International Journal for Business Education

April 2020

Number 160

The *International Journal for Business Education* is a peer-reviewed journal. Articles that are included have been subjected to a blind-review by external peers.

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**Message from the
International President**

Dear SIEC-ISBE Friends,

Welcome to the 160th edition of The *International Journal for Business Education*, formerly known as *The Review*. This year, we debut our new website for the journal, http://www.ijbe.online. The journal is a double blind, peer-reviewed publication that provides global business educators with scholarly articles related to business education. An international review board consisting of renowned experts ensure the high quality of all manuscripts before being accepted for publication.

With its mission to promote scientific knowledge to business educators around the world, SIEC-ISBE has taken an initiative to support open access publication. All articles published by IJBE are made immediately available worldwide under an open access license.

The new website is an important step in getting the journal indexed in various databases and gives our journal more status in the research world.

I´d like to encourage SIEC-ISBE members to place articles of general interest to the business education community worldwide. Each submission based on research conducted by our members and contributes to the body of knowledge in global business education.

I want to thank Tamra (Davis) Connor, Ph.D. of the ISBE-US Chapter and Michaela Stock, Ph.D. of the ISBE-Austrian Chapter for taking on the task of editors. I also want to take a moment to thank our reviewers. The complete list of reviewers is available on our Editorial Board page (https://www.ijbe.online/editorial-board.html). Your expertise was beneficial in helping improve the quality of the accepted manuscripts and offering guidance for improvement to those authors whose work was not accepted this year.

I am looking forward to reading many interesting articles submitted by our SIEC-ISBE researchers!

With best SIEC-ISBE wishes,

Evelyn Meyer
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Review Process

The *International Journal for Business Education* is a double-blind, peer-reviewed journal. Due to the international nature of the journal, two or more editors work together to facilitate the review process. The editor from outside of the United States handles all manuscripts that originate from the United States. This editor assigns the manuscripts to the appropriate reviewers, handles all correspondence with the author(s) and reviewers, and makes the final decision on acceptance. The editor from the United States handles manuscripts that originate from outside the United States. Again, this editor assigns the manuscripts to the appropriate reviewers, handles all correspondence with the author(s) and reviewers, and makes the final decision on acceptance. By following this process, it is possible that one or more of the editors will also have a manuscript published in the journal. Additionally, it is also possible that someone who has submitted a manuscript is also selected to be a reviewer.

In the 2020 edition, there is no fee to publish in the journal. The corresponding author must be a member of his/her SIEC Chapter.

Beginning with the 2021 there will be either a $50 publishing fee, or the corresponding author must be a member of his/her SIEC Chapter.

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Preface

We would like to thank the wonderful professionals who filled the role of reviewers for this year's journal. Due to the number of manuscripts received, multiple reviewers were needed. Without their assistance, the job of editor would have been much more difficult. Thank you to the entire Editorial Board who are SIEC-ISBE members and volunteered to help when asked. Thank you.

We hope that you find the articles included in this year's The *International Journal for Business Education* interesting. Thank you to everyone who submitted a manuscript for consideration. Without your submissions, we would not have had a journal.

Tamra S. Davis, Ph.D. and
Michaela Stock, Ph.D.
SIEC-ISBE Editors 2020

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Evaluating the Influence of Venue on Experiential, Project-Based Learning

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ABSTRACT

Experiential, project-based learning is widely endorsed as an effective pedagogy for enhancing the understanding of theory, increasing critical thinking skills, and preparing students for future roles as contributing employees. Likewise, the use of online classes at universities is becoming popular. A logical evolution of course venues would be the appearance of project-based, online courses. However, there is scant research on whether online, experiential learning is as effective as face-to-face courses. In this study, comparisons are made between online and face-to-face classes of a project-based, strategic management course at a regional university. No statistically significant differences were found in the course measurements of student grades, teammate evaluations, or client project evaluations.

Keywords: project-based learning, experiential learning, active learning, strategic planning

Evaluating the Influence of Venue on Experiential, Project-Based Learning

Face-to-face and online courses have been compared in the past in a variety of fields with mixed conclusions (Dendir 2016; Morgan, 2015). Project-based pedagogy has also been compared to traditional classes; however, few, if any, comparisons have been made of face-to-face, project-based teaching to online classes and virtual projects. In this paper, the researchers compare the results of an online, project-based strategic management course with those of a face-to-face, project-based class.

For several years, the authors have taught face-to-face, project-based strategic planning classes in a business capstone course. Prior to the start of each semester, regional businesses were interviewed and screened to find appropriate clients for strategic planning projects for student teams. Also, the authors have taught an online, strategic management class in a non-project-based format. In the previous

semester, faced with a plethora of clients, the instructors decided to try assigning actual clients to the online student teams to work with virtually. The motivation to aid these additional clients provided the opportunity for this study with the research question determined as "how would online, project-based learning compare to the face-to-face, project-based course?"

As a capstone course in the College of Business at Western Carolina University, three metrics are commonly used by all instructors: an overall student grade, a team's assessment of the student's contribution to the project (Ohland, Loughry, et al., 2012), and a client satisfaction rating. These measurements were analyzed to see if venue (face-to-face or online) or instructor had any influence on the outcomes.

Literature Review

The Association to Advance Collegiate Schools of Business (AACSB) defined applied experiential learning as: "A business curriculum-related endeavor which is interactive (other than between teacher and pupil) and is characterized by variability and uncertainty" (Gentry, 1990, p.10). The experiential approach to teaching strategic management was outlined by Singh (2018) as a process requiring students to 1) conduct external and internal environmental analysis on a market and an organization, 2) create various analyses and forecasts based on possible situations, and 3) develop potential strategies that would guide the firm to an aspired future state. Canziani and Tullar (2017) argued that the primary goal of student-led, client-based experiential projects is to develop critical thinking skills and that consulting opportunities enhance these competencies in ways that differ from other instructional methods. Business schools and colleges of business utilize multiple methods to teach strategic management. George (2015) reported that the use of experiential teaching and learning is instrumentally invaluable in guiding students to learn and grasp real-time challenges businesses face in today's complex environment. Further, the author noted that the experiential learning process provides hands-on involvement that can enhance the development of hard skills, soft skills, and foster behavior modification in students.   Beyond the traditional textbook-based approaches to learning, three primary experiential methods have been adopted in Strategic Management education: case studies, simulations, and project-based learning (Jennings, 2000).

Case studies, popularized by the Harvard Business School, can be characterized as a description of a business or a specific set of obstacles confronting the organization or its activities (Cornwell, 2012). According to Davis and Wilcock (2003), case studies are "student-centered activities based on topics that demonstrate theoretical concepts in an applied setting" (p. 3-4). Instructors can utilize these problems in various teaching modalities as illustrations of real-life lessons.

The use of case studies to teach strategic management has both its advocates and its critics. Mintzberg, Quinn, and Voyer (1995) noted that case studies are ideal scenarios for investigating real-world issues. Jauch and Glueck (1988), Johnson and Scholes (1993), and Thompson and Strickland (1999) put forth similar arguments regarding the efficacy of utilizing case studies to teach strategic management. Chang (2003) declared that numerous researchers affirmed that the use of case studies could advance the student's capacity to understand and retain information by inserting a dose of realism into the classroom (Christensen & Hansen, 1987; Dooley & Skinner, 1977; Osigweh, 1989; Romm & Mahler,

1991). On the flip side, Yin (1989) and Garrido-Lopez, Hillon, Cagle, and Wright (2018), argued that case studies, while offering a clear contextual framework for analysis and synthesis, are limited in representing the complexities of the real world. One criticism of using the case study method to teach strategy is that due to the static nature of data available in a case, the scope of decisions available to the student is narrow (Mitchell, 2004). According to Jack (2018), considering the rapid change in global demographics, women managers are not sufficiently represented in the case study method of instruction. Further, given the widespread argument over globalization, a disproportionate percentage of cases are focused on U.S. organizations. Certain viewpoints, including those of labor unions, are underrepresented. Anand (2017) posited that the utilization of case studies was quite suitable for a more settled world, but the breadth and scope of today's challenges call for a new approach.

Simulations are the business game approach to the analysis of an organization in a competitive situation. A realistic simulation enables students to analyze various factors that can impact an outcome while developing analytical expertise, management skills, and communication (Schroder & Liviu, 2012). Ceschi, Sartori, Tacconi, and Hysenbelli (2014) stated that the primary goal of a business game is to develop management skills, analytical know-how, and to teach decision-making skills relative to business strategies. In a review of the literature assessing the value of simulations, Reid, Brown, and Tabibzadeh (2012) maintained that despite the high degree of attention spawned by the simulation teaching mechanism, the preponderance of the literature examined did not indicate statistically significant confirmation that the learning outcome was more compelling than the use of other educational methods. One ongoing criticism of the use of simulations to teach strategic management has been the automation of the decision-making process. For example, emergency loans to bail out a poor decision are allowed with little, if any, regard to overall financial planning (Poisson-de Haro & Turgut, 2012). An argument was put forth by Jennings (2000) that claimed the use of simulations may not readily be translated to real-world business circumstances.

Project-based learning "Is a student-driven, teacher-facilitated approach to learning. Learners pursue knowledge by asking questions that have piqued their natural curiosity" (Bell, 2010, p. 39). Thomas (2000) noted from various project-based learning handbooks for instructors that projects are complicated assignments built on the foundation of demanding situations that require student immersion in analytical activities, problem-solving and outcome resolution. Additionally, with project-based learning, the students must work independently and as a team to develop and deliver a final product or presentation (Jones, Rasmussen, & Moffitt, 1997; Thomas, Mergendoller, & Michaelson, 1999). The essence of project-based learning is the examination process. This process requires students to develop questions relative to the project being directed through the research procedure by the instructor.

Xiao and Carnes (2017) observed that when teaching strategy to college level undergraduates, a significant challenge is the students' dearth of relevant work background, participation, and know-how. Often lacking the appropriate job experience, students find that many of the topics covered in a strategic management course are problematic relative to their ability to embrace and comprehend when being taught by traditional methods. Students who learn through project-based experiential methodology can more readily grasp first-hand the intricacies of day-to-day life in an organization and how to deal with multiple challenges both internal and external. Project-based learning, where students

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engage in projects related explicitly to real-world business situations, has proven to be a boon for not only the students but for the outside clients, many of whom return for additional assistance by future student teams (Thompson & Edwards, 2009).

Distance education is defined as "Education that uses one or more technologies to deliver instruction to students who are separated from the instructor and to support regular and substantive interaction between the students and the instructor synchronously or asynchronously" (Seaman, Allen, & Seaman, 2018, p. 5.). Driscoll, Jícha, Hunt, Tichavsky, and Gretchen (2012), wrote that numerous researchers (McFarland & Hamilton 2005; Parkhurst et al. 2008; Summers, Waigandt, & Whittaker 2005; Tucker 2001) reported the positive attributes of online learning versus face-to-face. Conversely, other investigators (Logan, Augustyniak, & Rees 2002; Urtel 2008) offered contradictory arguments to the view that online learning was as effective as face-to-face teaching in providing an overall positive learning experience.

The review of the literature assessing distance learning versus face-to-face teaching revealed conflicting views when examining course-specific subject matter. Morgan (2015) found that students graduating from online accounting programs scored lower on the CPA exam than those who graduated in a matched set of face-to-face accounting programs. Contrary to Morgan's (2015) findings, Dendir's (2016), examination of two Principles of Microeconomics courses at a U.S. public university determined that the online students earned higher scores on a set of universal questions given over three exams. In a study of a college level operations management course delivered by both online and face-to-face classroom instruction, Nemetz, Eager, and Limpaphayom (2017) research revealed that student performance as measured by their grades were the same regardless of the delivery mechanism. In an exploration of educational delivery methods on knowledge retention, Turner and Turner (2017) concluded that while online instruction may deliver greater short-term knowledge procurement, the synchronous face-to-face instructional delivery yields more significant levels of knowledge retention. Stern (2004) put forth the suggestion that future research might evaluate which types of courses are more applicable to distance learning while others may be less suitable.

While academic literature provides multiple examples of varying pedagogical methods as well as comparisons of face-to-face and online courses, there are few, if any, evaluations of face-to-face, project-based curricula to online, project-based courses. And, although the effectiveness of project-based, experiential pedagogy is well acknowledged and the growth of online courses widely recognized, an investigation of the effect of combining the two approaches was of interest to the researchers. Could an online, project-based course with virtual student teams be just as effective as a face-to-face, project-based class? If so, online curricula could benefit from the enhanced, project-based learning experience. Similarly, the application of project-based, experiential learning could be substantially expanded due to the growth and convenience of online venues. Taking the opportunity presented by a semester with too many client projects, the researchers adapted the structure and syllabus of the online program to closely match the traditional course.

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Method

Students who major in a business discipline within the AACSB-accredited B.S.B.A. program at Western Carolina University are required to take a management capstone strategic planning course during their final academic year. Students in four sections of this course were surveyed in the Fall and Spring semesters of the 2018-2019 academic school year. Participation did not have any impact on the student's final grade. The demographic make-up of the classes was unremarkable with no differences in sex, age, or ethnicity. Gauging the impact of venue on the project-based learning approach was accomplished by comparing the group results of overall grade, teammate evaluation, and client satisfaction scores of the online and face-to-face classes.

One hundred and fifteen (115) students participated in this study. Seventy-two (72) took the class in a face-to-face classroom setting. Forty-three (43) took the online version of the course. All elements of the course: the syllabus, class materials, team make-up processes, client projects, and grading schemes were closely duplicated except for venue and instructor (two instructors participated).

Several assessments of the students' performances were integrated into this study. All these assessments were based on a 100-point scale. A student's overall grade was compiled from multiple components including quizzes, a mid-term exam, written assignments, a final strategic plan report, and teammate assessments. The teammate assessments were based on an instrument validated by Ohland, Loughry, et al., (2012); whereby, students confidentially rate their teammates on five attributes (contributions to the team's work, interactions with the team, keeping the team on track, dedication to quality, and having relevant skills, knowledge, and ability). A sample of the survey is included in the Appendix A. In addition, each student project team was assessed by the external client at the end of the term using a survey tool in widespread use over the past ten years that was developed by the North Carolina Small Business Technology Development Center (SBTDC). This assessment considered the student's professional behavior, communication, depth of content, oral presentations skills, and final project results. A sample of the survey instrument is included in the Appendix B.

Results

Assessments of student performance in the capstone project were conducted from the following perspectives: the project's external sponsor, the instructor of record for the class project, and the members of the student team. These assessments were based on a 100-point scale. An independent samples student's t-test was performed to identify if there were differences in the assessments of the students based on the course venue. The independent samples t-test is a parametric test that compares the means of two independent groups to determine whether there is statistical evidence that the associated population means are significantly different.

A total of 115 students were involved in the capstone projects discussed in this research study. Client evaluations were collected on 77 of these students (34 students in face-to-face and 43 students in online classes), and team and instructor evaluations were collected on all 115 students (72 students in face-to-face and 43 students in online classes). Results of the independent samples student's t-test on these client evaluations resulted in a t-statistic of 1.716 (p-value = 0.090), indicating a statistically non-

significant result. Team and instructor evaluations also resulted in statistically non-significant results, with t-statistics of -0.867 (p-value = 0.388) and -1.073 (p-value = 0.286) respectively. These statistically non-significant results indicated that the venue did not impact client, team, or instructor evaluation (see Table 1).

Table 1
Results of t-tests on effect of venue on client, team, and instructor evaluations

Assessment	Face-to-Face	Online	t	p-value
Client Evaluation	91.18	87.95	1.716	0.090
Team Evaluation	87.00	89.42	-0.867	0.388
Instructor Evaluation	86.69	88.09	-1.073	0.286

The assessment data was also analyzed to determine if there were differences in these assessments of the students based on the instructor of the class, independent of the venue (see Table 2). All 115 students involved in the capstone projects were divided between the two course instructors. Instructor 1 supervised 65 of the students, and Instructor 2 supervised the remaining 50 students. Results of the independent samples student's t-test on the team and instructor evaluations for the students in these two instructors' classes resulted in a t-statistic of 0.573 (p-value = 0.568) and a t-statistic of -0.725 (p-value = 0.470), indicating statistically non-significant results. The absence of statistically significant results with regards to team and instructor evaluations demonstrates that the choice of instructor had no impact on the findings. A comparison of client evaluations by the instructor was not performed due to a low response rate by the clients of one instructor.

Table 2
Results of t-tests on effect of instructor on team and instructor evaluations

Assessment	Instructor 1	Instructor 2	t	p-value
Team Evaluation	88.58	87.02	0.573	0.568
Instructor Evaluation	86.81	87.74	-0.725	0.470

Discussion

Academic literature continues to advocate the superiority of project-based learning pedagogy over traditional, lecture-based courses (Garnjost & Lawter, 2019); yet, there is little research comparing online versus face-to-face, project-based learning. This may be due to the dearth of available online, project-based courses. In the experience of the authors, such courses require a good deal of extra effort in preparation and execution by the instructor. Adding the burden of an online classroom and virtual clients for the student teams makes the undertaking even more burdensome and may discourage educators from designing such pedagogy. Further research is warranted to discern the most effective approach to teaching project-based strategic management online, including the development of appropriate interpersonal skills, empathy, patience, and time management.

The findings of this research show the benefits of online project-based learning to be substantial and worthwhile. Like Neuhauser, (2002) in a comparison of online and face-to-face class venues, this study demonstrated no essential differences in the outcome measurements (student grade, teammate assessments, and client satisfaction) of project-based pedagogy as well. The researchers posit that this is due to the focus of the course on the work itself-- working with teammates on a real business project with an actual client. No matter the venue (face-to-face or online), students concentrate on getting work done and meeting the client's expectations. Venue does not appear to matter.

 The indications of this research suggest the opportunity for expanding the curriculum of online educational programs to include more project-based courses which are widely acknowledged to provide superior learning experiences to traditional, lecture-based classrooms. Mills and Treagust (2003) noted that the engineering profession and those charged with teaching the subject matter are exceedingly familiar with projects and that the use of project-based learning should be a key component of their curriculum. Research should be conducted on the use of this learning medium in the ever-growing realm of online engineering education. Given the relative infancy of online project-based learning versus more traditional modes, future research efforts should include an examination of student experience. For example, why is it that venue has no impact upon student performance? Laguna, Razmus, and Zalinski (2017) suggest viewing this question through the framework of social cognitive / self-efficacy theory (Bandura, 1993) would be a worthwhile approach. Perhaps students are so motivated to succeed by the project-based approach that the choice of venue has no influence on performance. Another question to be explored is related to the nature of distance learning. Are students with a broader range of work/life experiences more influential in this modality than in the classroom setting? The learning outcomes would be of interest and possibly guide the composition of student teams. The results of future research into these areas could lead to the development of new pedagogical configurations that enhance student learning.

The intention of the authors is to continue to collect data over time to gain confidence and credibility in the findings. It is hoped that other researchers may pursue additional comparisons of project-based venues in a variety of other settings.

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Appendix A
Team Assessment Instrument

Comprehensive Assessment of Team Member Effectiveness—Behaviorally Anchored Rating Scale (BARS) Version

	Your name					← Write the names of the people on your team including your own name.
						This self and peer evaluation asks about how you and each of your teammates contributed to the team during the time period you are evaluating. For each way of contributing, please read the behaviors that describe a "1", "3," and "5" rating. Then confidentially rate yourself and your teammates.
Contributing to the Team's Work	5	5	5	5	5	• Does more or higher-quality work than expected. • Makes important contributions that improve the team's work. • Helps to complete the work of teammates who are having difficulty.
	4	4	4	4	4	Demonstrates behaviors described in both 3 and 5.
	3	3	3	3	3	• Completes a fair share of the team's work with acceptable quality. • Keeps commitments and completes assignments on time. • Fills in for teammates when it is easy or important.
	2	2	2	2	2	Demonstrates behaviors described in both 1 and 3.
	1	1	1	1	1	• Does not do a fair share of the team's work. Delivers sloppy or incomplete work. • Misses deadlines. Is late, unprepared, or absent for team meetings. • Does not assist teammates. Quits if the work becomes difficult.
Interacting with Teammates	5	5	5	5	5	• Asks for and shows an interest in teammates' ideas and contributions. • Improves communication among teammates. Provides encouragement or enthusiasm to the team. • Asks teammates for feedback and uses their suggestions to improve.
	4	4	4	4	4	Demonstrates behaviors described in both 3 and 5.
	3	3	3	3	3	• Listens to teammates and respects their contributions. • Communicates clearly. Shares information with teammates. Participates fully in team activities. • Respects and responds to feedback from teammates.
	2	2	2	2	2	Demonstrates behaviors described in both 1 and 3.
	1	1	1	1	1	• Interrupts, ignores, bosses, or makes fun of teammates. • Takes actions that affect teammates without their input. Does not share information. • Complains, makes excuses, or does not interact with teammates. Accepts no help or advice.
Keeping the Team on Track	5	5	5	5	5	• Watches conditions affecting the team and monitors the team's progress. • Makes sure that teammates are making appropriate progress. • Gives teammates specific, timely, and constructive feedback.
	4	4	4	4	4	Demonstrates behaviors described in both 3 and 5.
	3	3	3	3	3	• Notices changes that influence the team's success. • Knows what everyone on the team should be doing and notices problems. • Alerts teammates or suggests solutions when the team's success is threatened.
	2	2	2	2	2	Demonstrates behaviors described in both 1 and 3.
	1	1	1	1	1	• Is unaware of whether the team is meeting its goals. • Does not pay attention to teammates' progress. • Avoids discussing team problems, even when they are obvious.
Expecting Quality	5	5	5	5	5	• Motivates the team to do excellent work. • Cares that the team does outstanding work, even if there is no additional reward. • Believes that the team can do excellent work.
	4	4	4	4	4	Demonstrates behaviors described in both 3 and 5.
	3	3	3	3	3	• Encourages the team to do good work that meets all requirements. • Wants the team to perform well enough to earn all available rewards. • Believes that the team can fully meet its responsibilities.
	2	2	2	2	2	Demonstrates behaviors described in both 1 and 3.
	1	1	1	1	1	• Satisfied even if the team does not meet assigned standards. • Wants the team to avoid work, even if it hurts the team. • Doubts that the team can meet its requirements.
Having Relevant Knowledge, Skills, and Abilities	5	5	5	5	5	• Demonstrates the knowledge, skills, and abilities to do excellent work. • Acquires new knowledge or skills to improve the team's performance. • Able to perform the role of any team member if necessary.
	4	4	4	4	4	Demonstrates behaviors described in both 3 and 5.
	3	3	3	3	3	• Has sufficient knowledge, skills, and abilities to contribute to the team's work. • Acquires knowledge or skills needed to meet requirements. • Able to perform some of the tasks normally done by other team members.
	2	2	2	2	2	Demonstrates behaviors described in both 1 and 3.
	1	1	1	1	1	• Missing basic qualifications needed to be a member of the team. • Unable or unwilling to develop knowledge or skills to contribute to the team. • Unable to perform any of the duties of other team members.

Ohland, Loughry, et al. (2012)

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APPENDIX B
Client Satisfaction Survey Instrument

sbtdc
Your business. Better.

Thank you for your participation in the business student team program at WCU. Below you will find a survey to assess the work the students from WCU completed with your company. Your comments are greatly appreciated and will be used to improve the program for future semesters.

Date: _____ Your Name: _____

Your Company or Organization: _____

(Please circle the most accurate answer to each of the questions below; include additional comments in the space provided)

1. Did you find the team's communication and behavior to be polite and professional?

   Always   Generally   At Times   Seldom   Not At All

   Comments:_____
   _____
   _____

2. How many times were you in contact with your student team over the course of this project?

   More than 15   15   10   5   1

   Comments:_____
   _____
   _____

3. Was the content of the team's <u>report</u> meaningful and of adequate depth?

   Very Much So   Generally   Neutral   A Bit Weak   Not At All

   Comments:_____
   _____
   _____

4. Was the content of the team's <u>final presentation</u> meaningful and of adequate depth?

   Very Much So   Generally   Neutral   A Bit Weak   Not At All

   Comments:_____
   _____
   _____

North Carolina Small Business Technology Development Center

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Digital Transformation and Higher Education:
A Survey on the Digital Competencies of Learners
to Develop Higher Education Teaching

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ABSTRACT

The aim of this paper is to clarify the effects of digital transformation on educational institutions and to outline the challenges that arise and need to be addressed in this context. Teaching and learning processes should be continuously developed due to changes in educational requirements as well as social and technological changes. Therefore, within this paper, these technological changes are described in the first step. In the next step, the challenges facing higher education institutions, as a result of digital transformation are discussed, and strategies for the further development of higher education, regarding digital transformation, are described. In this context, a research study that focuses on the self-assessment of the digital competencies of students is outlined and the results are presented. The first results emphasize the need for further development in technology-supported teaching and learning processes at higher education institutions. The implementation of technology-supported teaching and learning settings and the rethinking of present teaching content is seen as both a challenge and an opportunity for preparing students – as well as lecturers – for digital transformation. With regard to the current COVID-19 situation, this is a challenge that must be met sooner rather than later.

Keywords: Digitalization – Digital Transformation – Digital Competencies – Higher Education Teaching – Teaching and Learning Processes

Introduction

Digitalization and digital transformation have become an integral part of labor policy, social and scientific debates, as well as contributing to the change of learning processes of individuals and organizations. Keywords such as Internet of Things (Mukhopadhyay, 2014), disruption (Bower & Christensen, 1995), digital natives (Prensky, 2001), digital competencies (European Commission, 2019),

deep learning (Buduma & Locasio, 2017), Industry 4.0 (Dastbaz & Cochran, 2019) and finally all terms with the addition 4.0 are discussed in the context of digitalization (Heuermann, Engel & Lucke, 2018). It becomes apparent that the topic is attributed great importance in current research projects[1]. Disruptive forces and prognosticated drastic effects on society and work also illustrate the high request for scientific research and discussion about potential future changes due to the digital transformation. These changes, triggered by digitalization, lead to the demand for research in both the business and the educational sectors. In order to close these research gaps, it is important to clarify frequently used technical terms, get an overview of current and future changes in social, educational and business fields, but also point out how students change. That means it is essential to show which competencies learners bring with them today and which competencies should be developed in order to cope with digital transformation.

However, in order to promote the necessary competencies and to stimulate the development of learners, an appropriate learning environment, as well as a proper interplay of content, methods and media, is required (Handke, 2017). For didactic design, it is therefore important to know the entry requirements of learners. With regard to digital transformation, educational institutions are thus confronted with new challenges in the context of didactic designs. Hence, it seems likely that educational institutions will have to redesign their teaching and learning processes. For designing higher education teaching it is therefore crucial to determine which competencies learners develop during their school career and with which competence portfolio graduates enter the tertiary education system. In short, it is important to get an impression of the digital competencies of learners in order to develop study programs based upon them. Therefore, this article addresses the following research question: *On the basis of which digital entry requirements of students can higher education institutions further develop study programs in order to support students in their competence development and prepare them for the digital transformation?*

In order to answer the research question, the authors first outline the differences between digitalization and digital transformation to create a uniform basis for subsequent statements and discussion. The effects of digital change on educational institutions and organizations will be discussed explicitly, although it should be emphasized that it is not the aim of this paper to predict future developments. The intention is rather to link theory and empiricism by giving an overview of a research project currently conducted at the University of Graz. This project focuses on the self-assessment of the digital competencies of first-semester students, for in order to adapt the teaching, it is essential to know the entry requirements of students. Within this paper, the authors present results from the study's pretest with learners from secondary level education. With the help of the empirical results presented, a connection to the theory can be made and from this, the importance of adapting teaching and learning processes, in consideration of digital transformation, is emphasized.

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[1] Against the background of the current COVID-19 pandemic, it is very likely that research on digitization in the education sector will further increase in relevance and quantity in the near future. However, this article was written prior to the current developments around COVID-19, but it fits seamlessly into the necessary research on how to deal with the accelerated process of digital transformation in higher education.

Digitalization and Digital Transformation: A Clarification of Terms

The term digitalization is based on the adjective digital, which derives from the Latin word *digitus* and means categorized, integer, countable and discrete in value and time. The origin of the term digitization goes back a long time and is attributed to the development of the binary number system in the 17th century (Vogelsang, 2010). Digitalization today describes a process of the conversion and integration of analog into digital data with at least two characteristics (0 and 1), that are located in a discrete system (Heuermann, Engel & Lucke, 2018). Analog data (that means stepless and continuous data) are converted into digital data (that means stepped and discrete information streams), whereby the information content remains unchanged (Huppertz, 2018; Talin, 2018). This also happens with processes and workflows. The transformation from analog to digital work steps, based on data represented in bits and bytes, is also called digitalization (Ensinger, Fischer, Früh, Halstenbach & Hüsing, 2016). In contrast, digital transformation refers to a more sophisticated process of thinking and structuring. Problems can be solved in new, creative ways by using existing technologies and available digital information. Due to the requirement to grow with digital technologies, the goal of digital transformation is to realign technology and business models, to come up with fundamental changes in basic structures and to adapt existing processes. In the context of digital transformation, this means that it is not the technology, but a resulting problem that is seen as the starting point, and this problem is to be solved in the best way possible through new patterns of thought (Oxford College of Marketing, n.d.; Talin, 2018).

In detail, three terms are distinguished with an even more concrete differentiation. A distinction is made between the terms *digitization*, *digitalization* and *digital transformation,* which build on each other. The level digital transformation is located at the end of the precondition chain and can be reached only if previous levels have been achieved. Figure 1 shows the delimitation and definitions of the terms related to digital transformation, as discussed by Kamsker and Slepcevic-Zach (2019).

Figure 1: Digitization – Digitalization – Digital Transformation

Digital Transformation
Take advantage of digitalization to develop new models/structures/processes.

Digitalization
Let digitally available information work for you to improve and automate processes/structures/business models.
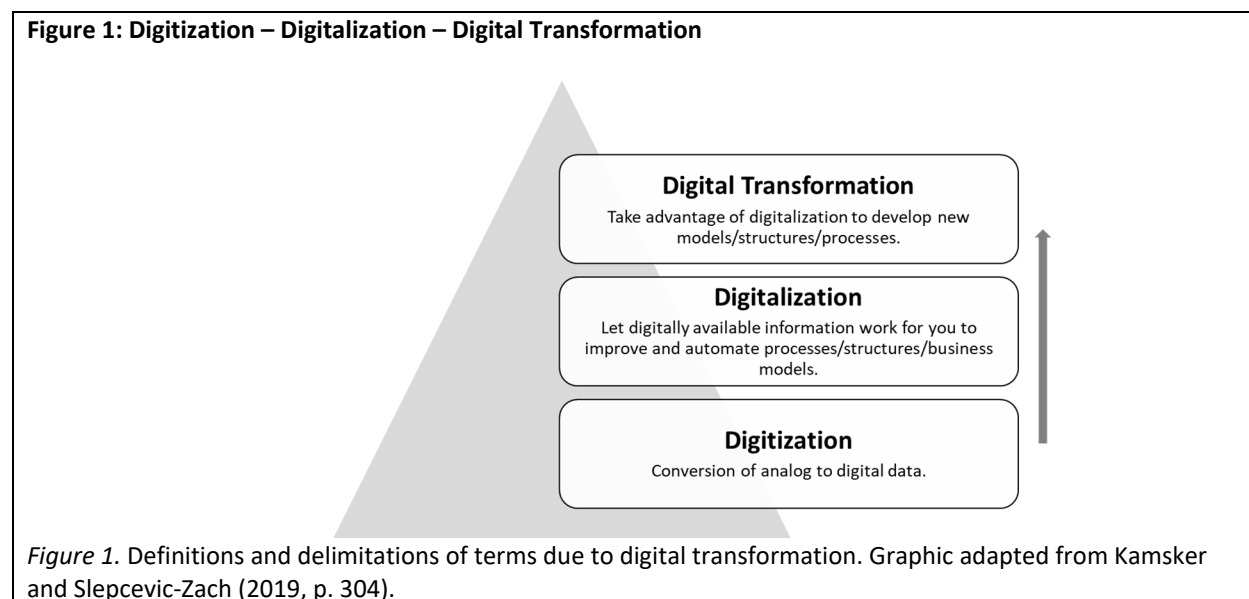
Digitization
Conversion of analog to digital data.

Figure 1. Definitions and delimitations of terms due to digital transformation. Graphic adapted from Kamsker and Slepcevic-Zach (2019, p. 304).

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Digitization is defined as a transformation of analog data into digital data. This means, for example, scanning a hand-written document and making it available digitally. When the information is available in digital form, it is used within the framework of *digitalization* to enable new workflows and to improve established ones. As an example, the electronic execution of the tax returns can be mentioned. In the past, this process was characterized by folders full of invoices, the completion of a demanding form and the storage of numerous sheets of paper. Then the tax return was processed directly to the tax office in the central tax department, where the forms were checked manually. Through digitization, it is now possible to accelerate the process and to work in a paperless manner. Taxpayers can enter their data online at any time and from anywhere, and after the input confirmation, the online form is automatically forwarded to the responsible tax office. There the data entries can be checked promptly, and a confirmation e-mail can be sent automatically to the taxpayer. This example shows that there is enormous potential for applications to facilitate standard procedures as soon as data is digitally available. These improved applications and procedures can then be used to consider changes in business activities and models. This makes it possible to exploit the potential of digital technologies. Such a process of developing new business models that integrate all digitized data and applications as well as workflows is called *digital transformation.* To this end, the example of Netflix, which has replaced the previous dominant video rental company Blockbuster, can be mentioned. In the beginning, films were available in digital formats and movies were watched at the cinema or on DVDs in the home for entertainment. Due to advancing technology and the associated digitalization that has arisen, a completely new business model emerged – film streaming (Heuermann, Engel & Lucke, 2018).

Due to the different approaches of various disciplines, such as sociology, computer science, cognitive science and business administration, the terms are used inconsistently. Nevertheless, it is necessary to establish a common understanding in order to discuss the challenges triggered by digital transformation.

Digital Transformation and the Impact on Educational Institutions

In discussions about the digital transformation of work and society (Autor, Levy & Murnane, 2003; Bonin, Gregory & Zierahn, 2015; Frey & Osborne, 2013), the structural interdependencies between technology, organizational forms, and work processes are often the focus; whereas, the people who participate in such processes, are often pushed to the background of the discussion. Although the importance of performance indicators is central, it is not the sole objective of digital transformation (Kamsker & Slepcevic-Zach, 2019; Kamsker & Slepcevic-Zach, 2020). Actually, it is more about asking questions such as, what skills do employees need and how can educational institutions create opportunities to prepare future generations for both new and different skill requirements and a changing labor market (Ahrens & Gessler, 2017).

To be a specialist in one subject or one area will no longer be enough, rather multiple qualifications are required (Schrack, 2018). There is an increasing demand for the development of interdisciplinary and personal competencies. In addition to interdisciplinary cooperation, the development of innovation and team spirit is required. In general, the acquisition of a wide competence repertoire should be fostered. In addition to the increase in professional competencies, the focus of teaching processes should primarily be on interdisciplinary (for example, communication and problem-solving skills, as well as process understanding) and personal competencies (for example, linguistic and intercultural

competencies). The demands for a wide range of competencies have existed for a long time, but due to discussion about digital transformation, the value of some competencies – especially digital competencies – has increased, while at the same time the focus is no longer on knowledge skills only (Euler, 2017; Schrack, 2018). To the same extent that the terms digitization and digital transformation are used differently, digital competencies are also associated with different definitions.

In order to name the competency facets that are relevant for the use of modern information and communication technologies, a variety of terms have developed in scientific discourse that go beyond the term digital competencies. Nevertheless, in order to be able to define digital competencies, it is important to understand the concept of competence in educational science (Klafki, 2007; Roth, 1971; Weinert, 2001). Although discussed and defined in different ways, the key aspects of competencies are the following: (1) competencies manifest themselves in concrete situations; (2) they are activated depending on the situation; (3) they are subject-bound; and (4) they are changeable (Kaufhold, 2006). In addition, competencies represent a mixture of knowledge, skills, as well as motivational and volitional aspects and are necessary in order to actively participate in society. In the age of digital transformation, an active participation includes the acquaintance of digital competencies; therefore, digital competence frameworks have emerged. One of them is the *Digital Competence Framework for Citizens* (short: DigComp) of the European Union (Carretero, Vuorikari & Punie, 2017). The DigComp Model is based upon the digital competence definition used in the publication of key competencies for lifelong learning. The latest definition is the following:

> Digital competence involves the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and competences related to cybersecurity), intellectual property related questions, problem solving and critical thinking. (European Commission, 2019, p. 10)

While digital competencies are defined as quoted above, competencies themselves are understood as a "combination of knowledge, skills and attitudes" (European Commission, 2019, p. 5). This includes the key elements of the educational science concept of competence. Hence, by referring to the DigComp definition of digital competencies, a connection is established between a theory-based definition of competence and a more empirically oriented one.

Transferring this definition to higher education institutions highlights the importance of covering the need for further development in higher education teaching and learning processes. Kerres (2016) has dealt with the question of the consequences of digital transformation for education. He defines the digitalization of education as a transformation of the entire learning process, from knowledge generation to knowledge communication. The definition includes a broad understanding of the learning process and in addition, preparation and follow-up activities (e.g. counselling of learners, assessment, enrollment for educational opportunities). Above all, the question of *how* the quality of learning processes has to be addressed in order to fulfill current and future requirements of the labor market and society. There is also a need to talk about the change of learning through the use of new digital technologies, as learners and their learning habits have also changed (Androsch, Gadner & Graschopf,

2017; Hochschulforum Digitalisierung, 2018). The ability to retrieve information anytime and anywhere from mobile devices, to search for interests, and to generate knowledge, refers to a design of learner-specific teaching and learning arrangements. The creation of individualized learning settings becomes more important. Learners want more freedom to design their own learning processes; nevertheless, it is important to ensure a combination of the face-to-face interaction of a classical classroom teaching setting with online units (Sachs, Meier & McSorley, 2016).

Higher Education Teaching and Learning Surrounded by Digital Transformation

Digital media, electronic platforms, as well as teaching and learning arrangements framed by information and communication technologies, have arrived in higher education and are accompanying lecturers and students in their everyday life. As mentioned, there are many changes in learning behavior and in the skills needed in an age characterized by digital transformation. In many cases, higher education institutions are merely seen as the suppliers to the employment system; nevertheless, it is important to address the demands of prevailing and increasing digitalization as an occasion for the transformation of current educational processes (Gerholz, 2018).

LeBlanc (2018) describes three challenges that higher education institutions will have to deal with in the future: (1) Development of a learning-eco-system; (2) Adaptation of the predominant unit model; and (3) Rethinking educational content:

(1) "A coherent learning eco-system in which learners move in and out over a lifetime" (LeBlanc, 2018, p. 23) is required. The system is intended to provide learners with the opportunity to participate in different learning settings offered by various institutions and thus to gain various learning experiences. A stronger outcome-orientation at higher education institutions can also be observed. The educational processes are oriented towards the needs of the employment system in a national as well as an international perspective. In that way, the focus should not only be on the labor market. It is also important to prepare students for future social, professional and private problems through the development of scientifically based action competence (Gerholz, 2018).

(2) As a further challenge, higher education institutions see themselves confronted with the need to move away from the idea of a "one size fits all model of education" (LeBlanc, 2018, p. 25) and to adapt and realign the predominant standard model in order to offer learning opportunities adapted to the future needs of students.

(3) The last aspect refers to the rethinking of previous educational content. For example, the increasing rationalization and substitution of work activities requires a rethinking of future occupational profiles. It is demanded that a new taxonomy of work activities will be created in order to deduce which tasks will be taken over by machines in the future, which activities will take place in the interaction between humans and machines, and which activities can only be done by humans. This results in new requirements and challenges for future graduates, both in society and in the labor market, which triggers higher education institutions to rethink educational content, stimulates the process of developing digital competencies and improves the quality of teaching (Gilch et al., 2019; LeBlanc, 2018).

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Due to these new challenges and the expectations posed by digitalization, it is no longer sufficient to make working materials available online or to meet digital transformation solely at a level of methodical and media innovations (Hochschulforum Digitalisierung, 2016). The aim of higher education development is, among other things, to consider the employment prospects of future graduates and to adapt existing curricula (Walkenhorst, 2017) and further develop them in a cyclical process (Plan Do Check Act) in order to ultimately support students in their competence development. However, this can only be achieved if appropriate teaching-learning-arrangements, adapted to the current situation, are designed within the curricular framework.

In order to realize these demands on the further development of higher education institutions, to move away, in particular, from a "one size fits all model of education" (LeBlanc, 2018, p. 25) and to better align teaching-learning-arrangements with a focus on the future needs of students, it is necessary to start with an analysis of the people involved in the teaching-learning-process. On the one hand, it is necessary to ascertain and promote the competencies of lecturers with regard to digital teaching-learning-settings ("teaching prerequisites") (Riedl, 2004). On the other hand, in the sense of a holistic design of university teaching, consideration must be given to the entry requirements of the learners. Hence, lectures are required to design teaching methods in such a way that students are supported in their competence development (Meyer, 2015) and prepared for future challenges in their professional field (Bologna Declaration, 1999).

Under the assumption that students as so-called digital natives (Prensky, 2001) already have sufficient digital competencies to successfully complete their studies, scientific research has primarily dealt with the acquisition and development of the digital competencies of lecturers (Bundesministerium für Wissenschaft, Forschung und Wirtschaft [BMWFW], 2017; Hochschulforum Digitalisierung, 2016; LeBlanc, 2018). As digital natives, it is assumed that students possess crucial digital skills which they have learned in everyday life through the use of digital devices and applications; however, practical experience from technology-supported academic teaching suggests that students (and above all, first-semester students) cannot directly transfer their digital skills to their study situation (Kopp, Gröblinger & Adams, 2019). Furthermore, the digital competencies of freshmen appear to be very heterogeneous, depending on previous schooling, private interests and social environment. This has an impact on student's acceptance of the technology-supported courses and learning opportunities offered by higher education institutions.

In order to successfully enrich academic teaching with digital elements, it is necessary to understand which digital competencies first-year students possess in order to balance the different levels of professional competence in the field of digital transformation, and prepare students for a professional world where digital skills are necessary. Although an essential basis for teaching students with the help of modern technological tools and media-enhanced didactic methods, a well-founded survey of these digital competencies is not yet available in Austria; however, similar research studies dealing with digital competencies of students exist in Germany (Plasa, Kmiotek-Meier, Ebert & Schmatz 2019) and Switzerland (Frischherz, MacKevett & Schwarz 2018).

DiKoS: Analysis and Development of the Digital Competencies of Students

The circumstances and problems outlined above have been the incentive for a research project focusing on the digital competencies of first-semester students. The project *DiKoS – Analysis and Development of Digital Competencies of Students (*DIKOS: Digitale Kompetenzen von Studierenden, n.d.) is a joint project of all nine Styrian higher education institutions[2]. The project is dedicated to a comprehensive self-assessment of the digital competencies of first-semester students and their demands on modern technology-supported academic teaching, followed by the formulation of practical implications for academic teaching. These recommendations are consequently used for designing future technology-supported teaching and learning settings, which match the existing competencies of the students and their expectations.

Research Design and Method

The DiKoS-project aims at a complete survey of all first-semester students who started their studies in the winter semester 2019/2020 in the Styrian higher education area. In order to achieve the objective of a full survey, we decided to conduct a large-scale written survey. Prior to the study, the advantages and disadvantages of online and paper-pencil questionnaire surveys were discussed. In order to achieve the goal of a complete survey, the researchers decided to administer a paper-pencil questionnaire survey, since the response rates for online surveys are lower than those of traditional paper-pencil surveys (Gusy & Marcus, 2012; Maurer & Jandura, 2009). The chosen method of a questionnaire survey in paper-pencil format is thus in line with research interest and provides the empirical results to answer the research question. The researchers developed a questionnaire based on the Austrian DigComp 2.2 AT competence model (Bundesministerium für Digitalisierung und Wirtschaftsstandort [BMDW], 2018). This model consists of the six competence areas (0) Basics and access, (1) Information and data literacy, (2) Communication and collaboration, (3) Digital content creation, (4) Safety, and (5) Problem solving and further learning (BMDW, 2018), which are based upon the above-mentioned European Digital Competence Framework 2.1 (Carretero, Vuorikari & Punie, 2017). To get an overview of the state of research and for the operationalization process of the mentioned DigComp 2.2 AT areas of competencies, existing studies dealing with digital competencies, digital literacy, media literacy, media competencies, or information and communication technologies, have been systematically reviewed. We analyzed eight German studies in detail, which have been published in the last five years (Janschitz et al. 2019). As a result of the analysis, the researchers identified 390 items that have already been used in questionnaires. These items served as a starting point for the questionnaire. With regard to the research study – the measuring of the self-assessment of the digital competencies of first-semester students – some items from the surveys were used, while others were adapted or replaced by newly created ones.

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[2] The nine Styrian higher education institutions consist of five universities (Graz University of Technology, Medical University of Graz, Montanuniversitaet Leoben, University of Graz and University of Music and Performing Arts Graz), two universities of applied sciences (CAMPUS 02 University of Applied Sciences and JOANNEUM University of Applied Sciences) and two teacher training universities (Private University College of Teacher Education Diocese Graz-Seckau and University College of Teacher Education Styria). These institutions cooperate in the Styrian University Conference. For further information about the Science Space Styria and the Styrian University Conference see: http://www.steirischerhochschulraum.at/en/.

It is important to emphasize that when measuring competencies of any kind, attention has to be paid to the fact that competencies, per se, can only be measured in terms of performance, i.e. in action. Such performance cannot be demonstrated in a questionnaire; therefore, the questionnaire asked students to self-assess their digital competencies. However, in order to not only measure digital competencies in terms of self-assessment, other aspects were also taken into account. In addition, the term "digital competencies" is a multidimensional construct which requires more than one dimension of measurement. Such constructs must be made empirically measurable by operationalization procedures. Through the theoretical reference to the DigComp 2.2 AT model, which was used as guidance, different facets of the construct of digital competencies are reflected in the questionnaire. Thus, in addition to questions on the self-assessment of digital competencies, the questionnaire contains questions on the use and application of digital devices and online offerings, questions on attitudes towards digitization, and knowledge questions on specific digital topics.

In addition to the DigComp 2.2 AT model, the researchers also oriented towards the Digital Index (Initiative D21, 2018; Initiative D21, 2019) which has been used to survey the digital competencies of German society, annually, since 2013, using a multidimensional Digitization Index. The DigComp 2.2 AT Model and the Digital Index have been the frames of reference for the creation of the study questionnaire, due to a well-founded presentation of digital competence understanding. The first draft of the study questionnaire was constructed with these two reference points in mind and prepared for pretesting.

Description of the Population and Pretest Sample

As previously mentioned, the researchers aim for a complete survey among first-semester students in the Styrian higher education area. According to official figures from the nine Styrian higher education institutions, in the winter semester 2019/2020, a total of 5,866 students received a matriculation number for the first time in Austria. Of these 5,866 first-year students, 4,676 could be questioned, which corresponds to a response rate of 79.7%. In order to successfully conduct a survey on such a large scale, a pretest with the measuring instrument used is required. Hence, the pretest was conducted to test the validity of the questionnaire and to check whether the planned multivariate analysis methods would be feasible in practice. In this paper, the researchers specifically focused on the results of the pretest as the data from the main survey was not available at the time of publication.

The pretest was conducted with upper secondary education pupils and not with university students. This can be explained by the fact that, due to the project schedule, the researchers could not wait to pretest students at the semester opening in October 2019. The researchers decided to question potential prospective students, meaning pupils in their last school year in the upper secondary educational level. The focus schools included schools with an upper secondary diploma (Matura), specifically in Academic Secondary Schools Upper Cycle (AHS Oberstufe) and Colleges for Higher Vocational Education (BHS) like Secondary College of Business Administration (HAK), Secondary School for Economic Professions (HLW) or Higher Federal Technical College (HTL). Because of Matura examinations, pupils in their last year quit school earlier. For this reason, the pretest was conducted with a sample of pupils in the third (AHS) and respectively the fourth (BHS) class of the upper secondary level. A major limitation of the pretest itself is the questioning of *possible* first-semester students and not first-semester students themselves.

Nevertheless, the surveyed sample is as comparable to first-semester students as possible and best represents their attitudes, behavior and style of living.

The pretest took place in eight different schools in Styria. Overall, 176 pupils completed the questionnaire. Due to listwise case deletion the number of cases used for statistical analysis differs among the presented calculations. In our sample, 63% attend a BHS and 37% an AHS. This is in contrast to the educational background of Austrian first-semester students who predominantly come from an AHS. According to the Austrian National Education Report 2018 55% of first-semester students attended an AHS before beginning their studies, while only 35% attended a BHS (Mayrhofer et al., 2019). Furthermore, the majority (72%) of our respondents are female and have grown up in a rural environment (59%). The average age of the pupils is 18 years.

Results

Starting point: The Role of Digital Devices and Media in Everyday Life

Digital devices and tools determine the everyday life of young people intensively. For example, the majority (79%) of the respondents state that they use digital tools, such as an online calendar or notes app, to organize their daily lives. 80% also agree that the disappearance of the Internet and digital equipment would have a negative impact on their lives. More than half of the people surveyed (54%) indicate that a life without the internet would be unimaginable.

On the one hand, this means there is a strong dependency on digital devices and the Internet. On the other hand, there is also an awareness of the consumption of online media and a critical reflection on its intensive usage on the part of the pupils. More than half (53%) strongly agree that they often use the Internet longer than they intended. Furthermore, 76% want to be consciously "offline" more often in the future. Concerning the future, more than half (53%) are worried by the idea that much can be done only via the Internet. Another interesting finding, highlighting the insecurities towards a digital future, is the fact that pupils do not feel well-prepared for digital transformation: More than two thirds (70%) point out that school has not prepared them well for a digital future.

The strong dependency paired with critical reservations towards digital devices and digital media, lead to an ambivalent relationship between the pupils and their digital environment. This relationship can be described as follows: Digital devices and digital media are both a blessing and a curse at the same time and have – as well as a blessing and a curse – a huge impact on pupils' everyday lives.

Figure 2 shows a list of the items discussed above. These items address the attitude of the pupils towards the Internet and digitalization. They have been measured on a 4-point Likert scale, where number 1 stands for "strongly agree" and number 4 for "strongly disagree". In the Figure 2 the items are sorted by mean, whereby low mean values indicate approval.

Figure 2: Attitude towards the Internet and Digitalization

n=131, mean values: 1=strongly agree, 4=strongly disagree
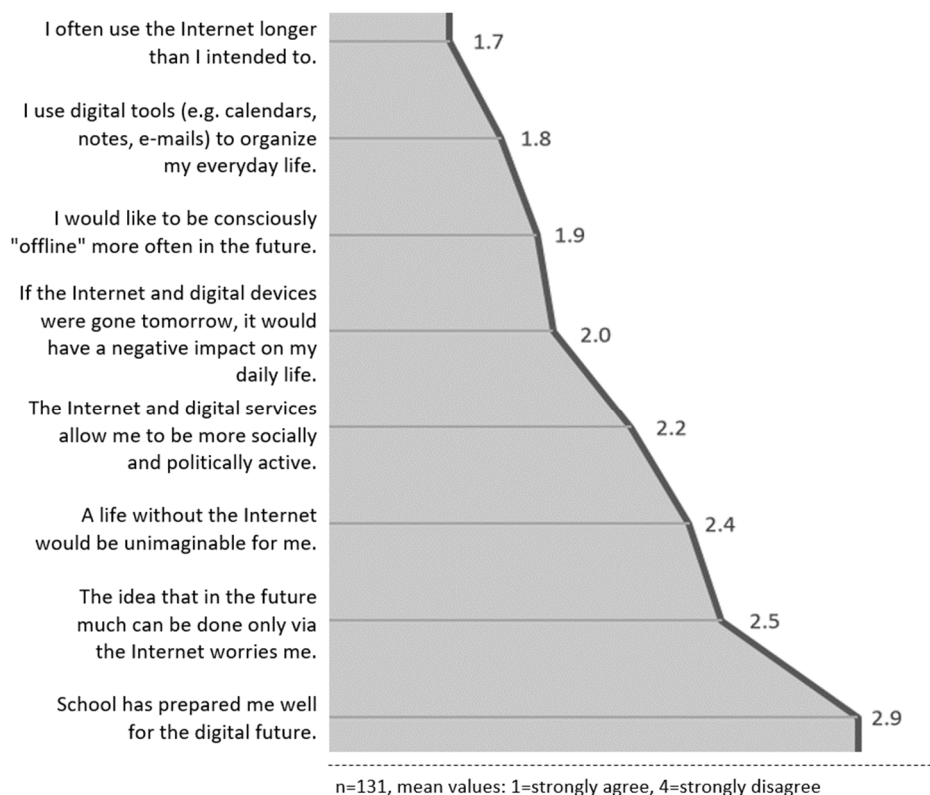
Figure 2. Items measuring the attitude towards the Internet and digitalization sorted by mean values.

Hidden Potentials: Equipment and Possible Benefits in Higher Education

On average, each of the participants owns 3.4 devices, of which almost everyone owns a smartphone (99%), by far the most popular device among the respondents. As can be seen in Figure 3, 94% use a smart phone in their free time, while only 71% use their smartphone for educational activities. Therefore, the potential for higher education institutions and the professional use of smartphones in future technology-supported teaching and learning settings is enormous, as about one-third of those who own a smartphone do not use it for learning contexts.

The same applies to the use of tablets as well as e-book-readers. Both devices could be utilized in educational institutions, as well, since less than half of those who own a tablet (39%) use it for school purposes (14%). An e-book-reader is owned by 20%, while only 2% use it for educational activities; however, it is interesting to note that laptops or notebooks and desktop PCs are generally used more frequently for school activities (laptop/notebook 54%, desktop PC 76%) and less in leisure time (laptop/notebook 30%, desktop PC 65%).
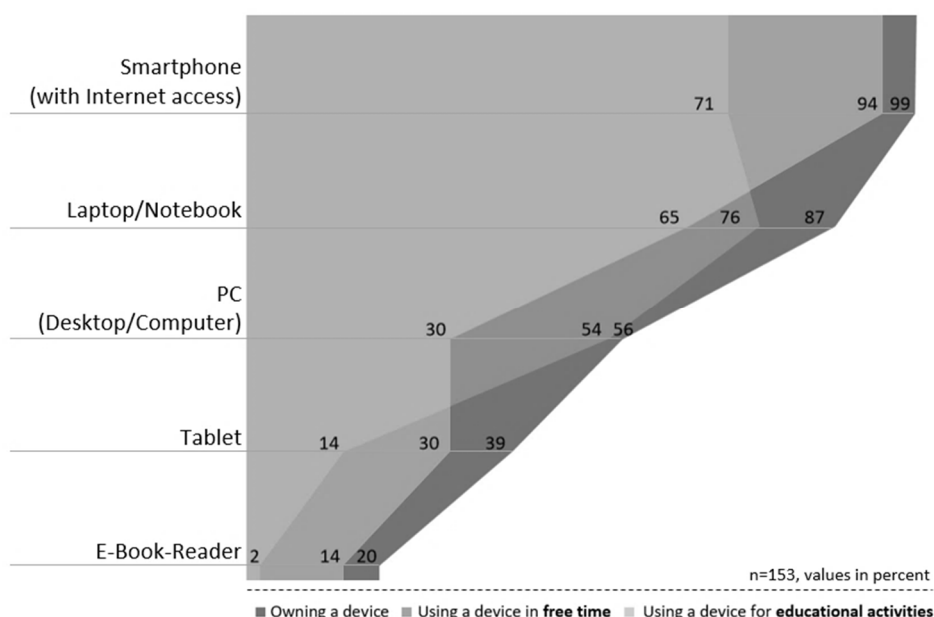
Figure 3: Equipment and Usage of Digital Devices

Figure 3. The equipment and usage of digital devices differentiated by usage in free time and usage for educational activities.

The fact that digital devices are already widespread among young people is shown above all by the fact that of eight devices given for selection in the survey[3], nobody indicated owning only one device. Of the 153 respondents, 26 people own five devices or more. The average number of owned devices is 3.4. In general, the trend is towards portable devices is apparent, as can be seen for example by the fact that just 56% of the pupils own a desktop computer, which almost all use for educational activities. In comparison, 87% own a portable laptop or notebook, of which 76% use it for school purposes and 65% use the device in their free time (see Figure 3).

Figure 4 shows how respondents use their devices and which social media or online services they use. Social media, messenger services, but also videos and podcasts are used by the respondents both in their free time and for educational purposes (approximately 90%). Online encyclopedias like Wikipedia are also used by almost all participants (98%) in their free time, but less than half (42%) use it for learning activities. This requires educational institutions to follow the trend in a way that the social channels that are mainly used by the target group are provided with valid information.

Cloud services, forums and online-communities, as well as professional social networks are currently less popular, especially for educational activities. Particularly surprising is the result that 42% do not even know about professional social networks like *LinkedIn* or *XING*, while almost half of the participants (46%) know them, but do not use them. This circumstance seems to hold great potential, since in a

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[3] The following devices were available for selection in the pretest: Smartphone (with Internet access), Mobile phone (without Internet access), Laptop/Notebook, PC (Desktop/Computer), Tablet, Portable Media Player (e.g. MP3-Player, iPod), E-Book-Reader, Wearables (e.g. Smartwatch).

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constantly changing labor market, maintaining a presence on professional platforms could not only improve employability, but might also be a prerequisite for participating in the labor market in a digital future (Lupton, Oddone & Dreamson, 2019).


Figure 4: Social Media and Online Services
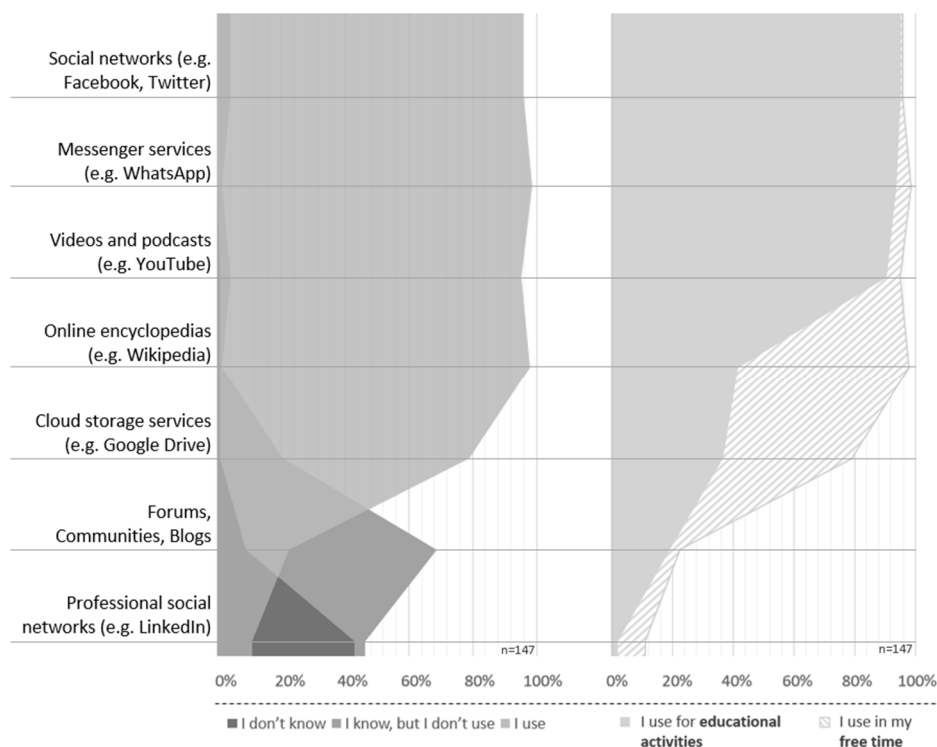
Figure 4. The usage of social media and online services differentiated by usage in free time and usage for educational activities.

Concerning digital services that can be used for learning purposes, pupils were asked to state which online services they know and which of them they use (free of charge and/or fee-based) (see Figure 5). More than three-quarters of the pupils surveyed (77%) use a service to retrieve text documents (e.g. PDF documents). This service is predominantly used free of charge (68%), while only a minority (9%) pay for this kind of service. Learning platforms like *Moodle* or *LMS.at* are used by 61% of the pupils. Although the majority of the respondents are aware of learning apps (58%), only 28% use them.

A surprising finding concerns online courses like *MOOCs* or *iMooX*. By now only 7% of those surveyed use such services, while 67% have already heard of them, but do not use them. The remaining 26% do not even know about such online courses; therefore, higher education institutions might do well in promoting their *MOOCs* and online tutoring courses and make these services better known. Furthermore, it might be beneficial for future technology-supported teaching and learning settings to perfectly tailor the online course offerings to students. Also learning platforms such as *Moodle* or *LMS.at* could be used to a greater extent.

Figure 5: Usage of Digital Services for Learning Purposes

Figure 5. The usage of digital services for learning purposes differentiated by usage free of charge and usage fee-based.
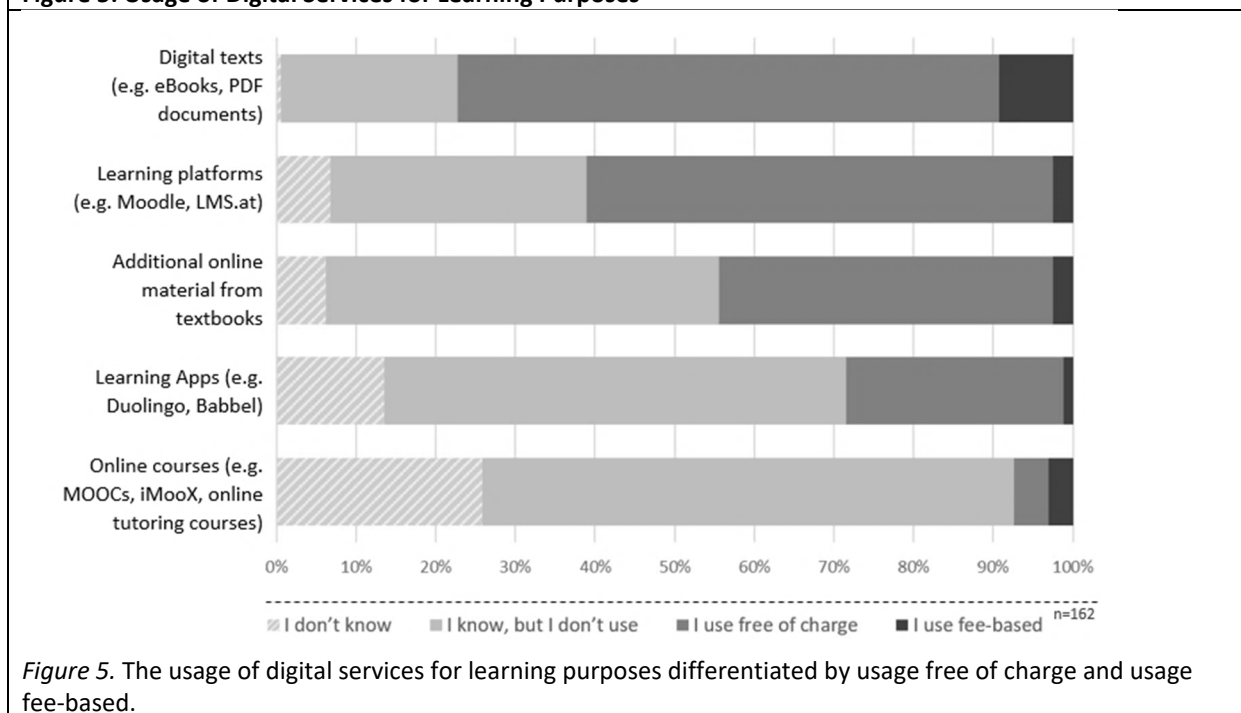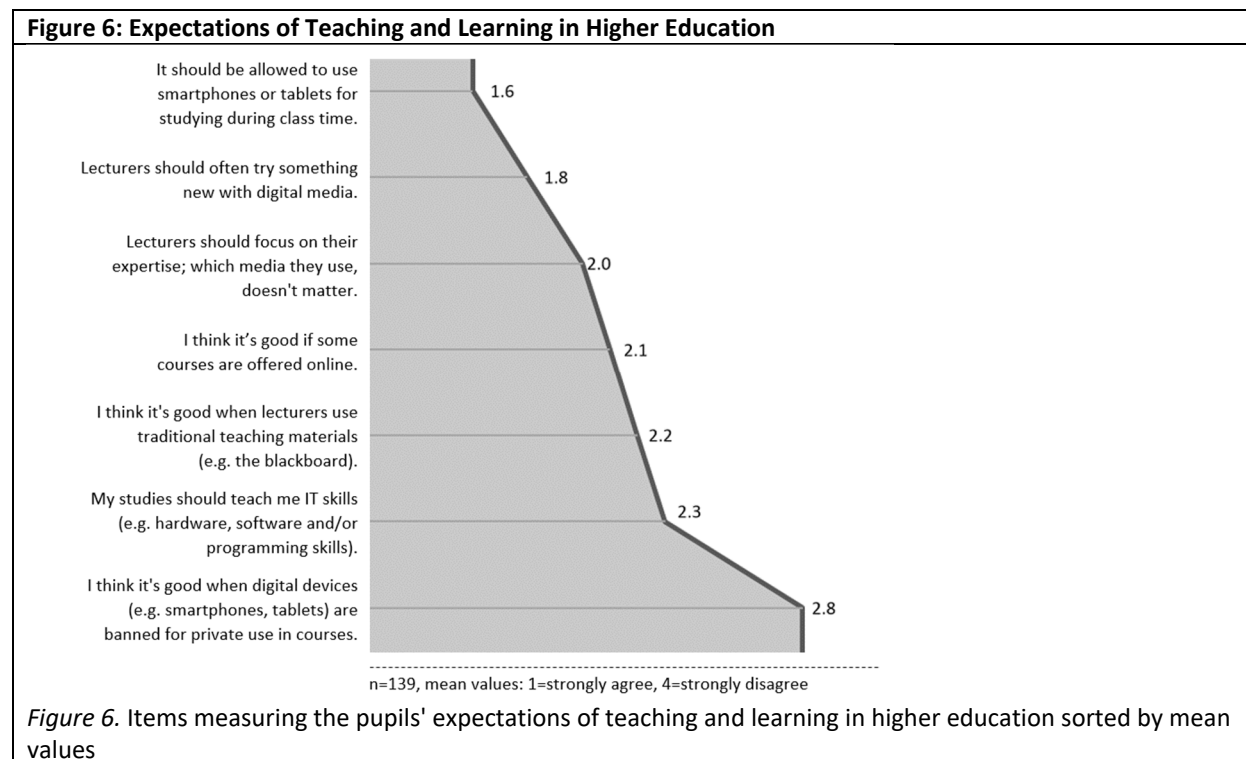
Going into First Year: Expectations vs. Reality

Teaching in higher education institutions is still conducted in a rather traditional way. Although the majority of courses are already supplemented by online materials, the potential of online teaching is far from being exploited and is only gradually finding its way into educational institutions. For example, successful use of blended learning can combine the advantages of online and face-to-face teaching and thus offer an optimal setting for learners. Formats such as these or similar, are precisely what the surveyed pupils want.

Most of the ongoing freshmen (83%) expect course instructors to often try something with new media. A study on vocational training in the digital age reaches a similar finding. 85% of the respondents want their instructors to try out something new with digital learning media and 93% prefer a mixture of analog and digital instructions (Schmid, Goertz & Behrens, 2016). The majority (90%) also want digital devices to be allowed for studying purposes during class time. On the other hand, the survey has shown that students do care about the content of a course, since 71% of them think that lecturers should focus on their expertise before considering which digital media to use. Good teaching is a sensible combination of media and didactics.

Figure 6 shows a list of items addressing the expectations pupils have of teaching and learning in higher education. The items have been measured on a 4-point Likert scale, whereby 1 stands for "strongly

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agree" and 4 for "strongly disagree". In the figure the items are sorted by mean, whereby low mean values indicate approval.

Figure 6: Expectations of Teaching and Learning in Higher Education

n=139, mean values: 1=strongly agree, 4=strongly disagree

Figure 6. Items measuring the pupils' expectations of teaching and learning in higher education sorted by mean values

Discussion and Future Work

Digitalization – or more differentiated – digital transformation leads to new questions and challenges for higher education institutions. In some cases, the current questions are not completely new, but these questions need new answers. In addition to changing framework conditions and in the interest of providing an environment for teaching and learning at higher education institutions, it is also important to perceive the changed competence requirements of graduates. Learners should be provided with a range of learning processes to help them develop and further promote the required competencies. In order to stimulate the promotion of necessary competencies for a digital world, it is important to know the entry qualifications of first-semester students by getting an overview of their digital competencies. This is done in the above described DiKoS-project at the University of Graz.

Within this paper, the authors specifically focused on the pretest results of the DiKoS-project. Based on the pretest data, results were first presented in this article. A major limitation of the study is that the size of the pretest sample does not yet allow generalizable statements to be made about how the design of teaching sessions might be structured in concrete terms based upon the digital competencies of the students surveyed. Nevertheless, initial starting points for the design of higher education teaching can already be identified. For instance, the current results have shown, that educational institutions could focus much more on the use of devices for educational purposes, by making use of targeted applications

or tools. Further findings suggest that online courses like MOOCs, tutoring classes, as well as professional online platforms, should be better promoted by higher education institutions. Based on the digital competencies that first-semester students bring with them, the design of adequate teaching processes can be addressed. Furthermore, one of the aforementioned challenges for designing teaching processes in a digitized world is to rethink present educational content and develop new curricula. Since the discussion regarding the design of teaching due to the changed framework conditions caused by digital transformation usually only takes place on a media and methodological didactic discussion, there is a great need for research in the field of current and future educational goals and contents. One such study is underway as a doctoral project at the University of Graz. The aim of the doctoral thesis is to identify necessary new educational goals and content for curricula development in economic and business education.

With regard to the students, a database is needed that allows generalizable statements to be made about their digital competencies. The already mentioned DiKoS-project of the University of Graz has created such a database with 4.676 surveyed first-year students of the winter semester 2019/2020. Based on this data, it will be possible to make generalizable statements about the degree of digitization among Austrian students. Furthermore, the data can be used to derive recommendations for the development of new technology-supported teaching and learning offerings. These are more important than ever with regard to the current COVID-19 situation. The spread of the corona virus is currently forcing universities to very quickly switch to online and distance learning with an extremely short lead time. In order to draw the best lessons from this transformation process, accompanying empirical studies and comprehensive reports from lecturers and students on their experiences with online teaching and learning are required. Measuring the digital competencies of lecturers and students can also make valuable contributions here, in order to provide empirically sound knowledge and recommendations for action for the further development of online teaching and learning.

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International Business Education Using Global Virtual Teams: Relationship Between Cultural Intelligence, Global Knowledge, and Team Performance

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Abstract

Corporate employees must interact with people from different cultures in cross-cultural environments. This study examined the extent that cultural intelligence and global knowledge predicted team performance for university students engaged in collaborative team projects resembling the global corporate work environment. The sample for this study was 2,012 students who participated in the X-Culture Global Virtual Team Project during the spring semester of 2015. Participants were members of 412 teams representing 40 countries and attending 95 universities. Study results indicated that global knowledge and cultural intelligence significantly relate to team performance. Cultural intelligence is a significant partial mediation between global knowledge and team performance in international business courses.

Keywords: Cultural intelligence, global knowledge, international business education, GVTP.

Introduction

In today's competitive environment, businesses and their employees must remain responsive to the dynamic realities of globalization. Modern organizational success relies on the ability to compete in a globalized environment while creating new ideas, accessing innovative strategies, and effectively managing ideas and strategies (Dereli, 2015). The world economy continues to grow, leaving companies with the challenge of operating in a cross-cultural environment (Misra, 2012). Interaction among people from various cultures is becoming the norm for a broad spectrum of jobs, from blue-collar to professional (Alon, Boulanger, Meyers, & Taras, 2016). Advances in technology (e.g., the Internet and network computers) have changed the very nature of work (Aggarwal, 2008). The evolution of technology will continue and poses a risk to organizations' survival. Companies' survival depends on their ability to transform the organization and successfully compete in a global environment (Maerki, 2008).

The continued expansion of the Internet facilitates virtual connection of people in various geographic locations. The virtual-teams phenomenon references the exploitation of human capital interacting

interdependently in geographically dispersed locations using information and communication technologies (Berry, 2011; Haines, 2014; Olariu & Aldea, 2014). The organization that effectively capitalizes on available computer-mediated communication technologies will remain relevant in today's business environment. Advances in technology fuel the growth of virtual teams by connecting individuals and allowing them to work together; organizations benefit from this connectivity (Gilson, Maynard, & Bergiel, 2013; Gilson, Maynard, Young, Vartiainen, & Hakonen, 2015).

Effective teamwork is the cornerstone of improvement and productivity (Bektas & Sohrabifard, 2013). The synergistic nature of teamwork increases collaborative problem-solving and innovation, among numerous other advantages. The use of human capital in dispersed locations combined with the advantages of technology increases organizations' competitive advantage (Bektas & Sohrabifard, 2013). Traditional communication modes such as e-mail and videoconferencing increase virtual teams' use of modern tools such as wikis and instant-messaging applications (Lilian, 2014; Olariu & Aldea, 2014). The birth of the global virtual team (GVT) results from the manifestation of the virtual team in a cross-border scenario. A GVT can be beneficial because a virtual team reduces resource use and costs associated with redundancy of work, time, travel, and relocation (Dekker, Rutte, & van den Berg, 2008; Gaeta, Orciuoli, Lola, & Senatore, 2011; Hsu, Liang, Wu, Klein, & Jiang, 2011; Sarker, Ahuja, Sarker, & Kirkeby, 2011).

International business education must introduce students to global virtual-team environments to prepare students for today's global collaborative business setting. It is imperative for business students to study international business as globalization continues (Aggarwal & Goodell, 2011). University business schools and international business educators must properly educate future international business managers by creating curriculum that provides students with the skills required to be successful in an international-business environment (Eisenberg et al., 2013; Jurse & Mulej, 2011; Rehg, Gundlach, & Grigorian, 2012). The study of international business is vital and must provide students with cross-cultural experiences and the skills necessary to navigate a global work environment (Duus & Cooray, 2014; Taras et al., 2013). Traditional tool case studies, videos, and lectures provide indirect experiences and do not offer direct exposure to the international-business environment (Taras et al., 2013).

Virtual teams allow businesses to collaborate in an international environment, transcending the reality of the international-business classroom environment's preparation of students (Taras et al., 2013). The use of online technologies and the edification of cultural intelligence increases cross-cultural competencies to prepare students for today's global business environment (Gonzalez-Perez, Velez-Calle, Cathro, Caprar, & Taras, 2014; Milhauser & Rahschulte, 2010; Shea, Sherer, Quilling, & Blewett, 2011). This does not indicate a complete parallel between the educational setting and the business setting; students must be prepared to work in international business regardless.

The purpose of this nonexperimental correlational study was to examine the extent to which cultural intelligence and global knowledge predict team performance for university students engaged in team projects resembling the global corporate work environment. In today's competitive environment, businesses and their employees must respond to the dynamic realities of globalization. Interaction among people from various cultures is becoming the norm for a broad spectrum of jobs (Alon,

Boulanger, Meyers, et al., 2016). Company survival depends on the company leaders' ability to transform the organization and compete in a global environment (Maerki, 2008).

International business education must introduce students to the global virtual-team environment. International business educators should consider implementing projects such as the X-Culture Global Virtual Team Project (GVTP), designed to prepare students for modern global business environments. The X-Culture GVTP brings international-business and management students from 43 countries on six continents and more than 80 universities together to engage in collaborative teamwork designed to resemble the global corporate work environment (Magnusson, Schuster, & Taras, 2014; Taras et al., 2012, 2013).

This study addresses one university's efforts to prepare students to operate in a cross-cultural environment in a global virtual setting and the factors that influenced student outcomes. Knowing the extent to which cultural intelligence and global knowledge predict team performance can help organizations avoid the problems associated with workforce lack of cultural knowledge (Barnwell, Nedrick, Rudolph, Sesay, & Wellen, 2014; Kiznyte, Ciutiene, & Dechange, 2015). Experiential GVTPs improve students' cross-cultural competencies through active engagement with culturally diverse teams (Duus & Cooray, 2014; Taras et al., 2013). Moon (2013) examined how team-level cultural intelligence relates to team performance. Data from Moon indicated that teams that displayed increased levels of cultural intelligence also exhibited higher levels of team performance.

This study built on the literature of Taras et al. (2013), who examined the benefits of hands-on experiential projects in a GVT environment and assessed how experiential projects add a dimension to international-business and international-management curriculum. Taras, who founded the X-Culture Project, revealed that experiential GVTP-based approaches have a positive impact on international-business learning. This study also builds on the literature of Zwerg-Villegas and Martinez-Diaz (2016), who addressed student participation in the X-culture project and measured the impact and difficulties in virtual and cultural aspects of the GVT. This study moves a step further and addresses how cultural intelligence and global knowledge can potentially increase student teams' ability to work together, increasing their level of preparedness to work in a global business environment.

Literature Review

We introduce the topic of teams in the review of literature, followed by a review of past and current extant research on various topics such as teams, GVT, the X-Culture GVTP, and the Business Cultural Intelligence Quotient (BCIQ) as they pertain to the study's purpose.

Teams

Teams are groups of individuals who interact interdependently and have integrative accountability, empowerment, processes, and reward systems that encourage the completion of assigned tasks (Bektas & Sohrabifard, 2013; Berry, 2011; Solansky, 2011). Companies have used teams for many years as a critical component of a modern organization (Tannenbaum, Mathieu, Salas, & Cohen, 2012). Teams increase the cohesion levels of people while creating social ties between individuals (Necşoi, 2015).

Teams operate in increasingly complex environments and must adapt to the teams' fluidity and dynamic (Tannenbaum et al., 2012). Teams play an important role in organizations, undertaking complex problems that require diversity in expertise to solve (Tannenbaum et al., 2012). Managers or team facilitators must prepare a team to operate in challenging situations, keep team members on track, and take necessary actions to enhance the team's ability to work collaboratively (Cagiltay, Bichelmeyer, & Kaplan Akilli, 2015).

Effective teamwork has proven to be the foundation for the improvement and productivity of organizations' human capital (Bektas & Sohrabifard, 2013). The synergistic nature of teamwork creates an environment that fosters collaborative problem-solving and innovation, among numerous other advantages. Teamwork, coupled with the empowerment of workers on the team, leads to improved productivity (Bektas & Sohrabifard, 2013).

GVT

GVTs are culturally diverse groups or teams that work together to achieve goal commonality by using computer-mediated technologies (Daim et al., 2012; Pinjani & Palvia, 2013). As businesses have expanded across borders, the GVT has become a normal way to conduct business, tap into broader talent pools, leverage a 24-hour work cycle, capitalize on local knowledge, and obtain international perspectives on business challenges (Derven, 2016). The enabler for GVT is technology, which—although sometimes flawed—allows the virtual team to communicate by simulating face-to-face scenarios (Derven, 2016). Global teams often coordinate tasks using communication and information technologies, which becomes a challenge when working in a virtual environment (Zander, Zettinig, & Makela, 2013). GVTs are challenged to coordinate activities at the team level, having to address team dispersion and learn how to use communication and information technologies to the team's advantage (Zander et al., 2013).

Cross-cultural training is an essential component in team success and creating an experiential learning GVTP can enhance cross-cultural abilities (Duus & Cooray, 2014; Erez et al., 2013; Taras et al., 2013). Erez et al. (2013) sought to discern if the characteristics of global identity and cultural intelligence were enhanced when using "the construction-group model of experiential learning" (p. 330) when participating in a GVTP. A sample of 1,221 graduate students participated in a 4-week GVTP. Study findings suggested that global identity and cultural intelligence improve when team members develop positive levels of trust among members (Erez et al., 2013). A GVTP offers an opportunity for members to be exposed to cross-cultural collaborative environments (Kolb, 1984) relevant to collaborating in an international environment (Taras et al., 2013). Taras et al. (2013) assessed the use of student-collaborative GVTPs in international-business and management education using a rationale that addressed three theories: social learning, intergroup contact, and experiential learning. The X-Culture GVTP is an example of a university-level GVTP.

X-Culture GVTP

The X-Culture GVTP, developed by Professor Taras of the University of North Carolina at Greensboro, is a virtual-team collaboration that attempts to enhance student learning in international business courses

using information and communication technologies (Taras et al., 2012, 2013). The X-Culture GVTP can be considered an experiential cross-cultural exercise and has proven effective in engaging students in a cross-cultural or global virtual-team environment (Duus & Cooray, 2014). The X-Culture GVTP replicates the international business environment by assembling teams that work together for an entire semester on realistic international business challenges (Tullar & Taras, 2017). The X-Culture GVTP includes university students in international business type courses from around the globe who take part in an 8-week systematized project, where students are assigned to virtual teams (Alon, Boulanger, Meyers, et al., 2016). Team sizes range from 5 to 7 students from various global locations, and these students are instructed to create a business plan for an international venture (Alon, Boulanger, Meyers, et al., 2016). Teams are exposed to various aspects of preproject training that lead to participating in instructor-supervised projects involving activities such as research and market entry (Tullar & Taras, 2017). Student participants of the X-Culture project participate at no cost to the student; the instructor who administers the X-Culture GVTP in their course pays a fee. The X-Culture GVTP brought international-business and management students from over 40 countries on six continents to engage in collaborative teamwork that mimicked the realities of today's global business environment. The GVTP used various collaborative online tools such as Google Docs, Skype, Facebook groups, Dropbox, and Google Translate (Taras et al., 2012, 2013). The project enhanced students' cultural intelligence as they students met the challenges associated with collaborating in a global virtual environment (Taras et al., 2012, 2013).

Approximately 2,000 students from 43 counties participated in the X-Culture project. The X-Culture project collected data on processes, team composition, and outcomes throughout the semester. The results from Taras et al.'s (2013) study revealed that experiential GVTP-based approaches in international-business and management learning lead to positive outcomes. These outcomes are based on the evaluated levels of learning, behaviors, and attitudes in an international experiential-learning project. In a two-part, longitudinal, and multinational study, Eisenberg et al. (2013) measured the effects of students' level of cross-cultural management on cultural intelligence. Eisenberg et al. concluded that cross-cultural management courses increased students' level of cultural intelligence. Students' levels of cultural competency improved when students were exposed to cross-cultural experiential activities, which had a positive effect on their future job performance (Eisenberg et al., 2013). Students must understand and build the global business environment; therefore, instructors must increase the quality of educational international business learning as students progress into the corporate world.

Team Performance

Team performance often links to explicit output, determined by a customer or an organization (Weimann, Pollack, Scott, & Brown, 2013). Several factors impact team performance, such as cultural diversity, cultural intelligence, trust, team cohesion, technology, and geographic challenges. Cultural diversity strongly relates to team performance (Nederveen Pieterse, van Knippenberg, & van Dierendonck, 2013). Cross-cultural competencies, along with cultural intelligence, positively impact team performance by alleviating the adverse results of cultural diversity (Moon, 2013; Sucher & Cheung, 2015). Barnwell et al. (2014) found cultural diversity to be an effective resource for global teams; however, cultural diversity also decreased team performance, perhaps due to mismanagement. Cultural intelligence is the ability to function effectively in a culturally diverse environment (Adair, Hideg, & Spence, 2013; Ang & van Dyne, 2008). Individual facets of cultural intelligence have a positive impact on

job performance and cross-cultural effectiveness (Chen, Lin, & Sawangpattanakul, 2011; Lee, Veasna, & Wu, 2013; Ott & Michailova, 2016) and positively correlate with cultural intelligence and the effectiveness of communication (Bücker, Furrer, & Lin, 2015; Ott & Michailova, 2016). Moon (2013) examined the role of team-level cultural intelligence as it relates to team performance. Study results indicated that teams that displayed increased levels of cultural intelligence also exhibited higher levels of team performance.

BCIQ

Cultural intelligence has proven important to management and international business. Understanding culture through the lens of cultural intelligence helps academic and work environments proliferate the cognitive flexibility and competencies necessary to navigate the cross-cultural environment (Alon, Boulanger, Meyers, et al., 2016; Gabrenya, Griffith, Moukarzel, Pomerance, & Reid, 2012). The four-factor model of cultural intelligence does not adequately address cultural intelligence in a business environment (Alon, Boulanger, Meyers, et al., 2016). Researchers developed the BCIQ instrument to address the limitations of other cultural quotient (CQ) measures, such as the four-factor model of cultural intelligence. The BCIQ instrument focuses on the need for culturally intelligent business managers in the global corporate workforce (Alon, Boulanger, Meyers, et al., 2016).

The BCIQ measures cultural intelligence in a business context and relies on a sophisticated measure that combines quasidirect observations and direct measures (Alon, Boulanger, Meyers, et al., 2016). Alon, Boulanger, Myers, et al. (2016) created the BCIQ to address the limitations of other cultural-intelligence measures. When validating the BCIQ, the researchers used the four-factor model of cultural intelligence and the 20-item CQ instrument to draw comparisons. The Ang et al. (2007) measure was the most widely-used measure of cultural intelligence (Alon, Boulanger, Meyers, et al., 2016).

The BCIQ comprises four factors. The first three factors use a 5-point Likert-type scale ranging from 1 (never) to 5 (always), and the fourth factor scale uses true and false responses (Alon, Boulanger, Meyers, et al., 2016). The BCIQ differs from Ang and van Dyne's (2008) four-factor model of cultural intelligence by presenting a honed factor structure, applicability to the business context, and the use of impartial cultural-knowledge measures (Alon, Boulanger, Elston, et al., 2016). The BCIQ includes four factors: "BCIQ1: Motivation; BCIQ2: Cross-cultural listening, communication and adaptation; BCIQ3: Cognitive preparation; and BCIQ4: Global knowledge" (Alon, Boulanger, Elston, et al., 2016, p. 4).

Theoretical Framework

The theoretical framework chosen for this study is the theory of cultural intelligence (Earley & Ang, 2003). Along with experiential-learning theory, cultural-intelligence theory supports the concept that different strata or sets of groups may learn differently and can be applied to undergraduate or graduate teams. Experiential-learning theory is foundational to providing a better understanding of cultural intelligence. Cultural intelligence is an individual's set of malleable abilities to function and self-manage effectively in a culturally diverse environment (Early & Ang, 2003; Leung, Ang, & Tan, 2014). The early works of Steinberg asserted that cultural intelligence is a theoretical extension of the underlying constructs of intelligence (as cited in Ang et al., 2007). Steinberg drew on a multifactor framework of

intelligence and concluded that the loci of intelligence includes metacognition, cognition, and motivation, whereas actions taken are behavioral (as cited in Ang et al., 2007). Cultural intelligence is important to international business education and affects academic and work-related performance and judgment (Alon, Boulanger, Meyers, et al., 2016; Gabrenya et al., 2012).

Ang and van Dyne (2008) applied Steinberg's different loci to the multifaceted dimensions of cultural-context diversity to identify a metacognitive CQ, cognitive CQ, motivational CQ, and behavioral CQ (Leung et al., 2014; Wang, Heppner, Wang, & Zhu, 2014). The four-factor model of cultural intelligence has limitations in its ability to measure cultural intelligence in a business context. Researchers developed the BCIQ instrument to address the limitations of CQ measures such as the four-factor model of cultural intelligence. The authors designed the BCIQ to measure cultural intelligence in a business context, relying on sophisticated measures that combine quasidirect observations and direct measurements (Alon, Boulanger, Meyers, et al., 2016).

The BCIQ's four factors of cultural intelligence provided an effective model for the present study. The theory's metacognitive factor addresses an individual's ability to process information on culture (Eisenberg et al., 2013; Morrell et al., 2013), which closely aligns with the predictor variables of cultural intelligence and global knowledge. The theory's cognitive factor addresses the individual's global-knowledge structures and the comprehension of norms and practices in cultural settings (van Dyne et al., 2008, 2012), and also aligns with the predictor variables of cultural intelligence and global knowledge. The four-factor motivation and behavior components connect to the dependent variable of team performance. Table 1 illustrates and defines the BCIQ four factors. The measure of the independent variables for cultural intelligence include BCIQ1 (motivation), BCIQ2 (listening, communication, and adaptation), and BCIQ3 (cognitive preparation). The measure for the independent variable of global knowledge is the BCIQ4 (global knowledge). Researchers measured cultural intelligence before the project commenced and after project completion (Taras et al., 2012, 2013).

Table 1
Elements of the BCIQ Four Factors

Factor	Subdimension	Definition
BCIQ1	Motivation	An assumed force operating internally that induces and individual to choose on action over another, specifically choices supporting openness to ideas, interpersonal relationships, cultural identities, and experiences
BCIQ2	Listening, communication, and adaptation	The cross-cultural utilization of baseline verbal/nonverbal awareness regarding social practices and how information is exchanged. Also, the ability to accurately modify and adapt actions according to the situation
BCIQ3	Cognitive preparation	The self-study of appropriate cross-cultural behavior/business practices
BCIQ4	Global knowledge	The level of general knowledge about other cultures in terms of facts, customs, practices, norms, and values.

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The present study addressed three research questions based on the information gathered in the literature review on cultural intelligence and team performance. We also present alternative hypotheses for each research question.

Research Question 1:   Are global knowledge and cultural intelligence related to team performance controlling for other independent variables?

> H1a: Global knowledge is related to team performance controlling for other variables.

> H1b: Cultural intelligence is related to team performance controlling for other variables.

Research Question 2:   Do mean differences exist for global knowledge, cultural intelligence, and team performance between undergraduate student teams and teams with at least one graduate student present? The study explores the difference in these outcome variables between undergraduate student teams and graduate student teams.

Alternative hypotheses:

> H2a: There is a difference in average global knowledge between undergraduate student teams and graduate student teams.

> H2b: There is a difference in average cultural intelligence between undergraduate student teams and graduate student teams.

> H2c: There is a difference in average team performance between undergraduate student teams and graduate student teams

Research Question 3:   Is cultural intelligence a mediator between global knowledge and team performance? We are exploring the existence of a mediation effect between global knowledge and team performance.

> H3a: Cultural intelligence is a significant mediator between global knowledge and team performance.

Methodology

The X-Culture (2016) project administrator provided the data. Because we used secondary data for this study, the owner of the data—the X-Culture GVTP—provided consent for its use. We received e-mailed permission to use the data from the X-Culture GVTP and obtained official written permission. We had no contact with the participants in the study. Because we used data collected by the X-Culture GVTP, we could maintain the confidentiality of participants and had no information about participants' identity.

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The sample for this study consisted of 2,012 students who participated in the X-Culture GVTP during the spring semester of 2015. Participants were members of 412 teams representing 40 countries and attending 95 universities. Of team observations, we identified 12 as outliers and removed them from the sample. We used the remaining 401 teams for analysis. Table 2 provides a description of the sample of teams (*n* = 401).

Table 2
Description of the Sample

Variable	Minimum	Maximum	Mean	StDev
Percent Male	.00	1.00	.48	.23
Percent International	.00	1.00	.70	.20
Team Size	3.00	7.00	4.72	1.08
Percent Graduate	.00	1.00	.22	.36
Global Knowledge	.30	.80	.60	.10
Cultural Intelligence	3.40	4.64	4.05	.25
Average Performance score	2.20	6.80	4.91	.77

n = 401 teams

The average size of participating teams was 4.72 participants and team sizes ranged from 3 to 7 students. The average team consisted of 22% graduate students and 88% undergraduate students. The average team also consisted of 48% male students. International students played a large role in the sample, with 70% of the teams having at least one international student. Global knowledge scores were collected and the average percent correct was 60.3%. A Likert-type rating scale was used to collect cultural-intelligence information. The mean score was 4.05 (*s* = .25).

The methodology used for data analysis included a multiple regression analysis, independent samples *t*-tests, and a path analysis used to test mediation effects. We used team-performance scores as the dependent variable for the multiple regression analysis with percent male, percent international, percent graduate, cultural intelligence, and global knowledge as the independent variables. We used a significance of alpha = .05 to determine statistically significant results. We checked diagnostics and assumptions related to multicollinearity, normality of residuals, and homoscedasticity. No problems emerged for any of the assumptions or multiple regression diagnostics. We calculated Mahalanobis distances and identified 11 teams as multivariate outliers. We did not include these 11 teams in the data analysis, resulting in a sample size of 401 teams.

We tested the mediation effect of cultural intelligence using path analysis and LISREL software (Jöreskog & Sörbom, 2018). Mediator variables transmit a portion of the effect of a prior variable onto a subsequent one (Kline, 1998), known as indirect effects. The path analysis included in this study provided a test of the mediation effect of cultural intelligence, which receives an effect from the global-knowledge variable and passes the effect on to the team-performance variable.

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Measures

We measured the independent variables of cultural intelligence and global knowledge using archived X-Culture GVTP data gathered using the BCIQ instrument. We used true and false items to measure the variable of global knowledge and a Likert-type scale to measure the variable of cultural intelligence. We measured the outcome variable of team performance using archived X-Culture GVTP data gathered from the assessment of team performance by the project's instructors (Magnusson et al., 2014). We calculated reliability of the BCIQ instrument using Cronbach's alpha, which was $\alpha = .88$ for the sample. We measured cultural Intelligence using 13 Likert-type items addressing the BCIQ factors of BCIQ1-Motivation (eight items), BCIQ2-Listening, communication and adaptation (three items), and BCIQ3-Cognitive preparation (two items). We computed the cultural intelligence variable using the average score for these 13 items and calculated the global-knowledge variable separately, using the responses of 20 true/false items measuring global knowledge. We assigned a score of 1 for a "true" response and a score of 0 for a "false" response. We calculated global-knowledge scores as the percentage of "true" responses for each participant. Although researchers have identified the global-knowledge variable as a factor in the overall construct of cultural intelligence, we did not include the global-knowledge variable itself in the overall cultural-intelligence score. Rather, we calculated the global-knowledge variable as a separate and independent variable from cultural intelligence for this study.

Data Analysis

We used multiple regression analysis to determine significant relationships between team-related variables collected for the study and the resulting team-performance scores. Table 3 displays the results of the multiple regression analysis.

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Table 3
Multiple Regression Results

Variable	B	Std. error	Beta	t	*p*-value
(Constant)	2.45	.66		3.69	.000
Percent Male	-.46	.17	-.14	-2.77	.006
Percent International	.21	.19	.05	1.10	.274
Percent Graduate	-.15	.10	-.07	-1.47	.142
Global Knowledge	.89	.38	.12	2.34	.020
Cultural Intelligence	.50	.15	.16	3.33	.001

Note: Team performance is the dependent variable.

The percent variance of team performance scores explained by the multiple regression model was a relatively low 8.1%. Three team-related variables significantly related to team performance: (a) percent male, (b) global knowledge, and (c) cultural intelligence.

As the percentage of men on the team increased, team performance declined (B = -.46, t = -2.77, p < .05) controlling for other independent variables. As the average percent correct for global-knowledge scores increased, team performance also increased (B = .89, t = 2.34, p < .05) controlling for other independent variables. Finally, as cultural-intelligence scores increased, team performance also increased (B = .50, t = 3.33, p < .05) controlling for the other independent variables. The most important predictors of team performance were cultural-intelligence scores (Beta = .16), followed by percent male (Beta = -.14), and finally, average percent correct for global-knowledge scores (Beta = .12).

We conducted independent *t*-tests to determine if a mean difference between teams with graduate students and teams without graduate students arose for the various team-related scores (see Table 4).

Table 4
Results of Independent Samples t-Tests

| Dependent Variable	Groups	Mean	StDev	t	*p*-value
Global Knowledge	Undergrad Teams	.61	.09	2.80	.005
	Teams with Grad Students	.59	.11		
Cultural Intelligence	Undergrad Teams	4.04	.24	-1.41	.160
	Teams with Grad Students	4.07	.26		
Average Performance score	Undergrad Teams	4.89	.79	-.63	.528
	Teams with Grad Students	4.94	.73		

Note: Undergraduate teams n = 253; teams with graduate students n = 148.

Significant mean differences in the average percent correct of the global-knowledge test emerged between undergraduate teams (mean = .61, *s* = .09) and teams with graduate students (mean = .59, *s* = .11). Teams with graduate students scored slightly lower on the global-knowledge test than teams of

solely undergraduate students (mean difference = .02). No significant differences emerged in average cultural-intelligence scores or average team-performance scores between undergraduate teams and teams with graduate students.

The final analysis included a test of cultural intelligence as a mediator between global knowledge and team performance. We calculated the path model (see Figure 1) to determine the relationships between these three variables in a path of global knowledge leading to cultural intelligence, which led to team performance. The results of the initial path analysis showed a significant path from the beginning to the ending variable. Figure 1 includes the *t*-values for each path. Each path was statistically significant and positively related at the alpha = .05 level of significance.

Figure 1: Path analysis of team variables
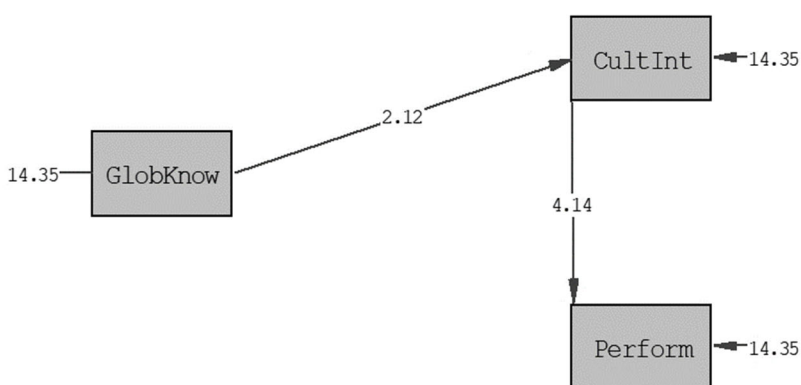
Figure 1. Path analysis of team variables.

Next, we conducted a mediation test to test the mediation effect of the cultural-intelligence variable. This test required us to add a path between the global-knowledge score and the team-performance outcome. Figure 2 shows the results of this test.

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Figure 2: Mediation effect of cultural intelligence
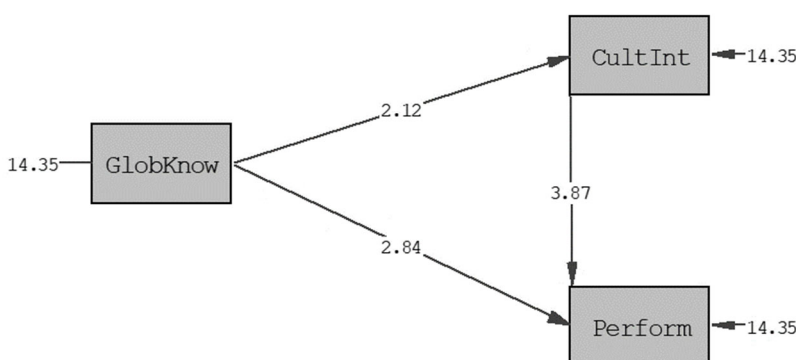
Figure 2. Mediation effect of cultural intelligence.

The mediation effect resulted in a significant path from global knowledge to team performance. As a result, cultural intelligence was a partial mediator between global knowledge and team performance. Part of global knowledge was mediated by cultural intelligence, whereas the other part of global knowledge led to team performance. In summary, cultural intelligence is considered a partial mediator of the significant effect that originates with global knowledge and ends with team performance.

Conclusion

Study findings indicated that cultural intelligence and global knowledge increase the ability of student teams to work together and increase students' level of preparedness to work in a global business environment. This is a significant finding for those involved in international business education, as international business courses prepare students to function in a team-based, computer-mediated GVT environment. The BCIQ four-factor model of cultural intelligence was an appropriate model, and this study's tests supported the model. The theory's metacognitive factor addressed an individual's ability to process information on culture (Eisenberg et al., 2013; Morrell et al., 2013), which closely aligns with the predictor variables of cultural intelligence and global knowledge.

The use of global teams and intercultural teams is increasing, and business courses must prepare students to function on international business teams. Students who experience these types of preparations will be able to function in the global virtual reality of teamwork and provide new insights to improve international business education. It is yet to be determined how cultural intelligence and global knowledge will impact business, international business education, or government; however, it is clear that ignoring these educational elements would be a mistake.

The predictor variable and cultural intelligence relate positively to team performance. Cultural intelligence is a predictor of successful team performance as well as a mediator between global knowledge and team performance. Moon (2013) examined the role of team-level cultural intelligence as it relates to team performance. Study results indicated that teams that displayed increased levels of

cultural intelligence also exhibited higher levels of team performance. The findings in this study support the Moon study.

Findings implied that global businesses, universities that employ international business educators, and other organizations should seek greater cultural intelligence in employees to increase team performance. Additionally, global knowledge relates positively to team performance. This finding implies that individuals who increase their global knowledge increase their chances of gaining positive team outcomes. Universities teaching international business courses need to provide curricula to increase global knowledge, and businesses must consider employing people with greater global knowledge.

Study results indicate that cultural intelligence and global knowledge increase a team's performance. Although graduate students should have more educational experience, these students did not necessarily impart more global understanding, which may explain why the difference between the two groups (undergraduate and graduate) did not affect student learning. International-business educators must consider integrating curriculum that equates to experience in global understanding rather than solely academic learning. Separating the two groups is not effective unless the curriculum focuses on giving students opportunities to increase global understanding with real-world projects.

Limitations and Future Research

The present study considered possible limitations to internal and external validity. When discussing validity, one refers to the inexact verity of inferences, propositions, or conclusions; external validity refers to the verities of the conclusions that involve generalizations ("External Validity," n.d.). A notable threat to external validity was that the data accrued from college students in an academic setting; thus, study findings may not be generalized beyond the academic setting in which the project occurred. Internal validity seeks truth in inferences of causal and cause–effect relationships ("Internal Validity," n.d.). Internal validity did not apply to this study because establishing a causal relationship was not the study's purpose.

One limitation of this study on real-life learning in GVT was that we could not assess the learning students acquired, beyond the knowledge imparted by the international-business curriculum. Thus, we could not determine whether adding to the curriculum would be effective; however, it makes reasonable sense that anything added to the curriculum that gives students realistic learning experiences would enhance the international business curriculum. It would be useful to conduct a future study that discerns how the university trains international business chairs and how international business instructors create curriculum to prepare students for real-life experiences. One area to further investigate is whether the curriculum presented to students prepares them for the global corporate workforce, particularly if courses challenge students to participate in realistic international business experiences. A teaching study arising from this research may go to the core of international business learning curriculum development.

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