In this curriculum, the student will be able to choose a few of the technical electives from available courses in the fundamentals of design for manufacturing and assembly and knowledge of the industrial environment to perform effectively as well manage and lead others in the workplace. The semester hour breakdown by area is shown in the following table.

Table 1. Sample Curriculum

BAMS Degree	Credit Hours
Wright State Core Requirements	40 hours
Technical Manufacturing Courses	54 hours
Management & Communication Courses	15 hours
Applied Math & Computer Skill Electives	7 hours
Experiential Learning Requirement	4 hours
Total	**120 hours**

* Core Coursework is a WSU requirement, with pertinent areas defined as: Communication, Mathematics, Global Traditions, Arts & Humanities, Social Science and Natural Science

Population, Partnerships, Demographics

- 26 regional high schools (Table 2).
- Collaborations and articulation agreements are or can be developed between WSU-Lake Campus and Tri-Star Career Compact, Greenville Career Tech Center, John Jay Learning Center, Apollo Career Center, Edison State Community College, Ivy Tech Community College, and Vantage Career Center.
- Develop workforce development program to capture 18-25 year underemployed or unemployed population and those who face barriers to employment.

Table 2. High Schools Served by Lake Campus

High Schools Served by Lake Campus	
Anna High School	Memorial High School
Ansonia High School	Minster High School
Arcanum-Butler High School	New Bremen High School
Botkins Local High School	GED-Diploma Holders
Celina Senior High School	Parkway High School
Coldwater High School	Perry High School
Delphos-Jefferson High School	Russia Local School
Fort Loramie High School	Saint Henry High School
Fort Recovery High School	Saint Mary's High School
Greenville Senior High School	Sidney High School
Jackson Center High School	Van Wert City High School
Marion Local High School	Versailles High School
McComb High School	Wapakoneta Senior High

Statewide/Regional Manufacturing

- Ohio has 48 out of 88 counties where manufacturing accounts for at least 20% of total employment earnings (Table 3).
- 26,000+ jobs directly tied to advanced manufacturing sector in our service area
- 280+ operations/companies involved in this sector (Table 4).
- About 68% of these counties are located in rural or metropolitan areas.
- Reciprocity agreements between WSU and several bordering Indiana Universities

Table 3. County w/Percentages of Manufacturing Earnings, Employment, & OMB Designation

County	Mfg. % age of Total Earnings	Mfg. % age of Total Employment	Metro. Micro, Rural Areas
Ohio Counties			
Shelby	52%	34%	Micro
Auglaize	40%	25%	Micro
Van Wert	30%	21%	Micro
Mercer	29%	21%	Micro
Preble	35%	20%	Metro
Miami	31%	18%	Metro
Paulding	27%	17%	Rural
Allen	24%	13%	Metro
Darke	23%	15%	Micro
Indiana Counties			
Adams	35%	21%	Micro
Randolph	33%	21%	Rural
Jay	32%	26%	Rural

Table 4. Lake Campus Regional Manufacturing Employers

Lake Campus Regional Manufacturing Employers		
American Trim	ATI Portland	CAPT
Coldwater Machine	Continental Contitech	Cooper Farms
Crown Equipment	Dannon	DRT Power Systems
Eaton Corp.	Emerson Climate Technologies	Excel Machine & Tool
Federal Mogul	Fort Recovery Industries	Greenville Technologies
Honda of America	JR Manufacturing	Machine Concepts
Midmark	Midwest Poultry	Nidec Minster
Pax Machine	Parker Hannifan	Plastipak
Precision Strip	Reynolds & Reynolds	Setex
St. Marys Foundry	Lincoln Electric	Whirlpool

Projected Regional Workforce Attrition Rates

Currently, high-quality, high-paid, skilled positions are going vacant. From a variety of company contacts—with heavily diversified product lines—we have learned many of our local companies are or will be facing a 10-20% attrition rate in skilled workers due to an aging workforce within the next 5 to 10 years. A generation ago, word of mouth was responsible to keep youth interested in manufacturing careers as well as young people witnessed the excellent livelihoods created by parents working in the manufacturing industry.

Over the last few decades, this mindset has shifted considerably. Economic downturns, overseas manufacturing sourcing, and a generation of parents who thought a four-year college degree would give their child the best start

for economic success, have all impacted how people look at manufacturing and manufacturing careers. Young people are often not aware of paths available to them in the manufacturing field including those requiring advanced skills commensurate with excellent pay. This lack of talent in the hiring pipeline needs to be addressed immediately. We learned during the last recession that the economy cannot run only on the service or knowledge sectors.

Without products, no one has the financial wherewithal to buy services. We need to manufacture products required by other tier or end customers. Technology is changing so rapidly, this type of training opportunity will allow companies within our region to access a pipeline of potential employees with the skills and industrial knowledge to increase workplace / product flexibility. Currently training is undertaken in more urban areas with higher costs plus travel plus lost work time to attend those centers. We plan to create a flexible, cohesive program that teaches specific needs as well as the management, communication, and leadership skills needed by our local companies.

Skill Demands

Currently, advisory boards (Business Enterprise Center (BEC), Manufacturing Center, and Robotics Curriculum & Equipment) have several recurring themes that are essential and overdue. To offer education and training to the local incumbent workforce, the underemployed, those who face barriers to employment, and direct from high school graduates in these areas:
- Integration of skills (this includes high-end automation integration as well as integration of soft skills along with technical training)
- Troubleshooting skills & training in processes of troubleshooting
- Automation and robotics
- Set up, calibrate and maintain new equipment as well as repair and re-calibrate existing equipment
- Strong communication abilities (written, verbal, presentation)
- General manufacturing skills for entry-level and high skilled personnel
- Create workforce pipelines in manufacturing
- PLC's, CNC's, code-writing, programming skills, etc.
- Technical integration of computerized languages
- Specific skills related to specific equipment or facilities as needed

Program Competition

We are the only four-year university that has the ability to offer this degree within a 50-75 mile radius. Technically- trained students will receive an officially transcripted education from a well-known Ohio university. But there are career tech high schools and community colleges that offer technical training programs in our region. A few manufacturers even have on-site training programs. This hasn't seemingly made a negative impact our business due to:
- Highly flexible training options with well-rounded curriculums
- Offers more in-depth, hands-on training than many on-site programs
- A wide variety of training equipment located in one area
- Our instructors are industry-trained and possess the skills required to do or to effectively teach these skills to a wide range of ages. This requires a unique skill set.

We do have limited competition from training centers such as Greenville CTC, Tri Star Career Compact, etc. These high school and/or adult instruction programs can partner with the WSU-Lake Campus BAMS program in order to not duplicate resources. Articulation agreements can be established to offer credit to students from those programs with additional credit hours taken at WSU-Lake Campus.

Program Implementation

The Bachelor of Applied Manufacturing Science (BAMS) degree program is proposed for implementation in fall 2019.

1. Quality and Efficiency

Annual assessment reviews of each program are conducted by each department in accordance with WSU requirements. These assessments include measurements of success for the goals for each program and include pertinent data such as enrollment figures, retention rates, and student academic progress. Measures used for assessment include student course evaluations, student success in completion of selected courses, evaluation of student projects by faculty, and annual surveys of alumni and employers of alumni. A continuous improvement component is contained in each program assessment.

2. Appropriateness

Feedback and quantitative data will be used to modify or extend the program's offerings. An assessment plan will be developed by BSME/BAMS faculty to evaluate the strengths and weaknesses of the program and to implement a continuous improvement cycle.

3. Student Demand

WSU-LC enrollment data indicate student demand for the educational opportunities offered by the Applied Manufacturing Science program. Continuous monitoring of actual enrollment and retention rates will be conducted along with the annual program assessment to show student demand and satisfaction levels. The recent increases in the BSME program have been, in large part, due to the interest of students to work within local manufacturing facilities. Continued demand is anticipated and the proposed degree provides a more focused opportunity for students.

4. Student Access

WSU-LC has an institutional commitment to facilitate student academic success. Currently, many support programs and tutoring opportunities are available through such academic programs as Math Center and the Student Success Center to assure students have access to those programs. In addition, WSU-LC also have offices for Disability Services as well as Veterans Services.

The proposed program is designed to be flexible in providing reasonable transfer credit for entry into the program, and program transfer without major loss of credit. Initial elective areas can be reconfigured in reaction to market trends and employment opportunities. The adoption and integration of evolving technologies to meet changing needs will also be a priority in the proposed program. Immediate market or short-term demand for Applied Manufacturing Science graduates will be gathered and tracked through company human resources departments, local job listings, technical managers of local industries, and industrial advisory committee members.

Conclusion

The geographic region to be served by this proposed program is primarily West Central Ohio and East Central Indiana. As a regional campus, many students attending WSU-LC are considered "non-traditional" and are employed in the area. Most students are linked to the region by family, employment or other financial responsibility. Most graduates of the proposed degree program with are expected to seek or continue employment in our area.

Due to the attrition of highly-skilled technicians because of an ageing workforce, the resurgence of manufacturing throughout Ohio & Indiana, along with emerging manufacturing technologies, this training need is critical to maintain the stability of our manufacturing firms. Offering the Bachelor of Applied Manufacturing Science at Wright State University Lake Campus will provide high-quality, reasonably-priced advanced education opportunities locally. Our region and our state will keep training dollars in the area, maintain high local employment rates, and retain manufacturing base.

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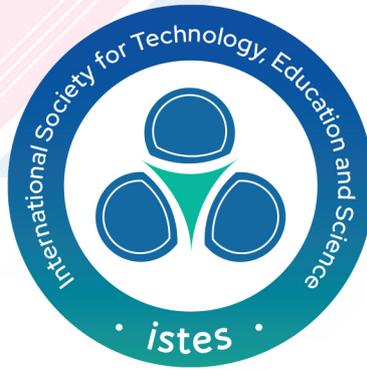
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