Introduction to *Online Learning* Volume 24, Issue 2

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This issue of *Online Learning* is the first to be published during the ongoing pandemic, which has had substantial implications for the education sector. The significance of online learning has changed dramatically since the onset of COVID-19. Virtually every institution from primary schools through graduate schools in the U.S. and around the world has moved instruction from classroom settings to remote and distance settings. It is important to note that institutions undertook this shift under extreme pressure with unrealistic timelines, frequently a matter of days or weeks. In many cases, the resultant coursework does not adhere to standards reflective of high quality online instructional design. Many institutions in the U.S. have adopted terms such as "emergency remote instruction" to describe their current distance learning offerings. While our timeline for reviewing rigorous studies generally precludes publication of current research on the great migration to emergency remote instruction, we do include two papers relevant to the current crisis.

The first section of this issue contains two papers relevant to the ongoing challenges related to the pandemic and higher education's response. Our first paper is "U.S. Faculty and Administrator Experiences, Concerns, and Approaches With Online Learning in the Early Weeks of the COVID-19 Pandemic" by Nicole Johnson of the Canadian Digital Learning Research Association, George Veletsianos of Royal Roads University, and Jeff Seaman of Bay View Analytics. This paper presents results of a national survey of 826 administrators and faculty across 641 institutions. At the time the survey was conducted 90% of institutions reported moving some or all instruction to distance format and 97% reported working with faculty new to remote instruction. Other high-level findings indicate that a majority of faculty surveyed changed the kind of assignments their students complete and nearly half of respondents lowered expectations for the amount of work students do. The results add empirical weight to the anecdotal evidence that remote instruction relies much more heavily on synchronous video than is typical of online learning with 80% of respondents reporting using synchronous video. This early study of the institutional transition to remote learning provides valuable insight as a snapshot of the quick response and actions taken across the U.S.

The next paper "Crisis Planning for Online Students: Lessons Learned from a Major Disruption" by Peggy Holzweiss, Daniel Walker, Ruth Chisum, and Thomas Sosebee of Sam Houston State University is also relevant in the current crisis. The authors of this study argue that, although more than a decade of prior research has emphasized the need for planning, crisis response on college campuses has been primarily reactive rather than proactive. This is clear from the current crisis and the absence of plans to move instruction online. The paper discusses the need for more planning after Hurricane Harvey, which disrupted access to online learning for the majority of students who lived close to the city of Houston but not those residing on or near that

campus, an hour north of the city. The study examines the experiences of the frontline staff who employed a plan to address the needs of the online learners. Results indicate that institutions need a proactive crisis plan for online students that includes knowledge of where this population lives, how different campus units can provide support in a crisis, who should lead the crisis response, and what kind of care can be offered to the frontline responders during the crisis period.

The next section presents several studies that look at student perspectives. The first paper in this section is "Examining Student Perception of Readiness for Online Learning: Importance and Confidence" by Florence Martin, Brandy Stamper, and Claudia Flowers of the University of North Carolina at Charlotte. This paper presents a model of online learner readiness, building on an extensive presentation of prior models. The authors identify four common constructs including online student attributes, time management, technical aspects, and communication competencies. The paper presents a survey on the importance of these measures of learner readiness with a sample of 177 students. The respondents rated student attributes, time management, and technical competencies high for importance compared to communication competencies. Students were significantly more confident in the importance of online student attributes and technical competencies compared to time management and communication.

The next paper in this section is "Attitudes Towards Technology Among Distance Education Students: Validation of an Explanatory Model" by Sonia J. Romero Martínez of Madrid Open University, Xavier G. Ordóñez Camacho of Complutense of Madrid, Francisco D. Guillén-Gamez of the University of the University of Almeria, and Javier Bravo Agapito of Madrid Open University. The goal of this paper is to investigate cognitive, affective, and behavioral beliefs of learners about the inclusion of information and communication technology (ICT) in teaching. The specific objectives of this study are to test the reliability and factorial structure of an instrument that measures attitudes and to propose and validate a model that hypothesizes a positive correlation between digital competence and frequency of use of technologies and positive attitudes. The authors test this model on a sample of 1,251 students of the Madrid Open University. Results indicated satisfactory psychometric properties for the instrument and a positive relationship between frequency of use of digital devices and positive attitudes to ICT. The influence of student's self-perceived digital competence on attitude was rejected however.

Rounding out the student perspectives section is "Flipping e-Learning for Teaching Medical Terminology: A Study of Learners' Online Experiences and Perceptions" by Perihan Şenel Tekin, Hale Ilgaz , Gülgün Afacan Adanır, Denizer Yıldırım, and Yasemin Gülbahar of Ankara University, Turkey. The authors of this paper argue that flipped classrooms can enhance and facilitate deep learning through greater use of active learning activities in the classroom. The researcher collected learners' usage of the system, submissions to the study process questionnaire, and academic achievement as quantitative data. Learners' attitude about the flipped classroom model were obtained as qualitative data. The authors conclude that learners' academic achievement was significantly related to their perceptions of deep learning and their time spent on learning activities.

The next three papers in this issue discuss faculty, professional development, and online learning from different perspectives. The initial paper in this section is "Presenting a Validated Mid-Semester Evaluation of College Teaching to Improve Online Teaching" by Virginia Byrne and Alice Donlan of the University of Maryland, College Park. This paper focuses on how to improve online teaching through formative feedback from students. The authors of this paper note that formative feedback is often used to improve teaching and identify concerns before the end-of-

semester evaluations are collected. Mid-semester evaluations give instructors an opportunity to gather actionable feedback from students in time to implement changes that can improve instruction, learner satisfaction and end-of-semester evaluations. The authors document how existing student evaluations of teaching have been found to be biased and set out to develop and validate an instrument for mid-semester formative feedback specifically for online instructors that is an improvement over current practices. This study found evidence that the instrument is valid and reliable for gathering formative feedback from undergraduate students about online teaching practices.

Continuing this theme, the next paper in this section is "Development and Validation of the Purdue Global Online Teaching Effectiveness Scale" by Elizabeth Reyes-Fournier, Edward Cumella, and Gabrielle Blackman of Purdue Global University, Michelle March of the College of Lake County, and Jennifer Pedersen of the University of Alaska Anchorage-Kenai Peninsula College. While the previous paper focuses on formative feedback, this study examine summative evaluation. Like the previous study, the authors of this paper also note that currently available measures of online teaching effectiveness are flawed and they also validate a measure based on more clearly-defined constructs. They identify four clear online teaching effectiveness factors: presence, expertise, engagement, and facilitation. The resulting instrument showed good internal consistency, good test-retest reliability, and predictive validity in relation to student achievement.

A third paper addressing the theme of quality online instructions closes out this section. This study is "Community College Faculty's Perceptions of the Quality Matters Rubric" by Rhonda Gregory of Volunteer State Community College, Amanda Rockinson-Szapkiw of the University of Memphis, and Vickie Cook of University of Illinois Springfield. The Quality Matters (QM) Higher Education Rubric provides a model to help assure quality course design. The purpose of this study was to explore the influence of a QM workshop on community college faculty perceptions of the rubric and their course design skills. Research was conducted in two phases at two institutions. Specifically the paper asks how successful completion of the QM professional development training effects participants' perceptions about the QM rubric, and what challenges and successes that faculty experience as a result of the training. The paper identifies six themes that respond to these questions including that the experience can be transformational though time consuming.

The next section presents two empirical studies, the first of which is "Detection of Online Contract Cheating Through Stylometry: A Pilot Study" by David Ison of Northcentral University, San Diego. This paper investigates issue of academic integrity and specifically the topic of contract cheating; that is, when a student employs another individual to complete assignments. This violation of academic integrity is difficult to track (we don't know the extent to which it is done in online higher education settings) and difficult to detect. Current plagiarism detection technologies do not identify original work produced by someone other than the student enrolled in the course a violations. One technique that has potential in uncovering contract cheating is stylometry, the analysis of authorial style and writing attributes. This study evaluated the efficacy of three stylometry software systems to detect simulated cases of contract cheating. Accuracy ranged from 33% to 88.9%. The authors conclude that while more research is needed, readily available stylometry software shows promise for the potential detection of contract cheating.

The second paper in this section is "From Design to Impact: A Phenomenological Study of HumanMOOC Participants' Learning and Implementation into Practice" by Patrice Torcivia Prusko at the Harvard Graduate School of Education, Heather Robinson and Whitney Kilgore of

the University of North Texas, and Maha Al-Freih of Princess Nourah Bint Abdulrahman University. This paper seeks to advance research of Massive Open Online Courses (MOOCs) by moving away from the common focus on course completion rates and instead seeks to foreground the learning experience and application of learning to practice among course completers. The study examines a MOOC designed to help educators better understand and implement the Community of Inquiry framework in their course design and teaching. A qualitative phenomenological study was conducted to explore how completers of the course perceived the phenomenon of implementing what they had learned, and its impact on their subsequent educational practices. The authors identify themes in the interview data they collected, highlighting the various goal and outcomes for MOOC completers.

The next section contains two papers that focus on online learning in the K-12 sector. The first of these is "Irrelevant, Overlooked, or Lost? Trends in 20 years of Uncited and Low-Cited K-12 Online Learning Articles" by Karen Arnesen of Brigham Young University, Shea Walters and Jered Borup of George Mason University, and Michael K. Barbour of Touro University, California. The authors of this paper point out that while systemic reviews of a field are useful, they usually center on highly-cited work and journals and ignore less-frequently cited work. The assumption is that less-frequently cited work is inherently less important or interesting. To analyze this assumption the authors identified 62 articles that had 5 or fewer citations and analyzed them for trends in authorship, publication outlets, dates of publication, and topics that could explain their low citation rates. The study found that the majority of these articles were published in less well-known journals and may have attracted fewer readers because they addressed topics with a narrow focus, often outside of the U.S. They did not find articles that were uninteresting, poorly researched, or irrelevant. This inversion of the conventional systemic review of a field of study thus raises interesting questions and presents intriguing possibilities relating to the future design of such studies. Perhaps looking at both ends of the spectrum of cited work in a field is a more fruitful approach.

The second paper in this section is "Student Perceptions of Their Interactions with Peers at a Cyber Charter High School" by Jered Borup, Shea Walters, and Megan Call-Cummings of George Mason University. These authors argue that, while lacking in many K-12 online settings, learner-learner interactions are perceived to be critical components to meaningful educational experiences because they help students to co-construct understanding of the course material. However little research exists that studies learner-learner interaction in cyber high schools, especially from the students' perspective. This paper begins to fills that gap. Utilizing the Adolescent Community of Engagement framework, this qualitative descriptive case study explored learner-learner interactions at a cyber-charter high school and identifies significant themes in these interactions. The authors conclude that interactions with peers allowed K-12 online students to develop friendships, improve their motivation, receive peer instruction, and collaborate effectively with others.

The next paper in this issue is a review of literature entitled "A Ten-Year Review of Online Learning Research Through Co-Citation Analysis" by Hyejin Park and Peter Shea (me) of the University at Albany. In this paper my colleague and I examined highly cited articles on online learning for the past decade. We review frequently cited and co-cited research items and unfold clusters of co-cited documents to reveal evolving research trends in online learning. Our results showed that literature review and studies on learners' discourse in asynchronous discussion were most frequently cited in the first half of the ten-year period. In the second five years, the focus

moved to online learners' satisfaction and self-regulation, informal learning, and learning through MOOCs. These results identify the contours of the field, but lack a view of research that was not highly cited per recommendations by Arnesen and her colleagues in this issue.

The final section of this issue contains two very different articles on best practices in online education. The first of these is "Making Instant Adjustments in Online Journalism Education: Responding to Continuous Needs Assessments in Asynchronous Courses" by Amanda Bright of the University of Georgia. This paper is founded in Knowles's theory of andragogy and analyzes the implementation of continuous needs assessment in three graduate-level online journalism courses. The study reveals that through this process of ongoing need assessment the instructor was able to provide a personal and practical level of instruction in the asynchronous courses that produced high levels of learning and satisfaction among the students in these courses.

The final paper in this issue is "Ensuring Online Learning Quality: Perspectives from the State University of New York" by Kristyn Muller, Kim Scalzo, Alexandra Pickett, and Lawrence Dugan of the State University of New York System Administration, Lisa Dubuc of Niagara County Community College, Ryan McCabe of Finger Lakes Community College, William Pelz of Herkimer Community College, and Donna Simiele of Niagara County Community College. This study examines best practices regarding the evaluation and assessment of online learning from an institutional perspective. It draws upon practices from the State University of New York (SUNY) System, which has developed a process using the Online Learning Consortium's (OLC) Quality Scorecard for the Administration of Online Programs to help SUNY campuses examine and improve the quality of online learning. The first section of the paper describes the development and implementation of that process and the second section probes deeper into the standards related to evaluation and assessment using examples from four SUNY community colleges. The authors conclude that using the OLC Quality Scorecard has helped to support positive campus culture change in online learning at numerous SUNY campuses.

We invite you to read and share this issue with colleagues and to consider submitting your original work to *Online Learning*.

U.S. Faculty and Administrators' Experiences and Approaches in the Early Weeks of the COVID-19 Pandemic

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Abstract
The COVID-19 pandemic has had a profound and rapid impact on higher education institutions across the world. In this study, we report the findings of a survey investigating the rapid transition to emergency remote teaching in the early weeks of the pandemic at public and private post-secondary institutions in the United States. Participants consisted of 897 faculty and administrators at 672 U.S. institutions. Findings reveal that with few exceptions nearly all reporting institutions transitioned to emergency teaching and learning approaches. Administrators reported that faculty with and without online teaching experience pivoted to online teaching, and nearly all administrators indicated that those who did not have online teaching experience were in the process of learning how to teach online. Regardless of whether faculty had previous experience teaching online or not, many faculty reported that they were using new teaching methods. A majority of faculty reported making changes to their assignments or exams as a result of transitioning to a new mode of delivery. Nearly half reported lowering the expected volume of work for students (including dropping assignments or exams) and/or shifting to a pass/fail model for this semester. The primary areas where faculty and administrators identified a need for assistance related to student support, greater access to online digital materials, and guidance for working from home. This study provides an early snapshot of efforts towards teaching and learning continuity at a large scale and provides some insights for future research and practice.

Keywords: COVID-19, online learning, emergency remote teaching, remote teaching, remote learning

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U.S. Faculty and Administrators' Experiences and Approaches in the Early Weeks of the COVID-19 Pandemic

At the time of writing, the impact of COVID-19 on institutions of higher education has been widespread. In March of 2020, UNESCO estimated that in the span of two months 850 million individuals have transitioned to alternative forms of teaching and learning worldwide (UNESCO, 2020), following the reduction or elimination of in-person courses to support physical distancing efforts and mitigate the spread of the virus. In this study, we provide one of the first reports of how this transition has impacted institutions, administrators, and faculty in the United States. Specifically, we report the results of a survey that sought to understand the transition to online course delivery in the early weeks of the COVID-19 pandemic. Following a review of literature that identifies classroom and faculty impacts and responses to prior events of similar magnitude, we discuss the methods used in this investigation. Next, we present the findings of this study and discuss their implications for research and practice.

Review of the Relevant Literature

The COVID-19 pandemic has sent shock waves to the entire higher education system on a global scale. As the virus spread, city-wide, regional, and country-wide lockdown orders were put into place across the world. With stay-at-home orders or physical distancing orders prohibiting larger gatherings, decisions to cancel, postpone, or move in-person classes online came within a matter of days in most countries. Moving education online in times of disruption (e.g., natural disasters or political unrest) is not a new strategy (e.g., Ayebi-Arthur, 2017; Beebe, 2010; Lorenzo, 2008; Swartz, Gachago, & Belford, 2018); however, in contrast to COVID-19, prior events described regional responses: few disruptions warranted a worldwide, or even nationwide, transition to online/distance education.

Previous studies investigating shifts to online course delivery during crises have offered lessons learned during these times. For instance, the Sloan Semester was an initiative that provided continuity of learning following Hurricane Katrina in which over one hundred institutions provided courses for students in the affected region to maintain their studies. Reflections from participating faculty revealed that the student-to-student interactions and class dialogues in virtual learning environments created an opportunity for students to give and receive emotional support to one another, which was important for student well-being as they dealt with the aftermath of the disaster (Lorenzo, 2008).

In a case study investigating resilience with e-learning in response to the 2011 earthquakes in New Zealand, Ayebi-Arthur (2017) discussed the importance of supporting faculty, noting that the availability of the selected technologies and their ease of use positively influenced the use of e-learning tools. Tull et al. (2017) described effective professional development practices that emerged following the New Zealand earthquakes, particularly shifting from a reliance on face-to-face training and one-on-one support to online communities of practice. Similarly, Czerniewicz et al. (2019), in their study of the move to online and blended learning during student protests and university shutdowns in South Africa, noted the importance of maintaining an awareness of student inequities when determining how to shift learning online. They remarked that "blended learning may have helped overcome certain practical hurdles (classroom disruptions) while raising others (digital inequality)" (p. 18). Ultimately, these past studies illustrate that a shift from in-person instruction to online course delivery during a disruptive event requires cognizance of the complex

needs of staff, administrators, students, and faculty in order to effectively provide instruction and support.

At the time of writing, little published literature existed that specifically examined experiences in the higher education sector with COVID-19. However, between the beginning of the transition in the U.S. (March 2020) to the submission of this paper (May 2020), the topic has been explored in varied ways in the gray literature. Numerous blog posts, editorials, and short reports emerged, highlighting the challenges and anxieties faced by students, faculty, and institutions as they made decisions about whether and how to provide continuity of education as COVID-19 cases continued to rise (e.g., Judy, 2020; Morgan, 2020; Reed, 2020). Topics ranged from how to manage inequities and student needs, how to support faculty teaching online for the first time, sharing faculty and student experiences, and the implications for institutions in both the short and long-term (e.g., Baker, 2020; DePietro, 2020; Govindarajan & Srivastava, 2020; Grajek, 2020; Veletsianos & Kimmons, 2020). The gray literature is instructive as it affirms the upheaval in higher education arising from COVID-19, reveals that the impacts for institutions, faculty, and students alike have been pervasive, and highlights experiences "on the ground."

The rapid transition from predominantly in-person classes to delivering classes online has also sparked much discussion within the scholarly community. One significant area of debate surrounds the use of the term "online learning." Bates (2020), emphasized that there are differences between online education and remote education employed rapidly in response to a pandemic. He argues that online learning is more than the mode of delivery, defining online learning as follows: "A form of distance education in which a course or program is intentionally designed in advance to be delivered fully online. Faculty use pedagogical strategies for instruction, student engagement, and assessment that are specific to learning in a virtual environment" (para. 18). Hodges et al. (2020) agree, arguing that the current environment represents "a temporary shift of instructional delivery to an alternate delivery mode due to crisis circumstances [which] involves the use of fully remote teaching solutions for instruction or education that would otherwise be delivered face-to-face or as blended or hybrid courses and that will return to that format once the crisis or emergency has abated" (para. 13). Throughout this paper, we avoid using the term *online learning* to describe the in-person classes that are now being delivered online. Rather, we use terms that clarify the mode of delivery (e.g., delivering courses online, delivering instruction online) and recognize the context of the pandemic (e.g., emergency remote teaching) that surrounds these efforts.

As U.S. institutions begin to announce plans for the fall of 2020, with some aiming for in-person classes to resume (Burke, 2020; Fain, 2020), understanding the needs and experiences of faculty and administrators early and at a large scale is critical for a variety of reasons. Such research may provide an early snapshot in time informing next steps. Understanding faculty and administrator experiences may enable researchers to gain valuable insights on how individuals responded, informing future course design, institutional responses, support structures for faculty/students/staff, and potentially shed more light on techno-pedagogical practices that emerged during this period. This is the gap that this research addresses. Nonetheless, findings from such studies need to be set in context given the rapidly-shifting landscape that surrounds spring, summer, and fall 2020 education offerings. In this particular study, we sought to understand these experiences at a large-scale through a short survey in the early weeks of the widespread transition from face-to-face classes to emergency remote teaching in the U.S.

The research questions guiding this study are the following:

- How have institutions provided continuity of education in the early stages of the COVID-19 pandemic?
- What techniques are faculty using to deliver instruction online and what modifications have they made to their teaching practices?
- What would be of most assistance to institutions and faculty at this time?

Methods

The survey was conducted by Bay View Analytics in partnership with the Online Learning Consortium (OLC), WICHE Cooperative for Educational Technologies (WCET), University Professional and Continuing Education Association (UPCEA), Canadian Digital Learning Research Association (CDLRA), and Every Learner Everywhere, with the support of underwriter Cengage, and media support by Inside Higher Ed (IHE). All partners helped disseminate the survey to administrators and faculty across the U.S.; however, only the research team had exclusive access to the data. The research team was solely responsible for the survey design and the analysis of the data.

Participants

In this study, 897 higher education faculty and administrators from the U.S. responded to a survey. Participants represented 672 institutions from 47 states. Participant institutional affiliation was matched to the federal Integrated Postsecondary Education Data System (IPEDS) to retrieve institutional characteristic data allowing for analyses to be conducted by type of institution (National Center for Education Statistics, n.d.-a). No other demographic data was collected.

The largest group of respondents (47%) were from four-year public institutions, with 36% from four-year private institutions and 17% from two-year institutions. Over one-third (36%) of the respondents were from the largest (over 20,000 total enrollments) institutions, with an additional 37% from institutions with between 5,000 and 19,999 total enrollments. Only 6% of the respondents were from institutions with fewer than 500 total enrollments.

Materials

The survey consisted of questions designed for faculty, questions directed to administrators, and questions appropriate for both groups. There was a total of 14 questions, five of which were only displayed if appropriate based on a respondent's prior responses. Faculty were presented with a maximum of nine questions and administrators with a maximum of nine. Since many academics have both teaching and administrative responsibilities, respondents were asked to select their primary role and were only presented with questions for that role. Where appropriate, questions included an 'other' response where the respondent could provide their own detailed answer. Administrators were asked questions pertaining to the extent to which courses had transitioned from in-person classes to an online mode of delivery, how in-person classes were being moved online, and what type of assistance they needed at the institutional level during this transition. Faculty were asked about their experiences with online learning prior to the pandemic, course transitions, kinds of assistance that would be of assistance to them, course modifications

that they needed to do for transitioning their courses online, and types of teaching techniques that they were using in their newly-developed courses.

The median time it took participants to complete the survey was 4.6 minutes among all respondents and 2.5 minutes for those who choose not to respond to the two optional open-ended questions.

Procedures

Data were collected during the period of April 6 through April 19, 2020. The primary distribution of the survey invitations used two mailing lists from Market Data Retrieval (Market Data Retrieval, n.d.). One list included a representative sample of all U.S. higher education teaching faculty (defined as faculty who were teaching at least one course during the current academic year) and the second was a representative sample of relevant academic administrators (e.g., provosts, deans, department heads). This primary distribution was augmented by announcements and invitations from several of the partner organizations, including the survey link in mailings or newsletters. Some organizations posted the survey invitation to their social media channels (e.g., Twitter, Facebook) and these invitations were further disseminated by other individuals through typical social media activities (e.g., retweeting, reposting, etc.).

All data were checked for completeness, missing values, or erroneous codes. All responses entered as 'other' were reviewed to determine if they should also be coded as one of the fixed responses. The only required question for the survey was that of the role of the respondent (faculty or administrator), so respondents could skip any question or portion of a question. Very few respondents skipped questions, but all surveys where less than three-quarters of the eligible questions were not completed were deleted from the analysis.

Potential participants were provided the option to include their email to receive a copy of a final summary report. Email addresses were separated from the rest of the data prior to any analyses and were deleted once final reports were emailed. To ensure further confidentiality and anonymity, results are presented in aggregate and summary statistics.

Limitations and Delimitations

This study faces a number of limitations. First, the results of the study rely on self-reported data. Second, because the data were gathered via multiple recruitment approaches (e.g., mailing list, social media), if certain populations are over- or under-represented in certain spaces, the final sample may over- or under-represent those populations. However, because the source of each survey response (direct mail or through a partner newsletter or mailing) was known, the pattern of responses for the supplemental survey outreach by partners was compared to that of the primary direct mail sample to ensure that the addition of these respondents was not biasing the overall pattern of results. Third, all survey responses were linked to the federal IPEDS data and the characteristics of respondent's institutions were compared to the national distribution. The range of responding institutions was a good match for the national pattern with two exceptions: for-profit institutions and the very smallest institutions (those with under 500 total students) were not well represented in the sample.

Results

The responses by faculty and administrators were analyzed broadly and by institution type and size. Findings were consistent across different types of institutions and different sizes of institutions. The results were also consistent regardless of whether the institution offered online programs or courses prior to COVID-19.

Current Status

Administrators and faculty were asked about their current situation. Specifically, all respondents were asked to indicate whether their institution was operating as usual, whether some or all of their in-person classes had been (or were about to be) transitioned to an online environment, whether in-person classes were canceled or suspended, or another option that was not listed. The vast majority of administrators (89%) reported that their institution had rapidly transitioned to emergency remote teaching. Administrators that fell into the remaining 11%, reported a variety of reasons as to why they were not employing emergency distance classes such as: already being a fully online institution, their institution was located in an area of the country where stay-at-home orders were not in place, they were working on a different schedule so the term was already complete, or the nature of their instruction was specialized and not possible to replicate online. There was little difference among types of institutions: Most four-year public institutions (93%) two-year institutions (91%), and four-year private institutions (87%) transitioned to emergency remote teaching. Similarly, the majority of faculty (76%) reported that some or all of their in-person classes had transitioned to an online mode of delivery, with most of the remaining faculty respondents reporting that they were either continuing operations as usual (e.g., continuing to teach classes that were already online pre-COVID-19), that in-person classes had been suspended or canceled, or that they were not teaching this semester and the transition was not applicable to them.

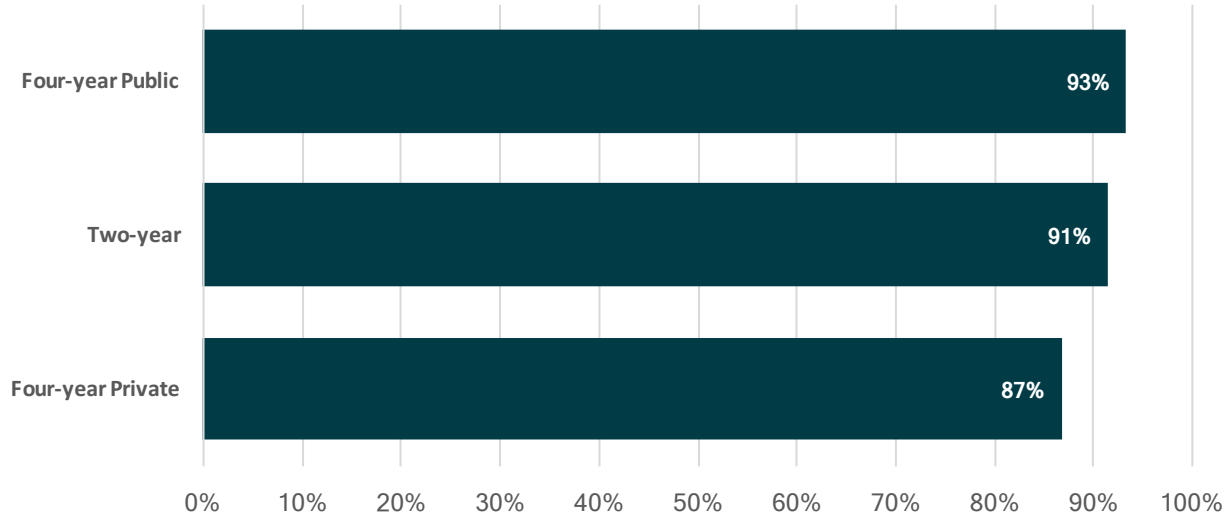

Figure 1. Percentage of Administrators Reporting That Some or All of the Institution's Classes Transitioned to Online.

Additionally, administrators were asked how in-person classes had been moved online. Almost all administrators (97%) reported that their institution had some faculty with no prior online teaching experience who were now delivering instruction online. Roughly half of the

administrators surveyed (49%) reported having faculty at their institution with previous online teaching experience who were delivering courses online following the transition. Very few administrators reported that their institution was receiving assistance in transitioning to an online delivery format from other institutions (3%), from an industry partner (4%), or from an association (1%). The survey question had the option for administrators to leave a comment that described further strategies that were being employed as classes were being moved online. Most commonly, administrators commented that internal supports were being used to facilitate the transition including the use of instructional designers, support from digital learning centers, and mentorship by faculty with online teaching experience. These results were similar regardless of the type of institution.

Faculty Experiences

To better understand how remote teaching was being conducted, faculty were asked a series of questions about their practices and approaches during this time. To situate their experiences in context, faculty were first asked what kinds of the kinds of experiences that they had with online learning prior to COVID-19. There were a wide variety of experiences reported including having taught an online course. In addition, there were multiple other experiences reported such as taking an online course, teaching or developing hybrid courses, completing doctoral work online, completing training or professional development for teaching online, teaching or mentoring others to teach online, and regular use of their institution's Learning Management System (LMS) or other online platforms when facilitating in-person classes. For this analysis, we were interested in differences in approaches between faculty who had previously taught online and those that had not.

More than half of faculty members (56%) reported that they were using new teaching methods following the transition to an online setting. Two-thirds of faculty with no teaching experience and half of faculty with previous online teaching experience reported using new teaching methods.

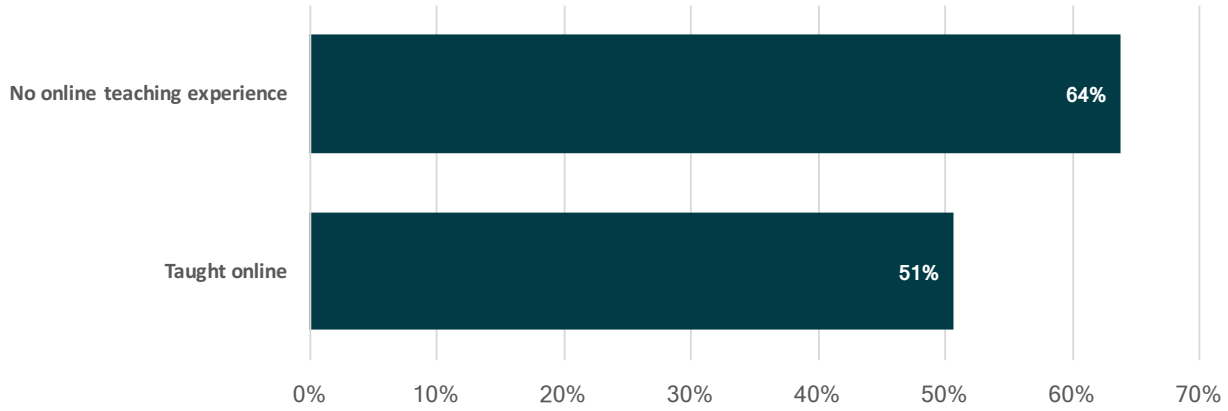

Figure 2. Percentage of Faculty Reporting That They Used New Teaching Methods in the Courses That They Transitioned Online by Their Previous Online Experience.

To probe further into the use of new methods to faculty engaged in remote teaching, we asked a series of questions. First, we asked faculty to select from a predetermined list the kinds of techniques they were using (Figure 3). Over two-thirds of faculty reported using three or more of the listed techniques. Distribution of materials via the institution's Learning Management System

(LMS) and the use of video technologies were the predominant techniques used by the majority of faculty following the transition to emergency remote teaching. A higher proportion of faculty reported using synchronous video (80%), compared to asynchronous (prerecorded) lectures (65%) and pre-recorded video from external sources (51%). A minority of faculty also reported using techniques such as chats using institutional software (24%) and social media (12%). Faculty that selected "other" as a response commented that they have used techniques such as apps for learning and communication, email, phone conversations with students, a packaged curriculum, and mailing physical materials to students.

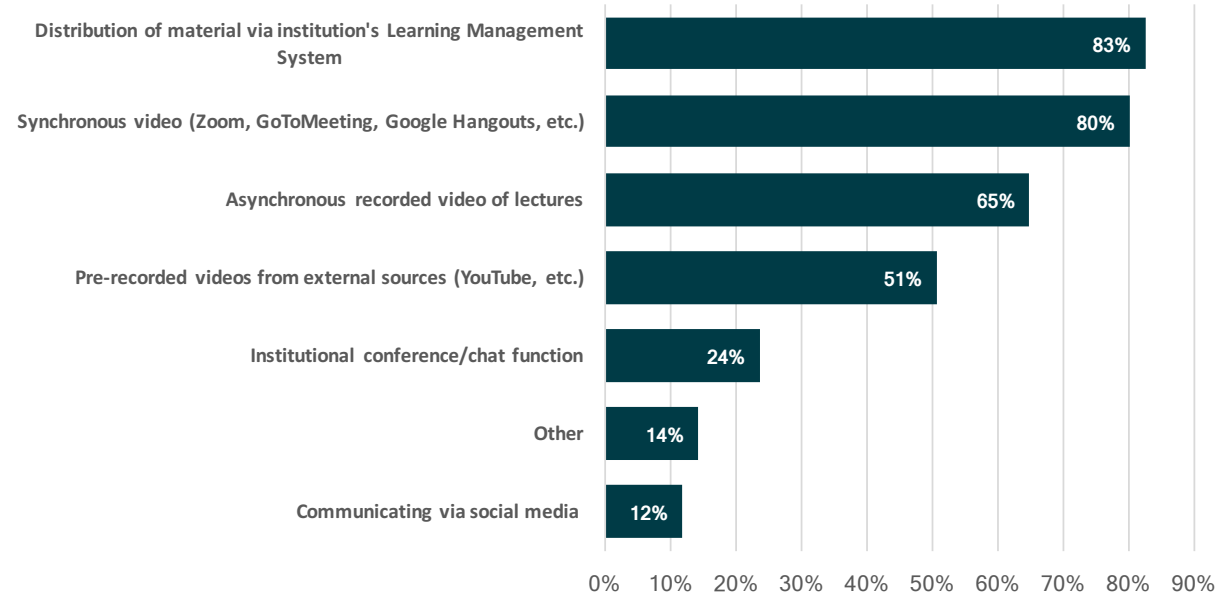

Figure 3. Percentage of Faculty Reporting Which Teaching Techniques They Used in Classes Moved Online.

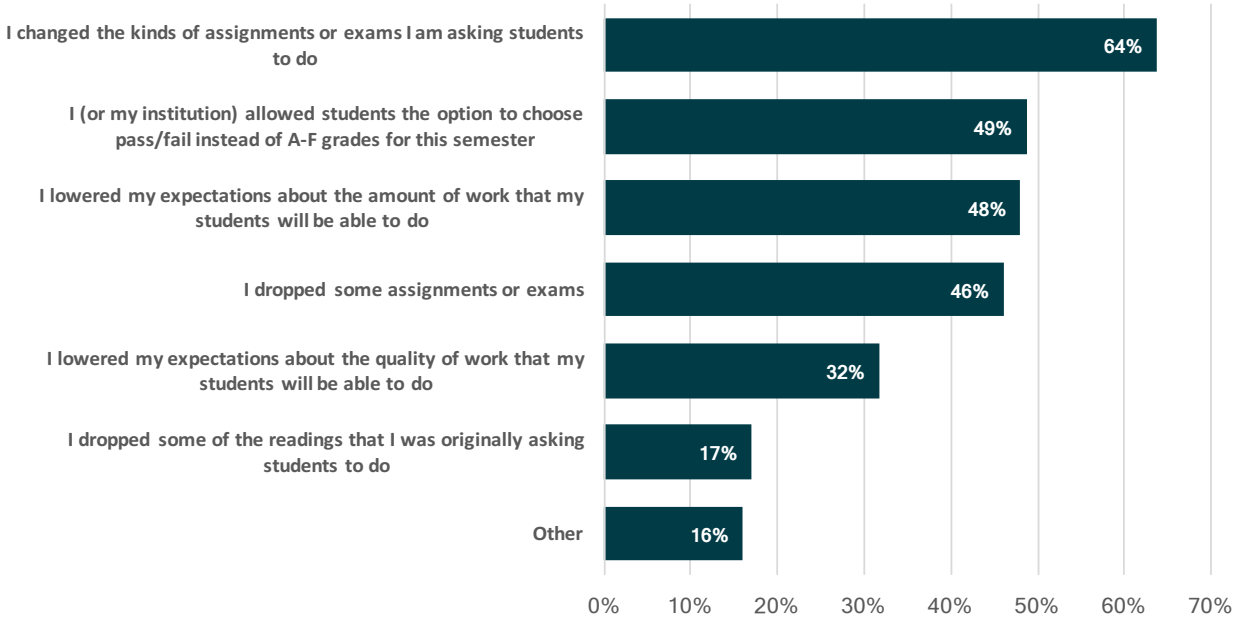

Figure 4. Percentage of Faculty Reporting What Changes They Made to Their Classes Made Moving Them Online.

We also asked faculty what modifications they made to their curriculum or teaching practices in the classes that they had moved to an online environment: 93% of faculty made at least one modification to their teaching practice. Roughly two-thirds of faculty reported changing the kinds of assignments or exams that they were asking students to do. Just under half of faculty reported that students were given the option to choose pass/fail grades instead of A through F grades, that they lowered their expectations about the amount of work they expected students to do, or that they eliminated some assignments or exams. Roughly one-third of faculty reported reducing their expectations regarding the quality of student work. Faculty that selected "other" as a response (16%) made comments about additional modifications including providing more resources and time to students, making situationally appropriate adaptations to accommodate student needs, changing their assessment approach or the weight of certain assignments, and lowering their expectations about their own teaching.

Types of Assistance Needed

Faculty and administrators were asked about general assistance they might have needed during this time, and administrators were specifically asked about their need for policy assistance. A minority of administrators (32–40%) identified a need for the policy assistance items listed in Figure 5.

When administrators and faculty were asked what types of general assistance, if any, would be valuable to them, increasing support for students was the top concern for both. Over half of administrators and faculty also identified the need to provide faculty with best practices for working and teaching from home. Some administrators also provided open-ended responses with comments about what other options would be helpful for them. Suggestions included sharing of plans for the 2020 fall semester among institutions, help with developing viable replacements for previously hands-on learning activities, and support with helping faculty transition to working online and providing technology to students.

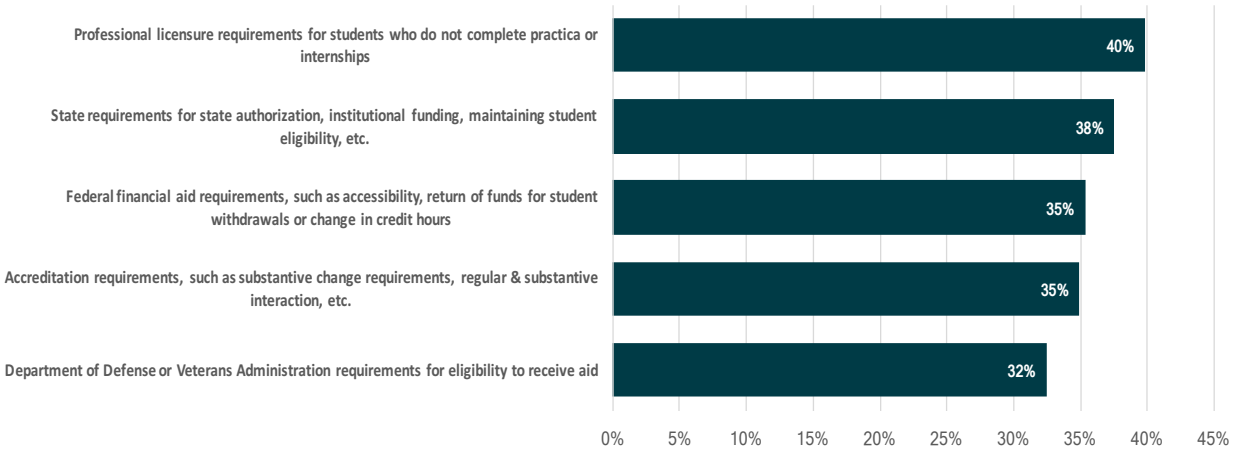

Figure 5. Percentage of Administrators Reporting What Policy Assistance Would Be Most Helpful for Their Institutions.

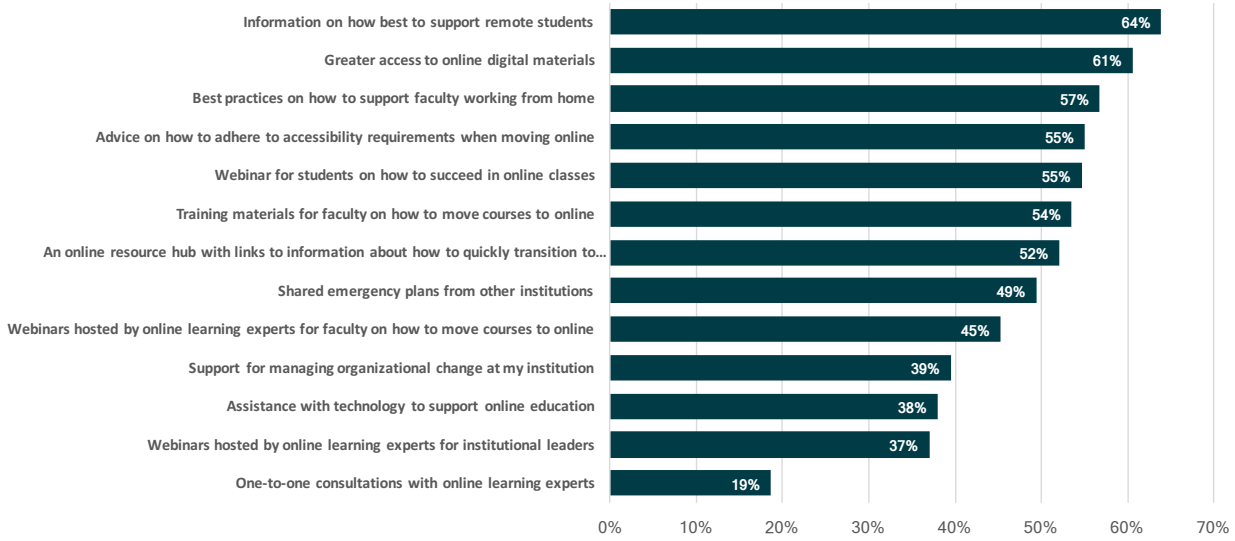

Figure 6. Percentage of Administrators Reporting What Assistance Would Be Most Helpful for Their Institutions.

Faculty were provided with a similar list of options and asked what types of assistance would be helpful to them during the rapid transition to remote teaching. As reflected by the top two responses, faculty were most concerned with student support: an equal number of faculty (58%) reported that information on how to best support remote students and a webinar designed for students on how to succeed in online educational settings would be helpful. Additionally, roughly one-half of faculty respondents reported that it would be helpful to have greater access to online digital materials (53%) and information on best practices on how to work and teach from home (53%). Almost half of faculty respondents indicated that it would be of assistance to have access to an online resource hub with link to information about how to quickly transition to online learning (48%), advice on adhering to accessibility requirements (46%), and assistance with technology (44%).

Figure 7. Percentage of Faculty Reporting What Assistance Would Be Most Helpful.

The faculty respondents who left an open-ended comment suggesting other options that would be of assistance mentioned a need for more time to adjust to the demands of emergency remote teaching, peer support, and mentorship, having a plan for if a student or faculty member becomes ill, teaching strategies for previously hands-on subjects, subject-specific advice for teaching online, access to appropriate technology for themselves and students, and support for coping with acute stress. Several faculty also stated a need for guidance on how to work from home with babies and small children.

Discussion and Implications

These findings provide a snapshot in time describing administrator and faculty experiences during a tumultuous period that required rapid responses and transitions. In this section, we discuss these results and expand on implications they may have for future practice and research.

Care and Concern

First, we urge readers to avoid viewing the changes that faculty made to their courses in the middle of the pandemic as criticisms of faculty and their teaching. The changes that the majority of the faculty made to their courses should be viewed not only as necessary, but as steps to support, care for, and enable students to succeed. Whether enacted by individual faculty, departments, or institutions writ large, changes that faculty reported making to their courses (e.g., lowering expectations) aimed at alleviating anxiety and stress, and ultimately supporting students. To put this further in context: at the end of the survey, participants were given the option of leaving an open-ended comment about any concerns they had. While we did not perform a formal analysis of these comments, a large volume of faculty respondents expressed feelings of stress and anxiety. Thus, amidst their own feelings of anxiety and stress, a large number of faculty sought to support their students, oftentimes by being responsive to student needs and engaging with progressive educational practices (e.g., ungrading, eliminating unnecessary work) that center students, and reflect a broader conversation that highlights the need and value of such practices. While this study suggests the presence of this environment of care and concern, future research may provide much more insight into this area. Research specifically investigating how faculty, staff, administrators, and students cared and supported one another during this difficult time may shed light on valuable practices that may be worthwhile to continue enacting. Such research may also investigate individuals' lived experiences but also focus on various other aspects of interest, such as what role class discussions, Zoom sessions, or the elimination of assignments may have offered in terms of emotional support (see Lorenzo, 2008).

The (Un)sustainability of Emergency Remote Teaching

While emergency remote teaching enabled many students to continue the spring semester amidst the pandemic, this form of education is not a viable long-term solution. Going forward, institutions need to develop sustainable educational plans that can withstand the challenges and unknowns of the ongoing pandemic.

As institutions work to make decisions regarding the fall semester of 2020, plans and contingency plans ought to consider good practices that the field of distance and online learning recommends. Given the unpredictability of the COVID-19 pandemic, it is likely that some form of online and hybrid models of learning will be the most viable options for course delivery for the foreseeable future. Our results indicate that online instruction in the early weeks of the pandemic

was more characteristic of emergency remote teaching as defined by Hodges et al. (2020) than online learning. For example, regardless of whether they had previous online teaching experience, at least half of faculty respondents reported using new teaching methods. Almost all faculty (93%) reported making some type of modifications to their teaching practices (e.g., reduced workload for students and lowered expectations regarding the quality of student work). Thus, the impetus is on institutions to equip faculty and students with the necessary skills and resources to teach and learn effectively in online and blended settings that align with health officers' recommendations.

Our survey found that the majority of faculty respondents wanted more information on how to best support remote students as well as best practices for themselves as they work and teach from home. Preparing faculty to teach in online and blended modes will increase the likelihood of quality online educational experiences. We recommend that institutions deploy online professional development opportunities for faculty. These opportunities should not be limited to the use of tools and online learning checklists. Rather they should also emphasize pedagogy, assessment, and the different kinds of support that varied learners need to succeed. Although research on best practices for training faculty to teach online during times of disruption is scant, Tull et al. (2017) suggested establishing virtual communities of practice to reduce reliance on both face-to-face workshops and one-to-one technical support. The majority of research participants indicated that the type of training that would be most helpful for them was having access to an online resource hub with links to information about how to quickly transition to online learning. More information and support on how to continue to teach online, or how to transition between online and in-person classes in response to changing conditions, is necessary not just for the fall but beyond.

Nevertheless, faculty professional development needs to be supplemented by systemic actions and support structures. A successful online and digital learning approach requires an ecological approach and should not solely rely on individual faculty members. To this end, institutions may need to consider how other professionals might support the development of online and blended courses (e.g., instructional designers), what kinds of remote support services might be needed for by students, and how certain services (e.g., libraries) may need reorganization to support teaching and learning. In other words, while professional development is important, there is a need for systemic support to launch and sustain new forms of teaching and learning that may be required, and these supports may be needed not solely at the institutional level but also at the state level as well. Significantly, this issue will impact some institutions more than others, as some may already have some of these structures in place, and some may face more/less financial and resource pressures than others. This may be an area for future investigation, as researchers could probe issues around online learning preparedness, faculty development, inequities across institutions, institutional responses, and so on.

Student Support

Past research highlighted the importance of maintaining an awareness of student socioemotional needs and inequities when developing online offerings (Czerniewicz et al., 2019; Lorenzo, 2008). In our study, the majority of both faculty (57%) and administrators (64%) identified increasing support for students as the top need in terms of assistance. When developing a strategy for continued online learning, or a contingency plan for shifting back to an online environment if in-person classes are being considered, conducting a needs assessment of students is paramount. Do all students have access to the requisite technology to learn effectively online? Are resources available to students to help them develop strategies for success in online learning

environments? Do faculty have the knowledge and resources to support students as they learn remotely?

Potential for Positive Change

While rapidly pivoting from in-person to online course delivery on a mass scale was challenging and stressful, it is important to recognize that this was not only an amazing feat, but one that highlights the resiliency of higher education. The magnitude of this transition goes well beyond any previous change in U.S. higher education. According to the most recent IPEDS data (National Center for Education Statistics, n.d.-b.) there were a total of 19,865,281 students enrolled in U.S. degree-granting institutions of higher education in the fall of 2018. Of these students, 16,592,064 were taking all or some of their courses on campus and were, therefore, a potential candidate for the emergency transition to online learning. The current data do not allow for a precise count of the number of students that were impacted, but even the most conservative estimate would put this number over 10 million. Likewise, the most recent IPEDS count of the number of higher education faculty is 1.5 million (National Center for Education Statistics, 2020). We do not know the exact number of faculty who had to make this transition; however, even accounting for those teaching exclusively online, at institutions that were not impacted, or teaching courses that were canceled instead of transitioned, a fair estimate would be that between 750,000 and a million faculty were involved in some way in making this emergency transition. While the higher education sector is sometimes described as slow and divorced from society, it rapidly developed approaches for instructional and learning continuity and iterated over time. The question that we now need to turn to is the following: how do we create resilient and stable institutions that serve our societies and our futures?

Conclusion

The rapid transition from in-person to online delivery that the higher education sector experienced differed from a planned online learning experience; even experienced online faculty used new teaching methods to cope with the challenges presented due to this mass-scale pivot. Needs that emerged during the transition to emergency remote teaching should inform strategies for student and faculty support as a plan, or contingency plan, for online instruction is developed for the 2020 fall semester. How to develop long-term online learning strategies is an important issue that institutions need to address to deliver sustainable and high-quality education throughout the duration of the pandemic. Further, strategies implemented now can be built upon and hold the potential to increase institutional resilience in the future.

Acknowledgments

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Crisis Planning for Online Students: Lessons Learned from a Major Disruption

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Abstract
While institutions have crisis management plans, they are often focused on face-to-face students and the physical campus. In this case study, researchers investigated the crisis response for online students at one institution after Hurricane Harvey hit the Houston, Texas area in the fall of 2017. While face-to-face students were not severely impacted, more than a thousand online students were in the impact zone and in danger of dropping out. With financial resources and student retention at risk, campus leaders approved a strategy to delay online courses for several weeks. This study examines the experiences of the frontline staff who implemented the plan. Findings suggest that institutions need a proactive crisis plan for online students that includes understanding where this population resides, how different campus units can provide support in a crisis, who should lead the crisis response, and what kind of care can be offered to the frontline responders during the crisis period.

Keywords: crisis management, academic continuity, online students, qualitative research, case study

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Crisis Planning for Online Students: Lessons Learned from a Major Disruption

Zdziarski (2006) defined a crisis as "an event, often sudden or unexpected, that disrupts the normal operations of the institution or its educational mission and threatens the well-being of personnel, property, financial resources, and/or reputation of the institution" (p. 4). The definition further examined different types of events that could impact a college campus including *disasters*, which involve the campus and community; *crises*, which occur just on the campus; and *critical incidents*, which involve smaller units within the campus. Researchers urged administrative leaders to make crisis planning a priority so the campus is well-prepared for any incident (Harper, Paterson, & Zdziarski, 2006; Mitroff & Anagnos, 2001; Rollo & Zdziarski, 2007; Zdziarski, 2006).

Despite more than a decade of emphasizing the need for planning, crisis response on college campuses has been described as mostly reactive rather than proactive (Catullo, Walker, &

Floyd, 2009; Wang & Hutchins, 2010). While a few crisis response strategies are well-planned and practiced such as building evacuations and recovery of data after technology failures, college leaders often neglect scenarios that could put economic, informational, physical, and human resources at risk (Mitroff & Anagnos, 2001).

For instance, after Hurricane Katrina hit the Gulf Coast in 2005, several campuses in the impact zone lost more than half of their student enrollment (L'Orange, 2010). This represents a significant financial loss for an institution, especially now that tuition and fees have become a primary revenue stream for most colleges (*The Chronicle of Higher Education Almanac*, 2018). While the immediate physical safety of students and campus personnel is a priority for any crisis, these events also tend to cause disruption in the academic functions of the campus. Creating academic continuity plans can help students continue their education, maintain retention rates, and keep campus financial resources stable. L'Orange (2010) explains that most crisis situations have short-term impacts for students and can be mitigated when clear planning and cooperation among different units occurs.

The purpose of this study was to examine what happened at one institution when a disaster interrupted the continuity of online courses. The study addresses what occurred, how a crisis response developed, how the response helped online students stay enrolled during a challenging time, and what effect the situation had on the frontline staff. The experiences of the frontline staff can inform crisis planning on college campuses and identify possible obstacles and solutions for supporting online students experiencing a crisis.

Review of Relevant Literature

Theoretical Framework

Zdziarski (2006) explained that crisis management in higher education settings should consist of an iterative process rather than merely tasks to perform. The author examined several models of crisis management then proposed a five-step process specifically designed for college campuses consisting of (1) prevention and mitigation, (2) planning, (3) response, (4) recovery, and (5) learning.

The first step, prevention and mitigation, encourages campus leaders to identify possible crisis events then find ways to reduce the likelihood of their occurrence or the associated risks (Zdziarski, 2006). The author suggests that this step is the most commonly neglected part of the crisis management process but is the most critical for reducing the impact of a crisis. The next three steps—planning, response, and recovery—represent the typical crisis response on college campuses. Leaders determine a few crisis events most likely to occur then develop a strategy for addressing them, implement the strategy when a crisis occurs, and help the campus community through the aftermath until normal campus functions are possible. The final step of learning prompts leaders to assess what occurred in a crisis and evaluate what could be improved in future crisis management activities (Zdziarski, 2006).

Zdziarski's (2006) model for higher education crisis management is a helpful lens through which to view the literature regarding academic continuity challenges involving crises in the online environment. Existing research, while limited, addresses three primary topics relating to online education in a crisis: (1) using online technology to assist face-to-face students during a crisis, (2)

challenges in using the online environment for crisis response, and (3) crisis planning for online students. All of the literature is reviewed for alignment with the Zdziarski (2006) model.

Using Online Technology to Assist Face-to-Face Students during a Crisis

Only a few studies examined academic continuity following a crisis, and those studies highlighted online instruction as a way for face-to-face (FTF) students to access learning when it was not available on the physical campus. For example, online instruction temporarily replaced FTF instruction when faculty could not appear in person due to personal emergencies (Day, 2015), when students could not reach their classrooms during a teacher's union strike (Regehr, Nelson, & Hildyard, 2016), when sick students had to remain home during a flu pandemic (Regehr et al., 2016), and when significant natural disasters occurred and campuses were not accessible (Camille, Dennis, Jackson, & Kenney, 2008; SchWeber, 2008). In all of these studies, online technology became a tool for FTF students to continue their courses during the crisis period. None of the studies consider what happens when online students experience academic disruptions.

While the researchers all provide good examples of the response and recovery steps in crisis management, only two of the four studies highlight situations where the planning step occurred prior to a crisis situation (Day, 2015; Regehr et al., 2016). What all of the researchers offer, however, is an overview of some of the challenges encountered when utilizing online technology to assist in crisis response. Understanding the challenges can help campus leaders improve planning and mitigation for future crisis situations.

Challenges in Using the Online Environment for Crisis Response

Researchers noted challenges for both students and faculty when moving from a FTF to an online learning environment during a crisis. Students felt unprepared to handle online learning and experienced several negative outcomes as result such as disengagement with course material (Day, 2015; Regehr et al., 2016), difficulties in managing academic demands (Camille et al., 2008), and an increased likelihood of dropping out (Camille et al., 2008; SchWeber, 2008). Instructors struggled with providing quality online instruction (Day, 2015) and needed more training on how to teach in the online environment (Camille et al., 2008).

These challenges emphasize the need for careful preparation and mitigation of crisis situations. With proper support, students and instructors moving into the online learning environment due to a crisis could successfully recover with fewer obstacles. Yet learning from these experiences still leaves out crises that directly impact the online learning environment.

Crisis Planning for Online Students

Researchers have concluded that while the majority of college campuses have emergency response plans established for specific crisis situations, the plans do not include details for academic continuity (Meyer & Wilson, 2011; Regehr et al., 2016). And even when online courses are seen as an option for delivering instruction in a crisis, the FTF student population is the only consideration (Camile et al., 2008; Day, 2015; Regehr et al., 2016; SchWeber, 2008). No studies could be identified regarding online students experiencing a crisis. What happens when the student population impacted by a crisis is already taking courses online and their academic continuity is interrupted? With a third of all college students enrolled in at least one online course (Allen & Seaman, 2017), this growing population represents a significant portion of college enrollment and needs to be better understood for the purposes of crisis response planning.

This case study research fills a gap in the literature by examining what happened at one college with a substantial online enrollment when a significant natural disaster occurred near the physical campus. While FTF students were not heavily impacted, online students were at immediate risk for stopping their academic progress. To help students stay enrolled, a team of online support personnel created and implemented an academic continuity plan so students could delay their online courses for several weeks. The experiences of these frontline staff identify challenges and best practices for crisis planning regarding online students and their academic continuity.

Methods

This section includes the contextual background of the institution; the roles and responsibilities of the online support team; a brief overview of the hurricane and its impact; a description of the academic continuity response; explanation of the research design, data collection, and analysis techniques; and limitations of the study.

Institutional Context

The case study institution is located approximately one hour north of downtown Houston, Texas. Many members of the college community (commuter students, online students, staff, faculty) reside south of the college, towards Houston and its suburbs. In the fall of 2017, close to 21,000 students were enrolled at the institution, with approximately 15% enrolled in fully online programs (SHSU Institutional Effectiveness, 2018; SHSU Online, 2018). A majority of fully online students resided in the Houston region. The institution provides numerous online programs and courses and up to 80% of the student population takes at least one online course in any academic term. The online student population includes students enrolled in fully online programs as well as students who may take both FTF and online courses simultaneously. During the fall and spring academic terms, the majority of FTF and online courses at the institution are offered in a traditional 15-week format.

The institution has an online support team provide services to online students and the faculty who teach their courses. These services include instructional design, video production, technology support, graphic design, online system administration, online program marketing, and institutional support for online academic initiatives. The team members are cross-trained and have worked through challenging, large-scale situations together such as university-wide software migrations and the implementation of new learning management systems for the campus. During a typical academic term, the weeks leading up to the first day of class and up to two weeks into the start of the term are the busiest times for the online support team. Instructors need assistance setting up their online courses and troubleshooting problems while students require technological support and guidance on enrolling in and navigating their online courses in the campus learning management system. For the remainder of the academic term, the online support team responds to situational issues, trains instructors for online teaching, and works on projects for specific instructors and campus leaders.

Hurricane Harvey and its Impact

Fall classes began on Wednesday, August 23, 2017. At this time, Hurricane Harvey was already a named storm in the Gulf of Mexico and approaching the southern Texas coast. Campus leaders followed its progression closely but did not expect the hurricane to severely impact the

main campus, which is more than a two-hour drive from the Texas coastline. At this geographic distance, the primary concern was damaging winds and localized flooding.

On August 25, 2017, Hurricane Harvey made landfall on the southwestern Texas coastline and slowly worked its way northeast over the Houston region where it stalled for several days. The lingering storm dumped more than 50 inches of rain totaling over 19 trillion gallons of water—the record for the highest total rainfall in the continental U.S. from a single storm (Texas Commission on Environmental Quality, 2018). As a result, the Texas governor declared 54 counties as disaster zones (Harrington, Ramsey, & Varinsky, 2017).

While the main campus experienced some weather-related issues such as temporary street flooding and water damage to a few buildings, members of the campus community who lived south of the campus were more heavily impacted by the flooding. Entire neighborhoods were completely underwater while others on higher ground became islands with no way to get in or out. Electricity went out throughout the Houston region and internet services were no longer available. News outlets reported that normal functions would not be restored for several weeks in many areas. With such widespread devastation, the campus president suspended all classes for eight days beginning August 28, 2017 so the campus community could have time to recover from the hurricane. There was no emergency plan created for online students, so campus leaders originally made generic announcements that did not differentiate between FTF and online students. For instance, the first official communication about the campus closure did not mention online courses so students were initially unsure if they still needed to attend their online classes (Sam Houston State University, 2017). As students contacted the institution with questions, subsequent messages clarified that online courses were also cancelled for eight days.

At the same time, the online support team assessed the impact of the hurricane for online students. As they reviewed the geographic locations of students taking online courses, it became clear that a significant majority of them resided in the impact zone (Miller, 2018). Figure 1 depicts a close-up view of the Houston region. The Federal Emergency Management Agency (FEMA) provided a map of the flooded areas, indicated in blue and located throughout the impacted region. The white dots represent the geographic locations of the institution's online students during this time. The circled area in light blue at the top of the image is the location of the main campus. As the figure illustrates, students residing closer to the main campus were not heavily impacted but those in the Houston region had an increased chance of being affected by the widespread flooding and its resulting challenges.

With so many students residing in the impact zone, the possibility of mass withdrawals from courses became a critical concern. Students were facing long-term recovery of personal residences, vehicles, and belongings as well as living without electricity and internet for several weeks. Without an immediate plan to support academic continuity, online students could drop their courses as one way of coping. And, if mass withdrawals occurred, the institution could experience severe funding shortages.

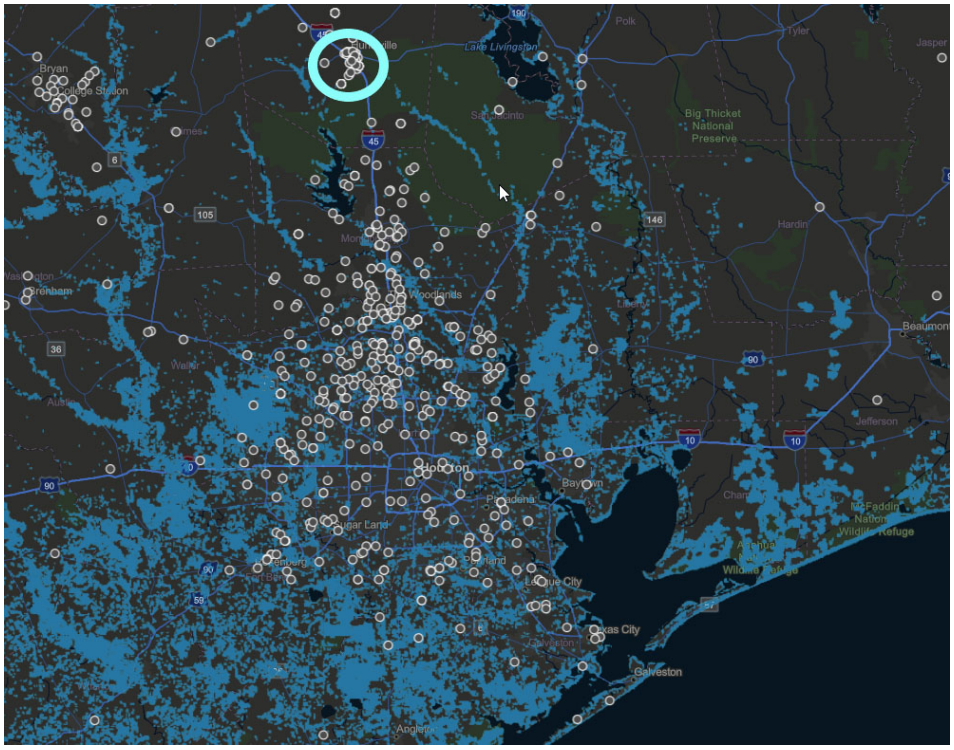

Figure 1. Flooded Areas of Houston, Texas, and Location of Online Students. Adapted from Miller (2018). Reprinted with Permission.

Academic Continuity Plan for Online Students

In an effort to keep students enrolled for the fall term, the online support team recommended moving from the 15-week traditional course format to a compressed 7.5-week course, called "7B." Compressed courses had been previously used at the institution so all technological structures such as enrollment systems and learning management tools already existed and could be used for the crisis response. The proposed plan called for 7B courses to begin in mid-October so students could postpone the start of their online courses for approximately six weeks. Senior campus leaders approved the plan and notifications went out to the campus community while the institution was still closed from the storm.

Faculty members teaching online courses for the fall term were invited to convert their 15-week courses to the 7B format. While some faculty were opposed to offering the shorter courses, monetary incentives of $1,000 per instructor were offered and more than 300 instructors volunteered to open 7B sections alongside their 15-week sections. The online support team contacted students who could potentially change sections and offered them the opportunity to enroll in the 7B option. The team collected information from each student then updated the Registrar's Office daily so students' enrollment status could be changed. When the conversion period concluded, the team had created 181 compressed sections with more than 850 students enrolled (Miller, 2018). The team then worked with faculty members to convert their online courses to the compressed format as well as provide support for instructional strategies. This included redesigning syllabi, moving existing course modules into the compressed course structures, and modifying assignments to accommodate the quick timeline. Students who did not

enroll in the 7B courses had the opportunity to remain in their 15-week courses and work with their instructors for individual accommodations. The team continued to assist faculty and students throughout the term as the 7B courses began and challenges were identified.

Case Study Approach, Data Collection, and Data Analysis

Yin (2018) describes case study research as the examination of a phenomenon involving multiple variables where the phenomena and context are closely intertwined. The topic of this research involves a unique situation where the context is a key factor of the phenomena, making case study methods an appropriate approach. The researchers utilized a single embedded case study design to achieve a holistic perspective. Two data sets informed the case analysis—a survey of the online support team members and institutional data regarding online student performance.

Online Support Team Survey. An anonymous, online survey instrument with two quantitative questions and ten qualitative questions was designed (Appendix 1) and received human subjects board approval. The questions were developed with three members of the online support team who participated in the crisis response. Their experiences informed what questions would generate meaningful responses across the team. A researcher familiar with, but not part of, the online support team coordinated the survey efforts so team members could feel comfortable offering their honest feedback. An invitation to participate was sent to all online support team members in mid-spring 2018. Out of 24 team members, 15 responded to the survey.

Simple counts and frequencies were performed for the two quantitative questions. Qualitative data was analyzed using a constant comparison technique (Creswell & Poth, 2018). Descriptive and in vivo codes comprised the first cycle of coding for each question, with a second cycle generating broader themes (Saldaña, 2016). Meta-themes were developed across all questions to better understand and apply the findings. To assist with trustworthiness, Yin (2018) recommended that a key informant examine the analysis to increase validity. The researcher met with a member of the online support team to discuss the initial themes and ensure accurate interpretation. In addition, a final draft of the manuscript was provided to three online support team members for feedback and to ensure that no participants could be identified based on the information shared. References to any specific situations were not reported to further protect participants' identities.

Institutional Data. Institutional data was requested for the fall terms of 2017, 2016, and 2015 so any differences in course performance or completion could be determined between the crisis term and previous fall terms. Course grades and course completion data for all online students were provided in categorical format so analysis included descriptive statistics and comparisons using a chi squared test.

Limitations

There are limitations of the study that must be considered. Case study research necessarily limits what is studied to a specific context and phenomena (Yin, 2018). This study involves a unique situation that may not transfer to other contexts. Care must be taken when reviewing the details of this case for its applicability to other institutions and situations. In addition, the use of survey methods as a data collection tool does not allow the opportunity for follow-up questions with participants. It is possible that the full depth and breadth of participant experiences are not captured in this study. Finally, researcher subjectivity is an acknowledged challenge for qualitative

methods (Creswell & Poth, 2018). While strategies were used to reduce researcher bias, it still may have some influence on the findings.

Results

Overall Student Performance and Enrollment

Despite the large-scale disaster, a majority of online students successfully passed their courses by the end of the fall 2017 term. Table 1 provides a comparison of course performance and completion between fall 2017 and the previous two fall terms.

Table 1.
Course Performance and Completion for the 2015, 2016, and 2017 Fall Terms

Term	Pass (A,B,C,D) (n)	Fail (F) (n)	Incomplete / Withdrew (n)	N
Fall 2017	87% (16,844)	7% (1,385)	6% (1,226)	19,455
Fall 2016	87% (14,786)	6% (1,072)	7% (1,124)	16,982
Fall 2015	86% (13,773)	8% (1,225)	7% (1,116)	16,114

While statistically significant differences were found between the different terms ($p < .001$), there were no practical differences identified. Although more students enrolled in fall 2017 term courses, they performed similarly to students enrolled in online courses for previous fall terms. They also had similar rates of receiving incompletes or withdrawing from courses across all terms. Additionally, no differences were found for course format (15-week versus 7B) in the fall 2017 term.

Online Support Team Experiences

The online support team regularly provides resources and services for both faculty and students. After the hurricane, which hit during the busiest time of the term, team members added to their list of responsibilities by also performing crisis response activities. Participants identified how many weeks they worked more than 40 hours in order to implement the crisis response plan while still providing regular term support. Eight participants reported working overtime for one to two weeks while another six reported overtime hours for seven to eight weeks. One participant reported working overtime for 11 to 12 weeks.

Participants were asked a series of open-ended questions to better understand their experiences with the crisis response. Across all qualitative questions, the 15 participants provided a total of 313 unique comments. Five meta-themes were identified, and Table 2 illustrates definitions, sample quotes, and a total number of comments offered. Along with the five meta-themes, a few important ideas also emerged. These ideas are explored in each of the following sections.

Table 2.

Meta-Themes

Meta-Themes	Constructed Meaning	Sample Quotes	Number of Comments
Data Management	All processes designed to support the collection, analysis, and sharing of data such as creating forms, collecting data, and verifying the data	"So much data, and all manually entered that then had to be reconciled and rechecked at several levels, then cleaned, corrected, and checked again as problems were identified."	80
Communication	The sharing of information, both internally and externally, throughout the process including meetings, sending information via email, answering questions, etc.	"There was a lot of communication that took place, some of it was confusing because things were still being figured out." "The registrar's office and our office quickly met and got on the same page. Once they understood the problems we were facing and we understood theirs we were able to meet regularly and work through all of the issues."	74
Challenges	The barriers encountered when creating a crisis response such as having to adapt to frequent changes, lack of an existing plan, increased workload, and stress from both the job and the personal impact of the hurricane	"Many students made mistakes and assumptions that we didn't predict. They sent the emails to each other, not understanding that the emails were for specific courses. Some students heard about the extra semester but their faculty didn't choose to participate, and they tried to register using links from other courses. All of these issues had to be analyzed and sorted through daily." "The challenge I encountered in my work stemmed from issues that were happening outside of work. I had to devote time to both my job and to helping friends and loved ones bounce back after their homes were nearly destroyed."	62
Task Management	Traditional academic term responsibilities as well as new ones generated because of the hurricane. Does not include data management activities.	"None of the tasks I performed were exactly outside of my normal set of tasks. They were tasks that I normally do at the beginning of a semester and at the beginning of the 7.5 week courses. However there were more of them and there were more questions and requests for support than there is in a usual semester."	51
Support	The types of support, and lack of support, exhibited and extended during the crisis response such as good internal teamwork, feelings of support from others, and a lack of support from external units	"We also had each other's back, and would take turns / take over on some of the more wearing tasks so others could take a break or at least switch to a different portion of the web of issues we were dealing with." "Lack of responsiveness from other university departments or processes. Lack of willingness from other university departments or processes to adjust their day to day workload to accommodate the emergency response."	46

Developing Work-around Strategies. Participants identified data management as the most significant complication during the crisis response. Due to institutional policies, the online support team did not have regular access to a critical campus database containing student information. The office managing the database had a policy of providing information within two weeks of a request and they would not make an exception to their two-week policy for the crisis response. Since no formal crisis plan existed for online students, the managing office was not mandated to assist. The lack of voluntary collaboration prompted participants to collect data by hand from almost a thousand students. A number of errors were made during the data entry process and the Registrar sent back incorrect information daily so team members could make updates. Participants mentioned these problems multiple times across questions and lamented the lack of assistance from the database office. The members felt that their stress levels and workloads would have improved if other campus offices were more cooperative during the crisis.

Each time participants encountered an obstacle within the crisis response such as the database access issue, they had to create solutions either through their own ingenuity or by appealing to individuals they each knew personally. If they could not gain support from someone in a leadership position, the team members used their personal networks to find other solutions such as asking a lower level staff member to provide assistance. These strategies helped the team accomplish goals but required a tremendous amount of effort that could have been directed to other crisis activities.

Providing Increased Support to Students and Faculty. Alongside solving crisis-related problems, faculty and students needed additional technological, procedural, and emotional support during the crisis. Participants, who were in regular contact with each group, reflected on the challenges they observed throughout the crisis response period. For the faculty, most of the observations focused on the increased workload and lack of instructor experience with compressed courses. As one participant explained, "If they hadn't taught a 7.5-week course before, it was hard to adapt the course material to a shorter time frame in the time that they had to adjust." Another issue observed for the faculty was communication with academic leadership. A participant shared that "Communication to and from their department chairs and deans seemed to be difficult for everyone to get onto the same page with the constantly changing information." The participants had to frequently troubleshoot the mixed messages and identify accurate information so faculty could move forward with course planning. Finally, participants noted that some faculty experienced damage to their personal property from the hurricane and had a harder time focusing on work responsibilities. The participants had to provide additional support for these individuals so courses would be ready for students.

Participants identified two primary challenges for students that needed extra time and attention. The first challenge was students' struggles to address administrative issues such as completing the correct processes to enroll in the 7B courses, providing accurate personal information, and understanding that they could enroll only if the instructor chose to offer the course in the 7B format. Because the format change was voluntary for faculty, students could have one course that changed to the 7B format but another course that remained in a 15-week format, leading to confusion. One participant explained, "The students that assumed their courses were going to be starting in October may have not done required work in their [15-week] courses."

The second challenge emphasized helping students adjust to the shorter course format while they also dealt with issues arising from the hurricane's impact. One participant observed "students that were effected by Harvey had issues with the technology that is required to be

successful in an online class, such as having a reliable internet connection and a computer to work on." These students had to locate internet services so they could access courses, then adapt to the compressed time for course activities. It should be noted that three participants did not have a good sense of how students were impacted. Only participants who had direct and sustained responsibilities for crisis activities could readily identify challenges experienced by students.

Positive Outcomes. Overall, participants shared positive reflections about their role in the crisis response. They strongly believed that their teamwork and willingness to help each other led to the success of keeping online students enrolled in courses. The word "proud" was used multiple times and described both their feelings towards the team's efforts but also towards the institution for considering the needs of online students. The "students first" sentiment was a consistent message throughout their comments, with participants sharing that they would repeat the hard work all over again if it meant being able to help students.

Advice for Crisis Planning. Participants offered advice on how to prepare for a future crisis involving online students. Most of their ideas focused on assessing what occurred and developing a plan that would address the challenges experienced, which is aligned with Zdziarski's (2006) model. As one participant noted, "The university has plans in place for disasters, however, they do not typically include any planning for online students. The assumption is that online resources are not impacted by physical disasters, but that couldn't be further from the truth." Participants also wanted to find out what happened to students such as how many completed their courses compared to normal academic terms. While this information was not available initially, later reporting from the institution did provide a sense of closure for the participants and helped them understand the scope of their efforts.

Finally, participants encouraged others on campus to extend more support during crisis response efforts. One participant shared observations of the mixed reaction to the compressed course option offered to online students:

> In many ways, I felt that we were caught in the middle of a project that half of our school supported and the other half opposed. This was a difficult place to find ourselves in. I heard faculty in favor of this [the 7B course option], and I heard faculty in strong opposition. I heard public, negative comments from senior leadership in the Colleges and in Academic Affairs, but at the same time, I heard gratitude from the students. This was a divisive initiative and after all the work we put into it, it was disheartening to know that many didn't even support what we had been asked to do. This was demoralizing.

Other participants encouraged more flexibility with job requirements such as being able to temporarily work from home, having some regular tasks deferred during the crisis period, and having access to additional staff resources such as part-time workers being able to work full-time hours or borrowing workers from other areas to assist with the increase in responsibilities.

Discussion

Similar to other studies detailing crisis events, this research covers the response and recovery efforts at one institution when students experienced a crisis. The study does fill a gap in the literature, however, by highlighting the needs of online students while also contributing ideas for planning and mitigation processes, an essential but often neglected step in crisis management in higher education (Zdziarski, 2006). Crisis management planning should address rapid

communication and decision-making, clear priorities, support from relevant units, and training for faculty who need to adapt their instruction (Bates, 2013; Camille et al., 2008; Day, 2015; SchWeber, 2008; Shaw, 2017). This case study supports these recommendations by reporting on the challenges and successes encountered by the online support team leading the crisis response.

While there was no road map for the online support team to follow during the crisis in this case study, their approach of supporting each other and prioritizing student needs helped them succeed. And when they encountered obstacles, team members created work-around strategies when they could not leverage formal organizational channels. The team members also found ways to support both faculty and students when they were adapting to the compressed course demands. Their collective efforts helped retain hundreds of students and emphasize the unique needs of the online population to the rest of the campus community.

Implications

Several recommendations inform the planning and mitigation of crisis situations for online students. Each recommendation is further explained in the following sections.

Recognize Online Students as an Essential Part of the Campus Community. During crisis planning, campus units and leaders work together to develop and train for response to a variety of scenarios (Zdziarski, Dunkel, & Rollo, 2007). These scenarios, however, often focus solely on the physical campus. The growth of distance education requires campus leaders to think more broadly about crisis response. In this case study, approximately 80% of the institution's online enrollment was impacted by severe flooding and was at risk for dropping courses. Having this kind of mass withdrawal could have resulted in millions of dollars in lost revenue for the institution along with other problems such as long-term student retention. Online students must become more than an afterthought. This study demonstrates that if online students are overlooked, leaders can put the health of an institution at risk.

Understand Online Student Demographics. To prepare more effectively for crises that impact online students, campus leaders should get to know their online student population and identify ways they could be at risk. For instance, understanding where online students reside geographically could help leaders quickly identify what portion of the population would be impacted by a disaster such as a weather event, pandemic, or terrorist situation. Even in a small-scale crisis, knowing where online students live would help campus representatives reach out to them quickly. It also may be helpful to understand what academic majors have large online student enrollment and whether or not online students are employed or have dependents. This information could lead to directed communication and targeted resources to support the unique needs of online learners after a crisis.

Create a Crisis Team for Online Students. Campus leaders should invite any units that serve the online student population to brainstorm possible crisis scenarios and develop strategies to mitigate the scenarios. These units should primarily address academic issues such as enrollment, course management, instruction, and technological support. Human resources personnel could be helpful for training, communication, and assessment of crisis plans (Wang & Hutchins, 2010). They could also develop strategies for temporarily assigning staff to assist the crisis response and offering counseling resources to personnel during the crisis. One last consideration should be to include a member of the student affairs division on the crisis team in order to support nonacademic needs such as advising, counseling, and accessing emergency funding.

Identify Possible Crisis Command Centers. Similar to crises occurring on a physical campus, one location for crisis response should be designated and all communication and decision-making should occur through this command center (Zdziarski et al., 2007). For instance, if a disaster occurs in the middle of an academic term, the faculty may be the primary group responding to student needs. In this scenario, the Provost's office would be a good command center so immediate support and advice could be offered to faculty. Other representatives assigned to the crisis team could temporarily relocate to the Provost's office so they could all work together on-site. Having everyone come to the same location would encourage consistent communication, identification of emerging problems, and authority to quickly create and apply solutions. In addition, embedding a senior campus leader with the team for the first few days could promote the quick removal of barriers. For instance, if a senior leader had been available in this case study, the two-week turnaround for database requests may have been waived with a phone call, thereby eliminating a substantial obstacle.

Prepare for Identified Strategies. As this case study illustrated, campuses may identify moving to different course formats as one strategy to assist online students in a crisis. However, this strategy may require additional planning before it can be implemented. For instance, learning management systems may need a special course shell created so it can be quickly applied to existing online courses. Enrollment management staff may need special sections in their databases to accurately record and track individual student records. And developing how-to videos may help faculty navigate both the structure of a different course format as well as ways to provide quality instruction in the new format. Regardless of what strategies are identified, attention should be given to developing the necessary infrastructure before a crisis occurs so institutions can respond quickly and effectively.

Provide Support for Frontline Responders. One last consideration is supporting the frontline responders to the crisis situation. Balancing regular job duties alongside crisis activities can create an intense and pressure-filled environment. Creating a support plan as part of the crisis strategy would ensure that frontline responders have the resources needed to effectively handle the burdens of the situation (Treadwell, 2017). Strategies could include reorganizing regular job responsibilities so some staff are handling those while others can be fully engaged in crisis response; identifying staff from across campus who could temporarily provide support; and increasing part-time staff to full-time hours for the crisis period.

Summary and Future Research

While many institutions have crisis response plans, these plans are typically focused on students who are on physical campuses. The growing population of online students mandates that campus administrators expand crisis planning to include the needs of distance learners. This case study contributes several lessons for crisis planning such as the documentation of online students being significantly affected by a crisis, the importance of having a strong online support team, and the need for all campus units to work together in a crisis situation. The case study also shares one strategy for addressing a crisis situation for online students and demonstrates that it could be an effective approach in similar contexts.

Future researchers could provide additional guidance for crisis planning such as identifying what situations may have occurred for online students at other institutions, generating possible scenarios of what could happen to online students to interrupt academic progress, and testing strategies for crisis response and recovery that institutions could implement for their online student populations. And, as more crisis situations impact online students, researchers could share details of what occurred so all institutions can enhance their planning before a crisis occurs.

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Appendix 1

Staff Survey

- Please describe what tasks you were involved in during the Hurricane Harvey response.
- Please describe what additional tasks you performed during the fall 2017 term that were outside of your normal set of tasks.
- What is the primary challenge you encountered in your work because of Hurricane Harvey?
- In what ways were you supported in your work during this period of time?
- What would have been helpful to your work during this period of time that you did not have?
- Based on your work with the Hurricane Harvey response, what seemed to be the biggest challenge for your office?
- How would you describe the communication between the institution and you regarding the Hurricane Harvey response?
- Based on your work with the Hurricane Harvey response, what seemed to be the biggest challenge for faculty members that you observed?
- Based on your work with the Hurricane Harvey response, what seemed to be the biggest challenge for students that you observed?
- What else would you like to share regarding the Hurricane Harvey response for online students?

Examining Student Perception of Readiness for Online Learning: Importance and Confidence

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Abstract
This survey study examined student readiness for online learning in 2018 through the dimensions of importance placed by the student in online learning and the student's confidence in their ability as measures of readiness. An instrument with four subscales of competencies (online student attributes, time management, communication, and technical) that measure student readiness for online learning (SROL) was developed. Reliability of student responses on the online readiness instrument and factors related to student perception of readiness were examined. Descriptive statistics and item level means for the competencies are provided. Repeated measures analyses of variance were conducted to examine differences between participants' ratings of importance and confidence. Online student attributes, time management, and technical competencies were rated high for importance compared to communication competencies. Students were confident in online student attributes and technical competencies compared to time management and communication. Data were also analyzed based on demographic differences. MANOVA showed significant differences based on the race (white and nonwhite) of the students and course format (asynchronous, synchronous, and blended) on their perceptions of online learning competencies.

Keywords: student readiness, online learning, student attitude, student ability, student perception

Martin, F., Stamper, B., & Flowers, C. (2020). Examining student perception of their readiness for online learning: Importance and confidence. *Online Learning, 24*(2), 38-58. https://doi.org/10.24059/olj.v24i2.2053

Examining Student Perception of their Readiness for Online Learning: Importance and Confidence

Since 1990, online learning has increased with higher education institutions investing considerable resources in electronic learning technologies (Collins, McKinniees, & Collins, 2010; Deng & Tavares, 2013; Moore, 2013). These technologies included Learning Management Systems (LMS) to facilitate online courses and online student collaboration as well as track students' progress (Islam, 2012). From the online classroom to the utilization of polling software, digital e-books, and adaptive learning management systems, educational technology options are growing and have transformed how higher education institutions approach curriculum and

learning engagement. Data collected from U.S. higher education institutions found that in the fall of 2015, over six million college students (29.7% of all higher education enrollments) were enrolled in at least one online course and, as a result, online course enrollments were increasing while the enrollment rates of physical campus courses were declining (Allen & Seaman, 2017). As the prevalence of online course offerings in higher education increases, so does the need for research on factors contributing to students' academic success in those online environments. Online courses require students to consider new ways to prepare, organize, engage, and complete requirements calling for students to utilize higher levels of independence and self-direction. This study aimed to examine online student readiness for online learning based on students' perception of the importance of and their confidence in several competencies.

Review of Relevant Literature

Student Readiness for Online Learning Instruments

Interest in student readiness for distance education dates back to the mid-1990s when Biner, Dean, and Mellinger (1994) examined learner characteristics in televised college-level courses. The concept of student readiness for online learning was first coined by Warner, Christie, and Choy (1998). In their study, student readiness for online learning was broken down into three key facets: students' preference in course modality, student competence and confidence in utilizing computer-mediated communication, and students' ability to participate in self-directed learning. Since then, researchers have continued their efforts to measure student readiness in online learning through the creation of a number of online student readiness instruments (Bernard, Brauer, Abrami, & Surkes, 2004; Dray & Miszkiewicz, 2007; Kerr, Rynearson, & Kerr, 2006; Mattice & Dixon, 1999; McVay, 2001; Parnell & Carraher, 2002; Watkins, Leigh, & Triner, 2004). Student readiness has been examined over the years through a variety of constructs. Table 1 includes details about some of the information and constructs of online student readiness instruments. Farid (2014) conducted a systematic review of student online readiness assessment tools and evaluated the quality of instruments developed through ten studies between the years 2001 to 2008. He examined 31 e-learning constructs among the 10 instruments and found that the highest number of common constructs in these instruments was seven. This illustrates the various foci among these instruments. Also, with the changing technologies and students' different levels of prior knowledge, there was a need to examine student readiness over time. By reviewing the literature, several existing online student readiness survey instruments and the constructs each instrument measured were identified (see Table 1).

Student Online Readiness Surveys in Universities

Farid (2014) surveyed 18 U.S. universities and found that many of the universities created their own self-assessment instruments to use with their students and these were not validated or published. Table 2 below is a list of some existing instruments found from a Google search.

Table 1

Summary of Existing Online Student Readiness Survey Instruments

Name of Instrument	Authors/Year	Number of Survey Items	Constructs Measured	Validated by
Distance Learning Survey	Mattice and Dixon (1999)	25 items	Student readiness, student assess to/use of technology, and student interest in distance education, demographic questions	Muse (2003); Osborn (2001)
Readiness for Online Learning (ROL)	McVay (2000/2001, 2003)	13 items	Self-management of learning (time management and self-discipline), comfort with e-learning (technical skills and use of discussion boards)	Smith, Murphy, and Mahoney (2003); Smith (2005)
E-learner Readiness Self-assessment	Watkins, Leigh, and Triner (2004)	27 items	Technology access, online relationships, motivation, online video/audio, internet discussions, importance to success	Watkins, Leigh, and Triner (2004)
Test of Online Learning Success (TOOLS)	Kerr, Rynearson, and Kerr (2006)	45 items	Computer skills, independent learning and dependent learning preferences, need for online learning, academic skills	Kerr, Rynearson, and Kerr (2006)
Online Learning Readiness Survey (OLRS)	Dray and Miszkiewicz (2007)	40 items	Learner characteristics, technology capabilities, online skills, self-management	Dray and Miszkiewicz, (2007)
Online Learning Readiness Scales (OLRS)	Hung, Chou, Chen, and Own (2010)	18 items	Computer/internet self-efficacy, online communication self-efficacy, self-directed learning, learner control, motivation for learning	Hung, Chou, Chen, and Own (2010)
Questionnaire for Predicting Online Learning Achievement	Bernard, Brauer, Abrimi and Surkes (2004)	38 items	Confidence in prerequisite skills, self-direction and initiative, desire for interaction beliefs about distance education	Hall (2011)
Student Online Learning Readiness (SOLR)	Yu and Richardson (2015)	20 items	Social competencies with the instructor, communication competencies, social competencies with classmates, and technical competencies)	Yu and Richardson, (2015); Yu (2018)
Online Learning Self-Efficacy scale (OLSES)	Zimmerman and Kulikowich (2016)	22 items	Learning in the online environment, time management, technology use	Zimmerman and Kulikowich, (2016)

Table 2

Student Online Readiness Instruments from Various Universities

University	Readiness Instrument	Constructs	URL
Penn State University	Online Readiness Questionnaire	Self-Direction, Learning Preferences, Study Habits, Technology Skills. Computer Equipment Capabilities	http://tutorials.istudy.psu.edu/learningonline/ORQ/ORQ.htm
University of Arkansas Online	Online Course Readiness Quiz	Computer Skills, Learning Style, Online Learning, Academic Skills	https://online.uark.edu/students/readiness-quiz.php
University of Hawai'i W'Ohau	Student Online Readiness Quiz	Technology skills and access. Time management	https://westoahu.hawaii.edu/distancelearning/student/student-online-readiness-quiz/
University of Illinois Springfield	Are you Ready to be an Online Learner?	Self-direction, Learning Preferences, Study Habits, Technology Skills, Computer Equipment Capabilities, Online Learning Awareness	https://www.uis.edu/online/ready-for-online/
California State University Stanislaus	Online Readiness Self-Assessment	No construct	http://www.csustan.edu/academics/online-programs/online-readiness-self-assessment
Wichita State University	Online Readiness Self-Assessment	No Construct	https://www.wichita.edu/services/mrc/elearning/online_orientation/online_self_assessment.php
Colorado Community Colleges Online	Online Learning Readiness Survey	No Construct	https://www.ccconline.org/survey-copy/
North Carolina Community College Virtual Learning	Online Readiness Assessment	Study Habits/ Course Participation & Interaction, Technology Access & Computer Skills, Time Management/ Personal Commitment/ Motivation	http://vlc.nccommunitycolleges.edu/faculty/online-readiness-checklist/

Based on the review of instruments and surveys, four common constructs emerged: online student attributes, time management, technical, and communication competencies (Bernard, Brauer, Abrami, & Surkes, 2004; Dray & Miszkiewicz, 2007; Kerr, Rynearson, & Kerr, 2006; Mattice & Dixon, 1999; McVay, 2001; Parnell & Carraher, 2002; Watkins et al., 2004). Figure 1 below includes the four constructs of student readiness.

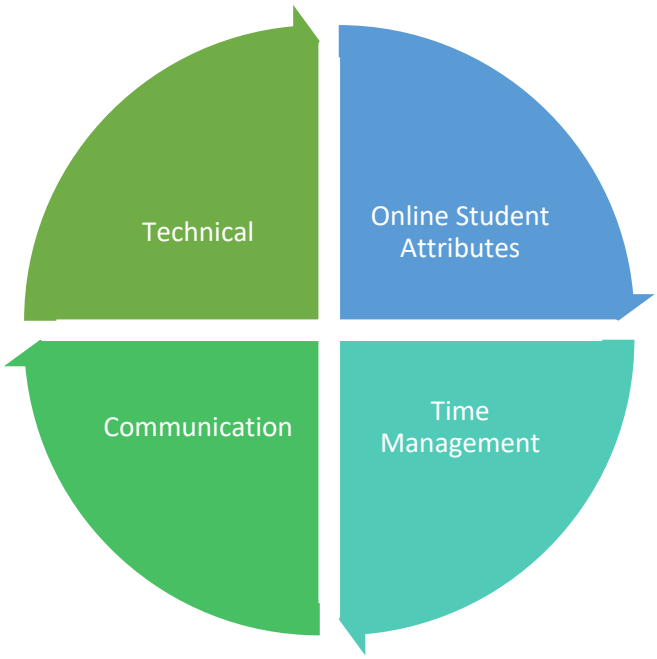

Figure 1. Student Readiness for Online Learning (SROL) Competencies.

Online Student Attributes

Researchers have attributed self-regulated learning, self-directed learning, locus of control, and academic self-efficacy as student-related factors that play an important role in student performance and readiness in online learning. Lin and Hsieh (2001) suggested that successful online learners develop higher levels of learner control, or self-directed learning, by taking responsibility for learning through self-discipline in their studies. Researchers focusing on academic locus of control have indicated that online students who have an internal locus of control tend to have higher levels of self-motivation and self-direction (Chang & Ho, 2009; Liu, Lavelle & Andris, 2002). Alternatively, academic self-efficacy is emphasized as an internal factor pertinent to student preparedness for online learning. The literature indicates that academic self-efficacy affects academic persistence, performance, and motivation (Caprara, Vecchione, Alessandri, Gerbino & Barbaranelli, 2011; Gore, 2006). The McVay instrument, revised in 2004, highlights self-direction (such as utilizing resources for learning and studying), initiative, and desire for interaction (like using resources to communicate with faculty and peers) as a driving factor in student success for online learning. Zimmerman and Kulikowich's (2016) OLSES contains items relating to online student attributes such as developing and following goals to complete assigned work, being self-disciplined with their coursework, learning new technologies, and utilizing resources when questions arise. The second-dimension researchers have noted that time management is essential to online learning.

Time Management Competencies

Many researchers have linked self-management in learning as a factor associated with student preparedness for online learning (McVay, 2001; Smith et al., 2003; Smith, 2005, Zimmerman & Kulikowich, 2016). One of the characteristics included in the self-management

factor consists of the ability of learners to manage their time well (Smith, 2001). Time management challenges such as being able to keep up with course assignments (Roper, 2007), completing the assigned work on time (Discenza, Howard, & Schenk, 2002), as well as actively participating in the online instruction of the class (Garrison, Cleveland-Innes, & Fung, 2004) have been noted in the literature. Unlike face-to-face courses where there are set meeting times, students participate in asynchronous online courses on their own time and this can be a challenge if they do not possess self-discipline. Some online learning readiness scales have included time management items such as managing time effectively, meeting deadlines with very few reminders (Zimmerman & Kulikowich, 2016), managing study time to easily complete assignments (McVay, 2001), as well as including time management as a component of self-directed learning (Hung, Chou, Chen & Own, 2010). Another dimension researchers have identified as essential to online learning involves technical competencies in online courses.

Technical Competencies

Research on self-efficacy in the online environment emphasizes the role of technological aspects, such as computer skills, internet skills, and information-seeking skills (Cho & Shen, 2013; McGhee, 2010; Shi, Chen & Tian, 2011; Wang and Newlin, 2002). Boyd (2004) reported that technical skills such as sending and receiving emails, researching and downloading information online, and installing software were indicators associated with successful online students. Tsai and Tsai (2003) found that students with high internet self-efficacy demonstrated higher levels of learning in web-based tasks than low internet self-efficacy students. Additionally, the perceived quality of an online learning system, such as ease of use and quality of resources, was considered an essential factor in successful online learning (Ho, Tsung-Hsien, & Binshan, 2010, Park & Wentling, 2007). The online learning readiness scale (OLRS) developed by Hung et al. (2010) examined elements of computer/internet self-efficacy, online communication self-efficacy, self-directed learning, learner control, and motivation for learning. In regard to computer/internet and online communication self-efficacy, Hung et al. (2010) survey items looked at confidence in basic computer operations, navigation of course management software, and use of online tools for course communication. Zimmerman and Kulikowich's (2016) OLSES contain items on navigating the online grade book and course materials like the online help desk. Course communication is the final dimension researchers have pointed out as essential to readiness in online learning.

Communication Competencies

Numerous researchers have identified comfort with online learning as a component of student preparedness for online learning (McVay, 2001; Smith et al., 2003; Smith, 2005). Comfort in online learning is defined by McVay (2001) and Smith (2005) as the student's willingness to connect and communicate with others via computer-mediated communication like email, discussion boards, and chat as well as confidence in accessing these resources. McKavanagh, Kanes, Beven, Cunningham, and Choy (2002) reported that a student's willingness to participate in online discussion boards was critical to the effectiveness of online learning. Online classrooms provide a multitude of asynchronous and synchronous communication tools used to facilitate communication between teachers and students. These tools range from discussion forums and email to WebEx meetings and live chat (Hew & Cheung, 2008).

Moreover, Kaymak and Horzum (2013) noted that as communication interactions increased in the online classroom, the probabilities that students fulfill their individual learning needs also increased. The findings indicated that online communication and readiness for online

learning were positively associated. The OLRS examines elements of online communication self-efficacy through survey items relating to comfort in using asynchronous technologies such as email and posting questions via discussion forums. On the other hand, the OLSES examines synchronous technologies for course communication.

Online Student Demographics

Few researchers have examined demographics of online students. Studies have found that fully online students tend to be older (Johnson, 2019; Ke, 2010; Kummerow, Miller & Reed, 2012) and more often female than male (Ke & Xie, 2009; Quinn, 2011) than those students who take a mixture of online and face-to-face courses. Colorado and Eberle (2010) found that age of the online learner affected their self-regulated learning. Cigdem and Yildirim (2014) found that students' prior experience in web-based education and access to a home computer impacted their online learning readiness at a vocational school in Turkey. Fogerson (2005), when examining online readiness factors, observed that prior online course experience and computer-related experience predicted student confidence in online learning. Johnson (2019) compared on-campus and fully-online students and found that on-campus students were more likely to chat or tweet using a computer and also had higher extrinsic motivation for achievement.

Student Readiness Conceptual Framework for Online Learning

Existing online student readiness instruments focus on specific learner competencies ranging from technical, self-directed learning, and communication. Yet, researchers have not examined the relationship between an online student's perception of importance and confidence in their ability and online course readiness. In fact, the relationship between attitude of importance and confidence in abilities has been examined through a variety of other contexts. Rollnick, Mason, and Butler (1999) studied the relationship between the attitude of importance and confidence in ability towards readiness in health behavior change. Within the context of the current study, two aspects are focused on: (a) students' attitude on the importance of student competencies in their online learning and (b) students' perception of their confidence in their abilities to accomplish online student competencies.

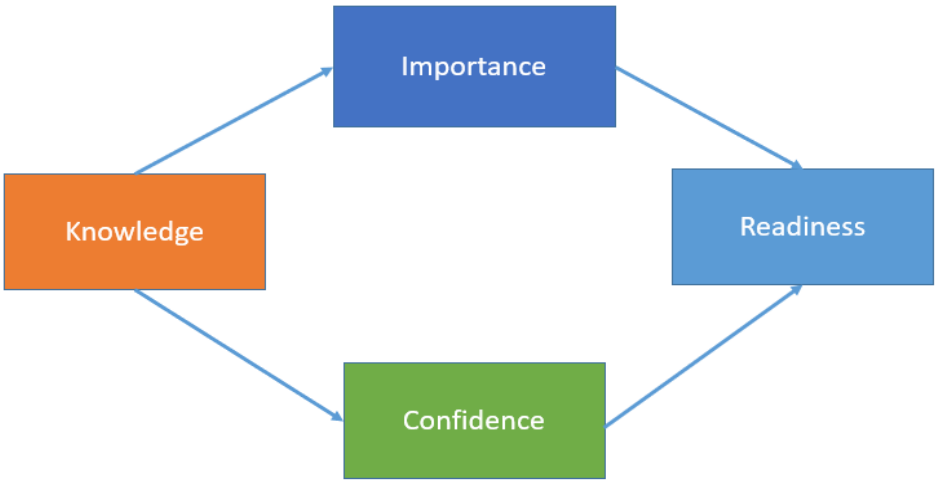

Figure 2. Conceptual Framework for Student Readiness for Online Learning (adapted from Rollnick, Mason and Butler, 1999, p. 23).

Purpose of this Study

There is a lack of consistency among existing student readiness for online learning instruments and surveys both from published and unpublished sources. Online learning is no longer an innovation but has become the norm in majority of the universities in the U.S. In addition, though several studies on online student readiness have been conducted, it is essential for studies to examine this over time because technology has changed the way online courses are offered and students are being exposed to online learning very early in their education these days. The purpose of this study was to examine student readiness for online learning in 2018 and to propose an instrument that can be used both by researchers and universities. The Research Questions were:

1. What competencies do students consider as important for their readiness for online learning?
2. What are student perceptions of their confidence in their readiness for online learning?
3. What demographic factors are related to student perception on their readiness for online learning?

Methods

Participants

The IRB approval for distributing this survey was obtained at the researchers' institution. The survey was distributed through SurveyShare electronic survey administration tool to the Distance Education email list of students at a Southeastern University (111 respondents) and to six program directors outside this university who manage online programs (66 respondents). This was done to reach more students across the U.S. Both of the respondent pools constitute a convenience sample. In total, 177 responses were received. There was not a statistically significant difference ($p < .05$) on any of the perception of readiness measures between the Southeastern University and students recruited through the program directors. Therefore, both samples were combined for all data analyses.

Student demographic characteristics are reported in Table 3. The average age of respondents was 37 years old and most of the respondents were female (79%). The academic standing of respondents was master's level (24%), seniors (22%), and juniors (20%). The majority of respondents attended courses using an asynchronous mode of delivery (59%). Not quite half of the respondents were in the discipline of education (45%), followed by health science (20%) and liberal arts (19%). At the time of the survey, on an average respondents had taken approximately nine courses online.

Table 3
Student demographic characteristics (N = 177)

Variables		Mean/Frequency and (Percentage)
Age		Mean = 36.68 SD = 11.73
Gender	Female	138 (78.9 %)
	Male	34 (19.2%)
Academic Standing	Freshman	4 (2.3%)
	Sophomore	3 (1.7%)
	Junior	36 (20.3%)
	Senior	39 (22%)
	Postbac	4 (2.3%)
	Grad Cert	24 (13.6%)
	Master	43 (24.3%)
	Doctoral	7 (4%)
	Postdoc	7 (4%)
Course Format	Asynchronous	101 (58.7%)
	Synchronous	43 (25%)
	Hybrid	28 (16.3%)
Discipline	Liberal arts	33 (18.6%)
	Arts & Architecture	1 (0.6%)
	Business	14 (7.9%)
	Education	80 (45.2%)
	Engineering	5 (2.8%)
	Health Sciences	35 (19.8%)
Number of Courses Taken		Mean = 8.78 SD = 7.86

Note. Due to missing demographic data, not all frequencies add up to 177.

Instrument

The Student Readiness for Online Learning (SROL) instrument was developed for this study after reviewing the literature and existing student readiness instruments and surveys. Several steps were used to develop the SROL. First the subscale definitions were determined by using previous research. Zimmerman's OLSES instrument and UNC Chapel Hill Student Readiness Survey were referenced during development of the SROL. The OLSES instrument contained 25 items but did not categorize items into competencies. But some of the OLSES items addressed aspects of student attributes, communication, and time management. Though this instrument did not include all the items that captured student readiness, the detailed process of review and evaluation of items led to the creation of categories as well as specific items. Similarly, the UNC Chapel Hill instrument had similar categories of technical and self-direction competencies. This survey is no longer available to the public. Next, using these three instruments, items that aligned to the research questions of interest but were not already included were generated.

After the items were developed, an expert review rubric was used to receive feedback from the experts. The Validation Rubric for Expert Panel (VREP) was designed to measure face validity, construct validity, and content validity and was used to receive feedback from experts (Simon & White, 2013). This rubric included items on clarity, wordiness, negative wording, overlapping responses, balance, use of jargon, appropriateness of responses listed, use of technical language, application to practice and relationship to the problem. The new instrument and review rubric were sent to four online learning experts to identify face and content validity. The experts agreed on the categories but suggested rewording some items for clarification.

The 20 items were organized into four subscales: (a) online student attributes (5 items), (b) time management (5 items), (c) communication (5 items), and (d) technical (5 items). The items can be seen in Table 4. Participants rate each item twice, once for importance of online readiness competencies and once for confidence in their readiness for online learning, which resulted in 40 responses and eight subscales. For the importance ratings, the students were asked, "Rate how important these competencies are for you in your online learning" on a 5-point Likert scale from 1 (not important at all), 2 (unimportant), 3 (neither important or unimportant), 4 (somewhat important), to 5 (very important). In the section for confidence, respondents were asked to "Rate your confidence in your ability to accomplish the following competencies in online learning" on a 5-point Likert scale from 1 (very unconfident), 2 (somewhat unconfident), 3 (neither confident or unconfident), 4 (somewhat confident), to 5 (very confident).

Cronbach alphas for each of the eight subscales suggested reasonable internal consistency, ranging from .88 to .95 (see Table 4). A confirmatory factor analysis (CFA) was conducted to determine if evidence supported reporting results by the eight factors. The results of the CFA suggested a marginal fit of the empirical data to the eight hypothesized factors ($\chi_{(702)}$= 1319.43, p < .001; RMSEA = .07; CFI = .91; SRMR = .01). All path coefficients between the items and the aligned factor were statistically significant. While the results of the CFA should be interpreted with caution due to the small sample size, it was determined that there was enough evidence to support using the eight subscale scores in this study.

Data Analytical Procedure

Descriptive statistics (means and standard deviations) are reported both at the item level, at the subscale level, and also by various demographic factors to address the first and second research questions. Two repeated measures ANOVAs for importance and confidence were conducted to examine differences between the four subscales. Multivariate analysis of variance (MANOVA) was employed to examine the differences among students in their responses to the survey when the characteristic was categorical (e.g., gender, academic standing). This assisted in addressing the third research question. Correlation coefficients were calculated to examine the relationship between respondents' characteristics that are continuous in nature (e.g., age) and perception of importance and confidence for online learning.

Results

Student Perception on the Importance and Confidence of Online Learning Competencies

To examine research questions 1 and 2, the means and standard deviations by item within each of the subscales, online course attributes, time management, communication, and technical competence rated on importance and confidence are reported in Table 4. All the means were above 4.0 except for the importance of the use of synchronous technologies, which was 3.95. This suggested that on average, respondents reported that all the competencies except for synchronous technologies were *somewhat important* to *very important* and respondents were *somewhat confident* to *very confident* in their ability to accomplish the competencies in online learning.

Two repeated measures ANOVAs for importance and confidence were used to determine differences between the subscales. For the four importance subscales, there was a statistically significant difference between the subscales (Wilks' Lambda = .61, $F = 36.51$, $p < .001$, partial eta squared = .39). Post hoc analyses indicated that respondents rated communication lower ($M = 4.22$) than the other three subscales on importance (ranging from 4.56 for technical competency to 4.63 for time management). There was also a statistically significant difference among the four confidence subscales (Wilks' Lambda = .76, $F = 17.75$, $p < .001$, partial eta squared = .24). Post hoc analysis indicated that respondents were the most confident in the online student attributes ($M = 4.54$) and technical domains ($M = 4.63$) than the time management ($M = 4.40$) and communication domains ($M = 4.33$).

Table 4

Student Readiness in Online Learning Descriptive Statistics

	Student Readiness Online Learning Competencies	Importance M(SD)	Confidence M(SD)
	Online Student Attributes		
1	Set goals with deadlines	4.67 (0.89)	4.58 (0.80)
2	Be self-disciplined with studies	4.74 (0.88)	4.52 (0.87)
3	Learn from a variety of formats (lectures, videos, podcasts, online discussion/conferencing).	4.48 (0.90)	4.52 (0.91)
4	Be capable of following instructions in various formats (written, video, audio, etc.)	4.69 (0.84)	4.58 (0.88)
5	Utilize additional resources to answer course-related questions (course content, assignments, etc.)	4.47 (0.94)	4.55 (0.87)
	Mean (SD)	**4.60 (0.83)**	**4.54 (0.79)**
	Reliability	**.94**	**.93**
	Time Management		
6	Devote hours per week regularly for the online class	4.51 (1.01)	4.23 (1.10)
7	Stay on task and avoid distractions while studying	4.42 (0.99)	4.02 (1.09)
8	Utilize course schedule for due dates	4.71 (0.84)	4.72 (0.77)
9	Complete course activities/assignments on time	4.80 (0.84)	4.58 (0.96)
10	Meeting multiple deadlines for course activities	4.76 (0.82)	4.51 (0.97)
	Mean (SD)	**4.63 (0.84)**	**4.40 (0.88)**
	Reliability	**.95**	**.92**

Table 4 (continued)

Student Readiness in Online Learning Descriptive Statistics

	Student Readiness Online Learning Competencies	Importance M(SD)	Confidence M(SD)
	Communication		
11	Use asynchronous technologies (discussion boards, email, etc.)	4.47 (0.97)	4.63 (0.80)
12	Use synchronous technologies (Webex, Collaborate, Adobe Connect, Zoom, etc.) to communicate	3.95 (1.05)	4.15 (1.12)
13	Ask the instructor for help via email, discussion board, or chat.	4.48 (0.96)	4.49 (0.96)
14	Ask classmates for support (accessing the course, clarification on a topic)	4.02 (1.06)	4.07 (1.15)
15	Discuss feedback received (assignments, quizzes, discussion, etc.) with the instructor	4.21 (1.05)	4.35 (0.99)
	Mean (SD)	**4.22 (0.85)**	**4.33 (0.85)**
	Reliability	**.88**	**.88**
	Technical Competence		
16	Complete basic computer operations (e.g., creating and editing documents, managing files, and folders)	4.70 (0.80)	4.65 (0.78)
17	Navigate through the course in the Learning Management System (e.g., Moodle, Canvas, Blackboard, etc.)	4.72 (0.84)	4.65 (0.79)
18	Participate in course activities (discussions, quizzes, assignments. synchronous sessions)	4.72 (0.86)	4.71 (0.74)
19	Access the online grade book for feedback on performance	4.56 (0.84)	4.75 (0.74)
20	Access online help desk/tech support for assistance	4.17 (1.05)	4.40 (1.03)
	Mean (SD)	**4.56 (0.81)**	**4.63 (0.72)**
	Reliability	**.91**	**.91**

Demographic Factors and Student Perception of Importance and Confidence in Competencies for Online Learning

The following analyses examined differences and relationships of perception of importance and confidence for online learning by respondents' characteristics and course format. Specifically, differences were examined based on gender, undergraduate/graduate status, academic major (education degree compared to a non-education degree), race (white compared to non-white), age, number of online courses, and course format. Because there were multiple correlated outcome variables, MANOVAs were used to examine difference when the characteristic was categorical (e.g., gender, academic standing, race, academic discipline, and course format). Correlation coefficients were calculated to examine the relationship between respondents' characteristics that are continuous in nature (e.g., age, number of online courses), and perception of importance of online readiness competencies and confidence in their readiness for online learning. The means by student characteristics are provided in Table 5.

Table 5

Student Readiness by Demographics

	Importance				Competence			
	Course Design M (SD)	Course Communication M (SD)	Time Management M (SD)	Technical Competence M (SD)	Course Design M (SD)	Course Communication M (SD)	Time Management M (SD)	Technical Competence M (SD)
Gender								
Female (N = 137)	4.57 (.92)	4.61 (.94)	4.21 (.90)	4.55 (.89)	4.47 (.87)	4.35 (.96)	4.28 (.91)	4.58 (.80)
Male (N = 34)	4.66 (.37)	4.71 (.37)	4.21 (.65)	4.58 (.36)	4.75 (.35)	4.58 (.45)	4.49 (.58)	4.81 (.32)
Academic Standing								
Undergraduate	4.60 (.88)	4.63 (.87)	4.17 (.93)	4.55 (.86)	4.38 (.92)	4.31 (.100)	4.18 (.95)	4.60 (.76)
Graduate	4.61 (.74)	4.64 (.77)	4.29 (.74)	4.59 (.70)	4.66 (.65)	4.49 (.75)	4.47 (.75)	4.65 (.70)
Race								
White	4.62 (.75)	4.65 (.76)	4.14 (.81)	4.55 (.74)	4.60 (.70)	4.43 (.79)	4.35 (.76)	4.70 (.56)
Non-White	4.56 (.99)	4.59 (1.00)	4.37 (.91)	4.57 (.94)	4.40 (.95)	4.32 (.104)	4.27 (.102)	4.48 (.97)
Academic Discipline								
Education	4.67 (.64)	4.68 (.67)	4.36 (.63)	4.64 (.58)	4.69 (.55)	4.51 (.69)	4.54 (.61)	4.71 (.56)
Non-Education	4.61 (.85)	4.65 (.85)	4.17 (.89)	4.55 (.84)	4.49 (.81)	4.41 (.86)	4.24 (.88)	4.64 (.66)
Course Format								
Asynchronous	4.62 (.77)	4.68 (.79)	4.26 (.77)	4.58 (.73)	4.48 (.92)	4.37 (.98)	4.29 (.89)	4.58 (.86)
Synchronous	4.57 (.88)	4.61 (.85)	4.18 (.89)	4.57 (.86)	4.53 (.7)	4.47 (.82)	4.2 (.84)	4.63 (.53)
Blended	4.49 (1.03)	4.42 (1.06)	4.1 (1.1)	4.42 (1.03)	4.75 (.36)	4.38 (.6)	4.61 (.71)	4.79 (.4)

Gender. Across all the measures, responses from males were higher than females, but there was not a statistically significant difference between females and males on the perception of importance of online readiness competencies and confidence in their readiness for online learning (Wilks' Lambda = .97, $F_{(8, 161)}$=.62, p = .76, partial eta squared = .03). Caution should be made in interpreting these results because of the small number of males in the study (N = 34).

Undergraduate and Graduate Status. Across all the measures, graduate students reported higher means than undergraduate students, but there was not a statistically significant difference between undergraduates and graduate student respondents on the perception of importance of online readiness competencies and confidence in their readiness for online learning (Wilks' Lambda = .91, $F_{(8, 157)}$=1.86, p = .07, partial eta squared = .09).

Education and Non-education Majors. There was not a statistically significant difference between education majors and non-education majors on the perception of importance of online readiness competencies and confidence in their readiness for online learning (Wilks' Lambda = .93, $F_{(8, 157)}$=1.55, p=.14, partial eta squared = .07).

White and Non-white Students. There was a statistically significant difference between white and non-white student respondents on the perception of importance of online readiness competencies and confidence in their readiness for online learning (Wilks' Lambda = .88, $F_{(8, 164)}$ = 2.85, p < .01, partial eta squared = .12). Post hoc discriminant analysis suggested that white respondents rated their competencies in online student attributes and technology higher than non-

white respondents, but non-white respondents rated the importance of communication higher than white respondents did.

Course Format. There was a difference between asynchronous, synchronous, and blended mode of course delivery (Wilks' Lambda = .85, $F_{(16, 322)}$=1.70, p = .05, partial eta squared = .08). Post hoc discriminant analysis suggested that blended format students rated their competencies in online student attributes and communication higher than the asynchronous or synchronous students did.

Age. Pearson product-moment correlation coefficients were estimated between respondents' age and the eight measures of perception of importance and confidence for online learning. All correlation coefficients were not statistically significant and ranged from .04 to .145, except for confidence in communication (r = .19, p = .01).

Number of Online Courses. Pearson product-moment correlation coefficients were estimated between the number of online courses taken and the eight measures of perception of importance and confidence for online learning. Seven of the eight correlation coefficients were not statistically significant with values ranging from -.05 to .15. Only the correlation between competency in time management and number of online courses taken was statistically significant (r = .20, p = .01).

Discussion

The findings from this study on four constructs of online learning readiness (online student attributes, time management, communication, and technical) are discussed within the two dimensions, Importance and Confidence.

Importance of Online Readiness Competencies

High ratings on most of the competencies. The categorical means for student responses on most of the items for the importance category of competencies were above 4.50. The competencies were rated between somewhat important and very important, which signifies the importance of these competencies for online learning. Most of the students are taking online courses at the university level, and not for the first time. They are coming prepared for online learning in higher education by taking online courses in middle and high schools (Toppin & Toppin, 2015). In 2018, students rated the online readiness competencies as important as they realize the value of these competencies. Yu (2018) had similar high ratings on three of the subscales in the Student Online Learning Readiness (SOLR) instrument but had low ratings on the social competencies with classmates. Similarly, Zimmerman and Kulikowich (2016) found that students rated items on the Online Learning Self-Efficacy Scale (OLSES) high when they had online course experience compared to the students who did not.

Low ratings on communication competencies. Online student attributes, time management, and technical competencies were rated high in importance. Overall, there was a statistically significant difference in the subscales based on importance. The communication competencies were rated lower by the students compared to the other three subscales. This shows that the students value their online student attributes, their time management, and technical skills to be more important than communication skills. Only two of the previous instruments examined included a subscale on communication. Hung, Chou, Chen, and Own (2010) in the OLRS examined elements of online communication self-efficacy in using asynchronous technologies

such as email and posting questions via discussion forums. They found that students in Taiwan rated communication competencies to be moderately high compared to self-directed learning and learner control competencies among undergraduate college students. Zimmerman and Kulikowich (2016) in the OLSES had items on communicating with the instructor, with technical support, asynchronous and synchronous communication and found these items to be rated moderately high. Both these scales did not include items on communicating with peers for course communication, which was also used in this study.

Using synchronous technologies. "Use synchronous technologies to communicate," a competency in the communication subscale, was the lowest rated competency. Though this competency was the only one rated in the 3s, it was still close to the rating "important." Martin and Parker (2014) found that instructors used synchronous tools to promote interaction, build a sense of community, and provide an opportunity for students from different locations to be able to participate; however, recent studies have found that students prefer the flexibility to participate asynchronously and not having to set aside specific times for online learning. Martin, Wang, and Sadaf (2018) found that students rated the use of synchronous tools to be a not very helpful facilitation strategy. In an earlier study, Park and Bonk (2007) found that the students viewed time constraints, lack of reflection, language barriers, tool-related problems, and peers' network connection problems as challenges for synchronous learning.

Ask classmates for support. "Ask classmates for support" was another competency in the communication subscale that was rated low. Students in online courses usually participate in courses from different locations and sometimes do not have the opportunity to meet or talk to their peers. Some online courses are designed without room for interaction both with the instructor and with their peers and students do not see the need to communicate or ask their classmates for support. This competency refers to the social aspect of the course and previous research has found this to be rated low. Yu (2018) found that undergraduates rated social competencies with classmates the lowest.

Confidence in the Online Readiness Competencies

High ratings on most of the competencies. Though not as high as the importance category, students still rated most of the competencies high based on confidence in their abilities. Similar to their perception of importance, students in the year 2018 were being exposed to several online courses both in middle and high school and in higher education and are confident in their skills for online learning (Toppin & Toppin, 2015). Mazanov, Meacheam, Heaslip, and Hanson (2016) found that self-efficacy that describes students' confidence had positive effects on peer engagement, learning management system (LMS) interaction, and convener interaction on business college students.

High rating on "Online student attributes" and "Technical competencies" There was a statistically significant difference in the subscales based on confidence. The students rated the online student attributes and technical competencies higher compared to communication and time management competencies. While student attributes and technical skills might be similar for web-enhanced or blended and online courses, communication and time management competencies are different (Martin & Bolliger, 2018). Students might have rated these high as they are prepared for these tasks of online learning through prior experience. Time management in online courses is very different and students are expected to be self-disciplined learners who manage their time well.

Similarly, communication in the online environment is different than the face-to-face communication.

Low ratings on "Stay on task" and "Avoid distractions while studying" The lowest time management competency was "stay on task and avoid distractions while studying." While time is a challenge even to the student taking a traditional on-campus course, it is even more challenging in the online environment as students have to be self-disciplined, manage their schedule, and stay on task to participate in the online course (Michinov, Brunot, Le Bohec, Juhel, & Delaval, 2011; Parkes, Stein, & Reading, 2015). These could be due to several reasons including the student-centered nature of online courses where online courses may not have a set time for class meetings. Instead, students have to manage their time by balancing other priorities such as work and family.

Low ratings on "Use synchronous technologies" and "Asking classmates for support" The two lowest communication competencies were "Use synchronous technologies to communicate" and "Ask classmates for support." This was consistent with their ratings on importance. Students not only considered these competencies to be the lowest in terms of importance, but they also rated them lowest in terms of their confidence. More and more online programs are offering asynchronous courses to provide the online learner with flexibility by not requiring them to join synchronous meetings. In addition to time challenges, the technical challenges, and network issues of theirs and peers might have made them rate this item low.

Similar to the importance category, students rated "Asking classmates for support" low in terms of their confidence. Students in online courses may not always be provided the option to interact with their peers as some courses are still designed to be self-paced, and this could have made them rate it low. Also, this could have been because if they needed support or clarification, online students might have reached out to their instructors and not to their peers. Due to the distance involved in online learning where they may not have opportunities to interact with their classmates, students may not be comfortable reaching out to their peers for support.

Demographic Factors and Student Perception

There were no differences found when examining differences in gender, undergraduate/ graduate status, academic major (education degree compared to a non-education degree), age, and the number of online courses. This shows the students in 2018 were equal in most of these areas irrespective of the demographic differences. However, significant differences were found in race and course format.

Race. White students considered online student attributes and technical competencies to be important, whereas non-white respondents rated communication competencies to be more important. These responses could be based on student experiences and different findings show that it is essential to understand racial and cultural differences when teaching online. The white students did not think communication skills were as important as the non-white students. Previous research has found that African-American pharmacy students rated themselves lower on communication apprehension compared to white and Asian students (LaRochelle, & Karpinski, 2016). Different communication strategies that enhance and prepare online learners of different races to communicate effectively should be considered across all races.

Course Format. Students who take the course in blended format rated online student attributes and communication competencies higher than the asynchronous or synchronous student respondents. Since these students have been exposed to a model other than entirely online, the

blended model they might see the value in the different attributes such as being self-disciplined, setting goals as important attributes for online readiness compared to the students who have not taken blended courses. They also rated the communication competencies higher as they probably see differences in communication in blended and asynchronous/synchronous communication.

Implications

This study has several implications. The findings from this study inform faculty and instructional designers, administrators, and online students. The findings support the administration of a readiness survey to identify student needs in online learning. The results of this study and future administration of the readiness survey have implications for the design of online courses and informs both faculty teaching online courses as well as instructional designers who support faculty in the design of the courses to help students prepare for online learning. The findings also inform training and assessment development. The results of this study inform student orientation and training development for online students. Administrators can benefit from the results to support training initiatives for online students. Students should be encouraged to reflect on their attributes as an online learner, their time management, communication, and technical skills. It is crucial for students to be prepared in all these four areas. Finally, this study adds to the research base on student online readiness competencies.

Limitations and Future Research

There were some limitations to this study. First, an exact response rate could not be calculated because several program directors who distributed the survey did not provide the number of students receiving this survey. Second, the majority of the students were from Education, with very few students from other disciplines. Third, the findings from this study are based on the self-reported survey data. Due to this, there might be response bias which is the tendency of the respondent to provide inaccurate responses that are socially acceptable. Finally, the instrument does not include an exhaustive list of student online readiness competencies. It is vital to interpret the results with caution as it may not be generalizable to all contexts and settings.

Future research studies could use this SROL instrument to measure student readiness in various contexts. Future validation studies of the instrument will also be beneficial to confirm if the instrument measures online learner readiness as designed and discriminates among those students who are ready and those who are not ready. In addition, future research could investigate reasons why students view communication as the least important competency required for online learning. Specifically, future research could examine why students' confidence is low in asking for support from their peers as well as the use of synchronous technologies. Future research should strive to include other areas of competencies not included in this study and also collect data from non-education students.

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Attitudes Toward Technology Among Distance Education Students: Validation of an Explanatory Model

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Abstract:
Attitudes toward technology are preconceived notions that affect the teaching-learning process and the academic-professional performance of students, in particular those who use technology. This investigation has two objectives: to test the measuring properties (reliability, factorial structure) of an instrument that measures attitudes and to propose and validate a model that hypothesizes digital competence and frequency of use of technologies have a positive impact on attitudes. The sample included 1,251 students of the Madrid Open University in a nonexperimental, explanatory study using structural equation methodology. The results indicated adequate psychometric properties for the test and good adjustment of the proposed model ($\chi^2 = 163.91$, df = 37, $p < .001$) allowing for further exploration of the relationship between use, skill, and attitudes in the distance education context and improving the properties of measuring instruments proposed in Spanish.

Keywords: attitudes toward technologies, distance education, structural equation models, digital competence, use of technology

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Attitudes Toward Technology Among Distance Education Students: Validation of an Explanatory Model

In all spheres of life, including education, people are living a life of constant immersion in Information and Communication Technology (ICT). This has led to major changes in the field of education over recent decades, especially distance education where the context makes the use of ICT a necessity. ICT tools have transformed the teaching-learning process in many ways (Alhom & Courtney, 2018; Abdelmalak, 2015; Rodríguez, Restrepo & Aránzazu, 2014): increasing higher order thinking skills, problem solving skills, and the effectiveness of teaching and learning. Technologies in education include different environments designed specifically to fulfill certain objectives in teaching and learning. The most commonly used ICT resources include the Internet, multiplatform applications, communication tools such as mobile messaging, email and social media, and tools for sharing files and other resources like blogs, e-portfolio, MOOCs, web conference applications, etc.

Additionally, Learning Management Systems (LMSs) like Moodle, Sakai, LAMS, and Blackboard Learn Collaborate offer today's students different opportunities for online learning. Rhode, Richter, Gowen, Miller, and Wills (2017) point out that LMSs make the education process independent of students' time and location. Moodle, in particular, allows for the creation of effective online courses, using study material in the form of text files, images, presentations, audio and video files, working with glossaries, wikis, databases and interactive communication with students through forums, among others (Kerimbayev, Kultan, Abdykarimova & Akramova, 2017).

Abdelmalak (2015) established that the use of 2.0 tools in the teaching-learning process is indispensable, especially in distance education. This has led to increased interest in the study of personal and academic variables that might lead a user to have greater or lesser digital competency (He & Zhu, 2017; Ahmed, 2017). Among the most researched variables are the motivation of students toward ICT (Logan, Lundberg, Roth & Walsh, 2017; Senkbeil & Ihme, 2017), the possible gender differences on competency and frequency of use (Laabidi, 2017), and the effect of positive attitudes in the increase of shared information sharing knowledge (Podrug, Filipović & Kovač, 2017; Nisar & Haque, 2018). However, the use of these platforms and the resources available for achieving significant learning is conditioned by the attitudes of students toward the technology. This is why the objectives of this work are twofold: on the one hand, to check the properties (reliability, factorial structure) of an instrument to measure the attitudes among distance university students toward ICT and, on the other hand, to propose and validate a model that hypothesizes digital competency and the frequency of use of technologies has a positive impact on these attitudes.

In a general sense, attitudes can be defined as the positive or negative sensation regarding a specific issue (Binder & Nierdele, 2006). Attitudes are predispositions that are learned and change throughout people's live. Some authors consider them not to be innate, that they can be changed to achieve more appropriate attitudes (Binder & Niederle, 2006). For Ayub (2017), attitudes are opinions a person has of things, people, or some issue. The general attitude toward an issue may be positive, negative, neutral or may vary from one situation to another. In particular, the attitudes toward the inclusion of ICT in teaching can be defined as the ideas, preconcepts, beliefs, and opinions of students on the incorporation of ICT in the teaching-learning process and depend on the previous experience with technology (Binder & Nierdele, 2006). In most studies on attitudes, three components come into play: cognitive, affective, and behavioral, with the affective

taking greatest weight, followed by cognitive and behavioral with the lowest weight (Mirete, García & Hernández, 2015).

For Adekunle, Omoba, and Tella (2007), one of the most important personal variables for the epistemological development of students are their attitudes. Several authors have found that use of ICT is conditioned by the attitude of students as well as their knowledge of ICT (Tejedor, García-Valcárcel, & Prada, 2009). Yang and Kwok (2017) and Meerza and Beauchamp (2017) have found that a positive attitude toward ICT is a necessary condition for the use of ICT in teaching students to be effective learners online. These results have led to increased interest in the study of variables that might impact attitudes toward the use of ICT. The variables analyzed include self-perceived digital competence, frequency of use of the technologies, and the perception of the utility of same.

Review of Relevant Literature

Over the last decade, several studies investigated the effects of different variables on the attitudes of students at different levels of education and their relationship with the teaching-learning processes in different contexts.

Nketiah-Amponsah, Asamoah, Allassani, and Aziale (2017) examined students' attitudes on the use of some selected ICT devices and applications and their academic performance. A sample of 320 final year undergraduate students of the University of Professional Studies Accra, Africa (UPSA) produced a positive and statistically significant relationship between attitude toward the use of some 2.0 tools and academic performance. Specifically, a positive attitude toward the use of email has a positive impact on academic performance, while a positive attitude toward the use of the iPad had a negative impact. In contrast to these results, Petko, Cantieni, and Prasse (2017) analyzed the relationship between attitudes toward ICT using data collected from the Programme for International Student Assessment (PISA 2012) report on Mathematics, Science, and Reading, which included the academic performance of around 510,000 15-year-old students from 65 countries. No positive associations between attitudes toward the use of ICT and the school performance of students were found. It is likely that positive attitudes toward ICT are the result of positive experiences; therefore, it seems reasonable to conclude that what really matters is the quality rather than quantity of use of educational technology. Along the same lines, Stošić and Fadiya (2017) examined attitudes of students toward the use of ICT during their studies using a sample of 285 students from Girne American University (Turkey). Attitudes to ICT had a significant impact on the academic performance of the student because students with higher scores in attitude get better mean grades. Mantoro, Fitri, and Usino (2017) investigated the impact of ICT on the learning process and student attitudes using a sample of 20 students at a vocational school in Tangerang (Indonesia). The use of ICT created a fruitful learning process and fostered positive attitudes in students. Siragusa and Dixon (2008) studied attitudes from a small group of undergraduate students (n = 30) in a higher education institution in Australia on their use and engagement of ICT. The study found that negative attitudes can cause students to feel anxious or intimidated when they use technologies.

Another group of investigations have focused on the variables that might influence the development of favorable attitudes toward technology. Kubiatko (2010) studied differences in attitudes toward ICT according to sex, age, year of study, and type of residence in a sample of 316 Czech students. In general, the students reflected positive attitudes toward ICT, even though men,

second-year students, and students living in rural areas showed a more positive attitude in comparison to women and urban students. Casillas, Cabezas, Ibarra, and Rodríguez (2017) evaluated the digital competence of 580 education students at the University of Salamanca (Spain). Digital competence was measured through three dimensions: knowledge, use of, and attitudes toward ICT. Results found a more favorable attitude in female students than in male students even though males showed higher levels of knowledge and use of technology. In contrast, Rhema and Miliszewska (2014) evaluated the attitudes of 348 engineering students at the University of Tripoli (Libya) regarding their demographic characteristics, access to technology, use of technology for learning, skill in technology, and satisfaction with technology. no differences were found on these measures by gender or habitat (rural-urban) of the students with respect to their attitude toward ICT. Similarly, Kar, Saha and Mondal (2014) measured the attitude of 308 university students toward e-learning and found no differences with respect to gender, place of birth, or study discipline in relation to ICT.

García, Escofet, and Gros (2009) compared attitudes to ICT of 1,042 students enrolled in five Catalan universities (Spain) with different models, virtual, and blended. They analyzed whether different variables affected students in their level of attitude toward ICT (age, gender, university institution of origin, model: virtual or face-to-face, and area of knowledge). Attitudes toward ICT were measured on three dimensions: cognitive, social, and teaching. Significant differences were found between distance education and face-to-face students in the components of attitude except for the efficient development of knowledge and skills.

The Proposed Model

The model proposed in this study hypothesizes that technology use and self-perceived digital competence influence attitudes toward technology. The model is based on prior studies of the effect on attitudes of variables like Digital Competence (DC) or technology use. DC can be defined as a competence that allows the student to develop autonomously in a globalized society connected through technology and where information is increasingly growing. Nevertheless, said competence not only refers to possessing the knowledge and command of 2.0 tools but also putting them into practice (Cervera, Vidal, & Martínez, 2011).

DC can also be defined as the safe and critical use of ICT for work, leisure, and communication. In addition, a person will possess a correct DC when he / she is able to collect information, reflect and create knowledge, as well as communicate and share it through collaborative networks. (Aesaert, Van Nijlen, Vanderlinde & Van Braak, 2014). For Gallego, Gámiz, and Gutiérrez (2010), DC is formed by cognitive knowledge, attitudes, and procedural skill in the use of ICT. Rhema and Miliszewska (2014) have found that the self-perceived level of DC significantly influences attitudes toward educational technology.

Aesaert, Voogt, Kuiper, and Van Braak (2017) tried to identify the characteristics related to a student's self-perceived DC. The sample was composed of 378 sixth-grade students from 58 primary schools in Flanders (Belgium). Students' self-perceived DC were compared with an ICT competence test based on performance. The results indicate that current ICT ability and prior experiences are related positively with the self-perceived DC.

The second independent variable in our model is use of ICT. Gallardo, Marqués, and Bullen (2015) stated the way in which students interact with technological devices and 2.0 tools has

changed substantially. The current generations born after the 1980s have therefore lived with digital technology from birth (digital tablets, laptops, computers, etc.).

Fancovicová and Prokop (2008) analyzed if attitudes are influenced by the use of technology and other variables like accessibility to technology, personal characteristics, and educational context using a sample of 214 secondary students from four different Slovak elementary schools. The instrument was constructed of three dimensions: cognitive, behavioral. and affective. T attitudes toward the use of ICTs between different educational contexts (for example, online versus face-to-face) were different. The time spent on computers was positively correlated only with the behavioral dimension.

Mehra and Omidian (2011) also studied the relationship between attitudes toward technology, technology use, and perceived DC among 400 postgraduate students from the University of Punjab from different departments. They created an instrument with 48 items, whose results showed a positive attitude among the students who also considered ICT to be useful. However, only a little over half of the sample was in favor of adopting ICT in learning processes.

Explanatory Models of Attitudes toward ICT

Liaw, Huang, and Chen (2007) studied the attitudes toward ICT in 50 professors and 168 college students of distance education courses. The authors proposed a three-level model called Three-Tier Technology Use Model (3-TUM) derived from TAM (Technology Acceptance Model): the first level consists of the individual's experience regarding the quality of the LMS and the ICT tools, the second level includes the student's attitude in its cognitive and affective components, and the third level is comprised of the behavioral intention to use the ICT. Testing of the model showed that the attitude of students is influenced by the instructional pace, as managed by the teacher with the support of multimedia tools. However, this study is exploratory and a causal-explanatory analysis is required.

Edmunds, Thorpe, and Conole (2012) proposed the Technology Acceptance Model (TAM) to analyze attitudes toward ICT in three different contexts: work, leisure, and course study using a sample of 421 university students. The model suggested a causal influence of perceived digital competence and utility on attitudes and acceptance toward ICT. The comparison between contexts indicated that the students described utility in work significantly higher than other areas (leisure or study). The comparison by the study discipline indicates that technology students obtained significantly higher grades than those in other disciplines.

In the present study tests the TAM model on distance education students, just as the work of Edmunds, Thorpe, and Conole (2012) was carried out on face-to-face format students. For the model tested here the 3-TUM model was used. This model also was taken as background because even though these authors worked with distance education students in their research, it is exploratory rather than explanatory. For this reason, the present study formulated the following hypothesis: self-perceived digital competence and the frequency of use of ICT have a positive effect on attitudes to ICT among distance education university students. The causal model proposed in the present study is presented in Figure 1.

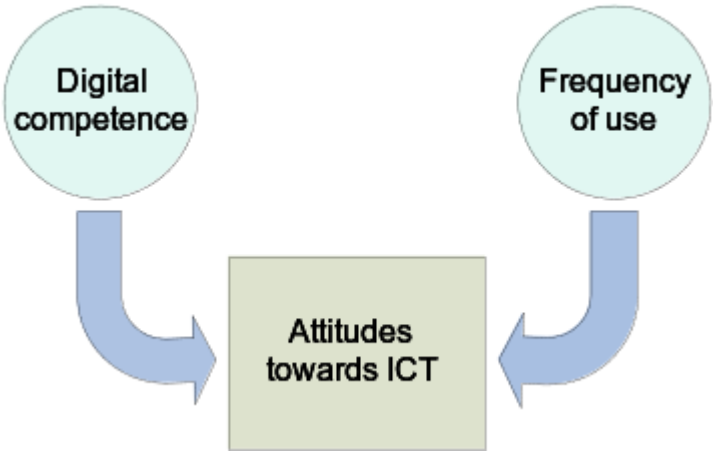

Figure 1. Causal model proposed in the present study

Methods

Data collection

A total of 1231 students from the Distance University of Madrid (UDIMA) participated in the study on a voluntary basis and with informed consent. The instruments were sent by email to all UDIMA students registered during the 2015-2016 course both in bachelor's and master's courses (the population of students in UDIMA is $N = 5776$). The email included an explanation of the objectives of the study and their consent to participate. The rate of response was 21.3%, which is somewhat low because they did not have any incentive to respond, either economic or academic. The sample included 601 women and 630 men. Some of the sample (62.47%) were bachelor's students and distributed as follows: 147 students of Engineering, 100 Law, 99 Criminology, 94 Education, 78 Psychology, 72 Labour Sciences, 66 Journalism, 62 Company Administration, 23 History, 10 Humanities, 9 Economics, and 9 Tourism. Their age ranges from 18 to 69 ($M = 36.01$, SD = 9.59). An important characteristic of the sample is that 40% of the students are employed in areas related to ICT and more than 50 have previous degree studies. The investigation was carried out in accordance with the ethical consideration established in the Declaration of Helsinki (World Medical Association, 2001).

Instruments

The instrument used includes three types of test: one to measure attitudes toward ICT, other to measure digital competence and one to measure frequency of use of ICT tools. The first one (attitudes) has been designed specifically for this investigation. The test is comprised of 20 items distributed on three scales: cognitive (7 items), affective (8 items), and behavioral (5 times). Each item contains a statement on thoughts, beliefs and attitudes to the incorporation of ICT in the learning process. The test used a Likert type format with 5 response options from 1 (completely disagree) to 5 (completely agree). The test is presented in Table 2 of the Results section.

The second instrument (self-perceived digital competence) appears in Appendix A. The questionnaire is composed of 15 questions in which each student evaluates their own capacity on a scale of 1 to 4 to develop actions with digital devices (computers, tablets, and smartphones). The actions selected were a subset of the actions included in a previous questionnaire by Carrera,

Vaquero, and Balsells (2011). The subset of actions includes action with digital devices; other actions as multiplatform applications were removed to abbreviate testing length.

Finally, students were asked about their frequency of use of a list of 24 technology resources commonly used at UDIMA divided into five groups: digital devices, Moodle, communication tools, collaboration tools, and other tools. The frequency of use was measured on a Likert scale from 1 ("I don't use it) to 4 (I use it very frequently). This instrument was also designed for this study and is presented in Appendix A.

Reliability

First, after the questionnaire on attitudes was prepared, five specialists in Education and ICT (lecturers in the master's in Education and Technology program) assessed the content and the syntactic and semantic adequacy of each item. They also evaluated the congruence of each item with respect to the factor it measured, and for this purpose were informed of the definition of the three factors that comprise the instrument (affective, cognitive, and behavioral). They were asked to pair each item with one of said factors. The percentage of items paired correctly ranged from 45.8% to 83%: evaluator 1 (11/24 = 45.8%); evaluator 2 (15/24 = 62.5%); evaluator 3 (20/24 = 83%); evaluator 4 (12/24 = 50%); and evaluator 5 (17/24 = 70.8%) indicting partial evidence of validity of the content. The other evaluations indicate easy comprehension of the items.

After obtaining the final version of the instrument, a subsample of 85 students with similar characteristics to the target population responded with the objective of obtaining data for the psychometric analysis. The reliability obtained in said pilot test was: $\alpha = 0.93$ (digital competence), $\alpha = 0.83$ (frequency of use), and $\alpha = 0.77$ (attitude). At the end of the pilot test, the following questions on the quality of the instrument were included:

(a) Are the questions clear?

(b) Is there any ambiguity in the questions?

(c) Is there any important aspect that is not considered?

(d) Do the questions correspond to the objectives of each test component?

(e) Is there any additional question that might improve this instrument?

The responses to these questions allowed for the inclusion in the digital competence instrument of several digital tools not considered in the original draft (e.g., glossaries, wikis, and calendars) and also the removal of others students did not use at all such as QR codes. All members of the pilot sample considered the questions to be clear.

Data analysis

This study can be defined as nonexperimental, explanatory, transversal, recursive, and one-directional. The data analysis included several procedures, all of which are derived from the structural equation model detailed next.

Confirmatory factor analysis (CFA) has been used as a tool to compile evidence of factorial validity of the attitude test. Due to polytomous nature of the items, the Generalized Least Squares (GLS) method was used as an entry to the asymptotic covariance matrix analysis. To analyze the adjustment of the model, various indices have been considered, as recommended by Brown and Moore (2014): Satorra-Bentler's χ^2 and the level of statistical meaning, the Root Mean Square Error of Approximation (RMSEA) with its respective confidence interval of 90%, the Comparative

Fit Index (CFI), the Non-Normed Fit Index (NNFI), and the Standardized Root Mean Square Residual (SRMR). The values must be below 0.06 for RMSEA and SRMR and above 0.95 for CFI and NNFI indices. The CFA results also provided composite reliability, factorial saturation, average variance extracted, and convergent and discriminant validity.

Reliability was studied through internal consistency (Cronbach's α) for each of the scales and for the total test, with its respective confidence interval.

To test the explanatory model proposed in Figure 1, modelling using structural equations was used. GLS was used as a method of analysis. To evaluate the adjustment of the model, the criteria presented previously for the CFA were analyzed.

The statistical packages SPSS v.20, LISREL 8.80 and Prelis 2.80 (Jöreskog & Sörbom, 2006) were used to carry out the analyses.

Results

Psychometric properties of the questionnaire on attitudes to ICT

Table 1 shows the indices of the adjustment of CFA and reliability according to internal consistency. Table 2 presents the composite reliability, the AVE (Average Variance Extracted of each factor), and the factorial loads of each of the items obtained through CFA.

Table 1

Indices of Adjustment of CFA and Reliability

χ^2_{SB}	*Gl*	*p*	CFI	NNFI	SRMR	RMSEA	90% CI
693.83	166	<.001	.97	.97	.041	.054	[.050-.059]

Reliability	Affective	Cognitive	Behavioral	Total
Cronbach's Alpha	.735	.801	.767	.903

As can be seen in Table 1, the reliability through internal consistency is adequate. The AVE (see Table 2) indicates that the Affective factor explains 86% of the variance, the Behavioral 78%, and the Cognitive 87%. These values exceed the recommended 50%, indicating good measurement of the construct (Hair, Black, Babin, & Anderson, 2010). With respect to the composite reliability, the values are higher than those obtained through internal consistency. With respect to the convergent validity, the 20 test items have statistically significant factorial loads (*T* values above 1.96) representing the factor they saturate.

Table 2

Saturations, Composite Reliability and Factorial Loads in CFA

Factor	**FC**	**AVE**	**Item**	**λ**
Affective	0.86	0.59	I would like to have more technological resources for my studies.	0.48*
			I feel at ease using ICT for my university studies.	0.99**
			I get overwhelmed accessing so much information on the internet.	0.66*
			When choosing my University, I took into account whether ICT would be used in teaching.	0.64*
			I like to work in virtual classes.	0.75**
			ICT have changed my way of learning.	0.84**
			I like to study through ICT.	0.94**
			I worry that in my professional future I will have to use ICT more.	0.71**
Behavioral	0.78	0.81	ICT facilitates my study of the subjects.	0.97**
			I would like to have more technological resources for my studies	0.73**
			I feel at ease using ICT in my university studies.	0.96**
			I get overwhelmed accessing so much information on the Internet.	0.90**
			My way of studying is helped by use of ICT.	0.93**
Cognitive	0.87	0.81	ICT assists me in my learning.	0.96**
			ICT is important at this current moment in my training.	0.98**
			I believe the integration of ICT into my study process to be a positive thing.	0.98**
			ICT is irrelevant in my learning.	0.77**
			ICT allows me to acquire basic skills for my career.	0.93**
			ICT provides flexibility of space and time to communicate with teachers and fellow students.	0.81**
			Use of ICT hinders the development of my professional skills.	0.84**

Note. CR = Composite Reliability; AVE = Average Variance Extracted; λ = Factorial Loads

* Significant load $p < .05$; ** Significant load $p < .01$

Table 3 presents evidence of the discriminant validity. The AVE is above the square of the correlation between the factors in the case of the affective-behavioral and affective-cognitive factors, evidencing the discriminant validity between these factors. The same does not occur between the factors in the case of the behavioral and cognitive factors as AVE is below that of the square of their correlation.

Table 3

Evidence of Discriminant Validity

	Affective	Behavioral	Cognitive
Affective	.86		
Behavioral	.31	.78	
Cognitive	.29	.90	.87

Note. Average Variance Extracted on the diagonal.

Explanatory model of Attitudes to ICT based on frequency of use and self-perceived digital competence

Table 4 shows the indices of adjustment of the structural equations model proposed in this study. It also includes the total reliability of each of the instruments used.

Table 4

Fit of SEM Model and Reliability of the Instruments

χ^2	*Df*	*p*	CFI	NNFI	SRMR	RMSEA	90% CI
163.91	37	<.001	.99	.98	.041	.052	[.044-.061]
Test				DC	FUSE	QAITC	Total
Reliability (Cronbach's α)				.94	.88	.90	.88

Note. DC = Digital Competence; FUSE = Frequency of Use; QAITC = Questionnaire on Attitudes to ICT.

The model's adjustment is very good because it meets the criteria specified in the data analysis section. Therefore, it is possible to proceed with the analysis of the different components of the model. Figure 2 shows the factorial loads (λ) of the measurement model and the estimated parameters (γ) for the structural model (causal).

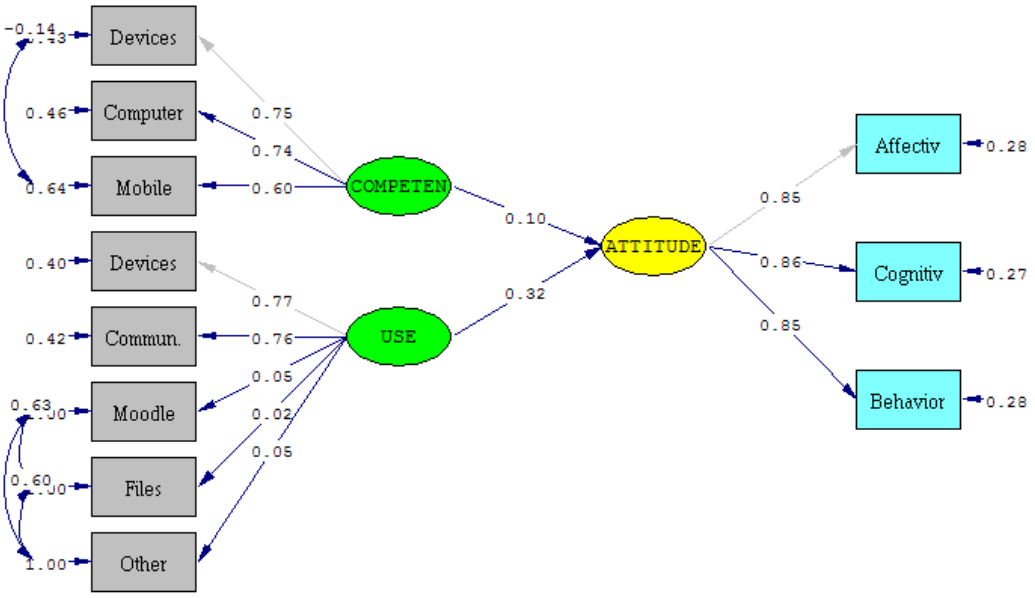

Figure 2. SEM model

Regarding to the measurement model, all λ_y parameters (.85, .86, and .85) were positive and statistically significant (student's $T = 50$, 55, and 55.36, respectively). The same occurs with the parameters λ_{x1} (self-perceived digital competence); all the parameters were positive and statistically significant: $\lambda_{11} = 0.75$, $t = 34.6$; $\lambda_{21} = 0.74$, $t = 27.51$; and $\lambda_{31} = 0.60$, $t = 21.7$.

With respect to frequency of use of ICT tools, some of the λ_{x2} parameters were not significant: the frequency of use of Moodle ($\lambda_{32} = 0.05$, $t = 1.57$), file-sharing tools ($\lambda_{42} = 0.02$, $t = 0.79$), and other tools ($\lambda_{52} = 0.05$, $t = 1.78$), that indicates that frequency of use is defined primarily as use of devices ($\lambda_{12} = 0.76$, $t = 38$) and by communication tools ($\lambda_{22} = 0.75$, $t = 31$).

With regards to the structural model, the parameters that relate self-perceived digital competence with attitude were not significant ($\gamma_{11} = .10$, t = .86) but the parameter that related frequency of use with attitude was ($\gamma_{12} = .32$, t = 2.61). This indicates that high use of technologies produces more positive and developed attitudes toward ICT; however, digital self-perceived digital competence has no impact on these attitudes.

Discussion

At present, attitudes toward ICT represent a valuable field of study for education. Its importance is reflected in the variety of studies and investigations that have been carried out on the topic. A couple of models have been proposed that relate attitudes with the use of technology or the digital competence like the 3TUM (Liaw, Huang, & Chen, 2007) or the TAM (Edmunds, Thorpe, & Conole, 2012). Also, some theoretical models explain attitudes such as Shared Planning Theory (Siragusa & Dixon, 2008). However, these models are not causal and therefore do not

consider the influence of different variables on attitude or how they relate to different constructs. It is important to highlight that the model presented in this study includes the influence of self-perceived DC and frequency of use of ICT on the attitude variable. Besides, these results indicated that self-perceived DC does not influence the attitude variable in contrast that Kubiatko (2010), Mehra and Omidian (2011), and Aesaert et al. (2017) obtained. It is important to note that the sample used in this work is composed completely by distance learning students. This result is different than results of previous works because distance learners could be different than face-to-face learners (García, Escofet, & Gros, 2009). Moreover, these results are similar, but more reliable than Mantoro, Fitri, and Usino (2017), since the sample used in this study was larger, perhaps resulting in the result that frequency of use of ICT has a positive effect on attitudes to ICT.

There is little consensus on the instruments used in the different investigations. Researchers usually use questionnaires to collect data, generally carried out independently for each investigation and not all verify the instruments of the measurement properties. This study, however, proposed an explanatory model but also analyzed the psychometric properties of the measurement instrument. It has been verified that the factorial loads are statistically significant and that the instrument presents convergent and discriminant validity. Through AVE, it has also been confirmed that the three factors explain over 70% of variance of the items and through internal consistency and composite reliability, it has been verified that the test is reliable.

The validation of the proposed model allowed an explanation of the attitudes and to obtain greater knowledge of said construct. This knowledge might lead others to focus on the variables that can have an impact on these attitudes through programs that foster those attitudes.

The conclusions of this study are: (a) evidence of the validity and reliability of the test for measuring attitudes has been presented; (b) a large and representative sample of the different degrees of the UDIMA have been used; (c) the causal influence of frequency of use of digital devices and computers on attitudes to ICT has been confirmed, and (d) the influence of student's self-perceived digital competence on attitude was rejected. These conclusions could allow teachers to generate programs to increase the use of various tools, such as digital devices, and thus reinforce the positive attitudes of students. This reinforcement also has an effect on improving the teaching-learning process as students acquire more significant learning.

Another important contribution of this study is to provide the scientific community with a reliable and valid tool to measure the attitudes toward incorporating ICT into the education. Its application is simple and brief (only 20 items) that Mehra and Omidian (2011) work. It also allows for the attitudes of students in the affective, cognitive, and behavioral factors to be precisely identified. Identifying students with low digital competence or negative attitudes allows for actions to be taken geared toward improving attitudes and competence of certain groups of students who need it most. It might also be helpful for teachers who can measure initial attitudes and skills and see how they change after intervention or a period of education.

This investigation also has a limitation that might constitute future lines of research. One of these is that the model establishes causal relationships between two independent and one dependent variable. However, other variables that might be important were not considered so as to simplify the model. Future studies might include other variables such as the use of technology or the average digital competence on an objective basis (not self-perceived). Another limitation is that this study used a sample of students with greater familiarity with technology in general and with Moodle in particular. In addition, 40% of participating students are employed in areas related

to ICT and more than 50% have previous degree studies, making them students with a very particular profile. These characteristics make it difficult to generalize the results to other educational contexts despite the broad size of the sample. Subsequent studies might replicate the model in other educational contexts such as blended or face-to-face learning.

Another possible direction for future research is analysis of the attitudes of teachers as fundamental stakeholders in the educational process. Finally, other future studies might center on the comparison between private and public universities, men and women, degrees and levels of study, among others.

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Flipping e-Learning for Teaching Medical Terminology: A Study of Learners' Online Experiences and Perceptions

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Abstract
Since e-learning has become popular in recent years, research studies have been conducted about which instructional methods are the most effective in online learning environments. The purpose of this study is to investigate one promising method by applying the flipped classroom model to a Medical Terminology Course. This course was provided fully online as part of a Medical Documentation and Secretarial associate degree program in a vocational college. We analyze learners' experiences associated with this application. Based on this flipped classroom method, learners were required to study interactive multimedia content and applications asynchronously. For synchronous activities, mainly learner-centered approaches—collaborative learning, problem solving, and discussion—were used. In the context of this study, learners' usage of the system, submissions to the study process questionnaire, and academic achievement were collected as quantitative data. Learners' opinions towards the flipped classroom model were obtained as qualitative data. We found that learners' academic achievement was significantly related to their perceptions of deep learning and their time spent on learning activities. Problematic aspects to the flipped classroom were time expectancies, insufficiency of instructional materials, and lack of advice received from the instructor.

Keywords: medical terminology, flipped classroom, deep learning, learning process, online learning

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Flipping e-Learning for Teaching Medical Terminology: A Study of Learners' Online Experiences and Perceptions

In recent years, online learning has gained more significance with an ever-increasing demand from a substantial and diverse array of learners. For instance, the total number of massive open online course (MOOC) learners was announced as 101 million in 2018 (Class Central, 2018). For the effective implementation of online learning, certain instructional models have been proposed like the flipped classroom, which was initiated by Bergman and Sams in 2006. For

learners who missed their classroom lectures, Bergman and Sams developed video lectures for learners to view outside of the classroom. After these efforts, the model was subsequently developed to its current state: "that which is traditionally done in class is now done at home, and that which is traditionally done as homework is now completed in class" (Bergman & Sams, 2012, p. 13).

The principle idea of the flipped classroom model is to transform the traditional instructional method to a novel approach with the use of instructor-developed videos and interactive activities such as problem-based and collaborative activities. In the context of the flipped classroom model, learners initially access and study course content (e.g., notes, presentations, videos) in advance of course classroom (in-class) sessions. Next, with their newly gained knowledge, they participate in classroom sessions in order to study problems, progress in concepts, and engage in collaborative studies (Tucker, 2012). The flipped classroom model provides learners with the chance to access course materials at a time and place that suits their needs, and with a student-centered perspective it changes the "focus from the instructor to the learner, and promotes active learning and problem-solving" (Galway, Corbett, Takaro, Tairyan, & Frank, 2014, p. 2).

Existing studies have analyzed the impacts of the flipped classroom on factors like academic performance (Missildine, Fountain, Summers, & Gosselin, 2015; Street, Gilliland, McNeil, & Royal, 2015; Koo et al., 2016), satisfaction (Gilboy, Heinerichs, & Pazzaglia, 2015; Street et al., 2015; Morgan et al., 2015; Koo et al., 2016), and engagement (McLaughlin et al., 2014; Clark, 2015; Morgan et al., 2015). On the other hand, few studies have investigated the effect of the flipped classroom model on perceptions of learning at deep and surface levels and fewer studies that have considered the learning process where the flipped classroom model was applied.

In the current study, the flipped classroom model was implemented in an online Medical Terminology course provided at a state university in Turkey. The content of the course covers a great number of medical terms, which must be memorized by learners. However, in previous years, learners experienced problems in the memorization and retention of terms. In order to increase learner achievement in the course, the flipped classroom model has been preferred for the implementation in the course. Thus, it is essential to investigate the flipped classroom model's effects on the learning process; hence, the first aim of the current study was identified as investigating the relation between learners' perceptions of their learning (deep-surface) and their academic achievement. Since the flipped classroom model requires a high level of participation with asynchronous activities, it is necessary to analyze learners' progress outside of the classroom (Guajardo Leal, González, & Scott, 2019) where the flipped classroom model has been applied. Therefore, the second and third aims of the current study are to examine the impact of student participation in asynchronous activities on learners' perceptions of their own learning process and also their academic performance. The needs and evaluations of learners is important for improving existing courses for future implementations of the flipped classroom model. Therefore, the current study additionally attempts to explore learners' perceptions related to the application of the flipped classroom model. Based on these facts, this research study is expected to fill the gaps by (a) adding to the existing literature for Turkish context, (b) considering online learning processes for flipped classroom model, and (c) adding to the literature of deep and surface learning.

Teaching Medical Terminology in Medical Secretarial Education

Medical secretaries work as the communication and coordination center of the team and use medical terms intensively, especially in communication (Tekin, 2009). Medical secretaries are employees who take an active role in the whole process, from the documentation of health records through to their archiving. Accurate writing, coding, and analysis of medical data contained in health records depends on their knowledge of medical terminology (Davies, 2007).

"Medical Terminology" courses are provided to students of medical secretarial programs in order for them to learn medical terms specific to the healthcare field. These courses are mostly taught as a two-hour-per-week, single-semester course during the first year of their program. In Turkey, a lack of sufficient teaching staff for Greek and Latin medical terminology, the lack of teaching methods other than traditional ways and methods, and the availability of limited Turkish language printed resources poses a significant disadvantage for this course. It is therefore a significant issue for educators in Turkey to find ways to improve the design and delivery of the course to fulfill the learners' needs.

Use of Flipped Classroom Model in Health Sciences Courses

Health sciences are considered an important field using the flipped classroom model in learning environments. Gilboy et al. (2015) flipped undergraduate nutrition classes by providing videos, textbooks, and supplemental reading materials as before-class activities, and implementing jigsaw (jigsaw is a kind of online activity that requires learners complete this activity collaboratively) as an active learning strategy during class. The evaluation of the flipped classes revealed the majority of learners preferred watching videos rather than attending face-to-face lessons and they preferred participation in classroom activities (Gilboy et al., 2015). Furthermore, learners stated the advantages of the flipped model was being able to study at their own time and pace and being able to apply their knowledge in class.

Morgan et al. (2015) applied the flipped classroom model to four different gynecologic oncology topics of the obstetrics and gynecology department. In the before-class activities, learners were required to watch videos online, whereas, for the in-class activities, learners were required to participate in coached discussions of cases through an online environment. The evaluation demonstrated significantly high participation (80% video view, 94% participation in discussions) and satisfaction rates (3.31 over 4) related to the use of flipped classrooms.

Koo et al. (2016) flipped a pharmacotherapy course for undergraduate pharmacy students. To be completed before attending class, students were provided with online videos and self-assessment questions related to foundational concepts. During the face-to-face class sessions, students were required to study patient cases followed by small group discussions and elaborations within larger study groups. The assessment resulted in students having significantly increased academic success and levels of satisfaction. Especially, students indicated the benefits of flexibility of viewing videos when time permitted and of knowledge application in their case discussions.

Besides these studies, a recent systematic review considered prior studies related to the flipped classroom model in medical education. Chen, Lui, and Martinelli (2017) analyzed 82 different studies and found students were generally satisfied with the use of the flipped classroom model thanks to its significant advantages like usefulness of online materials, ease of access to learning resources with self-pacing opportunities, and the appropriateness of interactive in-class activities for improved motivation and engagement. Students also indicated the capability of the

flipped classroom model in satisfying "greater task value," "increased enjoyment," and "decreased boredom" in comparison to traditional instructional models. The only negative perception of students was related to the requirement for studying course materials prior to attending class.

Based on these studies, there are not enough studies evaluating the effect of the flipped classroom in the different programs in the health sciences. In particular, studies done on learners in Turkey are needed.

Deep and Surface Learning in Flipped Classroom

The deep learning concept was firstly proposed by Craik and Lockhart (1972) as the advanced-level or active cognitive processing, whereas surface learning was identified as low-level cognitive processing like memorization. Deep learning refers to learners' high interest in learning and understanding together with their focus on relations among different aspects of the content as well as their hypotheses or ideas about the problem or topic. Surface learning refers to learners' intention to pass the course with minimum effort such as memorizing or utilizing procedures without any reflection (Marton & Säljö, 1976).

Learning strategies resulting in deep learning were proposed as "meaning making and comprehension, declarative learning, higher order thinking, meaningful learning and active engagement, intrinsic motivation, and knowledge transfer" (Czerkawski, 2014, p. 30). Surface learning strategies were proposed as "reproduction and repeat, procedural learning, highly influenced by assessment, engagement when required, extrinsic motivation, and difficulty connecting ideas to prior learning" (Czerkawski, 2014, p. 30). The current literature shows that the flipped classroom model can enhance and facilitate deep learning through active learning activities in the classroom (Roehl, Reddy, & Shannon, 2013). However, there have been very few studies about flipped classroom model and deep learning (Danker, 2015; Floyd, Harrington, & Santiago, 2009; McLean, Attardi, Faden, & Goldszmidt, 2016; Yılmaz, Öztürk, & Yılmaz, 2017).

Floyd et al. (2009) investigated the relationships among perceived course value, student engagement, and deep and surface learning strategies in an online learning environment. The researchers evaluated deep and surface learning according to the scales developed by Biggs, Kember, and Leung (2001). Deep learning strategy occurred when students perceived they were engaged in the learning process ($r = .386$, $p < .001$) and their perceived value of the course content was high ($r = .555$, $p < .001$). As expected, deep learning strategy and surface learning strategy were negatively correlated with each other ($r = -.439$, $p < .001$). As a result, the ultimate goal of enhancing deep learning should result from understanding and enhancing perceived value and engagement.

Danker (2015) investigated how the flipped classroom model engaged students in deep learning and guided exploration from the perspective of the students' improved aspects of deep learning. The evaluation of the study revealed that exploratory learning through guided inquiry-based activities (e.g., exploration of concepts through inquiry exercises) in the flipped classes was successful in engaging students on a deeper level.

Yılmaz et al. (2017) compared a structured flipped classroom (i.e., involving structured learning tasks and learning resources and requiring assessments to be completed in class), flexible-structured flipped classroom (i.e., involving same learning tasks and learning resources as structured flipped classroom but allowing learners to complete assignments in a week), and a traditional classroom teaching environment in terms of academic success of students who adopted

deep and surface learning approaches. Students with both deep and surface learning approaches in the structured and flexible-structured flipped classroom environments showed significantly higher academic success than students with a deep learning approach in the traditional learning environment. However, no difference was found between the academic success of students with both deep and surface learning approaches in the structured and flexible-structured flipped classroom models.

The flipped classroom model has been proposed as a novel and effective approach. While this model is implemented in online learning, learners study course content asynchronously and then participate in synchronous sessions in order to achieve deep learning through interactive activities. Thanks to such benefits of the flipped classroom model, it has been used in many fields with many in the field of health sciences. On the other hand, only a limited number of studies considered deep learning or the asynchronous participation of learners, which are both significantly important for learner achievement when online courses are provided in the flipped format. In this regard, the current study focuses on the implementation of the flipped classroom model in the context of an online Medical Terminology course in order to enhance the effectiveness of the learning process. Hence, this research was designed in order to answer the following research questions:

1. Is there any relation between learners' perceptions of their own learning (deep-surface) process and their academic achievement?
2. Is there any relation between learners' perceptions of their own learning (deep-surface) process and their participation in asynchronous activities?
3. Do learners' academic achievement and perceptions towards learning change according to time spent using interactive multimedia content?
4. What are the opinions of learners related to their experience of the flipped classroom model?

Methods

Research Design

This research was designed as a mixed methods research study. In this regard, the following quantitative data was considered: learners' usage of the system as provided by the learning management system (LMS) system usage logs (duration of usage time for interactive activities), learners' submissions to the study process questionnaire, and learners' academic achievement (i.e., final exam grades). As the qualitative data, learners' opinions towards the flipped classroom model were considered within this study.

Study Group

The research was conducted in a Medical Terminology course as part of a fully online Medical Documentation and Secretarial program of a vocational college at a state university in Turkey. Although 118 learners (98 female and 20 male) registered in the Medical Terminology course, the number of learners who participated in all the necessary activities and survey was 26. Therefore, the sample of the study was 26 participants, whose demographic characteristics are provided in Table 1.

Table 1

Analysis of Demographic Data for Sample Group

	Variables	Frequency (*f*)	Percentage (%)
Gender	Female	24	92.3
	Male	2	7.7
Age	16–19	7	26.9
	20–23	15	57.7
	24–27	1	3.8
	28 and older	3	11.5
Total		26	100

Research Context

The Medical Terminology course is for vocational level students and covers "integumentary, skeletal, muscle, nervous and digestive systems" as the content. The Medical Terminology course, which lasts 14 weeks, was structured to adopt a flipped classroom model during the 2017–2018 spring semester. The course was developed within the LMS environment by integrating various learning resources and activities (collaborative group work, group discussions) for completion asynchronously or synchronously (see Figure 1).

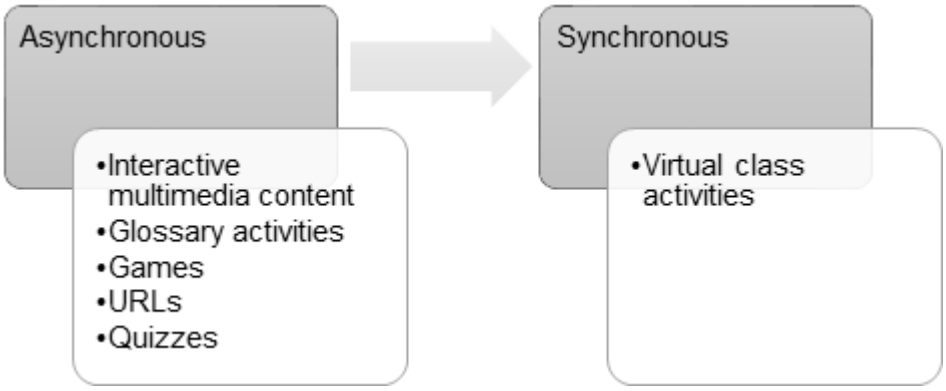

Figure 1. Asynchronous and synchronous activities.

Interactive multimedia content including texts, images, audios, and videos was provided as an aid to learners' understanding and for their individual study. They also supported learners' understanding of terms through various presentations means as demonstrated in Figure 2. The textual content provided an introduction related to parts of the body, whereas the audio content used sound recordings of medical terms, and the video content was developed in order to present summarized content of the course. In addition, flashcards and drag-and-drop questions integrated to online learning packages allowed for learner repetition of medical terms.

Figure 2. Interactive multimedia content.

In the first week of the semester, learners were introduced to the flipped classroom model and how it would work for their course. Since learners were familiar with the traditional instructional methods, a level of resistance to this new model was observed in the initial weeks of the course. In order to deal with this resistance, online discussion forums were held and students received feedback every week. In addition, participation in virtual classes and asynchronous activities were evaluated and bonus points awarded by the lecturer.

Learners were required to study interactive multimedia content prior to attending a virtual class. In these study sessions, they read text-based materials, watched videos, and listened to audio recordings for the purpose of learning the required medical terms. Learners were additionally supported with other asynchronous activities such as glossary activities, games, URLs, and quizzes on course-related practices.

During the weekly virtual classroom sessions, group activities were designed in place of subject narration. Initially, learners read and understand medical terms in these sessions. The collaborative activities included correct writing of medical terms based on audible texts, finding organs and structures correctly on anatomical drawings, writing meaningful texts using the given medical terms, and identifying incorrectly written medical terms in an example text. From their collaborative studies, the learners produced learning outputs and submitted these studies as their course assignments. The role of the instructor during online class was defined as managing the activity, creating groups, performing follow-up, and directing those students in need.

Data Collection Tools

The data collection tool used in the study was the "Study Process Questionnaire," as proposed by Önder and Beşoluk (2010), which is a Turkish adaptation of the Study Process Questionnaire (R-SPQ-2F) originally developed by Biggs et al. (2001). The scale is structured as a five-point, Likert-type scale with items ranked as "Always" (5), "Usually" (4), "Sometimes" (3), "Rarely" (2), and "Never" (1). In total, the scale consists of 20 items in two factors, which are classified as "deep learning" and "surface learning." At the end of the semester, learners voluntarily responded to items of the scale, hence reliability analysis was conducted based on the data of the learners who participated in the survey (i.e., 26 participants). The Cronbach Alpha value was calculated and found to be .84. In addition, the Cronbach Alpha coefficients related to the factors of the scale are shown in Table 2.

Table 2

Reliability Results of the Scale

Factors	Item Counts	Cronbach's Alpha
Deep learning	10	.93
Surface learning	10	.81

The sample items of the scale are presented in Table 3, please see the Appendix 1 for all of the items (in English).

Table 3

The Sample Items of the Scale

Item number	Item
6	I find most new topics interesting and often spend extra time trying to obtain more information about them.
20	I find the best way to pass examinations is to try to remember answers to likely questions.

Participants' opinions related to the application of the flipped classroom model were gathered through an online survey composed of eight open-ended questions, which asked about their experience in relation to the model as follows:

1. When you compare the Medical Terminology I courses in both semesters (fall vs spring), what are your thoughts about them?
2. What do you think about the learning materials, which have been presented to you in the Learning Management System? How did it contribute to your learning, motivation, and participation?
3. What are the most challenging parts of the learning materials? How did you overcome any difficulties?
4. What would your suggestions be to improve these learning materials?
5. What do you think about the flipped classroom model?
6. How did this new learning method contribute to your learning, motivation, and participation?
7. What are the most challenging aspects of this new learning model? How did you overcome any difficulties?
8. What would your suggestions be to improve the flipped classroom model?

The same 26 participants who submitted the Study Process Questionnaire also responded to these questions.

In addition to these data, learners' time spent using interactive multimedia content, their learning activity participation rates, and their final exam grades were also considered in the analysis. Learners' allocation of study time on interactive multimedia content was obtained from the LMS and defined as study hours. Learners' participation in weekly asynchronous activities was obtained from the LMS and graded as "attended" or "not attended." The final exam grades of learners were acquired from the student affairs system and defined as a score between 0 and 100.

Data Analysis

For the analysis of the quantitative data, SPSS version 17.0 software was used. Since the number of participants was deemed inappropriate for the use of parametric tests, non-parametric statistical tests were preferred. For research questions 1 and 2 the correlation analysis, for research question 3 The Kruskal Wallis H-Test, and for research question 4 qualitative data analysis has been conducted. For the analysis of the qualitative data, open coding was applied. According to Strauss and Corbin (1990) in qualitative research, the three different types of coding are open, axial, and selective coding. Open coding is an explanatory process about working on the data in an in-depth way. This gives an opportunity to the researchers for gathering new insights without preconceived components (Strauss & Corbin, 1990). This coding process has been conducted by two of the researchers and prior to interpretation of the qualitative data, Cohen's kappa coefficient was calculated in terms of intercoder agreement strategy. Two different field experts have checked all codes and interrater reliability was found to be .86, which is considered as a good reliability value (Creswell, 2007). Also, the member checking strategy has been used (Creswell & Miller, 2000; Merriam, 1998) by reaching out to participants who answered open-ended questions via telephone and discussing their answers in the context of the researchers' interpretations.

Results

RQ-1: Is there any relation between learners' perceptions of their own learning (deep-surface) process and their academic achievement?

In order to identify learners' perceptions about their own learning process, a correlation analysis was conducted between the data gathered from the "Study Process Questionnaire" and the learners' final exam scores. In the correlation analysis, Spearman's Rho coefficient was considered and the results are shown in Table 4.

Table 4

Results of Correlation Between Learning Process and Academic Achievement

Variables	*N*	*R*	*P*
Academic achievement Deep learning scores	26	.394	.046*
Academic achievement Surface learning scores	26	-.442	.024*
Academic achievement General scores	26	.043	.834

*$p < .05$, two-tailed

A statistically significant and positive relationship was found between learners' perceived deep learning levels and their academic achievement ($r = .394$, $p < .05$). As learners' perceived deep learning level increases, their academic achievement increases as well. In contrast to this finding, a significant and negative relationship was revealed between learners' perceived surface learning level and their academic achievement ($r = -.442$, $p < .05$). That is, while learners' perceived surface learning decreases, their academic achievement increases.

RQ-2: Is there any relation between learners' perceptions of their own learning (deep or surface) process and their participation in asynchronous activities?

Learners' participation in weekly asynchronous activities were graded as "attended" or "not attended." Afterwards, correlation analysis was applied in order to reveal the relation among learners' perceptions of their learning (deep or surface), their participation rates to asynchronous activities, and their academic achievement.

Table 5

Results of Correlation Analysis of Learning and Participation

Variables	***N***	***r***	***p***
Learning perception scores Participation scores	26	.305	.129
Deep learning scores Participation scores	26	.547	.004*
Surface learning scores Participation scores	26	.329	.101
Academic achievement Participation scores	26	.508	.008*

*$p < .05$, two-tailed

Correlation analysis revealed a significantly positive relationship between participation scores and deep learning scores ($r = .547$, $p < .05$), and a significantly positive relationship between participation scores and academic achievement ($r = .508$, $p < .05$). This finding can be interpreted that while participation in learning activities increases, academic achievement as well as perceived deep learning level also increases.

RQ-3: Do learners' academic achievement and perceptions towards learning change according to time spent using interactive multimedia content?

The Kruskal Wallis H-Test was applied in order to analyze whether or not learners' academic achievement and perceptions of deep versus surface learning are related to their allocation of study time on interactive multimedia content. Results based on this test are shown in Table 6.

Table 6

Results of Correlation Analysis of Allocated Study Time and Learning Achievement

Duration	*n*	Mean Rank	*SD*	X^2	*p*
0:00–7:59	10	7.50	2	13.53	.001
8:00–15:59	5	9.80			
16:00 or more	8	19.00			

The findings demonstrated that learners' perceptions of deep vs. surface learning did not significantly change based on their allocated study time on interactive multimedia content. On the other hand, learners' academic achievement significantly differed in terms of their time spent on interactive multimedia content ($\chi 2[2] = 13.53$, $p < .05$). This finding indicates that time allocated for study has a significant effect on academic achievement. According to the group's average results, the most successful learners were those who studied interactive multimedia content for 16 hours or more. This finding revealed the importance of performing interactive activities before and after online class for achievement.

RQ-4: What are the opinions of learners related to their experience of the flipped classroom model?

Open-ended questions were posed in order to explore learners' perceptions of the flipped classroom model. Surprisingly, the findings revealed that learners had positive perceptions towards traditional methods rather than the flipped classroom model. According to the learners, traditional methods were seen as preferable, while the flipped classroom model can result in an inefficient experience since it requires participation in course sessions based on activities. Additionally, the learners stated a decrease in their motivation since they were required to study prior to attending class, allocate more time, and learn through individual effort. Especially, while working on course materials, they felt overwhelmed due to their other responsibilities and a lack of time. In order to understand the course content, they developed strategies such as increased repetition and notetaking. Additionally, learners were required to participate in synchronous activities in order to deeply understand the course content, which resulted in confusion and inefficiency from the learners' perspective. Related opinions of the learners are as follows:

> I could not study course materials each week, I felt under pressure but couldn't find a solution since I had limited time. [P9]

> The most difficult requirement was participating in activities before completely understanding the course material. This was because I got confused. So, I gave up involvement in activities after a time. Instead, I made more repetitions to comprehend the material. [P2]

According to the learner, this situation caused a level of confusion and he/she gave up involvement in the activities after a while. Also, the learner stated that he/she made more repetitions in order to comprehend the materials.

Generally, learners indicated that the flipped classroom model was deemed as being inefficient and ineffectual. At the same time, they indicated their dissatisfaction regarding the online instructional materials provided for them to complete as asynchronous activities. This revealed that consideration of attitudes and learning process needs to be planned in a more detailed and appropriate manner.

However, there were also positive views about the materials and methodology. In contrast to previous opinions, one of the learners stated that:

> I participated in this course willingly, just as before, but this term was funnier and more motivating to study. [P15]

> Actually, I couldn't understand very well how it contributed to my learning. Overall, I thought that it was my responsibility, which it should. In addition, I really enjoyed in-class activities. [P7]

These diverse opinions may be due to the implementation of the flipped classroom model, their previous learning experiences, and also their individual differences.

Discussions and Conclusion

In the flipped classroom model, course content is delivered through technologies (e.g., videos, podcasts, screencasts) that learners can gain access to at any time and from any place. This approach results in the allocation of more time for interaction, enhancement of higher-order thinking, and for enrichment during in-class sessions. The principle role of the instructor is identified as a guide in this process, whereas learners take on active roles assimilating information, creating new ideas, etc. (Bennett et al., 2013).

The current study attempted to analyze the effects of the flipped classroom model on variables from the students' perspective. Despite of the fact that the study has a relatively small sample size, the findings still could be valuable from many aspects for educators. In this regard, first the relation between learners' perceptions of their learning (deep-surface) and their academic achievement were considered and a positive result was found. This finding was similar with other studies (Bhagat, Chang, & Chang, 2016; Koo et al., 2016; Missildine et al., 2013; Street et al., 2015) that found an increase in learner success when the flipped classroom model was implemented. On the other hand, some studies (Clark, 2015; Morgan et al., 2015) found no difference in learners' achievement when courses were transformed to the flipped format. In the case of the current study, learners gained knowledge about the definition and use of medical terms. Accomplishing deep learning within such a course will help its students apply this knowledge to other medical courses and to their future professional work life. Positive effects of the flipped classroom model on academic achievement may also be observed in the long term, since learners construct their knowledge through active involvement in the learning process, resulting in deep and persistent learning.

Analysis of the current study revealed higher achievement scores for those who has higher participation rates in virtual class activities. This finding is also parallel with certain studies in the literature (Clark, 2015; McLaughlin et al., 2014; Chen, Wang, Kinshuk & Chen, 2014), which found an increase in engagement for courses designed in the flipped format. Another finding was that learners' achievement was based on time spent on interactive multimedia content. This result confirmed the importance of learning materials on learner success in the context of the flipped

classroom model. This finding was similar to that of a study conducted by Gilboy et al. (2015), which revealed increased preference of learners towards out-of-class videos compared to face-to-face lessons. In addition, in their study, Carver, Muhkerjee, and Lucio (2017) revealed that learners' time spent in online learning predicted whether "A" grade would be achieved or not. In order to increase learners' asynchronous participation, learning activity interactivity and richness need to be considered. The preference of today's learners towards short and interactive videos should be an essential guide for course developers. Besides, learners can be supported with a greater number of interactive activities that may include group studies and communication tools such as online chat and forums, which all support peer work and therefore lead to increased collaboration that engenders better understanding of the course content.

Related to their flipped classroom experiences, learners in the current study encountered certain challenges. Requirements to study prior to attending class led to learners feeling overwhelmed, since they felt they needed to allocate more time to the course. This was a common finding of studies seen in the literature (Gostelow, Barber, Gishen, & Berlin, 2018; Koo et al., 2016) in which learners stated time requirements as a downside to the flipped classroom approach. The other reported challenge was lack of opportunity to ask questions of their instructor while studying during asynchronous activities, which was also revealed in other studies (Gilboy et al., 2015; Jones-Bonofiglio, Willet, & Ng, 2017). These kinds of challenges may be preventable with introductory sessions about topics to be studied prior to synchronous activities, hence achieving a more effective flipped classroom experience.

The online course materials were sometimes felt to be insufficient. In this regard, instructional materials can be improved based on learners' preferences in order to increase learner motivation and use of these materials. Analysis, design, and development phases for the creation of instructional materials can be performed with the involvement of not only the instructors and instructional designers, but also of the learners themselves. In this way, more adaptable and preferred asynchronous materials and increased participation rates may be achieved.

The results obtained in the current study showed that the flipped classroom model applied to a Medical Terminology course affected the students' deep learning and academic achievement. Similar studies in medical (Pierce & Fox, 2012; Prober & Heath, 2012; Sharma, Lau, Doherty, & Harbutt, 2015), pharmacy (McLaughlin et al., 2014), and nursing education (Critz & Knight, 2013; Hao, 2016; Presti, 2016) showed that this method can be applied successfully in healthcare education. Hence, the findings of the current research could be useful as a guide for instructors and instructional designers of similar courses that aim to use the flipped classroom model.

Suggestions and Implications

This study has certain recognized limitations with regard to sample size. The number of students who expressed their opinions in terms of methodology and materials was not as high as originally expected. It would be better to collect data from a larger group in order to see its effects. In addition, one-on-one interviews could be held with students as a means to obtaining more in-depth data.

Since the students were more familiar with traditional teaching and learning methods, such a radical change in teaching and learning approach was seen as a considerable challenge. Not more than 50% of students watched the prescribed asynchronous videos prior to the course. In the application of this study, it was seen that some students attended classes without having watched the prescribed asynchronous videos. First, the reason for such low rates of videos having been

watched should be investigated and students' expectations taken into consideration. Since the course materials were reported insufficiently, the students need to be included as stakeholders in the material development process. The results of the current study showed that it is important to reevaluate the design of the learning process by considering the views of the students. In addition, it may be advisable to provide detailed guidelines for the flipped classroom and to take measures to provide a smoother transition where the method will be applied for the first time. Finally, a design-based research approach could be implemented to enrich the learning process and outcomes by deepening the context.

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Appendix 1
Study Process Questionnaire

Items

1. I find that at times studying gives me a feeling of deep personal satisfaction.
2. I find that I have to do enough work on a topic so that I can form my own conclusions before I am satisfied.
3. My aim is to pass the course while doing as little work as possible.
4. I only study seriously what's given out in class or in the course outlines.
5. I feel that virtually any topic can be highly interesting once I get into it.
6. I find most new topics interesting and often spend extra time trying to obtain more information about them.
7. I do not find my course very interesting so I keep my work to the minimum.
8. I learn some things by rote, going over and over them until I know them by heart even if I do not understand them.
9. I find that studying academic topics can at times be as exciting as a good novel or movie.
10. I test myself on important topics until I understand them completely.
11. I find I can get by in most assessments by memorising key sections rather than trying to understand them.
12. I generally restrict my study to what is specifically set as I think it is unnecessary to do anything extra.
13. I work hard at my studies because I find the material interesting.
14. I spend a lot of my free time finding out more about interesting topics which have been discussed in different classes.
15. I find it is not helpful to study topics in depth. It confuses and wastes time, when all you need is a passing acquaintance with topics.
16. I believe that lecturers shouldn't expect students to spend significant amounts of time studying material everyone knows won't be examined.
17. I come to most classes with questions in mind that I want answering.
18. I make a point of looking at most of the suggested readings that go with the lectures.
19. I see no point in learning material, which is not likely to be in the examination.
20. I find the best way to pass examinations is to try to remember answers to likely questions.

Presenting a Validated Mid-Semester Evaluation of College Teaching to Improve Online Teaching

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Abstract
Mid-semester formative evaluations of college teaching are a promising, low-cost solution to providing online instructors with in-the-moment feedback to improve their online teaching practices. However, existing instruments suffer from issues of validity and bias, and fail to align with evidence-based strategies. This paper presented and psychometrically validated a research-based Mid-Semester Evaluation of College Teaching for Online Instructors (MSECT-O) among 170 undergraduate students in seven online courses. Pilot study results demonstrated that the MSECT-O is a valid and reliable tool for online educators seeking to improve their online teaching and classroom climate.

Keywords: online teaching, student evaluation of teaching, formative feedback, formative evaluation of teaching, classroom climate

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Presenting a Validated Mid-Semester Evaluation of College Teaching to Improve Online Teaching

Each semester, more faculty and graduate instructors are asked to teach an online course without formal preparation in effective online teaching (e.g., Borup & Evmenova, 2019). To support these instructors, universities often provide course templates and support (Hill, 2012) that tend to focus on course design instead of implementation (Thomas & Graham, 2019) and fail to ground effective online teaching in broader teaching theory and research. Often, faculty development programs (e.g., coaching, workshops) are adopted to address this disconnect and train new online instructors (Meyer & Murrell, 2014). These programs, however, require time and resources (Meyer, 2014) that many universities cannot offer at the scale of online learning growth. Further, instructors may not have time to learn about online teaching before the semester begins. Instead, they often need tools to help them learn how to effectively teach online *while* they are teaching online (e.g., Darby, 2019).

A low-cost approach for supporting online instructors is to gather mid-semester formative feedback from students, tailored to evidence-based teaching practices. Formative feedback from students can help instructors refine their practices mid-semester and improve students' learning experiences (Hampton & Reiser, 2004; Overall & Marsh, 1979). Formative feedback—which takes place during the process and provides guidance for improvement—is an evidence-based strategy for improving performance (Hattie & Timperlay, 2007). Unlike traditional end-of-semester evaluations, mid-semester evaluations (MSEs) provide instructors with feedback while they still have time to refine their teaching, which can be beneficial for addressing issues before the high-stakes end-of-semester evaluations (Cohen, 1980; Costello, Weldon, & Brunner, 2002). MSE feedback has the potential to provide just-in-time feedback to new online instructors; however, the field lacks an evidence-based and valid MSE instrument for online students to reflect on the online instruction. The purpose of this paper is to present a brief, literature-based MSE for online instructors and demonstrate its validity as a measure of college-level online teaching.

Review of Relevant Literature

This study is framed by Hattie and Timperlay's (2007) work on the importance of timely feedback for improving teaching and learning. Whereas Hattie and Timperlay focus on the importance of feedback from the instructor to improve students' performance, this study focuses on the importance of students' feedback to improve teachers' performance. As instructors learn how to teach online, in-the-moment feedback from students can help them refine their practice during the semester.

Student Evaluations of Teaching

American public institutions evaluate the quality of teaching with multiple methods but most commonly by an end-of-semester student evaluation of teaching questionnaire (SET; McKeachie, 1997; Spooren, Brockx, & Mortelmans, 2013). SETs collect systematic, cross-campus, longitudinal data of student perspectives on teaching and course quality that can be compared across semesters, courses, instructors, and mediums (e.g., face-to-face vs. online teaching; Carle, 2009). SETs afford the university with aggregate statistics of student satisfaction, an attractive metric both for financial and student recruitment. The validity of SETs, however, is critiqued in the literature (Spooren et al., 2013). Most notably, critics say SET responses are biased

because of instructor identity, the data are too general to inform faculty, and items are not developed using evidence-based psychometrics (e.g., Hammonds, Mariano, Ammons, & Chambers, 2017).

Most institutions develop their own SET instrument, but these measures are limited because of their lack of validation or alignment with education literature, and, as with all surveys, are only as strong as the literature used to create them (Hammonds et al., 2017). Most traditional student evaluations fail to reliably measure the multidimensionality of teaching (Knol, Dolan, Mellenbergh, & van der Maas, 2016), and instead load onto only one dimension of teaching (e.g., student satisfaction; Marsh, 1987). Teaching effectiveness, however, is more validly and accurately measured as a multi-dimensional factor, which is not simply satisfaction (Donlan & Byrne, 2020; Ambrose, Bridges, DiPietro, Movett, & Normal, 2010). For example, researchers such as Bangert (2008) pose that online teaching effectiveness consists of multiple factors including active learning.

End-of-semester SETs are also the primary method used for gathering institution-wide student evaluations of online teaching (Byrne, 2018). SETs for online courses are often developed by the institution and include a mix of Likert scale and open-ended core questions used for all in-person and online classes (Hammonds et al., 2017). However, just like evaluations of face-to-face courses, most evaluations for online courses were not developed using evidence-based psychometrics (Hammonds et al., 2017). Exceptions include the costly eSIR, a questionnaire developed by Educational Testing Services (Liu, 2012), which was recently discontinued by the company. Additionally, Gómez-Rey, Barbera, and Fernández-Navarro (2016) adapted the Online Learning Consortium scorecard into a student-facing evaluation. However, at 36 items, its length may hinder students' completion of the survey. Validated, evidence-based surveys enable institutions to ask students meaningful questions about the multidimensional factors of effective online teaching and focus on constructs meaningful to online teachers. Unfortunately, summative end-of-semester feedback cannot be implemented until the following semester, which fails to benefit the students completing the survey.

Mid-Semester Student Evaluations of Teaching

Formative feedback is often used to improve teaching (Overall & Marsh, 1979) and identify issues mid-semester before the end-of-semester evaluations are collected. Mid-semester evaluations (MSE) allow instructors to collect actionable and timely feedback from students in time to implement changes in the current semester (Berridge, Penney, & Wells, 2012; Costello et al., 2002). By collecting feedback mid-semester, instructors have time to react to feedback and make changes that could improve their end-of-semester evaluations, a critical measure for promotion and tenure. Thus, instructors have both intrinsic and extrinsic motivations to improve their teaching and the student experience. The use of a formative feedback process has been found to inform the use of better teaching practices (e.g., Hampton & Reiser, 2004) and can contribute to improved student satisfaction with the course (Costello et al., 2002; Overall & Marsh, 1979). MSEs have been found to be particularly beneficial for new instructors (Hampton & Reiser, 2004).

Bias in Student Evaluations

Existing student evaluations of teaching have been found to be biased measures of instruction dependent on student-level variables (Spooren, Vandermoere, Vanderstraeten, & Pepermans, 2017). For example, students tend to provide more positive evaluations when they expect to earn a higher grade or if the course is an elective, rather than a required course (Ting,

2000). Additionally, older students (e.g., juniors and seniors) are more likely to provide higher evaluations than younger students (Spooren, 2010). Despite the bias in student evaluations of teaching, Thomas, Graham, and Piña (2018) note that they "capture a critical perspective on online instructor behaviors that may be missed otherwise" (p. 6). Thus, an evidence-based formative feedback tool is needed that provides new online instructors with less biased student feedback on their online teaching.

Mid-Semester Evaluations in Online Teaching

Online instructors gather MSE data in different ways. The most discussed in the literature are instructor-made online surveys that collect anonymous open-ended feedback from students (Peterson, 2016). While these opportunities to provide feedback are appreciated by students, repeatedly generating and writing out ideas for course improvements is perceived to be tedious by students (Winchester & Winchester, 2012). Additionally, instructors often adapt in-person formative feedback processes to the online environment such as Berridge et al. (2012) and O'Neil-Hixon, Long, and Block (2017) who both adapted the Small Groups Instructional Diagnosis (SGID; Coffman, 1998) process for online courses. During an online SGID, the instructor identifies a colleague or faculty developer to repeatedly communicate with students via email to collect their thoughts on the teacher's effectiveness using open-ended prompts such as "What suggestions do you have for this class?" The responses are then synthesized into a report and recommendations for the instructor. This process is both labor-intensive and unfocused, with students providing feedback on topics unrelated to online teaching effectiveness such as technical issues or their desire for face-to-face time with the instructor (Berridge et al., 2012). Considering these limitations, researchers like Thomas et al. (2018) and Walker (2005) suggest the use of formative quantitative evaluations with constructs specific to aspects of the online course which the teacher can control. The field, however, lacks a literature-based instrument that gathers valid and reliable mid-semester feedback from online students with questions that they can answer and provides useful feedback to the instructor on the multiple dimensions of online teaching.

Fearless Teaching Framework

This study is part of a larger research project on mid-semester evaluations based on the University of Maryland's Fearless Teaching Framework (Donlan, Loughlin, & Byrne, 2019; Donlan & Byrne, 2020), a literature-based model for effective college teaching organized into four dimensions: classroom *climate*, course *content*, teaching *practices*, and learning *assessments.* These four dimensions emerged from education theory and empirical literature as being strong predictors of student engagement, motivation, and success (e.g., Lave & Wenger, 1991; Wigfield & Eccles, 2000) and are classroom aspects that the instructor can control (as opposed to the classroom design, student demographics, etc.).

The Fearless Teaching Framework poses that in courses with a positive course *climate*, the instructor supports students' learning and designs the curriculum to be challenging, yet accessible, to all students (Morin, Marsh, Nagengast, & Scalas, 2014). Effective course *content* is meaningfully relevant to students' lives and interests, both personal and professional, developmentally appropriate for their existing knowledge level, and aligned with learning objectives (Howard, 2001; Lave & Wenger, 1991). Positive teaching *practices* are intentionally organized, aligned with active learning research, and connected with prior knowledge (Alexander & Winne, 2006; Wentzel & Brophy, 2014). Effective instructors communicate high and clear expectations of student work and engagement (Online Learning Consortium, 2019). *Assessments*

are most effective when they are aligned with learning objectives, are communicated clearly (e.g., via a rubric), and do not contribute to unnecessary student stress (Wass, Timmermans, Harland, & McLean, 2018).

Building on the extensive literature review and expert validation that informed the Framework, the SET and MSE literatures were reviewed to develop the Mid-Semester Evaluation for College Teaching (MSECT; Donlan & Byrne, 2020). The original Mid-Semester Evaluation for College Teaching (MSECT) was designed to capture students' evaluations of effective face-to-face teaching and provide instructors with reliable and actionable feedback to improve their teaching (Donlan & Byrne, 2020). In partnership with education and faculty development experts, the original 13-item MSECT was designed to be applicable to all instructors from all departments who teach all types of courses. When piloted among 29 instructors and 1,350 undergraduate students, the MSECT items convincingly loaded onto the four latent factors of the Fearless Teaching Framework (all items loaded onto one of the four factors at or above the .40 threshold). That study provided sufficient evidence that the MSECT is a valid formative evaluation instrument of effective in-person teaching (Donlan & Byrne, 2020).

After reviewing the literature on student evaluations of online teaching, however, the MSECT items developed and validated for a face-to-face course may not provide sufficient feedback for an online instructor and thus warrant an online-specific MSECT instrument (Byrne, 2018). The purpose of this paper is to present the design and validation of a pilot study of the MSECT for Online Instructors (i.e., the MSECT-O). Additionally, this paper serves to explore the extent to which the MSECT-O feedback is susceptible to documented trends in student bias of teaching evaluations.

Research Questions

1. In alignment with the Fearless Teaching Framework, to what extent do latent climate, content, practice, and assessment factors fit the underlying structure of the data?
2. To what extent does the MSECT-O data differ by student-reported variables?
3. To what extent does the MSECT-O data differ by course-level variables?

Methods

Instrument Development

Through a three-step process, the original MSECT instrument was amended to gather feedback about online teaching. First, the authors reviewed the original items and determined two that were too specific for a face-to-face classroom and thus were rewritten to be applicable for an online course. Second, experts in college teaching and online teaching reviewed the new MSECT-O instrument and provided feedback on the phrasing and relevance. After incorporating this feedback, a pilot 13-item MSECT-O instrument was developed. Third, the MSECT-O was administered to the students of seven online instructors to collect data to confirm the factor structure and validity, and potentially reduce the number items (Table 3 presents the items in the reduced 12-item MSECT-O).

The MSECT-O items used a 6-point Likert scale (1 = "Strongly Disagree" to 6 = "Strongly Agree") and were based on the four dimensions of the Fearless Teaching Framework (Donlan, Loughlin, & Byrne, 2019): climate, content, practices, and assessments. The initial MSECT-O

consistent of 13 items (reduced to 12 items in the analyses presented below) that load onto four factors:

1. Climate is a three-item measure of the extent to which the instructor fosters a classroom environment is inclusive and positive (α = .85). Items include, "My instructor creates an inclusive learning environment where everyone is welcome."
2. Content is a three-item measure of the extent to which the instructor conveys the relevance and connection of the course content (three-item scale α = .74). Items include "I have the prior knowledge necessary to be successful in this course."
3. Practice is a three-item measure of the extent to which the instructor enacts active and engaging activities to teach the content (α = .86). Items include "During online classes, this course includes activities other than watching recorded lectures."
4. Assessment is a three-item measure of the extent to which the instructor designs graded assignments that are fair and aligned with the learning objectives (α = .84). Items include "My instructor provides me with timely feedback on my work." The full instrument can be found in Table 3.

Sample

In fall 2018, seven online instructors at a large research university in the mid-Atlantic agreed to participate in the study as unpaid volunteers. Instructors were interested in getting student feedback for their professional development. The participating students were enrolled in one of the seven online courses taught by a participating instructor including an introductory level journalism course, a lower level agriculture course, two upper level humanities and social sciences courses, and three upper level STEM courses. 170 undergraduate students completed a mid-semester evaluation of teaching about their online instructor. Of the students, 13 (7.65%) identified as first year students, 22 (12.94%) were sophomores, 43 (25.29%) were juniors, 91 (53.53%) were seniors (see demographic and enrollment information in Table 1; 41.18% men, 55.88% women). This sample is demographically representative of the University of Maryland's student body. The University's Institutional Review Board approved this study.

Table 1

Student Demographic Information

Variable	Group	N	Sample (%)
Student Gender	Men	70	41.18%
	Other	2	1.18%
	Women	95	55.88%
Student Year	First Year	13	7.65%
	Sophomore	22	12.94%
	Junior	43	25.29%
	Senior	91	53.53%

Variable	Group	N	Sample (%)
Student Race/ Ethnicity	American Indian and Indigenous	1	0.59%
	Asian, Asian-American, or Pacific Islander	27	15.88%
	Black or African American	34	20.00%
	Latinx	15	8.82%
	Multi	14	8.24%
	Other	1	0.59%
	Prefer Not to Respond or Missing	16	10.59%
	White	60	35.29%
Course Discipline	Agriculture (1 course)	18	10.59%
	Humanities & Social Sciences (2 courses)	45	26.47%
	Journalism (1 course)	57	33.53%
	STEM (3 courses)	50	29.41%

Data Collection

In fall 2018, online instructors from all departments, ranks, and course types (including tenured faculty, tenure-track faculty, professional-track faculty, and graduate instructors) were recruited to participate in this study via email. Seven online instructors agreed to participate. Prior to agreeing to participate, instructors were informed of the Fearless Teaching Framework and the MSECT-O instrument, and that their participation would not impact their employment. Midway through the semester, participating instructors were provided with a link to the MSECT-O instrument to distribute to students. Instructors were asked to collect data after students had completed and received feedback on one major assignment (e.g., a midterm exam or project).

Students of the seven participating online instructors completed an online survey which included the 13 original MSECT-O items and questions about their course and demographic information (e.g., year in school, expected course grade, the degree to which the course is a degree program requirement). Instructors distributed the online survey via email or though the learning management system messaging platform on or around the eighth week of the sixteenth week semester and provided students with three business days to complete the instrument. The survey was designed to be mobile- and tablet-compatible so that students could complete the evaluation even when they were away from their laptop or desktop computer.

Before completing the survey, students were informed that their participation would not impact their employment with the institution, nor would it impact their grade. The Informed Consent form stated that the evaluation results would be shared only with the research team, who would aggregate and anonymize the results before sharing them with the instructors. The results would be used to study the instrument itself and provide instructors with formative feedback.

Data Analysis

Because preliminary normality testing (Shapiro & Wilk, 1965) provided evidence that the sampling distribution for the MSECT-O items was statistically different from a normal distribution ($\rho < .00$), robust nonparametric versions of traditional statistical methods in SPSS 24 and a robust maximum likelihood estimator (MLR) in MPlus 8.0 were adopted. To address the first research question, Confirmatory Factor Analyses (CFA) in MPlus was conducted to determine the fit of our four-factor solution. CFA assessed the extent to which the data aligned with the theoretically-

expected model based on the Fearless Teaching Framework. Because the MSECT-O items were developed to reflect the four parts of the Fearless Teaching Framework (Donlan, Loughlin, & Byrne, 2019; Kline, 2011), a confirmatory rather than exploratory factor analysis was appropriate. That is, whether the factor structure was aligned with the data was being confirmed, not rather than exploring different potential factor structures. A CFA was used to compare a four-factor model to a one-factor model to assess the extent to which this short scale could measure four subscales, as opposed to one omnibus latent construct. Output included loadings, factor covariance statistics, and multiple fit indices that aided in determining good model fit: a non-statistically significant chi-square test statistic, a comparative fit index (CFI) and Tucker Lewis index (TLI) greater than .95, a standardized root mean square residual (SRMR) value lower than .08, and a root mean square error of approximation (RMSEA) score lower than .06 (Hu & Bentler, 1999; Thompson, 2004). The model with the lower Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) values was seen to have a better fit. Factor replicability was determined by an H-index value below .80 (Hammer, 2016; Hancock & Mueller, 2001) and reliability was assessed using Cronbach's alpha (Raykov & Marcoulides, 2011).

To answer the remaining questions, robust nonparametric methods were adopted, such as: Spearman rank-order correlations (the nonparametric version of the Pearson correlation test), the Kruskal-Wallis test (the nonparametric version of the one-way ANOVA), and the Mann-Whitney U test (the nonparametric version of the unpaired Students' sample *t*-test; Byrne, 2017). The effect sizes for the significant Mann-Whitney U tests were calculated by hand to interpret the percent of the variance of the dependent variable is explained by the independent variable. These analyses assessed the extent to which students' responses differed by students' demographic variables, which may indicate some bias in the MSECT scales.

Results

***Research Question 1. In alignment with the theoretical frame, to what extent do latent climate, content, practice, and assessment factors fit the underlying structure of the data*?** Two CFAs were conducted: one with one factor and another with four factors based on the Fearless Teaching Framework (see Table 2). During analyses, the modification indices indicated that allowing one item (Content3: "The instructor communicated clear learning outcomes for this course") to crossload onto the climate and assessment factors as well as the content factor would improve model fit. To address this crossloading issue, the item Content3 was removed in the final analysis. We suggest that Content3 is not used in future assessments of online instruction because it does not provide unique information to the instructor within the Fearless Teaching Framework. The one-factor model had poor model fit while the reduced four-factor model had good model fit (see Tables 2 and 3).

Table 2

Comparison of Confirmatory Factor Analysis Models

Models	χ^2	df	p	AIC	BIC	RMSEA	RMSEA CI Lower	RMSEA CI Upper	CFI	TLI	SRMR
Original Model, One Factor	176.01	65	<.000	5670.15	5792.90	0.10	0.08	0.12	0.88	0.85	0.06
Original Model, Four Factor	115.47	59	<.000	5573.38	5715.01	0.08	0.05	0.10	0.94	0.92	0.05
Reduced Model, One Factor	150.30	54	<.000	5271.89	5385.20	0.10	0.08	0.12	0.88	0.85	0.06
Reduced Model, Four Factor	74.95	48	0.008	5158.28	5290.47	0.06	0.03	0.08	0.97	0.95	0.04

To statistically compare the reduced one- and four-factor models and determine the model with best fit, a χ^2 difference test was conducted to compares the fit of nested latent models (Kline, 2011).

$$\chi^2_D = \chi^2_{One-Factor} - \chi^2_{Four-Factor} = 150.30 - 74.95 = 75.35$$

$$df_D = df_{One-Factor} - df_{Four-Factor} = 54 - 48 = 6$$

The solution was retained where $\chi^2_D(6) = 75.35$, $p < .01$, indicating that the reduced four-factor model fits the data better than a one-factor model (reduced one-factor model: $\chi^2(54)= 150.30$, $p < .00$; AIC = 5271.89; BIC = 5385.20; RMSEA = 0.10; CFI = 0.88; TLI = 0.85, SRMR =0.06; reduced four-factor model: $\chi^2(48)= 74.95$, $p = .008$; AIC = 5158.28; BIC = 5290.47; RMSEA = 0.06; CFI = 0.97; TLI = 0.95, SRMR =0.04). Table 4 presents the correlations and descriptive statistics for the individual items.

Table 3

CFA Reduced Model Standardized Factor Loadings and Replicability Scores (H)

Item	CFA factor loadings (SE)				
	Model 1	Model 2			
	Single Factor	Climate Factor	Content Factor	Practice Factor	Assess. Factor
	H = .94	H = .89	H = .85	H = .88	H = .88
Climate1. My instructor creates an online classroom that is supportive for learning.	.86 (.03)	.92 (.02)			
Climate2. My instructor makes the class accessible to students with many different needs.	.71 (.06)	.74 (.06)			
Climate3. My instructor creates an inclusive learning environment where everyone is welcome.	.72 (.06)	.80 (.06)			
Content1. The content in this course is relevant to me academically, personally, and/or professionally.	.52 (.08)		.62 (.07)		
Content2. The instructor helps make the content of this course interesting.	.81 (.03)		.91 (.04)		
Content3. I have the prior knowledge necessary to be successful in this course.	.45 (.09)		.51 (.09)		
Practices1. During online classes, this course includes in-class activities other than lecture.	.69 (.06)			.70 (.06)	
Practices2. My instructor helps me understand new content by connecting it to things I already understand.	.84 (.03)			.89 (.02)	
Practices3. My instructor motivates me to put effort into the course.	.82 (.03)			.84 (.04)	
Assessment1. The assessments (e.g., quizzes, exams, papers) in this course are graded fairly.	.76 (.05)				.90 (.03)
Assessment2. My instructor provides me with timely feedback on my work.	.65 (.07)				.69 (.07)
Assessment3. The expectations for the assignments are clear.	.71 (.06)				.84 (.05)

H = Factor replicability scores

Note. The item Content3: "The instructor communicated clear learning outcomes for this course" was removed from the final instrument. It should not be used to assess online instruction.

Table 4

Spearman Correlations, Means, and Standard Deviations for Survey Items

Items	1	2	3	4	5	6	7	8	9	10	11	12	Mean	SD	N
1. Climate1	1												4.92	1.13	168
2. Climate2	.62**	1											4.91	1.04	151
3. Climate3	.71**	.62**	1										5.16	0.93	160
4. Content1	.50**	.43**	.55**	1									4.69	1.27	166
5. Content2	.71**	.60**	.56**	.57**	1								4.41	1.39	167
6. Content3	.38**	.39**	.32**	.41**	.40**	1							4.52	1.25	164
7. Practices1	.52**	.50**	.41**	.40**	.53**	.29**	1						5.02	1.14	166
8. Practices2	.66**	.55**	.48**	.44**	.69**	.42**	.59**	1					4.47	1.31	161
9. Practices3	.64**	.53**	.56**	.44**	.66**	.30**	.50**	.75**	1				4.52	1.32	159
10. Assessment1	.58**	.45**	.43**	.30**	.51**	.30**	.55**	.63**	.56**	1			4.71	1.30	167
11. Assessment2	.53**	.44**	.48**	.32**	.40**	.22**	.46**	.47**	.52**	.62**	1		5.23	0.95	166
12. Assessment3	.58**	.43**	.47**	.36**	.49**	.32**	.49**	.56**	.54**	.74**	.64**	1	4.95	1.17	167

** Correlation is significant at the 0.01 level (2-tailed).

Table 5

Spearman Correlations and Descriptive Statistics of Aggregate Factors and Student-reported Variables

Variables	1	2	3	4	5	6	7	Mean	SD	N
1. CLIMATE	1							5.04	0.87	149
2. CONTENT	.69**	1						4.54	1.06	162
3. PRACTICE	.74**	.66**	1					4.68	1.13	154
4. ASSESSMENT	.68**	.47**	.71**	1				4.97	1.00	165
5. Year	-.06	-.04	-.11	-.10	1			3.25	0.96	169
6. Expected Grade	.36**	.27**	.30**	.35**	-0.01	1		3.62	0.53	166
7. Required	.17*	.17*	.07	.05	-.02	-.05	1	4.09	1.79	158

** Correlation is significant at the 0.01 level (two-tailed).

* Correlation is significant at the 0.05 level (two-tailed).

Research Question 2. To what extent does the MSECT-O data differ by student reported variables? Students' year in school was not significantly correlated with any of the MSECT-O constructs (see Table 5). This means students provided comparable feedback regardless of their year in college. Next, students' expected grade had a moderate, positive, statistically significant correlation with all four of the constructs which indicates that as expected grade increases so does the degree to which their feedback is positive.

Research Question 3. To what extent does the MSECT-O data differ by course-level variables? As presented in Table 6, the extent to which students identified the course as being a requirement for their major or minor was not correlated with the MSECT-O constructs of practice and assessment. Indicating the course was a degree requirement, however, had a weak, positive correlation with the course climate and content. In other words, students provided more positive climate and content feedback if they perceived the course to be a requirement.

Finally, a Kruskal-Wallis H test provided evidence that there was not a significant difference in MSECT-O responses (across all four factors) between the difference course disciplines, $p > 0.05$. This suggests that, for example, students provided comparable feedback to STEM and to journalism instructors.

Discussion

In summary, this study found evidence that the MSECT-O is a valid and reliable instrument for gathering formative feedback from undergraduate students about online teaching practices. The CFA produced evidence that the reduced MSECT-O instrument is a valuable tool because it provides online instructors with formative feedback specific to the four factors of teaching effectiveness outlined in the Fearless Teaching Framework. With the MSECT-O, online instructors can collect feedback from their students across four dimensions and use the Fearless Teaching Framework to improve their teaching during the semester the data was collected. Institutions or instructors interested in the emerging practice of online MSEs (Thomas, Graham, & Piña, 2018), can use the free and brief MSECT-O instrument with confidence in its validity and reliability. The MSECT-O fills a gap in the field of online student evaluations because it is grounded in the education literature, designed to collect less biased formative feedback, and was developed with rigorous psychometrics.

The MSECT-O responses were generally consistent among students' year in school, their reason for taking the course (i.e., if it was a requirement), and the discipline of the course. The findings provide support for the notion that instructors from all disciplines can feel confident using MSECT-O to collect mid-semester feedback regardless of if their online class is in STEM versus the humanities. However, identifying the course as a requirement had a weak, positive correlation with a more positive evaluation of the class content and climate, i.e., that students in elective courses provided slightly more negative feedback to their instructors about the classroom climate and content. These results differ from that of Ting (2000) and suggests that more research is needed to understand the relationship between students' perceptions of required courses and the evaluations of the classroom climate and content.

Finally, the findings align with those of other student evaluation researchers (e.g., Spooren et al., 2017) that as students' expected course grade increases so does their positive evaluation of the instructor's teaching. While this correlation is only moderate, it is still significant and an area

of further investigation. future analyses will include a qualitative study of students' comments to explore the types of feedback they provide and if the constructiveness differs by course factors or expected grade.

Limitations

Limitations should be considered when interpreting the findings. First, the instructors who participated opted in, and therefore may be more open to student feedback than instructors who did not participate. Critics of SETs may not value or trust student feedback because the existing student-facing instruments ask questions that either students cannot meaningfully answer (e.g., regarding technology choices that require knowledge of the Learning Management System students might not have) or that instructors do not find valuable to improving their teaching (Peterson, 2016). In response to this perception, MSET-O measures were built to be clear and actionable.

Second, the effect of instructor-level variables such as instructor race and gender on students' responses were not explored because of the low number of instructors that participated. Future research will explore issues of bias by purposefully sampling a pool of instructors from diverse backgrounds.

Finally, although participating courses spanned disciplines, all student responses were from a single university. Therefore, further replication could assess the extent to which the measure provides robust information at other higher education contexts, such as small teaching colleges, and community colleges.

Conclusion

As more faculty, staff, and graduate students move their courses online, the MSECT-O provides a useful and valid way to gather student input for improving the course climate, content, practices, and assessments. An important contribution of this paper is providing an instrument that gathers formative feedback for online instructors about multiple aspects of their teaching, including how they foster an inclusive online classroom climate. As more instructors move online, faculty developers can provide tools like the MSECT-O to aid instructors in evaluating if they are providing an inclusive and equitable learning experience for all students and how they can further foster a climate in which all students feel supported.

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Development and Validation of the Online Teaching Effectiveness Scale

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Abstract
The currently available measures of online teaching effectiveness (OTE) have several flaws, including a lack of psychometric rigor, high costs, and reliance on the construct of traditional on-the-ground teaching effectiveness as opposed to the unique features of OTE (Blackman, Pedersen, March, Reyes-Fournier, & Cumella, 2019). Therefore, the present research sought to establish a psychometrically sound framework for OTE and develop and validate a measure based on this clearly-defined construct. The authors developed pilot questions for the new measure based on a comprehensive review of the OTE literature and their many years of experience as online instructors. Students enrolled in exclusively online coursework and programs at Purdue University Global (N = 213) completed the survey, rating the effectiveness of their instructors. Exploratory Factor Analysis produced four clear OTE factors: Presence, Expertise, Engagement, and Facilitation. The resulting measure demonstrated good internal consistency and high correlations with an established OTE measure; good test-retest reliability; and predictive validity in relation to student achievement. Confirmatory Factor Analysis revealed a good fit of the data and yielded a final 12-item OTE measure. Further refinement and validation of the measure are recommended, particularly with students in other universities, and future research options are discussed.

Keywords: online teaching effectiveness, instructor effectiveness, distance learning, student evaluations, asynchronous learning

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Development and Validation of the Online Teaching Effectiveness Scale

By the fall of 2015, there were nearly six million students enrolled in online courses at colleges and universities in the United States. Half were exclusively online students (National Center for Education Statistics, 2018). The advent of online education, in conjunction with Internet access, has ushered in technical advances in instructional design and teaching platform innovations (Nilson & Goodson, 2017). Despite this growth, the assessment of online courses and instructors has not kept up with the developments (Berk, 2013). Many tools now used to assess online instructors' teaching skills were developed for on-the-ground teaching (Thomas & Graham, 2017). In essence, in terms of assessment, online teaching effectiveness has been treated as a virtual extension of on-the-ground teaching effectiveness, rather than as the unique instructional phenomenon that it is (Blackman, Pedersen, March, Reyes-Fournier, & Cumella, 2019).

The Seven Principles of Good Practice in Undergraduate Education (Chickering & Gamson, 1987), a list of best practices for postsecondary teaching, has been a gold standard in conceptualizing higher education for over 30 years. These best practices were derived through a review of the literature rather than an established factorial processes (Chickering & Gamson, 1987). Thomas and Graham (2017) noted that most current online teaching effectiveness (OTE) measures use these seven principles for evaluating online instructors with little attempt at adaptation for or validation within online milieus. The lack of research and appropriate tools for online teaching evaluation remain pressing concerns for online instructors and administrators. In the Instructional Technology Council's 2016 *Annual National eLearning Report*, online university staff and administrators reported that adequate assessment of eLearning classes was one of their greatest challenges. Annual survey results have indicated for four years running that evaluation of online faculty remains a top concern for online university administrators (Lokken, 2016). Thus, proper measurement of OTE needs to be addressed using appropriate qualitative and quantitative research strategies (Lokken, 2016; Serdyukov, 2015).

For instance, commercially available measures, such as the Electronic Student Instructional Report II (e-SIR II) offered by Educational Testing Services (Klieger et al., 2014; Pike, 2004), are available for evaluating distance education. Nonetheless, the e-SIR II was adapted from the SIR II, which is used specifically for on-the-ground teacher evaluations (Centra, 2006). The e-SIR II retains more than half the items from the SIR II and then includes new items created by a panel of online educators. The e-SIR II specifically addresses the following dimensions: five items pertaining to planning and course organization; five to the interaction between faculty and students; five to specific course activities, such as grading, exams, and assignments;, eight to the teacher's instruction and course material; five to course outcomes; three to student effort and engagement; and three to the amount of work, pace, and difficulty of the course (Liu, 2011). Of these 40 items, more than half are specific to course content, such as materials, subject matter, assignments, and exams, which are often not controlled by the online instructors and therefore not relevant to rating OTE. Efforts to validate the e-SIR II demonstrate that, of the measured domains, the highest correlations between factors were student effort and course outcome, r =.78 (Liu, 2011). Thus, as it pertains to OTE, these issues raise questions about whether students are evaluating the course, their own effort, or the efficacy of their instructors.

Of the other available OTE measures, Bangert's 26-item Student Evaluation of Online Teaching Effectiveness (SEOTE; 2006, 2008) is purported to focus on producing valid feedback to instructors in regard to the effectiveness of their teaching. The SEOTE was initially founded in Chickering and Gamson's (1987) principles of effective teaching, but after initial exploratory

factor analysis, the measure produced a four-factor model of OTE (Bangert, 2008). The four factors measured by the SEOTE include "student-faculty interaction, active learning, time on task, and cooperation among students" (Bangert, 2008, p. 25). Of these factors, only one speaks directly to the work of the online instructor. Of the 26 items on the SEOTE, 14 are written with the following introductory phrase, "This course…", referencing course design and not directly measuring the effectiveness of the instructor (Bangert, 2008). Because online instructors often have little input into course design, items of this kind do not adequately reflect OTE.

Blackman et al. (2019) have reviewed available OTE measures and concluded that each has significant limitations. In summary, attempts to create a measure for OTE have tended to focus on evaluating the course and student effort rather than the effectiveness of the instructor. Thus, the existing measures use inappropriate constructs and questions for the online mode of teaching. All measures lack sufficient demonstrated psychometric rigor, including a lack of reliability and validity data. In the absence of appropriate tools to measure OTE, online universities have in many cases bypassed the role of instructor effectiveness and focused their quality improvement efforts on their technological delivery systems and students' digital experiences (Serdyukov, 2015). The lack of assessment of OTE clearly compromises the ability of online educators and administrators to fully assess their educational programming and engage in quality improvement initiatives. Therefore, an evidence-based, publicly available measure of OTE, based on current OTE research, would appear to contribute to both research and practice.

In short, the construct of OTE has not been well-defined or established through research. Rather, the face-to-face teaching paradigm has been imported with little modification and applied to OTE, even though online teaching diverges from face-to-face teaching in substantive ways. Therefore, we ask:

1. What factors empirically comprise the construct of OTE?
2. Does an empirically-derived OTE measure demonstrate adequate reliability and validity?

Method

Participants

Participants were recruited from undergraduate and graduate classes at Purdue University Global (PG), representing all undergraduate grades and all levels within master's programs. Classes represented seven academic departments at PG's College of Social and Behavioral Sciences: Communication, Criminal Justice, Early Childhood Education, Fire Science, Human Services, Psychology, and Social Science. The study was approved by the Dean of the College, each academic department chair, and the PG Institutional Review Board.

Department chairs emailed their faculty about the research opportunity. The email assured faculty that their decisions to participate or not would never be known by their chair or anyone besides the researchers; that their decisions to participate were voluntary and would have no impact, either adverse or positive, on their work at the university. Inclusion criteria for students consisted of being 18 years-old or older and enrolled as a student at recruitment time. Exclusion criteria consisted of being less than 18 years-old and not being enrolled. During week 8 of their courses, all students in the selected classes received emails containing a research announcement and video link. Week 8 was chosen since, by this time in the 10-week semester, students were familiar with their instructors' teaching behaviors and capable of rating instructors accurately. A

four-minute explanatory video was also posted as an announcement in the classes. Faculty were asked to play the video during week 8 seminars in these courses. Interested students clicked on an embedded link, taking them to a SurveyMonkey.com webpage. The SurveyMonkey landing page allowed students to read and agree to the Informed Consent.

Using this recruitment method, 32 unique faculty teaching 38 unique courses across seven academic departments and 213 unique students responded to the study (see Table 1). Mean student age was 36.1 years-old; most were women, 82.2%, with 17.8% men. These demographics are typical of online education (OE) and of PG's student body (Purdue Global Office of Reporting and Analysis, 2018; Seaman, Allen, & Seaman, 2018). Most respondents, 92.1%, were undergraduates, relatively evenly divided across the four years; see Table 1. Percentages of respondents by department also appear in Table 1.

Measures

Online Teaching Effectiveness Scale (OTES). The OTES contains closed-ended questions. The researchers developed the OTES through a thorough review of existing OTE research (Blackman et al., 2019) combined with their expertise as online instructors. Blackman et al. developed a precise definition of OTE. *Online teaching effectiveness* involves instructors facilitating student learning and construction of knowledge by:

1. *Presence*—strong cognitive, social, and teaching presence, promoting learning through social constructivism, effective communication, and quality instructional techniques.
2. *Engagement*—directly fostering engagement in the classroom, including timely and facilitative feedback and relationship building.
3. *Expertise*—demonstrating and applying content expertise and maintaining technical expertise.
4. *Facilitation*—regular, active, and thoughtful classroom interactions executing planned activities, managing communications, and supervising learning processes.

Using this definition, the researchers developed a set of pilot items to represent the OTE construct, with a minimum of five pilot items for each of the four dimensions. The pilot items can be found in Table 2.

Student Evaluation of Online Teaching Effectiveness (SEOTE). Bangert's (2006, 2008) 26-item SEOTE, a freely-available measure, strongly focuses on instructors' actual online teaching competencies and less on course characteristics beyond online instructors' control. Bangert developed his questions in relation to Chickering and Gamson's (1987) approach to OTE, which reflects constructivism. Thus, the theoretical foundation of the SEOTE accords with the primary theoretical approach to OTE in the literature. SEOTE items are scored using a six-point Likert scale (1 = strongly disagree; 6 = strongly agree). Bangert demonstrated SEOTE content validity through expert reviews by online instructors. Reliability of each factor was demonstrated via internal consistency estimates of $\geq$ .84. Although the SEOTE was published more than 10 years ago and does not reflect OTE research from recent years, the SEOTE remains among the best-validated extant OTE measures. As such, it served in the present study as a comparison measure to assist with OTES construct validation.

Outcome measures for construct validation. Two outcome measures were available: (a) participants' anticipated course grade in the course whose instructor they rated and (b) participants' actual grade in this course, issued by the instructor after the students' OTE rating.

Procedures

Participating instructors were notified by email exactly when to email the Research Announcement to all students in their classes, so that students received the Research Announcement during week 8 of the semester. Interested students clicked on the link in the Research Announcement. If comfortable with the Informed Consent, they indicated this electronically and completed the survey questions. The survey remained open for one week following the email send date.

To obtain test-retest data, the same students received a similar email one week later, during week 9 of the course. Students were asked to rate their instructors again via the same pool of OTE questions. Demographic and SEOTE questions were omitted, as a second set of responses to these items was not needed to establish test-retest reliability. Once the retest survey closed, outcome data were obtained from the university.

Statistical Analysis

Myers, Ahn, and Jin (2011) recommend a sample of $N \geq 200$ as an a priori target for sufficient statistical power to perform factor analysis. Thus, the 200 respondents in the present study sufficed for the analyses. A principal component analysis (PCA) reduced and refined the OTES to its principal components, which were based solely on extracted factors and not on a priori theory. Items comprising the principal components were then entered into a CFA with varimax rotation to verify factor structure, followed by Cronbach's alpha computations to measure internal consistency. The resulting OTES contained only items loading within confirmed factors.

The researchers reviewed the confirmed OTES factors for thematic unity and developed names to capture the items loading on each factor. The final retained OTES items were then compared within subjects to the same items for test/retest purposes, determining test/retest coefficients for each OTES factor and the total OTES score.

Initial construct validity for the OTES was established using a multitrait, multimethod approach to explore indicators of both convergent and discriminant validity (Campbell & Fiske, 1959). Convergent validity was explored by comparing the total OTES score to the "overall teaching effectiveness item" on the survey, as in Young's (2006) study. OTES total and factor scores were also correlated with SEOTE scores. Given that OTE is a measure of instructor performance, predictive validity was assessed by correlating mean OTES factor scores for all students taught by each instructor with mean course grades for that instructor. Higher instructor OTES scores were expected to be associated with higher grades, reflecting greater instructor teaching effectiveness. Discriminant validity was established by correlating OTES scores with student age and anticipated grade and contrasting via MANOVAs OTES scores by gender, year in school, and the department to which the course belonged. The OTES was not expected to be associated with these factors, as a robust measure of OTE should not be influenced by age, gender, student status, field of study, or anticipated course grade, but should produce similar results across these variables.

Results

Scale Construction

Data screening and sampling. The data were screened for univariate outliers. None was detected. Initial sample contained 269 respondents, but 56 surveys were incomplete and thus removed, leaving a final sample of 213.

A power analysis for Pearson correlations was conducted in G*Power to determine a sufficient sample size with an alpha of 0.05, a power of 0.80, and a large effect size, $\rho = .5$ (Faul, Erdfelder, Buchner, & Lang, 2013). Based on these assumptions, the desired sample size was 111 or greater. The current sample of 213 exceeded this minimum and permitted sufficient statistical power to detect moderate and large effect sizes.

Traditional recommendations (Catell, 1979) suggest a ratio of N: $p \approx 3$ to 6 to provide sufficient power for factor analysis. This requires a sample of 250. However, more recently, MacCallum, Widaman, Zhang, and Hong (1999) argued that this guideline is not mathematically sound. Osborne and Costello (2004) demonstrated that larger sample sizes open researchers to higher probabilities of error and component loadings that overlook latency. Ultimately, then, factor loading within a minimum number of iterations (< 100) demonstrated that the present sample provided sufficient statistical power for factor analysis (MacCallum et al., 1999). Furthermore, the Kaiser-Meyer-Olkin (KMO) sampling adequacy measure was .936. KMO values between 0.8 and 1.0 indicate adequate samples.

Testing assumptions and data pretreatment. PCA was chosen to avoid bias or attempts to fit data to proposed OTE factors. The goal, then, was to extract factors from data provided by student responses to items assessing their instructors' OTE (Tabachnick & Fidell, 2013).

Data pretreatment included performing Pearson correlations on all initial OTES items to avoid high collinearity that could produce false factors. The assumption was that if an item-item correlation was very high, the two items assessed the same part of the construct. Using an initial cut off of $r = .8$ with more than four other items, 10 items were removed, leaving 40 items for the PCA where the highest levels of collinearity were $r < .75$. Bartlett's test of sphericity was significant: χ^2 (780) = 10885.76, $p < .0001$.

Factor analysis and PCA. The remaining 40 items were entered into a PCA using SPSS version 25, after subjecting the data to a check for suitability for the analysis. The PCA revealed the presence of four components with eigenvalues exceeding 1, explaining 64.7%, 4.3%, 3.7% and 3.1% of the variance, respectively, with the four-component solution explaining 75.47% of the variance. An inspection of the scree plot revealed a clear break after the second component.

To aid interpretation of these four components, varimax rotation was performed. Within 20 iterations, the rotated solution revealed the presence of four clear factors showing several strong loadings and variables loading substantially on all four components. Items loaded on components as follows: Component 1, Presence, 21 items; Component 2, Expertise, seven items; Component 3, Facilitation, seven items; and Component 4, Engagement, five items. See Table 2 for the factor loadings of each item.

CFA. Prior to the CFA, the authors determined that, based on theory, a 40-item survey was too long. The goal of effective survey design is to measure constructs with short, concise, user-friendly questions that produce high response rates (Saleh & Bista, 2017). Scale purification was therefore conducted (Wieland, Durach, Kembro, & Treiblmaier, 2017). The authors decided to include all four factors with a minimum of two items per factor. This model included Presence with six items and the remaining three factors with two items apiece.

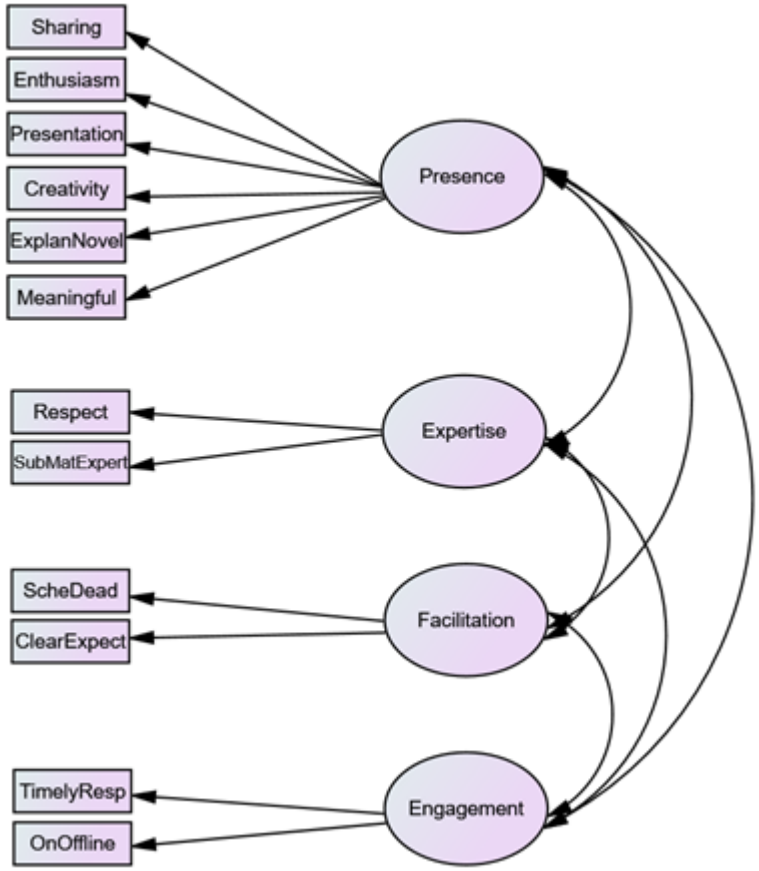

Figure 1. 12-item OTES

The CFA, using the estimation method of maximum likelihood over the variance-covariance matrix for the four-factor model, was conducted via the AMOS 25.0 statistical package (Arbuckle, 2014). To achieve model identification, regression coefficients of error terms over endogenous variables were fixed to 1. The CFA including goodness-of-fit modeling was performed to determine whether the PCA-derived four-factor model fit the actual data. Results indicated that the four-factor model fit the data well, χ^2 (48) = 255.41, p = .0001, RMSEA = 0.143, TLI = 0.857, CFI = .912. This model appears in Figure 1. Factor loadings for the final 12 items appear in Table 3.

Reliability

Cronbach's alphas for the four OTES factors and total scale were: Presence, .95; Expertise, .68; Facilitation, .81; Engagement, .82; Total, .95. Test/retest reliability coefficients for the four factors and total OTES scale ranged from r = .74 to .89; all were significant at p < .001, one-tailed. Coefficients were: 1. Presence, r = .85; Expertise, r = .74; Facilitation, r = .74; Engagement, r = .87; Total, r = .89.

Validity

Table 4 presents OTES inter-correlations and correlations with similar measures. The OTES total and all four factor scores correlated significantly, p < .001, with the overall teaching

effectiveness item, with coefficients ranging from r = .50 to .72. OTES total and factor score intercorrelations were all significant at $p < .001$, with coefficients between factors ranging from r = .49 to .71 and all factors having greater correlations with the total score than with other factors. OTES total and factor scores also correlated significantly, $p < .001$, with all four SEOTE scale scores, with coefficients ranging from r = .38 to .69. The lowest correlations with OTES scores occurred for the SEOTE Active Learning and Student Cooperation factors.

Correlations were run for the OTES total and factor scores with mean course grades. Course grade was significantly correlated with instructor Expertise measured by the OTES, r = .1, p = .05, one-tailed. Course grade was virtually uncorrelated with OTES Presence, Engagement, and Facilitation factors.

OTES total and factor scores were not significantly correlated with student age or anticipated grade, with correlations ranging from r = -.03 to .07 and none approaching significance. Three MANOVAs were computed to analyze OTES total and factor scores in relation to: (a) gender; (b) student status; and (c) department. For gender, the overall model was not significant: *Wilks' Lambda* = 0.967, $F(8,416) = 0.876$, $p = 0.54$. For student status, the overall model was not significant: *Wilks' Lambda* = 0.936, $F(24,709) = 0.565$, $p = 0.95$. For department, the overall model was not significant: *Wilks' Lambda* = 0.910, $F(28,730) = 0.689$, $p = 0.89$.

Discussion

Across the 30-year history of online education, the construct of OTE had not been well-defined or established through research. Rather, the face-to-face teaching paradigm was imported with little modification and applied to OTE, even though online teaching diverges from face-to-face teaching in substantive ways (Blackmann et al., 2019). In 2019, Blackmann et al. completed a comprehensive literature of OTE and developed a theoretical framework for conceptualizing the key dimensions of OTE. In the present research, we built upon Blackmann et al.'s theoretical framework and asked: 1. What factors empirically comprise the construct of OTE? 2. Does an empirically-derived OTE measure demonstrate adequate reliability and validity? The answer to both questions appears to be "yes."

For instance, the current results demonstrate that the theoretical framework for OTE emerging from Blackmann et al.'s recent literature review—a framework with the four OTE dimensions of Presence, Expertise, Facilitation, and Engagement—was supported by the quantitative analyses. When theoretical constructs align well with factors derived from purely quantitative analyses, as in the present research, the theoretical concepts can be taken to represent a strong framework for actual behavior in the specified domain. Thus, the match between theory and data in the present case supports the construct validity of the proposed OTE framework and the OTES. Construct validity of the OTES was also supported by supplemental analyses: total and factor scores were not significantly correlated with student age, gender, status, department, or anticipated grade—student-specific features that should not affect OTE, since OTE is a measure of instructor factors and not student factors. Furthermore, OTES reliability measures were relatively strong. Thus, the OTES appears to be a robust measure capable of assessing OTE among students from various backgrounds and education levels. This makes the OTES potentially applicable across diverse OE settings.

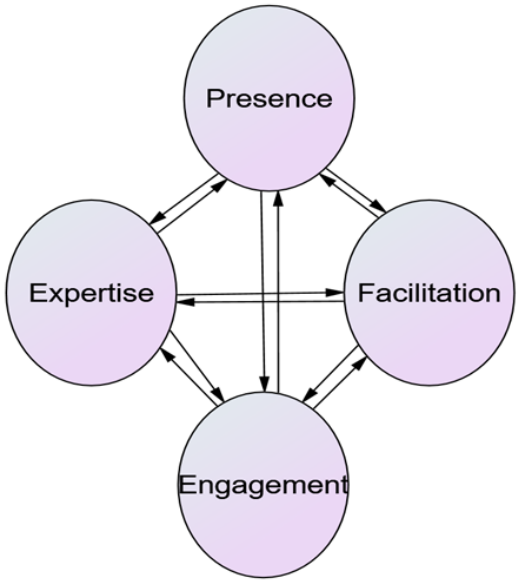

Figure 2. Synergistic Model of OTE

The OTES contains 12 items measuring four factors that replicate both theoretically and empirically: Presence, Expertise, Facilitation, and Engagement. Presence proved to be the most important OTE factor. Presence included items measuring instructors' ability to share relevant experiences and provide meaningful examples to illustrate course material, present information creatively, and communicate enthusiasm for course topics. Expertise included items measuring instructors' subject-matter knowledge and respect for students. Facilitation and Engagement factors were reminiscent of Chickering and Gamson's (1989) Seven Principles of Good Practice, since these factors included items on providing students with clear expectations, reminding them of deadlines, instructor availability, and instructor responsiveness. All four OTES factors were somewhat interrelated via CFA, as Figure 2 shows, and together provide a complete representation of the OTE construct. Thus, the total OTES score consists of the sum of the four factors and should succinctly and accurately indicate overall OTE.

Online Teaching Effectiveness Framework

The comparison of the OTES to the SEOTE (Bangert, 2006; 2008) revealed strong correlations between the two. Yet the OTES scores correlated more strongly with the OTES single-item overall teacher rating than with the SEOTE scales. This supports the validity of the OTES, in that the SEOTE measures teaching effectiveness for brick and mortar settings and includes questions beyond the scope of OTE, whereas the overall teacher rating is a single question about OTE itself.

In comparing the OTES and SEOTE, the lowest correlations occurred across all four OTES factors and the SEOTE Student Cooperation factor. This SEOTE factor is a direct reference to Chickering and Gamson's (1989) principle of Cooperation Among Students. It is logical that this factor was least correlated with the OTES because OE generally does not include a high degree of inter-student cooperation or many group projects. Due to the medium of instruction and that online students are often older working adults, the ability to cooperate with classmates is less important in OE than in traditional education settings serving younger students whose principal undertaking is often the pursuit of their university education (Lewis, 2016).

Limitations

Regardless of the mathematical assurance of a sufficient sample size in the present study, the development of the OTES would have benefited from a larger sample that included more graduate students. Further development of the measure could also benefit from student samples at other online schools. Although Purdue Global has a 20-year history of providing quality OE across a range of schools, colleges, and diverse academic and applied departments, it is only one institution and may not be representative of OE in general. The measure and OTE framework would also benefit from separate data collections to provide additional confirmation of the four OTE factors. The consensus is that when developing a measure, it is best to use different data sets or some form of cross-validation to perform a CFA (Cabrera-Nguyen, 2010). The current use of one data set for both PCA and CFA, although convenient, should be enhanced by further study to validate both the OTE framework and measure.

Conclusion

As a recent comprehensive literature review revealed (Blackmann et al., 2019), previous OTE measures, such as the SEOTE (Bangert 2006; 2008), were based on the Seven Principles of Good Practice, a theory created by college educators on ground campuses (Chickering & Gamson, 1989). This theory has been used for 30 years to measure teaching effectiveness at traditional universities. Applying this model to OE entails theoretical limitations, because OE differs substantially from ground education. For example, OE expands educational access to students who cannot reach ground campuses for various reasons, such as distance or disability. OE strongly supports students who have been poorly prepared for college. OE may in some cases provide a more rigorous education: for example, a student may receive a B- in a traditional course compared to a C in the same course offered online (Bettinger & Loeb, 2017). Attempting to mimic on-the-ground instruction does not account for the particular teaching skills needed to reach the diversity of students enrolled in online universities and negates the exclusive features and advantages of OE (Bettinger, Fox, Loeb, & Taylor, 2015). Thus, a new framework for OTE was needed to capture the unique dimensions of online teaching.

The OTES establishes this new framework for effective online teaching. The analyses herein support the theoretically-established understanding that online teaching indeed requires different instructor qualities than on-the-ground teaching. However, more research is required to refine and expand on the framework, in particular to validate the framework at additional online universities. Having a strong measure of OTE will assist online institutions in hiring and training instructors to provide more effective OE and engage in valuable quality improvement activities.

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Appendix A: Tables

Table 1
Respondents' Demographic and Course Characteristics (N = 213)

Measure	All Subjects
Age	36.1 (9.7)
Gender	
Male	17.8%
Female	82.2%
School Status	
Freshman	24.4%
Sophomore	23.9%
Junior	21.6%
Senior	21.6%
Master's Program	7.0%
Graduate Certificate Program	0.9%
Department in Which Rated Course Was Taken	
Communication	25.0%
Criminal Justice	15.3%
Early Childhood Education	1.9%
Fire Science	6.3%
Human Services	8.2%
Psychology	41.8%
Social Science	0.5%
Number of Unique Faculty Rated by Respondents	32
Number of Unique Courses in Which Respondents Enrolled	38

Table 2
Principal Components Analysis Varimax Rotation with Kaiser Normalization

Items	**Factor 1**	**Factor 2**	**Factor 3**	**Factor 4**
COMPONENT: PRESENCE				
Sharing their relevant	.778	.299	.162	.314
Enthusiasm for teaching	.777	.173		.360
Good presentation skills	.765	.192	.396	.237
Creativity to increase	.760	.188	.361	.324
Explanations presentations	.745	.181	.495	.168
Meaningful examples	.735	.192	.320	.155
Explanation to improve	.691	.337	.249	.283
Facilitation of thoughtful	.659	.451	.358	.169
Effective communication	.658	.428	.159	.318
Getting to know students	.642	.244	.272	.393
Motivation to take responsibility	.633	.413	.407	.227
Effective facilitation	.626	.323	.415	.256
Explanations of complex	.608	.423	.438	.229
Giving students valuable	.600	.463	.322	.263
Personalized interactions	.588	.476		.516
Emphasis of important	.583	.408	.340	
Giving students clear	.556	.387	.414	.408
Encouragement to students	.547	.388	.409	.401
Action oriented feedback	.541	.321	.371	.389
Effort to create a comfortable	.541	.472	.211	.481
Efficiency	.513	.171	.478	.506
COMPONENT: EXPERTISE				
Respect for students	.127	.866	.272	.110
Subject matter knowledge	.428	.692	.104	.130
Tolerance	.356	.651		.487
Honesty and Integrity	.234	.641	.455	.304
Resourcefulness	.370	.600	.519	.235
Motivation for student	.433	.546	.271	.396
Concern about student	.435	.460	.392	.413

COMPONENT: FACILITATION				
Schedules and deadlines	.206	.270	.717	.260
Clear expectations	.341	.450	.675	.199
Encouragement for	.408	.236	.613	.377
Extra resources for learning	.574	.164	.589	.103
Professionalism	.229	.576	.583	.282
Organization	.487	.377	.575	.257
Helping students to	.539		.574	.374
COMPONENT: ENGAGEMENT				
Timely responses to	.308	.310	.202	.686
Online and offline availability	.309	.162	.359	.674
Timely grading of material			.511	.601
Understanding and as	.300	.347	.306	.572
Warmth and friendliness	.519	.316	.130	.540

Table 3
Factor Loadings of Final 12-Item OTES

	Factors			
Presence	1	2	3	4
Sharing their relevant professional experiences	.778	.299	.162	.314
Enthusiasm for teaching	.777	.173		.360
Good presentation skills	.765	.192	.396	.237
Creativity to increase student interest	.760	.188	.361	.324
Explanations/presentations of material in novel ways	.745	.181	.495	.168
Meaningful examples	.735	.192	.320	.155
Expertise				
Respect for students	.127	.866	.272	.110
Subject matter knowledge	.428	.692	.104	.130
Facilitation				
Schedules and deadlines	.206	.270	.717	.260
Clear expectations	.341	.450	.675	.199
Engagement				
Timely responses to questions	.308	.310	.202	.686
Online and offline availability	.309	.162	.359	.674

Table 4
OTES Inter-Correlations and Correlations with Similar Measures

	OTES				
Measure	Presence	Expertise	Facilitation	Engagement	Total
Overall Rating	.71	.50	.60	.53	.72
OTES Presence	.60				
OTES Expertise	.71				
OTES Facilitation	.67	.62			
OTES Engagement	.96	.49	.59		
		.72	.83	.79	
Overall Rating	.82	.60	.70	.62	.84
SEOTE Student/Faculty Inter.	.62	.49	.59	.64	.69
SEOTE Active Learning	.58	.38	.57	.50	.61
SEOTE Time on Task	.67	.46	.59	.53	.69
SEOTE Student Cooperation	.51	.42	.46	.40	.53

Note. All correlation coefficients were significant at $p < .001$, one-tailed.

Community College Faculty Perceptions of the Quality Matters™ Rubric

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Abstract
This paper reviewed the factors that make up quality assurance including course design, content, delivery, and institutional support, as well as infrastructure in relationship to professional development impact on teaching practice. Building on the assumption identified in literature is the concept of course design being the most critical component impacting both student learning and faculty teaching. Course design affects student learning, faculty satisfaction with the course, establishes a teaching presence, and influences the transactional difference that occurs between the students and the instructor. Using the premise of the critical nature of course design, this study reviewed how the use of faculty professional development through a Applying the Quality Matters Rubric (APPQMR) workshop using the Quality Matters (QM) rubric as a framework to impact course design created specific faculty perceptions and affected teaching practice. Six themes identified from the research related to faculty's perceived value and rigor of the QM rubric and training are discussed in the conclusion section.

Keywords: faculty development, quality assurance, Quality Matters™

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Community College Faculty Perceptions of the Quality Matters™ Rubric

Since the early twenty-first century, higher education has experienced significant growth in online learning enrollment rates (Allen, Seaman, Poulin, & Straut, 2016) even as demands for online program quality assurance increases (Garrett, Legon, & Fredericksen, 2019; Ragan & Schroeder, 2014). Quality assurance is of concern to accreditation agencies, faculty, and students

alike. There are a number of factors that make up quality assurance, such as course design, content, delivery, institutional support and infrastructure, and student achievement (U.S. Government Accountability Office, 2011). To achieve accreditation, the USGAO report noted that institutions employ a range of course design principles and performance assessments to measure online course quality within a program. Each component is essential; however, course design is critical because it affects student learning and outcomes. Garrett et al. (2019) also found an emphasis on course design in the CHLOE 3 report, asserting that "the implementation of quality standards has progressed substantially in institutions engaged in online education, with the deepest penetration in online course design" (p. 32). CHLOE is an annual research report that examines the changing landscape of online education based on survey responses of U.S. higher education chief online learning officers. According to the findings, 85% of community colleges have adopted external quality standards for course design. Quality Matters (QM), is a widely recognized nonprofit organization that provides research-based best practices in online course design (Quality Matters, 2017).

The Quality Matters Higher Education Rubric, 5th edition (hereafter QM rubric), offers a model to help assure quality course design. Design establishes a sense of teaching presence in a course and influences the amount of transactional distance between students and instructors. Adair and Shattuck (2015) described how student engagement improved after applying the QM rubric to course design, resulting in higher grades, completion rates, and improved student satisfaction ratings in a number of research studies.

Online instruction and traditional classroom instruction differ considerably, requiring online instructors to design courses differently than they experienced during their own education (Mehta, Makani-Lim, Rajan, & Easter, 2017). Faculty members are subject-matter experts and often lack the skills required to effectively design online instruction unless they have received training in instructional design (Gregory & Martindale, 2017; Moore & Kearsley, 2012). Thus, online faculty members require various forms of support and resources to prepare them for success in the online educational environment. QM offers several workshops, most notably Applying the Quality Matters Rubric (APPQMR).

The purpose of this research was to explore the influence of QM's flagship workshop, APPQMR, on community college faculty perceptions of the QM rubric and their course design skills. Research was conducted in two phases at two QM subscribing institutions in the southeast U.S. Mezirow's (1997) theory of transformational learning is the guiding theoretical framework to this study, which suggests that faculty members, as adult learners, can change their perspectives following a disorienting dilemma such as the APPQMR professional development experience can provide. Perspective transformation may result progressively as participant's opinions are reinforced or challenged, new perspectives are introduced, and through critical reflection. Perspective changes can be experienced across three dimensions: psychological (autonomous reasoning), convictional (experience-driven belief systems), and behavioral (outward actions).

The following research questions guided the study and are later answered and discussed in terms of perspective transformation's three dimensions:

(1) How does successful completion of the APPQMR professional development training effect participants' perceptions about the QM rubric?

(2) What are the challenges and successes that faculty experience as a result of APPQMR?

Professional Development and Course Design

The literature suggests that a strong correlation exists between faculty professional development and course design quality (Bigatel & Williams, 2015). McQuiggan (2012) found that faculty who thoughtfully engaged in professional development not only improved their online teaching skills but were also more likely to fundamentally change their teaching philosophies and practices. Likewise, Koepke and O'Brien (2012) found through faculty surveys and interviews that participation in instructor training resulted in significant changes to their pedagogical beliefs and teaching practices. In a six-case qualitative study, Johnson (2015) found that faculty members who completed training developed new skills and changed their course design practices. Johnson et al. (2012) examined an institution's three-day summer intensive workshop and found that 100% of participants (N = 24) experienced greater comfort creating online courses after training was completed.

It has been estimated that almost 50% of higher education institutions rely on QM for their online faculty development (Herman, 2012). Kearns and Mancilla (2017) surveyed over 22,000 individuals who had completed at least one QM workshop between 2012 and 2015. Of the 2,148 people who responded, 92% had completed APPQMR. The researchers found that participation in APPQMR influenced faculty member instructional practices in their online and face-to-face teaching. Hollowell, Brooks, and Anderson (2017) found that faculty participation in APPQMR led to significantly higher informal course review scores than before training. They also found that students' final exam scores and overall course averages increased as QM review scores increased. Despite these findings, research is lacking about community college faculty perceptions and the results of QM training.

Methods

Setting

The population of this study included 470 full-time and adjunct faculty members at two Southern Association of Colleges and Schools Commission on Colleges (SACSCOC) accredited community colleges in the southeastern U.S. who use the QM rubric for internal quality control initiatives. Thirty-nine usable subjects were collected and included in the study.

Both institutions mandate that distance education courses meet QM standards as outlined in the rubric. Both colleges have departments that support online and blended course development, although the number of staff members varies between them. The staff in these departments provide support to faculty who are responsible for the design and development of online and blended courses. The full-time equivalency (FTE) rates are approximately 4,000 (institution A) and 5,000 (institution B).

Design

An explanatory sequential mixed methods study (Creswell, 2014) was used to examine the influence of the APPQMR workshop on community college faculty members' perceptions of QM rubric and to understand the challenges and successes community college faculty experienced after completing the APPQMR workshop. This two-phase study began with the collection of quantitative data from community college faculty members who were using the QM rubric to design and develop online and blended courses. Via a researcher-created online Quality Matters Rubric (QMR) survey, participants self-reported their completion of the APPQMR training (i.e.,

yes, no) and rated the QM rubric on perceived usefulness (PU) and perceived ease of use (PE). Using a causal comparative design and a Mann-Whitney *U* test, the difference in faculty perceptions of the QM rubric based on participation in the APPQMR training was explored.

In phase two, a basic qualitative research design was employed as a means to explore participants' experiences and feelings (Merriam & Tisdale, 2016; Patton, 2015). Qualitative data was collected from faculty members who reported completing the APPQMR training using a researcher-designed semi-structured interview protocol. Interview questions were based on the original research questions and on the results of phase one. Data were coded and analyzed in accordance with grounded theory procedures, including (a) open coding for concept identification, (b) coding for concept development and elaboration, and (c) coding for context, process, and integration (Corbin and Strauss, 2015, pp. 322–323). Themes emerged through constant comparison and inductive analysis (Patton, 2015). Interviews were used to explain the survey results and further examine faculty members' experiences in APPQMR to garner an understanding about training elements that helped or hindered their perceptions of and ability to apply the QM rubric.

Quantitative Phase

In the quantitative phase of the study, a convenience sampling was drawn from approximately 470 full-time and adjunct faculty members across the two participating institutions. During spring 2018, an email was sent to all faculty via their institutional email requesting their participation in the online QMR survey. Forty-six (9.78%) faculty responded to the online survey and 39 responses were complete.

The faculty participants were balanced in gender (female, $n = 21$, 51.2% and male, $n = 18$, 48.8%). Most of the participants were Caucasian ($n = 38$, 97.4%). All participants held a master's degree or higher, which is consistent with the standard educational requirement to teach at the community college level (SACSCOC, 2006). Participants taught across a variety of academic disciplines, such as applied arts, social and behavioral science, business, humanities, mathematics, and natural sciences. Seventeen faculty completed the APPQMR workshop, and 22 had not participated in or completed the APPQMR workshop. Participants' demographic and experience data disaggregated by whether or not they completed APPQMR is presented in Table 1.

Table 1

Participant Characteristics Disaggregated by Group

Characteristic	APPQMR Group ($n = 17$)	Non APPQMR Group ($n = 22$)
Gender		
Female	11(64.7%)	10(45.5%)
Male	6(35.3%)	12(54.5%)
Age Group		
20–39	3(17.7%)	6(27.2%)
40–49	7(41.2%)	2(9.1%)
50–59	5(29.4%)	8(36.4%)
60 and over	2(11.8%)	6(27.3%)

Faculty Status		
Adjunct/ Part-time faculty	1(5.9%)	0(0%)
Full-time faculty	16 (94.1%)	22 (100%)
Years at Institution		
0–10 years	9(47.1%)	13(59.1%)
Over 10 years	9(52.9%)	9(40.9%)

Qualitative Phase

Following the quantitative data collection and analysis, eight of the participants who completed the survey and participated in an APPQMR workshop were selected via purposeful sampling with maximum variation based on college affiliation, general demographic information, and experience level. Participants were selected who reported both positive and negative perceptions. The eight selected participants were contacted via email, asked to complete an informed consent, and scheduled for a 30 to 45-minute video-conferencing interview. Interviews were conducted over a five-week period in spring 2018 using the semi-structured protocol. Open coding was used after each interview to identify and explore main ideas in the data as it was presented. Initial codes were categorized into groups through constant comparison between interviews, allowing for constant reflection and refinement of codes and categories to combine similar ideas. Themes emerged within the data as categories were organized by research questions. Following the interviews, their transcription, and development of preliminary findings, the participants received a debriefing statement and a written summary of the preliminary findings. Table 2 summarizes the participant characteristics and perception scores based on the QMR survey. Though the combined perception range is 11 to 55, the combined perception scores of interview participants ranged from 25 to 55. Participants with the lowest scores generally had the fewest years of experience and were from institution B.

Table 2

Participant Characteristics with Combined Perception (PU and PE) Scores

Case[a]	Institution	Age	Gender	Faculty Status[b]	Yrs. Exp.	Score[c]
Lora	A	60–64	Female	Assoc. Prof.	11–20	55
Andrew	A	55–59	Male	Professor	11–20	48
Michelle	A	40–44	Female	Asst. Prof.	0–10	47
Dwayne	A	55–59	Male	Assoc. Prof.	11–20	38
Linda	A	45–49	Female	Professor	11–20	31
Rachel	B	45–49	Female	Professor	0–10	29
Vaughn	B	45–49	Female	Asst. Prof.	0–10	28
Sheila	B	30–34	Female	Asst. Prof.	0–10	25

Note. [a]Each participant is listed by an assigned pseudonym.

[b]The terms *assistant* and *associate professor* have been abbreviated as *Asst. Prof.* and *Assoc. Prof.*, respectively.

[c]The combined PU and PE score range is 11–55.

Results

Quantitative Phase

Thirty-nine valid survey responses were used for the quantitative data analysis. The Mann-Whitney *U* test was conducted as the nonparametric alternative to the independent-samples t-test. Results of the test demonstrated that there were no differences in faculty perceptions of the QMR survey based on their completion of the APPQMR workshop, $U = 141.00$, $z = -1.309$, $p = .001$. Community college faculty who completed APPQMR training had similar perceptions about the QMR (*Mdn* = 22.71) as the faculty who did not complete the training (*Mdn* = 17.91).

Qualitative Phase

Eight faculty members with diverse demographics and QMR perspective scores from across the two community colleges were interviewed and results were analyzed. Results of the analysis indicated that APPQMR training held practical significance in its influence on faculty perspectives of the QM rubric across psychological, convictional, and behavioral dimensions. Six themes emerged from the analysis to answer the central research questions about training's influence on faculty perceptions of the QM rubric and their experience in APPQMR. These themes help to further illuminate the significance of training.

Training's Influence on Faculty Perceptions

Theme 1: The QM rubric is a useful, though not perfect, framework for course design. Faculty increased their knowledge of the QM rubric through participation in APPQMR training, resulting in favorable perceptions of the instrument. Six of the eight participants perceived the rubric as a useful, though not perfect, framework for course design. Even faculty who had low perception scores recognized the utility of the rubric. Participants found value in how the rubric helped them to improve course organization, navigation, and clarity of purpose from a student-centered perspective.

Despite the mostly positive perceptions, five of the faculty members noted that the QM rubric could be improved in some way. Primary concerns included a perceived subjectivity in the standards, the rubric's failure to evaluate content, and an overall inability to ensure a high-quality course upon delivery.

Theme 2: Applying QM standards to course design is rigorous and inspiring. The rubric contains 43 individual standards and is accompanied by detailed annotations. Faculty did not view the rubric as "easy to use" in terms of its content. Rather, they viewed the rubric as rigorous and professional. One faculty member expressed feeling overwhelmed by the QM rubric prior to training, but later described the standards as an extremely helpful guide. Six of the eight interview participants described making notable changes to the design of their online courses after QM training. However, the time involved with applying QM standards to online courses was found to be a deterrent to making course improvements for one of the interviewees.

Theme 3: Learning to apply QM standards through training was more rigorous and time-consuming than anticipated. The APPQMR workshop is designed to encourage reflection while exposing participants to concepts related to the QM rubric and online teaching challenges. Faculty were challenged by the amount of time involved with completing some of the learning activities and disagreed with QM's estimation that the workshop should require 14 to 16 hours over two-weeks to complete. For instance, one participant remarked that the training took her twice as much time to complete the workshop as anticipated. This participant felt the time and rigor of

training might hinder others from participation. Another participant, though a proponent for the training, claimed to tell his colleagues to schedule their training during a slow time due to the rigorous expectations.

Theme 4: The most challenging and influential aspects of APPQMR were learning objective alignment and content accessibility. Each of these aspects represent a portion of the QM rubric. Learning objective alignment is the cornerstone of the QM rubric. Alignment is evaluated in nine of the 43 individual standards and is the one concept that is cross-referenced in four of the eight general standards. The APPQMR workshop focuses upon alignment as a core goal because a course cannot pass a QM quality review unless all alignment related standards are met. Accessibility is one of the eight general QM standards and is comprised of five specific standards that address issues such as navigation, format, readability, and usability of course materials for all students.

Seven of the eight faculty interviewed discussed how learning objective alignment impacted their thinking and course design strategies. Six of the faculty found value in the concept of alignment and recognized its importance. They viewed alignment as a tool to help improve course organization and clarity. However, two felt that the process of alignment was cumbersome and disadvantageous to students. In this view, the inclusion of learning objectives and the articulation of alignment confuses students by focusing on educator-oriented information and creates unnecessary complexity, a detraction from the course content.

Accessibility was another challenging and often mentioned aspect of the QM training experience. Half of faculty interviewed acknowledged the importance of course content accessibility for students with disabilities but felt underprepared or unable to successfully implement accessibility guidelines or to check learning objects for accessibility. These participants reported that their response to accessibility challenges is to eliminate learning objects such as visual illustrations, charts, graphs, and video, despite the detriment to student learning. The faculty felt that the APPQMR workshop did not contain enough instruction on accessibility and expressed a desire to learn more about technology tools and processes to more efficiently ensure course accessibility.

Theme 5: The APPQMR workshop has the potential to be a transformative experience. Six of the eight participants developed a belief through training that they could plan and implement course design changes to improve course quality.

The workshop experience provided many of the faculty with a disorienting dilemma by challenging them to consider a student-centered design approach. As a result, faculty perceived the QM rubric as a useful tool for improving course organization and structure. The learning experience also provided participants with a rationale to support their beliefs about online course design and using the QM rubric to support the design of their courses. Further, half of those interviewed expressed a belief that that the workshop could provide a transformative experience for all faculty, including traditional brick-and-mortar classroom instructors.

Theme 6: When QM is mandated, both social influence and facilitating conditions influence faculty's perceptions and use of the QM rubric. Though unintended during the design of the study, the two community colleges presented opposing cases in terms of institutional approach to QM implementation. Differing approaches may have had an impact on resulting faculty perceptions. Both institutions mandate QM compliance in online course design; however,

the initiative to adopt QM was a faculty-led decision at institution A, whereas the initiative was administratively driven at institution B.

Interviewees from institution A expressed a strong sense of social influence throughout the faculty and reported having access to a robust training and support network (which are forms of facilitating conditions). Four of the five participants identified a faculty member who was instrumental in the QM initiative. Participants also indicated that the QM initiative continues to be faculty-driven, as evidenced by the faculty provided workshops and training opportunities available at the college and peer mentoring. Additional facilitating conditions included financial incentives, technology tools and support, and one-to-one assistance from instructional designers and experienced online instructors.

In contrast, the interviewees representing institution B felt forced by college administration to comply with QM standards and expressed frustration with the process due to insufficient facilitating conditions, namely training and design support. These faculty members held more negative perceptions about QM than the faculty from institution A. Faculty members expressed frustration that their administrators had used QM punitively and to discourage online course development in the past. Instead of viewing the rubric as a course improvement tool, they felt burdened to comply with its standards when they teach online. Notwithstanding the historical influences and a stated need for more support and training, interviewees believed that faculty perceptions of QM have started to improve due to recent administrative changes.

Results showed that social influence and facilitating conditions both had an impact on faculty perceptions of QM at the two institutions. Results also indicated how participation in QM training can be used to counteract negative impressions.

Results

Results of this study showed that although there was no statistically significant difference in faculty's perceptions of QM between training participants and nonparticipants, there are several practical implications that training and support can provide. Six unique themes emerged from interviews with faculty who completed APPQMR. Themes centered around the value and rigor of the QM rubric and training. Results also helped to illuminate the faculty experience in APPQMR. These research findings are explored further in the following section.

Discussion

It is clear from the results of this study that creating a culture of support for online course developers—including various forms of training and development—can positively impact faculty's perceptions, which will positively impact teaching quality and student success in a distance education environment. Theory and research suggest that faculty experience level and demographics may provide explanation for the ambiguous results found in the literature and for the nonsignificant results found in this study.

Though there is no statistically significant difference in faculty's perceptions of the QM rubric between those who completed APPQMR and those who did not, the interview data demonstrated that those who participated in training found it useful in changing both their perceptions and behaviors. APPQMR is one form of training that can positively affect faculty's course design knowledge and skills.

Faculty professional development on course design has also been shown to improve student success throughout the literature (e.g., Bento & White, 2010; Hollowell et al., 2017; Rockinson-Szapkiw, Wendt, Wighting, & Nisbet, 2016). Additional research is needed to integrate the understanding of faculty development and student learning outcomes success.

Results of the basic qualitative research conducted in phase two provided some explanation about how participation in the training influenced faculty's perceptions of the usefulness and ease of use of the QM rubric. It also illuminated additional insight regarding potentially insignificant results, including mixed QM experiences. Results may be explained in part due to varying social influences and facilitating conditions between faculty at two community colleges. Two distinct themes emerged from this analysis that imply the practical significance of training. First, seventy-five percent of faculty who participated in the APPQMR training found the QM rubric to be a useable and helpful guide as they design distance education courses. Second, trained faculty believe that applying QM standards to their course design is a rigorous process.

APPQMR Content

A primary goal within the APPQMR professional development workshop was to understand and apply the foundational concept of learning objective alignment. It is not surprising then that the learning objective alignment content was found to be the most influential aspect of training. All but one of the interviewed participants discussed learning objectives and alignment. Some discussed it in a positive light while others discussed it negatively. Three out of four participants expressed that the content challenged them to think critically about their course design choices. As educators, they felt that the focus on alignment of learning objectives to course materials, activities, and assessments provided them with a useful outline from which to build a course. Faculty purported to gain new knowledge about the content that changed the way they think about course design. Likewise, the faculty in Mercer's (2014) study identified alignment between learning objectives and assessment as their biggest "takeaway" (p. 152). However, the faculty in Mercer's study also found the subject of learning objective alignment to be the most challenging. A few participants in this study expressed similar sentiments. Twenty-five percent of faculty members, however, failed to recognize the value and relevancy of learning objectives and alignment, arguing that the content is too educator oriented. The other seventy-five percent of faculty did not express concerns about the learning objective and alignment content. Additionally, faculty acknowledged that designing course materials to be accessible to all students is a worthy and important goal for distance education. Yet they felt ill-prepared to do so after training. They cited a lack of technology skills and resources to effectively and efficiently apply accessibility principles to their course design and they expressed a desire to improve their skills in this area.

Best practices in faculty professional development highlights that effective professional development includes ongoing support; thus, APPQMR may be most successful if course developers are supported by college instructional designers when applying the QM rubric (Roehrs et al., 2013). Dempsey and Liu (2017) also recommended providing faculty support with certain aspects of the QM rubric implementation, especially regarding technology and accessibility.

Results, therefore, provide greater insight into faculty's experience with specific aspects of the APPQMR workshop. The results of the research study suggested that faculty discovered learning to apply the QM rubric through training provided a disorienting dilemma, as found in transformational learning literature (Mezirow, 1997) that resulted in the acquisition of knowledge and confidence to plan and make a change.

Practical Implications

To determine the practical implications of professional development, we must look past providing only technology training and into the organizational cultural that provides ongoing support for learning technology, implementing technology, and providing significant faculty support for adoption within their online course structures. Creating a culture of support for online course developers—including various forms of training and development—will affect some faculty's perceptions and ultimate success in teaching online.

From an organizational perspective, the findings of this study illustrate that faculty's perceptions of the QM rubric's usefulness and ease of use can be influenced, in part, through participation in the APPQMR training. These perceptions are also impacted by social influences and facilitating conditions within the local setting where faculty engage with distance education quality assurance initiatives. Therefore, we suggest higher education institutions may need to develop a comprehensive plan that addresses the many aspects of quality assurance, including, but not limited to, faculty professional development, course design support, and evaluation of online course delivery. Previous studies by Bogle, Cook, Day, and Swan (2009) and Swan, Matthews, Bogle, Boles, and Day (2012) serve as excellent examples of combining QM design standards with Garrison, Anderson, and Archer's (2000) community of inquiry (CoI) framework to ensure the quality of course delivery. In this model, both frameworks were leveraged to combine the benefit of QM's explicit course design guidelines with the CoI constructs of social presence, teaching presence, and cognitive presence during the redesign of a program's core courses. The university provided professional development and support for both frameworks and the findings demonstrated significant improvements in student learning outcomes. The combination of training, social influences (including a QM expert and an instructional designer), and facilitating conditions (in the form of ongoing, individualized support) can serve as essential elements within an institution's quality assurance initiative for distance education.

Perhaps the greatest implication we see is the need for effective communication with faculty throughout the adoption of quality assurance tools and processes. Distance learning quality assurance initiatives will not be effective without faculty buy-in (Ragan & Schroeder, 2014; Wingo, Ivankova, & Moss, 2017), and high-quality courses begin with high-quality faculty to design and deliver them (Chen, Lowenthal, Bauer, Heaps, & Nielsen, 2017). This research has shown that faculty buy-in can be influenced, at least in part, through participation in training and development. As faculty members are faced with a disorienting dilemma through the knowledge, feedback, and interaction that training affords, they are challenged to reflect on their own pedagogical beliefs and practices and make behavioral changes. However, not all faculty who participate in training will experience this level of transformative learning.

Limitations

This was an investigative study limited to the APPQMR faculty professional development opportunity at two community colleges in the southeastern U.S. where there is an institutional mandate to use QM standards for course design. Results may not be generalizable to other institutions due to the limited focus or small sample size. Replication across a more diverse population or among different institutions and regions would improve generalizability. Further, a more robust experimental design could be used to allow for more control over the variables.

Conclusion

Faculty perceptions of an initiative like QM are important, because perceptions impact their intent to adopt and support any new initiative. The goal of this explanatory sequential mixed methods study was to examine the influence of the APPQMR workshop on faculty's perceptions about the QM design standards and their ability to design and develop distance education courses at the community college level. No statistically significant difference in perceptions was found between faculty who participated in APPQMR training and those who did not. However, several themes emerged through qualitative analysis of interviews that indicate participation in the workshop can be significant and influential for faculty learning how to apply the QM rubric to the design of their online and hybrid courses. The rigor of the training and of the QM rubric challenged faculty, but also provided them with a usable (but not perfect) framework for course design. Moreover, participants can experience a transformative learning experience through training that results in changed perceptions and course design skills. Results of the study provided descriptive information about faculty's experience in the APPQMR workshop, including illuminations of the most influential and troublesome aspects of the workshop, which were alignment of learning objectives and accessibility, respectively. It also provided some contextual explanation of the impact social influence and facilitating conditions have on faculty perceptions of QM. Both factors played a significant role in the formation of faculty perceptions of QM at the institutions where compliance was mandated. Additional research exploring the intersection of faculty professional development and student success in courses that are redesigned by faculty who are trained and supported in course design would be beneficial.

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Detection of Online Contract Cheating Through Stylometry: A Pilot Study

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Abstract
Contract cheating, instances in which a student enlists someone other than themselves to produce coursework, has been identified as a growing problem within academic integrity literature and in news headlines. The percentage of students who have used this type of cheating has been reported to range between 6% and 15.7%. Generational sentiments about cheating and the prevalent accessibility of contract cheating providers online seems to only have exacerbated the issue. The problem is that no simple means have been identified and verified to detect contract cheating because available plagiarism detection software is ineffective in these cases. One method commonly used for authorship authentication in nonacademic settings, *stylometry*, has been suggested as a potential means for detection. Stylometry uses various attributes of documents to determine if they were written by the same individual. This pilot assessed the utility of three easy-to-use and readily available stylometry software systems to detect simulated cases of contract cheating academic documents. Average accuracy ranged from 33% to 88.9%. While more research is necessary, stylometry software appears to show significant promise for the potential detection of contract cheating.

Keywords: academic integrity, contract cheating, plagiarism, stylometry

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Detection of Online Contract Cheating Through Stylometry: A Pilot Study

Various forms of cheating have plagued education since the inception of assessments of learning. Higher education, in particular, has endeavored to maintain academic integrity to provide meaning to the degrees they confer. Online programs have struggled with student authentication in various ways yet there are limited means of verifying authorship beyond the use of plagiarism detection technologies (Newton, 2018; Singh & Remenyi, 2016; White, 2016). Higher education faces an additional hurdle in that student participation in courses is remote and it cannot always be assured that the registered student is the individual logging into the course and completing assignments. In attempts to minimize cheating on traditional assessments such as quizzes and exams, higher education institutions often shift more focus on written assignments as they require

a higher level of thought and reasoning, and, in theory, are harder to thwart through simplistic cheating like copying from neighbors (Bretag et al., 2018; Newton, 2018; Singh & Remenyi, 2016; White, 2016). Even written assignments have been subject to various forms of duplicitous student activities. *Plagiarism*, the use of the words of another rather than the author's words or ideas, has been prevalent through the history of higher education. However, with the increased use of sophisticated plagiarism detection, the cutting and pasting of material from sources has become an unreliable and risky alternative for students. *Contract cheating*, also referred to as ghostwriting, is when a student employs an individual to complete assignments for them, has subsequently become more appealing. The benefit of using a contractor to complete coursework or writing assignments for students is that the resulting document is generally original thus not subject to detection by text-matching software (Lancaster, 2019, Lines, 2106). Current data indicates that "up to 16 percent of students have paid someone to do their work and that the number is rising" (Smith, 2019, para. 17).

Contract cheating is considered a relatively new form of cheating, estimated to only be a few hundred years old. While sharing of previous assignments and enlisting the help of others to complete work has been around for some time, such as within the U.S. fraternities and sororities, the 1940s seemed to mark a turning point for contract cheating. At this time, there was a significant uptick in the numbers of advertisements for ghostwriting services in New York City newspapers. Proliferation continued through the 1960s and 1970s, which included solicitations for assistance in writing papers, theses, and dissertations (White, 2016). While these services became more widely available, there was still the problem of the student finding the contractor as well as completing payment. This dynamic completely changed with the advent of the Internet. Services became easily discoverable and payment could be made anonymously to anyone around the globe. As such, essay or paper mills, in addition to individual writers, became a realistic and timely option for students looking to circumvent work (Singh & Remenyi, 2016; White, 2016).

According to Lines (2016), the use of such ghostwriting services has been steadily increasing over time:

> while collusion in the form of paying another person to complete all or part of an assessment is not a new form of cheating, technological advances and changes in the socio-economic context of tertiary education in recent years have led to a worrying trend in which this practice appears to be becoming more widespread. (p. 889–890)

Lancaster (2019) estimated the 2014 revenue for the industry to be in excess of $100 million. Both supply and demand appear to be very healthy for this form of commerce.

In a study by Rigby, Burton, Balcombe, Bateman, and Mulatu (2015), students were very willing to purchase papers. The emphasis on high grades, as well as the economic incentive of advanced degrees (which can significantly increase lifetime compensation in the workplace) is a possible explanation (Lines, 2016; Rigby et al., 2015). While the one-time or occasional use of ghostwriting for written course assignments could be problematic but not cataclysmic, the notion of a student receiving credit for something they did not do is disturbing. More importantly, though, is the award of degrees in which students have bypassed necessary learning through employing the services of another person (Lancaster, 2019).

As graduate school provides critical research education and skills that provide the basis for careers in science and academia, circumventing this learning could foster erroneous research

practices (Singh & Remenyi, 2016). For example, it is now possible for someone to have their dissertation written, in its entirety, for $3,000 to $5,000 (Top 20 Writing Services, 2019). An individual can be awarded one of the most coveted degrees in the world, the doctorate, with little or no original work by the student (Lancaster, 2019; Lines, 2016). The issue of contract cheating is so rampant that PayPal has recently refused to pay known contract cheating providers through their service, though after six weeks of the embargo many essay-writing services are still successfully accepting PayPal payments (Bailey, 2019; Coughlan, 2019).

Even in light of the apparent rise in contract cheating, little empirical evidence exists on its prevalence or impact within higher education. Unfortunately, an accurate estimate is difficult to garner as data on the actual prevalence of this type of cheating only comes to light if or when a student is caught (Bretag et al., 2018; Harper et al., 2018; Lines, 2016; Singh & Remenyi, 2016). Available data does, however, indicate that contract cheating is a concerning issue in the postsecondary sector. Although the incidence of students partaking in contract cheating is still small (reported to be approximately 3% in the U.S.), this estimate means that 1.7 million students are purchasing papers or other services (National Center for Education Statistics, 2019; Wallace & Newton, 2014).

The one consensus about contract cheating among researchers is that it is challenging to detect. Current text-matching detection applications are ineffective in identifying this type of cheating (Anekwe, 2010; Dawson & Sutherland-Smith, 2018; 2019; Lancaster, 2019; Lines, 2016; Newton, 2018; Rogerson, 2014; 2017; Singh & Remenyi, 2016). While Turnitin has recently launched its proprietary Authorship Investigate service that aims to detect contract cheating, it has yet to be widely adopted by higher education institutions (Turnitin, 2019). As of yet, this new Turnitin service has not been vetted through empirical scholarly research (Singleton & Ricksen, 2019). Moreover, it appears the service relies on Turnitin's database of previous student work, which may not include all assignments or that of newer students (Turnitin, 2019).

As Rogerson (2017) stated, the lack of effort on the part of higher education stakeholders to act against contract cheating is problematic. The claim that contract cheating is difficult, if not impossible, to detect has not been explored by exigent research and very little empirical evidence of the effectiveness of contract cheating detection methods exists. Because of these facts, Singh and Remenyi (2016) specifically call for a proactive intervention, as

> academic cheating undermines the good name of the institution and calls into question the integrity of both the faculty and students. There is every reason for a university to take all forms of cheating seriously, and to eliminate it wherever possible. (p. 36)

Thus with the increasing threat of contract cheating, it is time for higher education to address how to detect and handle this category of academic integrity violation (Medway, Roper, & Gullooly, 2018; Newton, 2018; Slade, Rowland, & McGrath, 2019).

One promising tool that can be used in detecting ghostwritten work is *stylometry*, the study of the writing characteristics of a specific author. To address contract cheating, Juola (2017) noted that "stylometry is an important and relatively mature technology that can be usefully applied to address a key problem in education" (p. 196). Dawson and Sutherland-Smith (2019) reiterated that research is needed in order to "focus on approaches to improve detection rates" (p. 291) specifically through empirical studies. Higher education needs "a process approach… to identify, document, and investigate irregularities using technological, interpretive, and conversational

means" (Rogerson, 2017, p. 3). Therefore, this study set out to explore the utility of user-friendly stylometry analysis software for the detection of contract cheating of written assignments. The following research questions were used to guide this study:

RQ1: What is the accuracy of user-friendly stylometry analysis software?

RQ2: Which of these software performed with the highest accuracy?

Review of Relevant Literature

Defining Contract Cheating

Singh and Remenyi (2016) defined contract cheating as the "practice of hiring a writer (or writers) to produce a piece of work that follows a predefined style, and none of the original writing credit is attributed to the ghostwriter" (p. 37). Therefore, contract cheating is not generally classified as plagiarism, in terms of stealing or theft of words or ideas. Instead, it is authorship fraud, stating that the identified author wrote the work. Other researchers have used more straightforward definitions, stating that anytime a student outsources assignments to fall within tailored instructions of the student, they have conducted contract cheating (Bretag et al., 2018; Clare, Walker, & Hobson, 2017; Harper et al., 2018; Lancaster, 2019; Lines, 2016). While contract cheating and ghostwriting are often used synonymously, Rogerson (2017) used a more specific term, "cyber-pseudepigraphy" (p. 1), to describe these practices through the use of the Internet. While there are minor differences in interpretations as to what constitutes contract cheating, or ghostwriting, the consensus among researchers is that it is an egregious form of cheating (Bretag et al., 2018; Clare, Walker, & Hobson, 2017; Harper et al., 2018; Lancaster, 2019; Lines, 2016; Rogerson, 2017).

Contract Cheating, Ghostwriting, and Paper Mills

In certain writing genres, ghostwriting and the use of pseudonyms have been commonplace, such as in fiction and among autobiographies (Farhi, 2014). Rarely does this practice seem to be problematic for authors or readers when agreements concerning terms of ownership and compensation are handled transparently. Such practices are also used in medical writing with pharmaceutical companies hiring authors to write studies on their medications and honorarily listing prestigious doctors as the actual authors. According to the National Institutes of Health, anywhere from 10 to 40% of research articles involving pharmaceuticals may be ghostwritten. Such practices are generally frowned upon, and in some cases subject to violations of ethical agreements with funding agencies, yet they continue to occur (Anekwe, 2010). Much less tolerance seems to exist for the use of contract or ghost writers by students to complete academic requirements (Lines, 2016).

Prevalence and Trends in Contract Cheating. A limited number of studies have determined the prevalence and trends of contract cheating in academia. Newton (2018) reviewed 65 studies dating from 1978 through 2014 for student self-reported conduct of contract cheating. In 1978, the average prevalence among respondents was 3.52%, increasing steadily to 15.7% in 2014, which was estimated to equate to approximately 31 million students. Although the details about the studies and their potential equivalence for comparison were lacking, it does appear that contract cheating is increasing among students and the absolute number of potential participants is disconcerting. In 2013, Turnitin conducted a study in which 7% of student respondents admitted to purchasing at least one assignment. Rigby et al. (2015) found that under typical academic

circumstances, 50% of the sample of students reported they would be willing to risk purchasing a written assignment. Two recent studies were completed in Australia, one querying academic staff and the other focused on students. The survey of 916 Australian academic staff discovered that 66% of respondents believed they have had students submit ghostwritten work on at least one occasion and 40% believed this had occurred five or more times (Harper et al., 2018). Among the 814 Australian students surveyed, 6% admitted to partaking in contract cheating (Bretag et al., 2018). Discussion within the literature suggested that these percentages are likely an underestimate, as students may not truthfully report transgressions (Bretag et al., 2018; Harper et al., 2018; Lines, 2016; Ma, Wan, & Lu, 2008; Rigby et al., 2015; Wallace & Newton, 2014).

Detection of Contract Cheating

As the existing literature has noted, contract cheating is very difficult, if not impossible, to detect with precision with current methods and tools. In particular, the fact that ghostwritten works can be of relatively good quality, or at least sufficient enough to receive a passing grade, complicates matters. Because insufficient research supports a specific method of detection, Rogerson (2017) stated "there is a need for an evolutionary approach to enhance evaluation skills beyond discipline related practices and academic writing conventions…. An approach that can streamline methods of determining irregularities and documenting evidence for evaluation and discussion" (p. 2). The literature has advocated only limited approaches to exposing contract cheating. These include looking for clues of radical differences in student performance across assignments, use of assessment data for comparison of assignments within courses and institution-wide, as well as ensuring proper documentation of past violations of academic integrity as student cheaters were found to act in a nonrandom fashion and likely to be repeat offenders (Clare, Walker, & Hobson, 2017; Taylor, 2014; Rogerson, 2017). The use of software and computer aids has also been suggested to confront contract cheating. Throughout the literature, no consensus exists on the most effective means of detection; moreover, what methods do show promise may suggest potential ghostwriting but do not necessarily prove it (Lines, 2016; Rogerson, 2014; 2017).

Evaluator-Based Detection. Various researchers have recommended that observations of inconsistent student writing by evaluators (i.e., faculty or teaching assistants) provide a means for detecting contract cheating. Lines (2016) suggested that student writing styles need to be tracked, though this technique may be unable to distinguish between genuine student work (albeit it significantly improved or of poor quality) when compared to past performance. Also, as noted by Singh and Remenyi (2016), graders and even faculty may not be adequately familiar with the student's writing style and quality of work to notice. Further, universities do not appear to be directing enough resources to ensure that students are the ones completing coursework. Overworked faculty and teaching assistants also may not have the time or energy to commit to unassisted attempts to "hand" detect such occurrences (Singh & Remeny, 2016).

In a study of products of essay mills in the U.K., Medway, Roper, and Gillooly (2018) purchased two papers to be evaluated by ten evaluators. The participants were not informed of the goal of the study. Not one of the graders detected issues with either paper, although these individuals did not have reference to previous works of writers. Dawson and Sutherland-Smith (2018) completed a study which provided seven graders with 20 assignments to grade in two groups of ten assignments of which three were purchased by an online provider. Participants were explicitly asked to identify which papers were a product of contract cheating or written by a "real" student. The average accuracy of detection was 57.2%. If considering only the contract papers, markers were able to identify 62% of the works. In 11% of cases, markers wrongly identified a

student paper as ghostwritten. In a follow-up study, Dawson and Sutherland-Smith (2019) enlisted fifteen graders which were given 20 papers, six of which were purchased, to evaluate. The graders were then given training on identification of contract cheating and subsequently given an additional 20 papers to evaluate, again with six of those provided being purchased online. True positive (correct identification of contract paper) improved from 17.3% pretraining to 24.6% posttraining. False negative (failing to detect a contract paper) dropped from 12.6% to 5.3%. Overall, papers were correctly identified as either student or contract work 75.3% before training and 85.7% after training. The presentation of results was sometimes confusing as some values did not include all papers which inflated reported values (Dawson & Sutherland-Smith, 2019).

Rogerson (2017) found similar difficulties in detection by graders noting that humans may or may not perceive writing irregularities resulting in an inability to distinguish between contract and low-quality student writing. Further, inconsistencies or incongruities do not equate to any level of assurance of contract cheating. Even if a paper is suspected of being ghostwritten by a grader, it would be hard to prove or take any action (Rogerson, 2017). Dawson and Sutherland-Smith (2019) came to a similar conclusion stating that "marker detection alone is not necessarily sufficient evidence to satisfy the burden of proof for a contract cheating allegation" (p. 722).

Other techniques suggested as possible solutions for the detection of contract cheating can be likened to "clue sleuthing." Both Lines (2016) and Rogerson (2014) found that ghostwritten assignments often include vague answers and lack the requisite depth. Additionally, ghostwriters frequently do not follow assignment instructions (Rogerson, 2014). Document metadata may also reveal clues such as the revelation of the document author information not matching the name of the student (Lines, 2016). Dramatic improvements in writing or language can also raise caution flags. Outliers in proposed grades were deemed to be suspicious. Other language-based warning signs include use of spelling or colloquialisms not common in the native language of the student. For example, the use of British English versus that of the U.S. is hypothetically a signature of a ghostwriter (Lines, 2016; Rogerson, 2014; 2017). While text-matching detection software does not work well to directly catch ghostwritten work, researchers found that abnormally low Turnitin similarity indices are undoubtedly worthy of further investigation, particularly if the references section of the work are not flagged, assuming they have not been omitted from analysis (Lines 2016; Rogerson, 2017). An additional clue common among contracted submissions is inconsistencies in references. These may include odd, very outdated, incorrect, or made-up references. Also, it was found that ghostwriters sometimes mix various components of references (e.g., using the author and publication date from one article while using the title and journal details from another) in order to thwart attempts at plagiarism detection (Lines, 2016).

Computer-Assisted Detection. While available text-matching detection technologies have proven to be relatively effective at catching textual overlaps with references, no software product currently exists that specifically targets contract cheating. Within attempts to detect plagiarism through text-matching, a technological arms race has occurred in which education stakeholders rush to find solutions to cutting and pasting of reference material while students search for ways around such safeguards. Currently, available detection programs cannot adequately protect against ghostwriting (Dawson & Sutherland-Smith, 2018; Juola, 2017; Lines, 2016; Rogerson, 2017). Turnitin's Authorship Investigate is one of the first integrated systems to detect contract cheating but comes at an additional cost and has yet to face the scrutiny of researchers (Turnitin, 2019; Singleton & Ricksen, 2019). To date, it seems that universities are not willing to invest in the resources, human or financial, necessary to combat contract cheating

through available methods of detection. Moreover, faculty and their assistants often do not have the time or tools available to make such an undertaking reasonably timely (Juola, 2017).

Stylometry

One method of analysis that has potential for use in detection of contract cheating is *stylometry*, the analysis of authorial style and writing attributes. In theory, this method of inquiry can determine the differences between authors, thus if a difference exists between genuine student submissions and those suspected of being ghostwritten, education stakeholders potentially have actionable evidence (Juola, 2017).

Uses of Stylometry. Stylometry has been used in a range of applications since it was first introduced. Stylometry has been implemented in forensic authorship analysis, such as in criminal and civil lawsuits. Intelligence agencies have also adopted the technique to determine the authorship of threats, Internet activity, and other potentially malicious writings (Brocardo, Traore, & Woungang, 2015; Neal et al., 2018). Because people have unique authorial fingerprints or idiolects, one author can be distinguished from another, e.g., the use of "near" instead of "by" (Juola, 2017, p. 189). In the analysis of the Federalist Papers, it was found that Alexander Hamilton never used the word "whilst" and James Madison never used the word "while" (Juola, 2017, p. 192; Mosteller & Wallace, 1963). Stylometry techniques also successfully "outed" J. K. Rowling as the real author of works produced under a pseudonym (Juola, 2017).

The goals of stylometry can vary depending on the type of outcome required by a researcher. In authorial attribution, the aim is "to determine the probability that a document was written by a particular author based on stylistic traits rather than the content of the document" (Neal et al., 2018, p. 86). Authorial verification entails a "binary classification problem that decides if two documents were written by the same author" (Neal et al., 2018, p. 86). When an author attempts to disguise their identity, termed obfuscation or adversarial stylometry, they will attempt to mask authorial style (Neal et al., 2018).

Stylometry Techniques. Various techniques of textual analysis exist within stylometry. Lexical analysis incurs the use of word-based and character features, which has the advantage of being robust against text "noise" (i.e., spelling and grammar errors). Lexical analysis includes word n-grams (i.e., repetition of words "n" times in a document, where "n" is the number of occurrences), word frequencies, words per sentence, the number of sentences, and vocabulary richness. Structural features may also be considered such as indentations, misspellings, grammar, and words specific to particular social or cultural backgrounds (Neal et al., 2018; Sarwar, Li, Rakthanmanon, & Nutanong, 2018). Syntactic features, which include punctuation and parts of speech, can also be employed to strengthen analyses (Brocardo, Traore, & Woungang, 2015).

The availability of fast, powerful, and inexpensive computers has allowed for advanced techniques to be developed. Machine learning classifiers and clustering have been recently adopted in stylometry analysis. This technique uses an algorithm that mathematically describes proximity of different data-points allowing for the distinction between data that naturally should or should not be grouped together. Another contemporary method are neural networks, Chain Augmented Naïve Bayes (CAN), and nearest neighbor calculations. Neural networks enlist a committee of machines that vote on author identity. CAN combines Bayesian analysis and n-grams. CAN was used in the exploration of authorship of the Federalist Papers and using only three features, correctly identified the author with 95% accuracy. The premise of nearest neighbor techniques is to determine the intertextual distance from a sample of training documents. Used regularly in

authorship attribution, differences in word frequencies can be calculated through chi-square analysis or the presentation of *z*-scores (Neal et al., 2018).

Best practices in stylometry have also been developed through numerous studies. Sample documents should be preprocessed for normalization such as removing nonalphabetical characters, capitalization, citations, names, cities, and dates. Next, selected features should be extracted (e.g., parts of speech, n-grams). Classification is then completed via comparison to training document features. Finally, an output is provided that provides authorship probabilities or designations (Neal et al., 2018; Prasad, Narsimha, Reddy, & Babu, 2015). Neal et al. (2018) determined that the accuracy was maximal when numerous examples for each author existed and when the total number of potential authors was small. Findings showed that documents to be analyzed should be on similar topics or from the same genre (e.g., a journal article vs. a mystery novel) and share authorial sentiment.

Athira and Thampi (2018) concluded that the ideal length of sample texts should be 500 words and when using this size of text, Brocardo, Traore, and Woungang (2015) had a 95.7% accuracy rate. A representative scenario for evaluation of authorship was noted to be composed of a training sample of 20 text blocks written by the known author vis á vis five blocks by the unknown author. Among the numerous types of analytics used by researchers, Sarwar, Li, Rakthanmanon, and Nutanong (2018) found that logistic regression with five documents per author provided sufficient accuracy for identifying authorship. In particular, the use of n-grams of the length of two to five with logistic regression was found to successfully delineate between authors (Prasad, Narsimha, Reddy, & Babu, 2015). Juola (2017) stated that a mixture of methods and feature extraction provides the most accurate results. Finally, it has also been established that simpler techniques are ideal, as these allow for more mainstream adoption and, in most cases, had a negligible impact on accuracy (Neal et al., 2018; Sarwar, Li, Rakthanmanon, & Nutanong, 2018).

Method

The purpose of this quantitative and descriptive pilot study was to evaluate commercial-off-the-shelf (COTS) stylometry software for its utility in potentially detecting contract cheating (Juola, Sofko, & Brennan, 2006; Salkind, 2012). The reasoning behind the use of COTS solutions is that they are readily available and relatively easy to use so that a student evaluator could employ them without a significant investment of time. Only free COTS software was included in this study to demonstrate that stakeholders would not be limited by financial investment restrictions (Juola, Sofko, & Brennan, 2006). An additional goal of this study was to assess stylometry software on a scenario that closely replicates how a student may submit work, both legitimate and ghostwritten.

Sampling Procedures

In order to simulate a real-world scenario in which an individual attempts to pass contracted work as their own, two corpora were developed. The first corpus comprised a random selection of five text blocks of approximately 500 words each from five separate peer-reviewed journal articles genuinely written by a known author.

The second corpus was created through the collection of five randomly selected text blocks of approximately 500 words each from five separate peer-reviewed articles from the same journal written by individuals other than the "known" author. All corpora were extracted from the same journal, the *Journal of Aviation Technology and Engineering*, which is highly focused on a specific

discipline and is well-respected among scholars in the subject area. Further, the selection of articles from one focused journal was conducted to retain both context and topic areas per the recommendations of Neal et al. (2018). This second corpus was labeled as "other" author or someone other than the "known."

Block lengths (500 words) were chosen as these were endorsed by exigent research (Athira & Thampi, 2018; Brocardo, Traore, & Woungang, 2015; García & Martín, 2012; Puig, Font, & Ginebra, 2016). The text blocks from both corpora were collected in a way to retain the last complete sentence to allow as close to 500 words as possible to ensure that an incomplete sentence did not influence results (García & Martín, 2012). The number of source original documents from which text blocks were selected exceeded the minimum document and text block counts recommended by Prasad, Narsimha, Reddy, and Babu, (2015). This allowed for additional text blocks to be available as test documents.

Test documents were randomly selected from both corpora to determine the ability of software to detect authorial differences. When a text block was used from a specific document, all other text blocks from that document were excluded from the known or other corpus during the specific analysis. Various combinations of corpora and test documents were examined. The most realistic contract cheating scenario would likely be the case in which only a single genuine work by a student (for example, something written in a controlled environment) would be available as a known author corpus. To test the software in this type of scenario, four text blocks (approximately 2,000 words) from a known author document were used to compare to four text blocks from a document written by a different author. All text blocks written by authors not included in the comparison were lumped into the "other" group for the test run (Juola, 2017; Prasad, Narsimha, Reddy, & Babu, 2015).

Measures

Three COTS software packages were used to evaluate text blocks. These were chosen specifically because each are backed by research implying positive results in author attribution as well as being free and readily available to download from the Internet. Moreover, with some brief reading of the programs' instructions, their use is intuitive even for persons without backgrounds in computer languages or coding. The first software was *Signature Stylometry System 1.0* (SSS) (Dawes, Merivale, & Millican, 2003). This system was developed to evaluate the Federalist Papers for authorship. Although this software is the most limited in capabilities, it is very simple to use and requires minimal computer memory processing power (Nieto, Sierra, Juan, Barco, & Cueto, 2008). The statistical analysis results provided by SSS are various chi-square comparisons of two documents or two corpora based on word lengths, sentence lengths, paragraph lengths, letter counts, and punctuation counts. Also, SSS provided graphical depictions of these measures (Dawes, Merivale, & Millican, 2003; Millican, 2003).

The second software, *Java Graphical Authorship Attribution Program* (JGAAP), was developed by researchers at Duquesne University and has been suggested as a potential means of detecting contract cheating (EVL Labs, 2018, Juola, 2017; Juola, Sofko, & Brennan, 2006). This program has a significant number of options available for analysis. Text blocks are loaded into the program from which point document analysis options are chosen: canonicizers, event drivers, event culling, and analysis methods. Canonicizers standardize the format of text such as normalizing whitespace, removing numbers, or making text all lowercase. Event drivers are the items the software seeks for the actual analysis, which can include parts of speech, n-grams, lexical

frequencies (a measure of reader processing of text), and first words of a sentence. Event culling allows to select how event drivers may be used (for example, looking only for the most frequent, a value set by the user, occurrences). The analysis method refers to the statistical processing of the resultant data. For this study, Naïve Bayes and K-Nearest Neighbors (KNN) were the selected methods of analysis. Within each of these categories, there is a wide range of additional options. One downside to JGAAP is beyond a certain level of analysis complexity, such as using more than a dozen event drivers, computer memory issues can become a factor, preventing the completion of analysis by a typical desktop or laptop computer (EVL Labs, 2018).

The third software used, *JStylo Authorship Attribution Framework v1.2* (JStylo), was created by the Privacy, Security, and Automation Lab (PSAL) at Drexel University and is an extension of JGAAP (Stolerman & Dutko, 2013). Much like JGAAP, JStylo has numerous options available for analysis. Documents are uploaded and users can choose from a range of features and classifiers to be examined during the analysis. Features include the items the software examines for statistical analysis such as average syllables in a word, average sentence length, and reading ease scores. Classifiers refer to the statistical testing options; in this case Naïve Bayes and Simple Logistic Regression were selected. Just as with JGAAP, advanced complexity testing (exceeding approximately a dozen features) can overwhelm computer memory capabilities, preventing the completion of analysis (Stolerman & Dutko, 2013).

Recommendations from research utilizing these software packages guided the selection of program settings used in this study (Athira & Thampi, 2018; Brocardo, Traore, & Woungang, 2015; García & Martín, 2012; Juola, 2017; Juola, Sofko, & Brennan, 2006; Prasad, Narsimha, Reddy, & Babu, 2015; Puig, Font, & Ginebra, 2016). The individual options chosen for each software are outlined in Tables 1, 2, and 3 for SSS, JGAAP, and JStylo, respectively.

Table 1

Selected Analysis Options for Signature Stylometry System 1.0

Category	**Selected Options**
Corpora	• Known author • Test (unknown)
Features*	• Word lengths • Sentence lengths • Paragraph lengths • Letters • Punctuation
Classifiers	• Chi-square
Analysis	Chi-square columns selected had minimum counts of 5; separated others into lower/higher columns.

* Features are standard and cannot be modified by the user.

Table 2

Selected Analysis Options for Java Graphical Authorship Attribution Program

Category	Selected Options

Corpora	• Training corpus
	  ○ Known author
	  ○ Other than known author
	• Test (unknown)

Event Drivers[a]	• Rare words count • Binned naming times (Complexity) • Sentence count • Average sentence length • Average syllables in word • Character n-grams (n = 4) • Word n-grams (n = 2)
Event Culling	• Most common events[b]
Analysis Methods	• Naïve Bayes • K-Nearest Neighbor with Cosine Distance[b]

[a] These were matched as closely as possible to JStylo available options.
[b] Settings were selected per the recommendations of software instructions (EVL Labs, 2018).

Table 3

Selected Analysis Options for JStylo Authorship Attribution Framework v1.2

Category	Selected Options

Corpora	• Training corpus
	  ○ Known author
	  ○ Other than known author
	• Test (unknown)

Features[*]	• Unique words count • Complexity • Sentence count • Average sentence length • Average syllables in word • Gunning-Fog Readability Index • Character space • Letter space • Flesch Reading East Score • Character n-grams (n = 4) • Word n-grams (n = 2)
Classifiers	• Naïve Bayes • Simple Logistic Regression
Analysis	Train on training corpus and classify unknown test documents

[*] Features other than n-grams are standard for the most basic analysis in JStylo. N-grams were added per the recommendations of the literature (Posadas-Durán et al., 2017; Ragel, Herath, & Senanayake, 2013).

Research Design

This quantitative, descriptive study sought to determine the accuracy with which stylometry analysis software can identify if a work was not written by a known author in a simulation of contract cheating scenarios. Accuracy of detection was calculated using the below formula from Prasad, Narsimha, Reddy, and Babu (2015):

$$Accuracy = \frac{\text{Number Correctly Identified}}{\text{Total Number of Items Analyzed}}$$

The results from each test run for individual software packages were recorded in Microsoft Excel for the calculation of descriptive statistics.

Procedure. All three software packages were evaluated for their ability to distinguish between a known author and someone other than the known author. Due to differences in the way the programs work, different procedures had to be used with SSS versus JGAAP and JStylo. Since SSS has very simplistic capabilities, designed only to compare two documents or groups of documents rather than more complex corpora, the known author documents were loaded as one group to be compared with others. The selection of documents and testing procedures are outlined in Figures 1 and 2 in the Appendix. A simulation of a realistic contract cheating scenario in which only one document was compared to another was conducted through random pairing of documents written by different authors. Another assessment of SSS was made comparing all known documents to all unknown documents.

In the testing of JGAAP and JStylo, one document from both the known and other corpora was randomly excluded for each analysis. The training corpus comprised the four remaining documents from both known and other groups. A range of one to five text blocks from the excluded "other" author document were used to compare with the training corpus. Also, one test run was completed to also include a randomly selected text block from the known author. Additional simulations of realistic contract cheating scenarios were conducted through the random pairing of documents written by different authors in which only one document (n = 4 text blocks) was compared to another (n = 4 text blocks). All remaining unknown author documents were classified as "other" during these test runs. The selection of documents and testing procedures are outlined in Figures 3 and 4 in the Appendix.

Data Analysis. In order to assess each software program, accuracy of results would need to be acquired. In each case, the software either correctly or incorrectly matched the author of the text being tested. The numbers of successful and unsuccessful times an author was identified were collected and summed. The process was repeated for each software package and method of statistical analysis. The aforementioned accuracy formula was then used to determine overall accuracy for each software.

Results

The results of the tests were mixed. JStylo performed well in all testing regimens while JGAAP presented inaccurate identification of known authors as the number of text blocks was reduced. SSS generally did poorly in all test types.

Statistics and Data Analysis

SSS Results. Due to the setup of SSS, accuracy was calculated as the number of significant chi-square tests versus the total number of tests for each round (n = 5). Overall, the test performance of SSS had an accuracy rate of 40%. During tests of individual documents, SSS performed with an accuracy between 20% to 40%, with an average of 33.3%. For the test comparing the entire known corpus with the unknown, SSS achieved an accuracy of 60%.

JGAAP Results. A total of 30 test runs were conducted using the test documents. Ten additional test runs were conducted using the four blocks of known and four blocks of unknown works. The overall accuracy for JGAAP when using Naïve Bayes analysis was 74.4% but only 43.7% when relying on K-Nearest Neighbor (KNN). Detailed analysis of the results of different numbers of blocks analyzed is presented in Table 4. During the testing to distinguish a known text block from an unknown block, JGAAP performed poorly, with a maximum accuracy of 25%. It was only after manipulating the settings of the program that this was increased to 87.5%. To achieve this increase in accuracy, discrete lexical frequencies were added as events, the standard deviation culler (which sought items with the largest standard deviation) was added, and Burrows Δ (which quantifies differences in event drivers of different texts) was used as the analysis method. These were added in attempts to improve accuracy per the recommendations of settings offered by the authors of the software (EVL Labs, 2018).

Table 4

Results for Tests Using JGAAP

Number of Test Text Blocks	Accuracy % (Naïve Bayes)	Accuracy % (K-Nearest)
1	82.9	57.5
2	86.1	75.0
3	57.8	34.4
4	77.5	26.4
5	70.6	25.0

JStylo Results. A total of 30 test runs were conducted using the test documents. Ten additional test runs were conducted using the four blocks of known and four blocks of unknown works. JStylo provided the most consistent and accurate results across all tests. The overall accuracy for JStylo when using Naïve Bayes analysis was 86.3% and 88.9% when utilizing Simple Logistic Regression. Detailed analysis of the results of different numbers of blocks analyzed is presented in Table 5. JStylo was able to dependably identify the majority of cases (83.3%) when a known author text block was added during testing.

Table 5

Results for Tests Using JStylo

Number of Test Text Blocks	Accuracy % (Naïve Bayes)	Accuracy % (Log. Reg.)
1	80.0	80.0
2	90.0	90.0
3	86.7	86.7
4	90.0	95.0
5	88.0	92.0

To further assess JStylo software, the data available for processing was limited. During this more rigorous testing, the number of features was reduced to five including the substitution of one feature that was not used in primary testing (unique words, complexity, character n-grams, word n-grams, lexical frequencies [added]). The number of known text blocks was reduced to two and the number of other blocks was reduced to four. Lastly, only one text block was used as the unknown. JStylo was still able to identify the block correctly at 91% accuracy (82% for Naïve Bayes, 100% for Simple Logistic Regression), albeit this procedure was only repeated five times with different test blocks.

Discussion

Based on the results of this pilot study, COTS stylometry analysis software has significant promise to evaluate document authorship. This, in theory, could easily be extended to student submissions. In this study, academic texts of a specific context and genre were used to assess the software, thus furthering the advocation of applying these methods to detect contract cheating. Considering that current methods and tools to detect contract cheating are tediously time-consuming (such as when using graders) and ineffective (in the case of text-matching detection software) the use of stylometry may provide a path for dealing with the growing issue of ghostwritten student work.

Clearly, stakeholders must have confidence in contract cheating assessment tools in order to use them for academic integrity enforcement. Accusing a student of contract cheating is a serious matter that could potentially affect their future at an institution. Further, it could potentially lead to legal action by the student to counter the claim. So even in light of the capacity of stylometry analysis, the variation in performance of the different software shows that careful selection of options and utilization are necessary to achieve reasonable accuracy.

It appears that SSS is not a good candidate to use in an academic setting. The software was easy to use and its interface was very intuitive, though text loading was more tedious than other software options. The very basic forms of analysis offered by the software are likely the reason why it performed so poorly. Moreover, the chi-square analysis did not work well due to many cells having inadequate counts to be an appropriate statistical tool even when combining cells. SSS does provide a graphical display of results, which can potentially be used to "eyeball" differences; however, stakeholders would likely balk at the idea of using this a primary means of detection. This feature could be a supplemental tool for assessors but not a primary means of identifying contract cheating. SSS seems to be more powerful when using much larger documents than used in this study though, again, this significantly limits its utility in a typical contract cheating scenario.

Although JGAAP is very sophisticated in terms of its background functioning, it was relatively easy to use. Uploading texts was efficient as was the selection of options. The challenge is to know which options to select, therefore the research literature was consulted for guidance. Further experimentation will likely yield more effective combinations of options. With an overall performance between 43.7% and 74.4%, JGAAP performed better than SSS. Naïve Bayes analysis, the stronger performer, would thus be the recommended setting for analyzing documents, though more thorough testing would be necessary. Although the performance of JGAAP in evaluating smaller quantities of text chunks was initially encouraging, with both types of analysis achieving over 90% accuracy, performance dramatically reduced to 25% when adding a known author text block. This calls into question whether the more accurate results were a function of the software

being biased toward selecting the unknown author. Reiterating the need to explore the various features and analyses available in JGAAP, when such adjustments were made, the software was able to perform at 87.5% in classifying a known text block as "known" when mixed with "other" test blocks.

JStylo performed the best among all three software packages across the range of testing. The user interface was straightforward and the adding of texts was easy to conduct. Just like JGAAP, JStylo has numerous options from which to choose. Although the program performed well, further exploration into the capabilities of various combinations of features and analyses will ensure that any improvements in performance can be identified. Both Naïve Bayes and Simple Logistic Regression analyses outperformed other software during primary testing. With an accuracy of 88.9%, Simple Logistic Regression showed the best promise for potential use in cases of suspected contract cheating. Even more evidence of this was 100% accuracy of Simple Logistic Regression when categorizing a known text block as "known" when mixed with "other" test blocks.

Comparing the use of stylometry software to existing contract cheating detection methods, it appears that the former is superior both in terms of accuracy and resources required. Current methods include text-matching detection software and human evaluators. Current text-matching software unvaryingly has been shown to be unable to highlight ghostwritten texts and new services designed to investigate authorship have yet to be tested by a wide range of users and researchers. Evaluator-based detection is extremely time-consuming and assumes the grader is either familiar with the previous work of the student, has received training about attributes of ghostwritten works, or both. Neither of these necessary defenses is likely to exist on a wide scale in contemporary higher education. In particular, as stated by Singh and Remenyi (2016), familiarity with student writing has become more difficult through growing class sizes and different graders being used across assignments. As noted by Lines (2016), even if contract cheating is suspected by evaluators, one cannot be sure that the cause of the suspicion is because a student's work has genuinely improved or they simply are weak academic writers.

The accuracy of human-based detection has been shown to vary significantly. In Dawson and Sutherland-Smith (2018), graders averaged 57.2% accuracy when classifying contract versus legitimate works and 62% of contract texts were correctly identified. Even after receiving training about catching contract cheating in Dawson and Sutherland-Smith's (2019) follow-up study, among contractor written papers, graders only identified 24.6% correctly although overall accuracy reached 85.7%. Not only can JStylo outperform these human-based procedures, this software would also take substantially less time and effort than a series of manual grading exercises. Moreover, both Rogerson (2017) and Dawson and Sutherland-Smith (2019) admitted that a grader's "hunch" would not be sufficient evidence to support a contract cheating allegation; thus, having additional tools, such as JStylo, are critical to appropriate handling of such occurrences.

While research by Neal et al. (2018) and Brocardo et al. (2015) reported high levels of accuracy in authorial identification, around 95%, these studies used much more sophisticated methods of analysis. Further, these researchers had significant knowledge of computer programming and used models that would require users to have the same level of knowledge. This certainly would require more out of assessors than can be reasonably expected in most cases. Thus, relying on COTS software such as JGAAP and JStylo are more practical options (Juola, 2017).

As with all studies, this research was subject to certain assumptions, limitations, and delimitations. The study was limited by potential variations within the documents randomly chosen to include in the study. An assumption was that since the documents came from the same journal, they were written in the same topic area, had similar tone, and were of comparable sentiment. The findings were also limited due to potential difference in software performance on different types of documents thus, at this point, it cannot be assumed that software accuracy performance will be consistent across types of authors, categories of documents, or genres. The accuracy of stylometry software is potentially limited if an author attempts to obfuscate their work in an attempt to replicate a specific authorial fingerprint, although it seems unlikely that a ghostwriter would have the knowledge, time, or energy to do this for a student. One delimitation was the selection of a specific journal on which to focus this pilot study. Another delimitation was the sample sizes. Although the selected sample sizes followed the guidance of available literature, larger and more diverse samples may have resulted in different findings. Future comprehensive studies are planned to address these weaknesses to provide more robust conclusions.

Although stylometry software may not yet be suitable for a standalone solution to contract cheating, it could, and conceivably should, be part of the evolutionary and systematic approach advocated by Rogerson (2017). Based on the findings of this study as well as those within the literature support, a methodical procedure should be developed for stakeholders to adopt in efforts to curb contract cheating. First, identification of caution "flags" is essential. These include a noticeable change in student writing, oddities in language (e.g., British versus American English), unusually low text similarity values, not answering the question, inappropriate references, misrepresented references, and past academic integrity violations by the student. One or more of these flags may warrant further investigation via one or more COTS stylometry software packages. This would also build a better case for stakeholders prior to confronting a student. Lastly, the knowledge by students that there are computer-based contract cheating detection methods in use may act as a deterrent.

Conclusion

The purpose of this pilot study was to determine if stylometry software could be a potential solution to the growing problem of online contract cheating. Based on the findings of this study, it is apparent that such software is capable of accurately detecting anomalies in authorship among documents. Just as text-matching detection software is not infallible and requires some level of interpretation, stylometry analysis cannot be expected to provide 100% accuracy and may require further appraisal by graders. Yet stylometry appears to provide the most auspicious solution to the quandary of ghostwritten assignments available. Further, the ease of use by computer novices as well as the lack of cost indicates that COTS stylometry software can provide a practical and low-cost answer to the question of how to detect and deter contract cheating. Moreover, upon familiarizing oneself with these software packages, testing could be completed within minutes in lieu of more tedious sleuthing through student papers.

What is clear is that stakeholders are losing the contract cheating battle and can no longer stand idle in the face of the issue. With further research into the best practices in terms of features, processing, and analytics called upon by the software can provide even more accuracy. As part of a systematic approach to contract cheating, stylometry software gives stakeholders a semblance of hope in dealing with this mounting threat to academic integrity. Just as importantly to catching

contract cheaters, stylometry provides a means of avoiding accusing students who submit legitimate work of something they have not done. In sum, stylometry software is an obvious and competent means of addressing contract cheating.

Recommendations for Future Research

Based on the finding of this study coupled with exigent literature, the following recommendations are made for future research. Researchers are encouraged to conduct a larger study utilizing JGAAP and JStylo to identify the best practices of software settings to improve accuracy and reliability. It is also recommended that a study takes place assessing stylometry software using actual student work versus contracted documents that address the same question or task. Lastly, studies on new contract cheating services, such as Turnitin's Authorship Investigate, should be undertaken to assess their capabilities.

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Appendix A: Figures

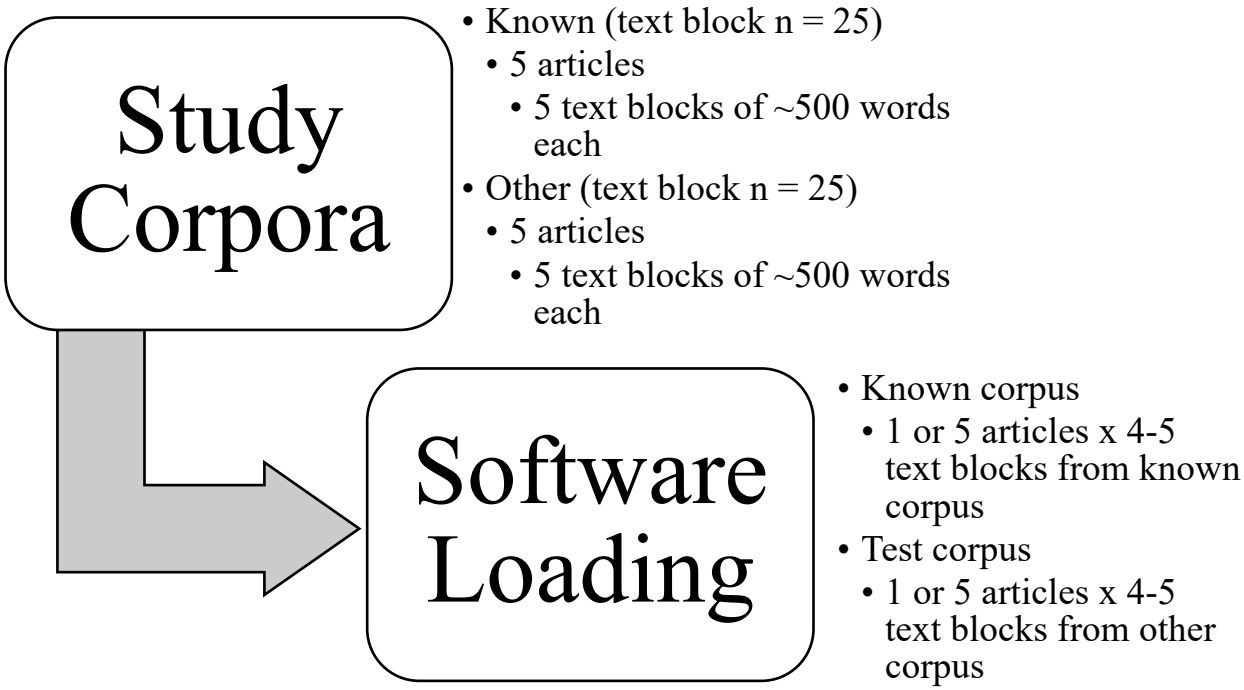

Figure 1. Document selection process for SSS.

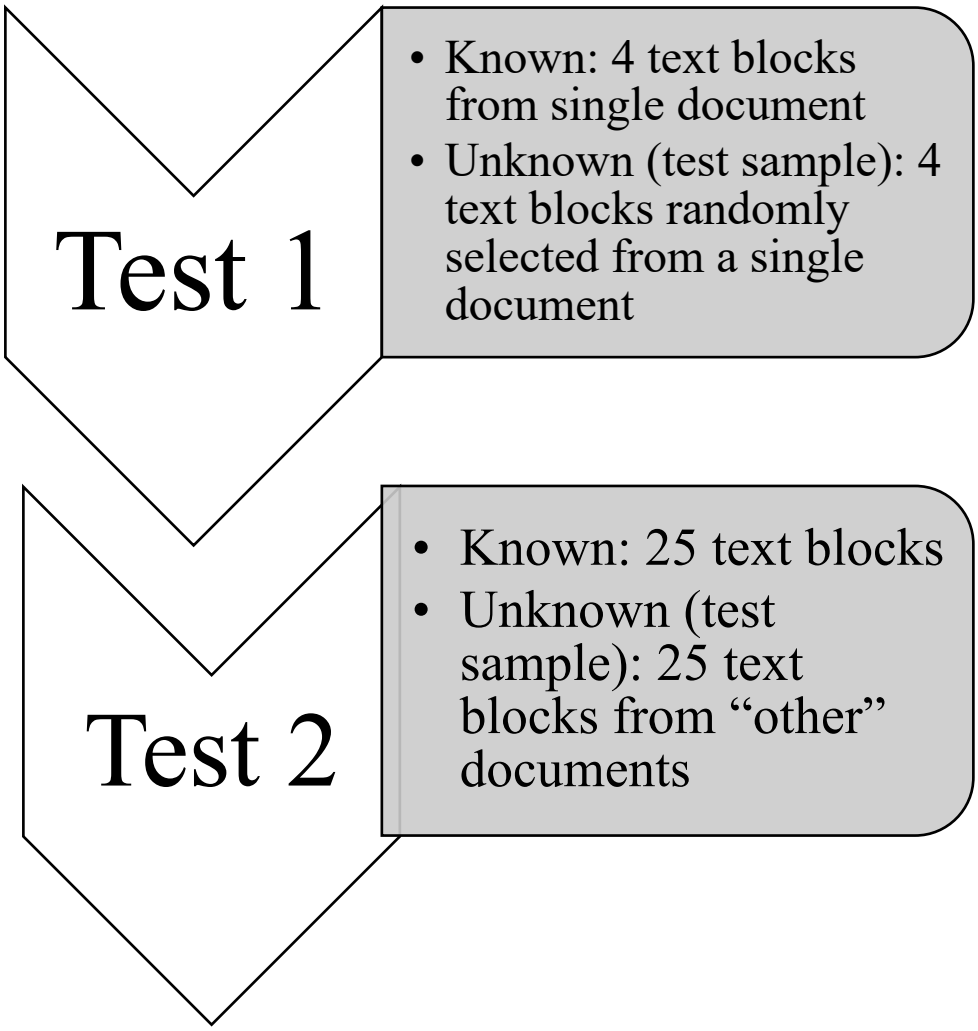

Figure 2. Testing procedures for SSS.

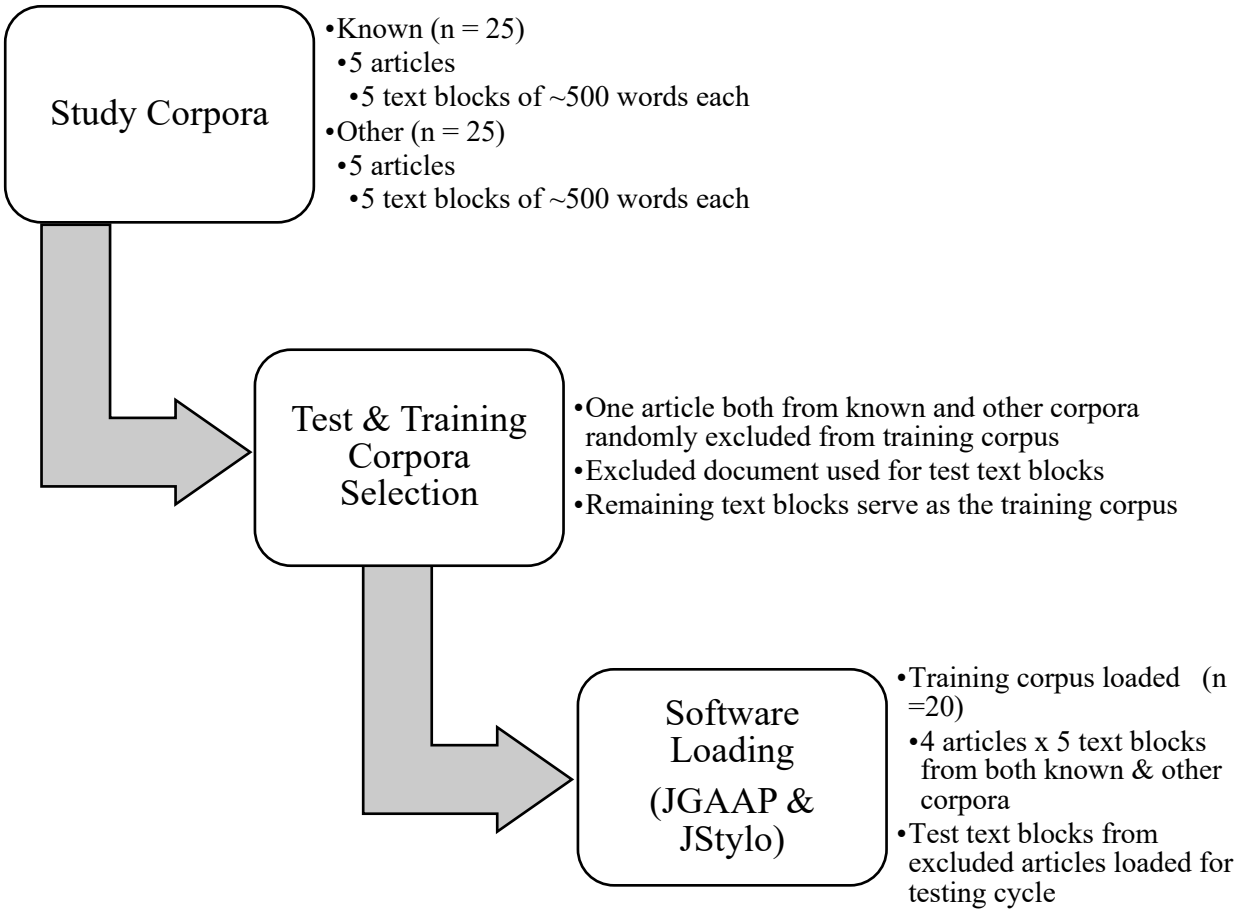

Figure 3. Document selection process for JGAAP and JStylo.

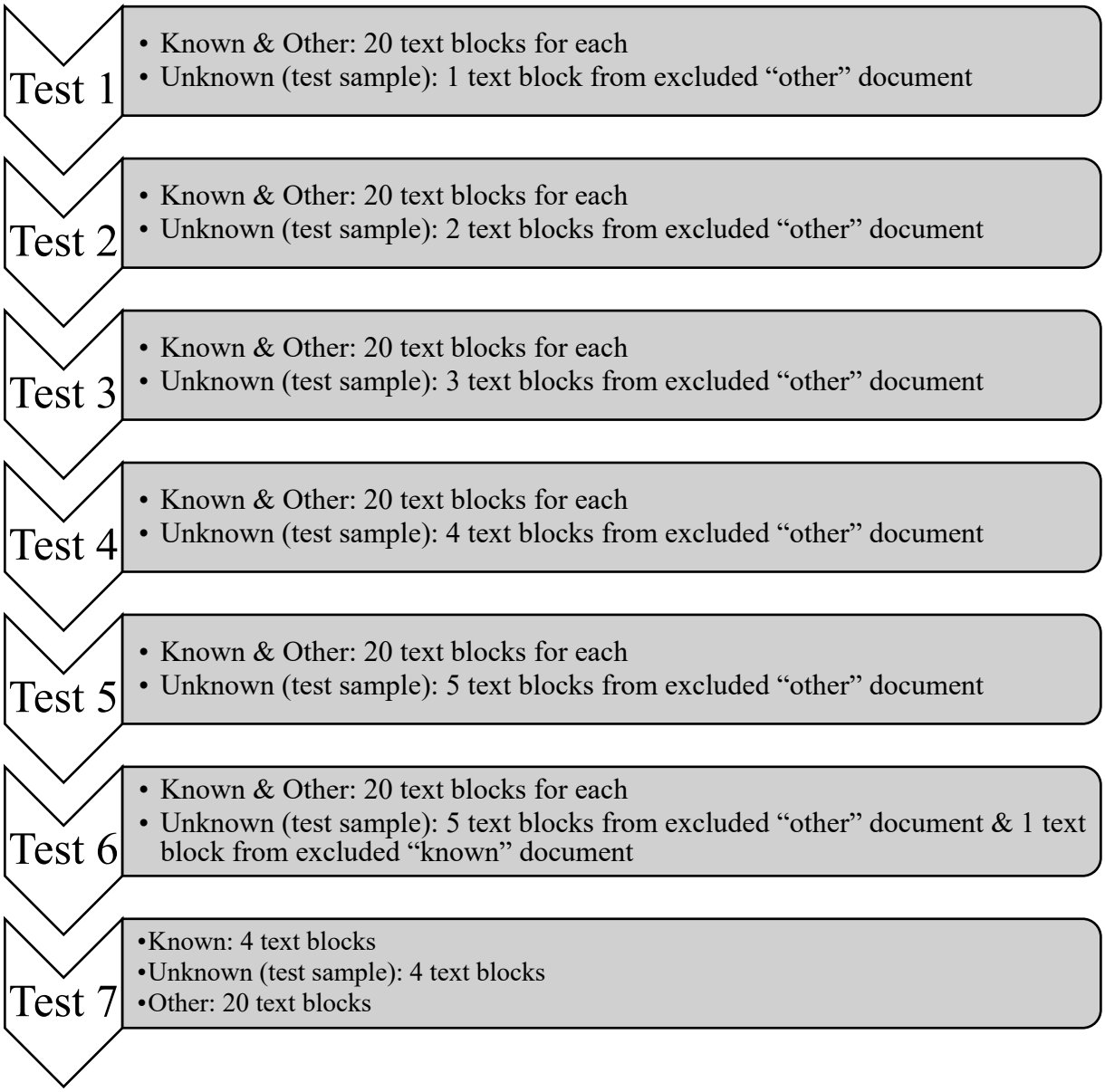

Figure 4. Testing procedures for JGAAP and JStylo.

From Design to Impact: A Phenomenological Study of HumanMOOC Participants' Learning and Implementation into Practice

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Abstract
The purpose of this research study is to shift the focus on Massive Open Online Course (MOOC) research by changing the narrative surrounding MOOC effectiveness from issues of course completion and certification to the impact of these courses on participants' actual practices. The "Humanizing Online Teaching and Learning" or HumanMOOC was offered four times with 2,614 participants overall and covered topics on the elements of the Community of Inquiry framework: social presence, teaching presence, and cognitive presence. Through phenomenological inquiry, literature review, demographics, and interviews, the researchers gathered and analyzed information from learners who completed the HumanMOOC. Three themes of the interviews that emerged from the coding analysis process are: *learning journeyers*, *I think I can*, and *bringing it back to the classroom*. The intention to participate and to overcome barriers and the increase in self-efficacy as a result of personal accomplishment, impacted the participants' will to implement what was learned into their teaching practice.

Keywords: community of inquiry, humanizing, online learning, online teaching, pedagogy, presence, MOOC, mentoring, self-efficacy

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From Design to Impact: A Phenomenological Study of HumanMOOC Participants' Learning and Implementation into Practice

Since their inception in 2008, Massive Open Online Courses (MOOCs) have generated considerable interest in the educational research community. This interest stems from the potential that these courses offer in providing flexible, affordable, and on-demand options for learning and development in a time of instant connectivity and constant change. Despite this rise in interest and research output, there are some major blind spots within this field of research that require serious attention. Early research in this area focused on categorizations of MOOCs based on their technological and pedagogical underpinnings, with this focus moving later to issues related to learners' experiences and patterns of engagement within a MOOC (Olazabalaga, Garrido, & Ruiz, 2016). However, this shift in focus did not extend beyond learners' experiences and engagement within a MOOC. Many researchers have pointed out the need to examine the impact these informal learning experiences have on participants' actual practices after they participate in a MOOC and how different design factors support or hinder the transfer of knowledge and experiences gained to real-life situations (Castaño, Maiz, & Garay, 2015; Olazabalaga et al., 2016). Some studies suggest that learners do not use the knowledge they gain in MOOCs in their jobs and that improvements in MOOC design could help remedy this problem (Milligan & Littlejohn, 2014).

Understanding what factors in MOOC design, pedagogy, and learning activities relate to the transfer of knowledge, by examining learners' experience after they leave a course, is an important and interesting area of study. The need to fill this gap in the literature becomes even more critical given the fast pace at which knowledge, technology tools, and job roles and responsibilities are changing —which means that traditional on-the-job professional development and training are no longer sufficient in addressing professionals' continuing need for learning and development (Littlejohn & Milligan, 2015). Unfortunately, research in the area of informal learning is still relatively limited, especially within teachers' professional learning literature (Gijbels, Raemdonck, Vervecken, & Van Herck, 2012; Jobe, Östlund, & Svensson, 2014; Macià & García, 2016; Manuti, Pastore, Scardigno, Giancaspro, & Morciano, 2015; Tour, 2017).

The purpose of this study is to examine the effectiveness of a MOOC offered on the Canvas Open Network entitled "Humanizing Online Teaching and Learning" (HumanMOOC) by exploring the impact that this informal learning experience had on learners' teaching and learning practices after they participated in the MOOC. The HumanMOOC covered topics on the elements of the Community of Inquiry (CoI) framework: social presence, teaching presence, and cognitive presence (Garrison, Anderson, & Archer, 2000). Our topics of inquiry were: In what ways has participating in the MOOC changed how participants perceive and enhance presence in their online courses? What factors (i.e., course design, personal, and institutional) supported or hindered the implementation of these changes in participants' actual practice?

Review of Relevant Literature

The Changing Nature of Professional Learning and Development

Advances in and widespread adoption of digital technologies and network-based services have transformed what we need and expect from professional development and learning. These new expectations are influenced not only by technological advances, but also by changes in the pace and nature of professional knowledge and skills as well as employees' and practitioners'

expectations for continuous opportunities and support for learning and development (Brown, 2017; Deloitte Insights, 2018; Gijbels et al., 2012; Kukulska-Hulme, 2012; Littlejohn & Milligan, 2015; Purvis, Rodger, & Beckingham, 2016; Thacker, 2017). Deloitte's fifth annual Global Human Capital Trends survey and report (2018) defines the twenty-first-century career as a "series of developmental experiences, each offering a person the opportunity to acquire new skills, perspectives, and judgment" (p. 41). The rapid pace at which old skills need to be redeveloped and new skills acquired is unprecedented and the nature of skills that are needed and valued in today's workforce is changing. Human-centered skills such as cross-disciplinary thinking, leadership, communication, and problem-solving skills are becoming more critical for success and adaptability than pure technical competencies and know-how (Deloitte Insights, 2018). With higher education lagging in providing flexible options for the development of these skills, organizations are taking the lead in reinventing professional learning and development by providing employees with access to self-directed and individualized learning solutions that enable them to take charge of their learning and address their current professional needs as well as to develop the skills of the future. Dynamic and personalized solutions are made possible through the curation of not only internal but also external content, such as open resources and MOOCs via learning and knowledge-sharing networks (Deloitte Insights, 2018; O'Brien, 2018).

Researchers and practitioners in many fields are acknowledging the implications these socioeconomic and technological changes have on how to effectively engage individuals, including higher education faculty and staff, in professional development and learning activities, which can no longer be fulfilled using traditional forms of formal professional development such as standalone, face-to-face, and intermittent workshops and seminars (Eraut, 2011; Fontana, Milligan, Littlejohn, & Margaryan, 2015; Gijbels et al., 2012; Manuti et al., 2015; Stewart, 2014; Tour, 2017). These changes and new demands have given rise to other forms and models of professional learning including online informal learning venues that are ongoing, affordable, focus on the development of a community of peers through the use of social media and in line with the realities of a technology-driven and networked world (Gast, Schildkamp, & van der Veen, 2017; Jobe et al., 2014; Littlejohn & Milligan, 2015; Stewart, 2014). Such informal online learning opportunities and environments using social media tools and applications allow educators to become more active and take charge of their path of learning by sharing knowledge and experiences, reflecting on their current practices, and connecting with peers and networks outside their respective institutions. In addition, it allows for in-time access to information and support as the need arises, which can be difficult to accomplish using traditional professional development methods (Kukulska-Hulme, 2012; Macià & García, 2016). Further, by providing faculty with the opportunity to engage with and adapt different technologies and social media tools in their own professional learning, they not only develop the skills and strategies needed to take charge of their own ongoing learning and development, but also develop an understanding from a student's perspective of how to best utilize these tools in their own teaching and professional practices (Kukulska-Hulme, 2012; Purvis et al., 2016; Stewart, 2014).

Faculty Informal Professional Learning and Development: Trends and Strategies

Faculty development and learning remains a critical issue that has faced higher education institutions for the past few years (Brown, 2018). Advances in digital technologies and open access to online content and networks have brought forth many learning opportunities and affordances that were not previously possible. However, informal learning as a construct has not been clearly defined or critically examined in the literature. One of the difficulties in reaching a unified

definition of informal professional learning is that it encompasses a wide range of activities that vary significantly in terms of timing, role of the trainer or instructor (if any), source, structure, and intention, which makes it a challenge to identify and explain (Eraut, 2000, 2011; Livingstone, 2001; Manuti et al., 2015; Schulz & Roßnagel, 2010). For instance, informal learning can be self-initiated and self-managed by the individual as a response to an existing or anticipated need or can occur unintentionally or incidentally as a byproduct of day-to-day work responsibilities (Eraut, 2011; Tour, 2017). These informal learning episodes can happen in structured informal activities, such as Twitter chats (Kilgore, 2016), or unstructured contexts such as interacting with and observing coworkers or dealing with work challenges (Eraut, 2011). Moreover, informal learning episodes can take the form of self-study or can exhibit strong social elements through engagement with others in discussions and problem-solving activities (Manuti et al., 2015). While the theoretical underpinnings of and differences between formal and informal learning are outside the scope of this study, mentioning this distinction does highlight the importance of informal learning experiences for professional learning and development purposes.

As a result of these technological advances and changes to workplace expectations, researchers and practitioners are beginning to examine and experiment with less formal and more innovative professional learning initiatives in an attempt to understand how best to support faculty as they engage in self-directed, social, and just-in-time learning. For instance, Kelly and Antonio (2016) examined teachers' use of large and open teacher groups on social networking sites such as Facebook to access informal online peer support and found evidence of teachers' pragmatic use of these open informal networks to connect with other teachers, socialize, and seek and provide practical advice about teaching and teaching practices (e.g., sharing resources and responding to one another's questions). Structured Twitter chats have also been used to connect geographically distributed educators and form open online communities in order to facilitate authentic and just-in-time learning and support (Beckingham, Nerantzi, Reed, & Walker, 2015; Kilgore, 2016). Using phenomenological research methods, Kilgore (2016) analyzed 46 U.S. state-level Twitter chats to evaluate their structure, underpinning pedagogy, and perceived value. Kilgore found that these Twitter chats allowed the formation of informal and collaborative online learning communities that extend beyond school walls, and beyond the Twitter chat itself in some cases. In these informal online communities, participants share different perspectives, engage in professional discourse, challenge each other's ideas, and connect with experts and peers based on their own needs and schedule—all things that are not easily accomplished with institutionally sponsored one-size-fits-all workshops and seminars.

MOOCs for Informal Professional Learning and Development

MOOCs have quickly evolved and adapted to market needs. Earlier MOOCs were offered as stand-alone courses that were open to anyone and everyone in the world, without a clear sense of who, how, or why individuals join and participate in MOOCs (Daniel, 2012; Shah, 2016a). However, as MOOC research progressed, so did our understanding of the different engagement patterns and purposes of MOOC learners. One major and recent trend concerns the packaging of these courses and how they are promoted to address the needs of well-identified subgroups of target audiences (Shah, 2016a, 2016b). A clear example of this is the shift toward more specialized MOOCs that specifically target the corporate sector (Johnson, 2017). One example is Coursera, which now offers Coursera for Business where organizations can handpick courses for their employees and track their progress through them. This trend, while in part motivated by monetary reasons (Cook, 2016; Shah, 2016b), arose in response to market demands. For instance, Radford,

Coningham, and Horn (2015) found that more than two-thirds of learners who signed up for one or more of the 24 MOOCs offered by the University of Pennsylvania through Coursera were working professionals, and over half of the registrants signed up for their MOOCs to either develop specific skills for their current jobs or learn new skills to get a job. Similarly, Littlejohn, Hood, Milligan, and Mustain (2016) examined the goals and motivations of 362 participants in an Introduction to Data Science MOOC offered on the Coursera platform. The researchers found that learners' primary motivations for participating in the MOOC were relevance to work, professional development, to expand their skill set, and to support career development and advancement.

This shift in the MOOC landscape highlights major implications that cannot be overlooked from a design or research perspective: the audience these MOOCs are targeting. MOOCs, especially those offered through major MOOC platforms, seem to have made a decisive shift toward professional learners who are seeking credentials that are acknowledged by organizations by focusing on assessment of high-demand skills in business and technology (Cook, 2016). As a result of this shift toward professional learning and development, research focusing on the design and implementation of MOOCs that is in line with the needs and wants of working professionals is gaining momentum (Littlejohn & Milligan, 2015). With that being said, most of these studies are descriptive in nature and focus on learners' experience within a MOOC, or on the potential that MOOCs offer as a professional development option for practitioners in addressing organizational and institutional goals and bottom line (Radford et al., 2015; Laurillard, 2016). Although there is a consensus among practitioners and researchers regarding the need to understand the effectiveness of these courses as informal professional learning options and their impact on working professionals' actual practices, this area of research remains a serious challenge (Jobe et al., 2014; Milligan & Littlejohn, 2014; Sneddon, Barlow, Bradley, Brink, Chandy, & Nathwani, 2018). This study is an attempt to fill this gap by understanding learners experience in translating what has been learned in one specific MOOC, the HumanMOOC, to their actual practices.

Humanizing Online Teaching and Learning: The HumanMOOC

The HumanMOOC was designed to create a space that supports the formation and development of a community with the goal of exploring and sharing ideas and thoughts regarding online learning and teaching, rather than one-way knowledge dissemination. Further, a dual-layer design was used to accommodate the needs and preferences of HumanMOOC participants while still supporting the development of an active community of learners (Kilgore & Al-Freih, 2017)). The first layer was contained within the Canvas Learning Management System (LMS) and served as a private "members-only" sharing and learning space for those who were not comfortable having their thoughts and comments displayed on the open Web. The second layer of the course was built around principles of connectivism, and participants were encouraged to share their learning process and progress openly on the web (e.g., blogs, Twitter, and other tools they wanted to explore). In both layers, participants engaged in the same weekly activities and assignments; however, the way that learning occurred and how assignments were created and shared were different (see Figure 1).

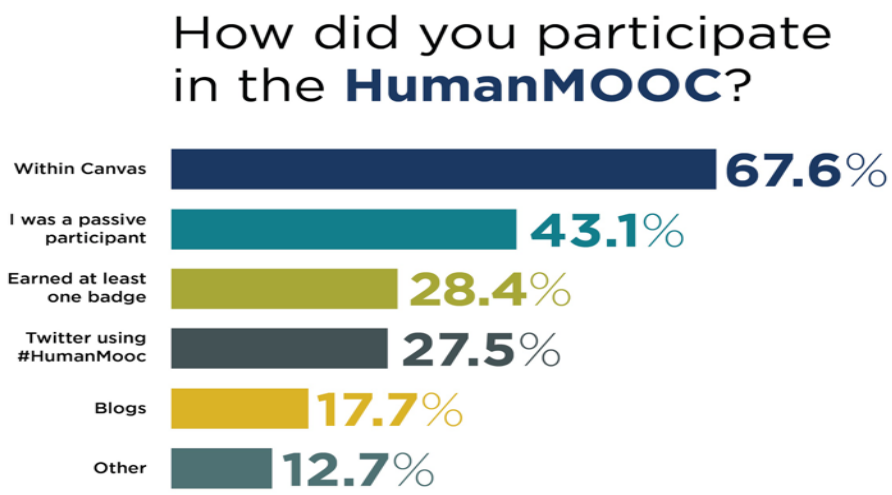

Figure 1. Participation patterns in the HumanMOOC.

The course consisted of three one-week modules covering the following topics: social presence, teaching presence, and cognitive presence. One major design consideration for the HumanMOOC was to ensure that its design was a direct translation of the principles of CoI. Thus, the course focused not only on covering topics related to CoI, but also on engaging participants in learning that allowed them the opportunity to experience what it feels and looks like to enhance presence in their own online courses. Participants had the option of earning single badges for completing the weekly assignment for the weekly topics (presences) they choose or earning a completion badge if they decide to complete all weekly assignments and badges in the MOOC. Instructional materials in the course included asynchronous discussions, expert interviews, synchronous discussions with experts, and scholarly articles. Graded assignments included:

- Creating and sharing an instructor introduction video and reflecting on the process of doing so in the discussion forum;
- Completing an assignment using VoiceThread, Flipgrid, or YellowDig, and reflecting on the experience in the discussion forum;
- Completing and reflecting on a triggering-events activity;
- Completing a peer review assignment in the discussion forum.

Purpose of the Current Study

Educators and professionals spend a considerable amount of time participating in and learning from informal professional learning activities and interactions (Eraut, 2011; Gijbels et al., 2012; Macià & García, 2016). Despite this, educators' informal professional learning is understudied because of the wide range of informal and tacit experiences that contribute to faculty professional development and learning (e.g., discussion forums, Twitter chats, MOOCs, etc.), which adds to the difficulty of measuring its effectiveness or how it relates to the individual educators' actual practice (Boud & Hager, 2012; Desimone, 2011; Macià & García, 2016; Tour, 2017). Meaningful understanding of professional development and learning cannot be reached without understanding how it is translated into actual practice. Professional knowledge and skills

acquired in professional development activities are not static, but rather subject to different interpretations by individuals that can only be understood through examination of their actual practices (Dall'Alba & Sandberg, 2006). Hence, this study attempts to extend our understanding of MOOCs as professional learning and development venues by exploring participants' experiences after they have participated in a MOOC and the impact the MOOC learning experience had on their actual practices.

Methods

Research Design

A qualitative phenomenological study was conducted to explore how participants in the HumanMOOC perceived the phenomenon of implementing what they had learned, and its impact on their practices, after participation. Qualitative research is a naturalistic method that allows researchers to interpret and try to understand how participants experienced events they engaged in (Denzin & Lincoln, 2005). The goal of phenomenological inquiry is to "obtain comprehensive descriptions that provide the basis for a reflective structural analysis that portrays the essences of the experience" (Moustakas, 1994, p. 13). Further, at the heart of phenomenology are the perspectives of individuals as the way to further understand a particular phenomenon (McConnell-Henry, Chapman, & Francis, 2009).

Data Sources and Collection Processes

Sources of data include literature review, demographics, and interviews. A survey was released to participants of the multiple iterations of the MOOC to deploy the initial demographic and those willing to be interviewed for the study volunteered after completing the questions. One-hour semi-structured interviews with open-ended questions were conducted with 10 participants to explore how participants in the MOOC learned and applied what they learned about using technology in support of learning goals and the CoI to enhance teaching, social and cognitive presence in their courses. Participants were asked about their intentions in taking the MOOC, their experience learning how to use new types of technology, and their experiences implementing what they learned in their practice. All interviews were conducted using Zoom, an online synchronous communication platform. These Zoom sessions were recorded and the audio transcribed and checked prior to coding for analysis.

Data Analysis

The first level of analysis from the participant interviews was aligned with the phenomenological approach for analysis (Moustakas, 1994). Researchers reviewed the transcripts and made note of important phrases and initial questions that might need further explanation. Next, transcripts were coded individually by researchers using *in vivo* methods, to honor the voice of each participant (Saldaña, 2009). Researchers met frequently during this process to discuss emerging codes and themes, and to address any questions that needed clarification. The next coding approach was used for theme development. Researchers entered the codes from the *in vivo* process from all researcher into NVivo, a data analysis software program. NVivo was used to assist in categorizing and consolidating the codes and to work toward theme development in a collaborative manner.

Validity

We utilized multiple methods to establish validity, credibility, and trustworthiness to ensure the findings are "faithful to the participants' experience" (Ravitch & Carl, 2015, p. 3924). To establish credibility researchers used member checking, peer debriefing, thick description of theoretical and methodological foundations, and triangulation. Three of the four researchers were wayfinders, or coaches who guide participants to meet their learning goals, of at least one iteration of the MOOC (Kilgore & Lowenthal, 2015). Potential biases were discussed during whole-group meetings, as well as reflective exploration of past experiences that might shape interpretations. Investigator triangulation through collaborative research, multiple perspectives, peer coding, and debriefing were integrated to contribute to validity measures (Ravitch & Carl, 2015).

All interview transcripts were anonymized prior to transcription. Names, locations, and other potentially identifying information were changed. Transcription was performed by a third party and verified by the interviewer and interviewee in preparation for coding using member checking. During data collection the researchers used purposeful sampling to gain different perspectives as a data triangulation approach. Further, perspective triangulation during data collection was used to make sure enough data was gathered to analyze. We continued to reach out to additional volunteers to obtain the depth and quality of information needed to answer our topic of inquiry (Ravitch & Carl, 2015).

The four MOOC versions had the same foundation and activities, but with different participants each time there was variation in the experience and discussions brought to light. It was important to find participants who took different iterations of the MOOC. By looking at these different participant perspectives the researchers were seeking a holistic view of how the MOOC impacted participants' teaching practice in regard to the different presences.

Results

A total of 2,614 participants from around the world joined the HumanMOOC during one or more of its four iterations that ran from 2013 to 2017, with a team of four wayfinders that included faculty and instructional designers working on the design and iterations each time the course was run. A total of 102 completed responses to the survey were included in the final analysis. The sample included 62.7% females and 36.3% males. The majority of respondents were 30 or older (96%) and held a master's or doctoral degree (85.3%). Of those 102 respondents, 78.4% were full-time employees, 14.7% were part-time employees, 4% were not employed, and 2.9% were retired. Employment titles included college and university professors and lecturers, instructional and learning designers and technologists, program directors, project managers, and researchers. Participants were also asked about their previous experience with MOOCs, with an overwhelming majority indicating prior experience (97%).

Because the researchers were interested in understanding the impact on practice as a result of participation in the MOOC, completing the MOOC was one criterion for inclusion in the interview pool. Hence, only participants who completed all weekly assignments and earned a HumanMOOC completion badge were recruited for this study. We defined completion as earning all badges in the course for recruiting participants. Those participants were invited to join the study with a recruiting message shared via the email list from the course registrations. The message explained the purpose of our study and that we would be recording interviews and asking them to

fill out a survey. Participants were informed they would be asked for their permission to record the audio of their interviews and that pseudonyms would be used. We invited them to complete a survey containing demographic items and CoI questions, and asking if they would participate in a 45-minute to one-hour interview.

Themes

Based on the initial analysis of the transcripts, it was evident that to understand how and why participants changed their practices as a result of the MOOC, one must understand their initial intention and motivation for joining the MOOC. Consequently, the idea that the 10 learners of the HumanMOOC who participated in the semi-structured interviews were on a journey or path was compelling. Upon further analysis and following a consolidation process, three major themes emerged: *learning journeyers*, *I think I can*, and *bringing it back to the classroom*. We found a number of categories that cut across the two themes of *I think I can* and *bringing it back to the classroom* as depicted in Figure 2 which is further explained in the following theme discussion.

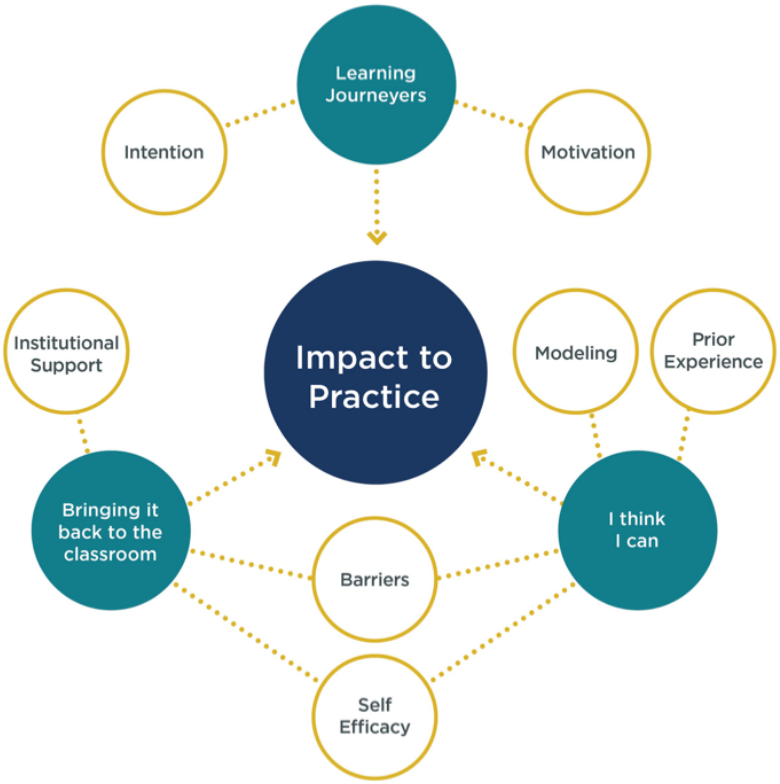

Figure 2. Categories and themes connected to learners' impact to practice

Learning Journeyers

The intention and motivation for participation, completion, earning badges, and engagement in MOOCs were connected to the theme of those we interviewed being on a journey or cycle of learning. All participants interviewed had clear, albeit different, intentions for joining the MOOC, and understanding their experience of implementing what was learned in the MOOC cannot be fully understood without careful consideration of their initial goals and intentions, and their individual learning. The intention to be a part of a learning community was a stronger thread

than the intention to simply follow through with the course to completion. Julie explained this idea by stating "after so many different MOOCs that I attended, when I say that my intention is not usually to complete, it's because my intention is to learn other people's opinions." Eric said that the MOOC activities were a great way to build community and connections. He recalled a specific event when a leader in the social media community he follows led a Google Hangout and he connected with her:

> It was really fun to see her live in the Google Hangouts, and actually for whatever reason, I got to be a part of it, that chat, which was great…to be able to ask some questions and just to put a face to a name and to a Twitter feed that I'd been following for a while and had connected through kind of more non-face-to-face experiences…again that just continued to solidify that sense of social presence that she was talking about in that setting.

The intention and motivation for a few others in taking the course was specifically to integrate learning in their classrooms or to learn new e-learning techniques. The use of the CoI model and the specific LMS used, Canvas, were important factors in some participants' learning. Julie explained that she joined the MOOC with the intention of participating in the discussion and learning from the conversations, not for completing assignments or completing the content. An important takeaway for Beth was understanding that

> it's about who you're learning with, or, you know, and how people are engaging with each other that actually challenges you and makes your thinking bigger and makes you think about things in a different way than you have before. That was big part of the value that I got out of it, because I did go outside of my comfort zone.

Those interviewed had mixed feelings about the motivation of badges offered during the course. During the first iterations of the MOOC, badges were new and participants were either highly motivated to earn badges or not. Heidi stated, "I know badges motivate some people. They like to have their recognition public. It's not for me. My goal was really to look for new techniques." Missy, on the other hand, earned all the badges. "The badges at that point were kind of the icing on the cake or the caramel on the ice cream. It was the topping that kind of enticed it and sweetened it (the learning)."

Another discovery regarding the theme of *learning journeyers* was that participants in this study take MOOCs regularly, and a few had participated in the HumanMOOC multiple times. Julie said that the HumanMOOC helped her identify "what I look for, why I enjoy some courses and I stick with them until the end…reflect on why, or discover some of my motivation, where my motivation lies when it comes to humanizing." Additionally, learning from others in a culturally diverse MOOC and from a variety of professors is a benefit of participating in MOOCs. Julie stated: "I noticed that my motivation and engagement is affected by the style of the instructor, not just the design of the course, or not just the subject." She took two MOOCs on the same topic with similar content, but was more engaged in the HumanMOOC simply because she preferred the instructor's style and interaction. The reflections that all the participants shared during the interviews were candid and the challenges they faced, as well as their likes and frustrations, were shared as part of their skill development and overall learning.

It was evident that all interviewees had clear intentions and purposes for joining the HumanMOOC that went above and beyond simply earning badges or completing the course. These intentions were either directly linked to improving their practices in the classroom by developing

new skills (technical and pedagogical) and strategies based on the content and activities they engaged with in the MOOC, or indirectly linked through the formation of a community and network of peers with other MOOC participants.

I think I can

Those interviewed described themselves as having a range of prior experiences and beliefs in their ability to use technology in their teaching. Each of the participants in this study described their participation in the MOOC as having increased their knowledge in some way. Jessica said:

> I'd say I got confidence because I saw some things that you were doing…. How the course was set up that I could translate to our D2L [Desire2Learn] learning platform, but the concepts…. As I looked back on it, it was more of a boost to get some ideas and then some confidence that I can do this. I can engage people. Our program has tripled in size at least. I know it's working.

Nell described how the experiences from the course helped them better understand the importance of scaffolding and modeling, stating:

> My biggest transformation, my thinking was that I've got to go a little slower than I thought with people, because I've got to give them things that they can have a really positive experience with to build up their confidence so that they will kind of take off with things.

Additionally, Nell stated:

> I really understood that it's about who you're learning with, or, you know, and how people are engaging with each other that actually challenges you and makes your thinking bigger and makes you think about things in a different way than you have before. And that's sort of…. That was big part of the value that I got out of that course, because I did go outside of my comfort zone.

Those with prior experience using technology in their teaching found the opportunity to build on what they already knew through learning from the experiences of others and sharing ideas. Jessica explained that she has always liked different technologies and wanted to expand her horizons. Tim explained that the course

> opened my eyes to a few others [i.e., other technologies], and even had me look at some other ones that we already used in a new light…there's that one technology, VoiceThread, which Webster does not have a license for. And that was something I always thought was cool, but I didn't really think that it was necessarily worth the extra cost.

Seeing the direct integration of different technologies was helpful to Eric. He recalled the use of the instructors giving feedback through video recording during the HumanMOOC, which was new to him. Instructors modeling the use of video feedback during the MOOC was helpful to his implementation in his current course and is something he continues to use.

Participants identified both personal and institutional barriers that got in the way of them implementing what they had learned in the MOOC. Participants mentioned a lack of opportunity within their own institutions to get advice, learn new teaching methodologies or find support to implement in practice what they had learned. Todd said:

> I haven't had much opportunity to practice any of it yet. At the time I was enrolled or about to enroll in the master's program in instructional technology and I intended to use a lot of the information I learned from your course and from what I'd experienced in ModPo but circumstances didn't allow me to follow through on completing that program so I still have a lot of that information locked up in my head and if the opportunity allows me to pursue that line of learning again in the future I intend to use those things.

Jessica identified institutional barriers and lack of support:

> I didn't feel that there were a lot of people at the university or with even in our university system that knew much about online teaching and learning…we did not have, or there weren't tutorials that were good that I could just learn about what I was supposed to do.

Bringing it back to the classroom

While participants highlighted the sense of support and increased confidence that came from collaborative experiences in the MOOC as well as the wayfinders modeling technology in their teaching and practice opportunities that came from the experience, it was not easily integrated into their actual practices at times because of different barriers participants faced when attempting to implement strategies learned in the HumanMOOC. Matt expressed his frustration with his lack of implementation of the ideas he took away from the MOOC, saying "my frustration with my participation in your course, was that I thought, I should really start to implement these things. I had good intentions for a while to do that, but they slipped away."

Tim faced some institutional obstacles related to licensing new software:

> I actually convinced my university to allow me to use Flipgrid for all of the discussion questions. For a while it was not even approved, but I had to keep pushing and showing them examples. I went to Flipgrid and got them to allow me to beta test it for 90 days or something. So, I even showed them how that would look and then I got permission to use it in the class.

Technological barriers existed for Eric who became frustrated with the video feedback recording tool in the Canvas speedgrader; he sought tech support on his campus to overcome this obstacle. While technological barriers can cause some to discard implementing a new approach, rather than give up, Eric found a workaround using Zoom to record his feedback for students instead.

When asked about how the course may have impacted their teaching practices in a positive way, several interviewees shared their lived experiences of implementing new pedagogical approaches and technologies. For some participants, like Holly, the gains were in how to think about who their students were. Holly said, "what I got out of that [course] was actually a way of thinking about who your learners are was much more…was where the change occurred for me, I think, in terms of my teaching." Missy said:

> I think maybe the other piece that did have impact was building that social presence very early into the course so that there are relationships between the students themselves beyond their relationship with me and I think what I do differently now than I did before was structure groups and open spaces that kind of are conducive to building and engaging social presence.

In the HumanMOOC, each participant was asked to engage on tools external to the LMS in whatever way made them most comfortable while allowing those who wished to engage in the open to do so. One way to participate in the open was to join live Google Hangouts where we also had live Twitter Chats running at the same time, which was facilitated by one or two of the wayfinders using the hashtag #HumanMOOC to extend the discussion within the Google Hangout and reach a wider audience. Jessica was inspired by this approach and is now using Twitter in her teaching.

> I have all my students…develop a Twitter account and all of my classes include some Twitter chats, and then learning about where else you can go to engage in other Twitter chats. Then we do, although when I run an online class we generally just, it's not that many people so we just use the chat feature there if somebody wants to ask another question. I did model that…I really liked [it], that was my first experience with Twitter as a Twitter chat thing.

The HumanMOOC wayfinders made every effort to model effective practice using each of the technologies presented. Eric described how this modeling of effective practices led to an impact on his program:

> so that was something, I think that I really picked up from the time at HumanMOOC as I was in the middle of revamping that program. And I just thought okay, this is really significant to keep in there. And that isn't to say that we don't try other methods through the…[for] which we now use Canvas, through the Canvas classroom to engage with students and show a video and just discussion forums and stuff. But to continue that sort of live synchronous session was I think a significant part of what we continued as a result of the class.

Eight of our 10 interviewees mentioned they had not used video in their teaching before taking HumanMOOC, but afterward implemented it on their own in their online and blended teaching, whether by adding instructor videos to the course, adding video to the discussions, or providing voice and video feedback. Missy spoke of her experience producing instructor videos:

> I balked at it first and then I just saw the power and potential of it. So no, that was not part of my course at all [before HumanMOOC]. And even now with the face-to-face course, I'll present those even before the students come to the classroom so they'll know who I am before they walk in the room. So, the power and potential of building that relationship, I think with the students, at an early point in the course I think is so critical.

Tim talked about his first time teaching using video and said that his course

> exploded through the use of video where I was not expecting it to be as powerful as it was. But it really was, and I think largely because of the types of questions I was asking. But also just students had never been in an online class with using video in that way.

Amy teaches writing and has started encouraging her students to use SoundCloud to record their writings as podcasts in their own voice, so that the students can listen to what they wrote and correct their own work.

Several participants mentioned implementing voice and/or video feedback on assignments and they all felt that it had a positive impact on the student experience; however, some said they

would intentionally ask students in the future to describe the way they used the feedback and how it made them feel compared with a grade or text-based feedback. Tim said that he began to provide video feedback on a couple of the assignments in his course, "And the reason that really helps in computer science and it really helped our department is because sometimes it's so difficult to explain where the error is or the problem is just via text in an email." While Tim felt this was a more effective method, the videos took time to produce and he didn't have a sense of how the students received them. Eric had the same experience; as he implemented the use of voice and video feedback, he didn't collect information from his students on their effectiveness and will work to do so in the future. Missy did obtain input from her students when she implemented video feedback in her teaching after the HumanMOOC and said "the feedback from the students was just phenomenal."

Missy also implemented Flipgrid after learning of it in the course. She said that the use of video discussions made it easier to see who was present in the discussions and added a layer of accountability that gets lost in text-based discussions. As an instructor she said that it allowed her to have a better understanding of "who they [her students] are and what their intentions or goals are for the course so I can support them in that learning."

Discussion

While participants in this study indicated different intentions for joining the MOOC (e.g., form connections, learn new e-learning techniques and best practices, exploring the LMS), they all stated that completing the MOOC was never their top priority. This is consistent with what is found in the literature as a number of researchers point out that, from MOOC participants' perspective, meaningful learning is not defined by time in a MOOC or completion, but rather by each participant's learning goals (Liyanagunawardena et al., 2014; Loizzo, Ertmer, Watson, & Watson, 2017; Zheng et al., 2015).

One of the major themes that emerged in this study is the increase in participants' self-efficacy beliefs as a result of participating in the MOOC, which supported and encouraged change in participants' practice. Perceived self-efficacy was formally defined by Bandura (1997) as one's personal beliefs about his or her capabilities to organize and execute courses of action to attain designated goals. Thus, self-efficacy beliefs do not concern an individual's actual skills and abilities, but rather judgment about the skills and abilities each possess. According to Bandura' theory of self-efficacy (1977), there are a number of sources that can be highlighted in a learning environment to support and promote the development of self-efficacy. Of special relevance to the development of self-efficacy for learning in MOOCs based on the findings of this study are vicarious experience, or one's observation of a role model performing the task successfully, and verbal persuasion.

Modeling both in terms of course design, which was based on the CoI framework (Garrison et al., 2000) as well as facilitation and interactions within the HumanMOOC by the wayfinders was important to learners and to their reported and future implementation of different technology tools and best practices in course design. New insights into pedagogical practices as well as emerging technologies to support humanization of online learning were learned in the HumanMOOC. Modeling the use of these tools can support the integration of these tools for participants as it allows for them to explore tools from a learner's perspective. Modeling was a

strong factor in this study and should stand as its own category and not just a source of self-efficacy.

Frequently, professional development experiences involve one-way information being pushed out to the participants, allowing no space for application, practice, or feedback. The opportunities in HumanMOOC to practice, and also receive feedback from peers and wayfinders on that practice, enabled learners to feel a sense of accomplishment and to get constructive feedback in a safe space. As Tim stated: "the HumanMOOC wasn't just information [at] all. It was, 'Hey, let's explore these things together.' And it felt like even the wayfinders were exploring them in some cases with us, which was neat." This finding is not unique to this study and other research in the area of technology integration have highlighted the role that a community appraoch to professional development plays in improving participants actual practices (Sullivan, Neu, & Yang, 2018).

Those we interviewed approached their learning as illustrated in Figure 3. Their learning is a cyclical approach that is directed and affected by a representation of major themes within a learning cycle/journey: motivation, modeling, intention, challenges along the way which deepens the learning happening on that journey. The *learning journeyers* theme encompasses intentions and motivations for learning that started before joining the HumanMOOC. The *I think I can* theme builds on the learner's prior experience and the modeling by the facilitators increases self-efficacy beliefs. *Bringing it back to the classroom* happened after the HumanMOOC as learners implemented activities and technology tools into their classroom or course, which circles back to the journey that learners take to develop and refine skills for their professional informal learning.

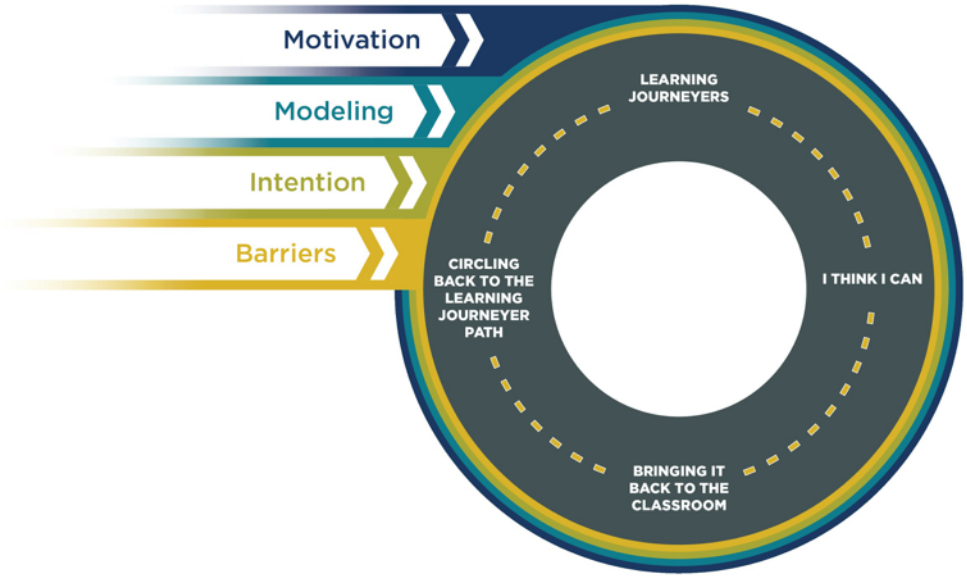

Figure 3. Factors influencing learning cycle in HumanMOOC.

The provision of ongoing, self-directed professional learning is a strategic goal for business, thus blurring the line even further between formal and informal learning (Deloitte Insights, 2017, 2018). The discussion needs to move away from "what is" to how we can integrate all available resources, whether formal or informal, to improve actual change in practice. Our hope

is this study helps fill this gap by examining how faculty's participation in the HumanMOOC translated into actual change in practice. The findings can inform policymakers or learning and development units of how to strategically and effectively utilize informal and open resources for professional learning and development.

Given the informal, free, and flexible nature of MOOCs, participating in MOOCs was a result of a personal choice made by participants based on their individual and specific needs. However, implementing what was learned and experimenting with new ideas as a result of joining a MOOC can not be fully realized without institutional and pedagogical support. A number of participants shared their frustration with the lack of support as they try to integrate new technologies into their practices, indicating that at times the lack of integration into actual practices might not be so much related to MOOC design or personal factors, but rather contextual and organizational factors, an important issue to consider when using impact to practice as a measure of MOOC effectiveness.

Conclusion

The wider socioeconomic context in which higher education operates has not only provided new opportunities for professional development and learning, but has also redefined the meaning and basic assumptions we hold about work, development, knowledge, and learning (Eraut, 2011). In this new work context, individuals are not only encouraged, but expected to stay current in their field and abreast of new changes and developments because of the central role that personal learning plays in individual career development as well as overall institutional success and competitiveness (Gijbels et al., 2012; Manuti et al., 2015). As a result, interest in informal learning as a suitable context for in-time learning of complex and interdependent skills and knowledge needed to accomplish current and future job responsibilities has intensified. Despite the acknowledgement of the multiple pathways and forms in which professionals learn and the rising interest in informal professional learning, research in this area is still relatively limited especially within faculty professional learning literature (Gijbels et al., 2012; Macià & García, 2016; Manuti et al., 2015; Tour, 2017).

This qualitative study has several potential limitations related to the sample interviewed and the data sources used. The findings of this study were based on data collected from previous HumanMOOC participants who have earned badges. Future research should also consider the experience of those who participated but did not earn badges and whether this factor plays a role, if any, in shaping their experience. In terms of the data sources in this study, the main source of data was the interviews conducted with participants. Triangulating and synthesizing findings from other data sources, such as observations and social media engagement, can provide a deeper understanding of MOOC learners' effort and experience in extending the learning that happens in MOOCs to their professional context. Despite these limitations, this study is significant in two main ways.

First, it adds to the literature on faculty informal learning, in the form of MOOCs, and what design and personal factors support participants' application of the new knowledge and skills to their professional context. Results of this study confirm what has been reported in previous studies (Milligan & Littlejohn, 2014) and point to some of the contextual and technological barriers participants' face when trying to integrate new tools or enact new practices. However, based on the results of this study, there are some design and pedagogical strategies that has the potential of

supporting faculty in mastering new knowledge and skills as well as in implementing the knowledge and skills gained in their actual practices. Results of this study show the need for more professional development opportunities that allow for application, practice, and feedback by nurturing a sense of community and encouraging connections and communications among learners. This approach not only enhances the learning effectiveness of MOOCs, but also allows learners to form personal learning networks that can serve as a support system that lasts beyond the boundaries of an individual MOOC. Additionally, strategies for overcoming some of the most common barriers to implementation can be included in MOOCs that target professional learners. For instance, MOOCs designers can provide opportunities for learners to plan ahead for such events by providing them with a space to discuss some of the anticipated challenges and share their experiences or plans in overcoming these barriers.

Second, this study pushes MOOC research forward by changing the narrative surrounding MOOC effectiveness from issues of course completion and certification to the impact of these courses on participants actual practices. Barriers to success within a MOOC has been investigated and examined in the literature (Loizzo, et al., 2017). However, for MOOCs to make an impact on practice, one must investigate the types of barriers most commonly reported by practitioners and professionals in the field. Understanding this allows MOOC designers and providers to pay explicit attention to these barriers in MOOCs and enhance participants chances of overcoming these hurdles by providing learners with evidence-based best practices as well as encouraging learners to discuss these issues and share experiences (Sullivan et al., 2018). Another interesting area for research is to understand how personal learning networks developed within a MOOC evolve over time and in what ways these networks provide support to members as they attempt to enact new strategies and practices.

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Irrelevant, Overlooked, or Lost? Trends in 20 Years of Uncited and Low-cited K-12 Online Learning Articles

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Abstract

In this study, we analyzed a subset of uncited or low-cited articles from the data reported in Arnesen, Hveem, Short, West, and Barbour (2019), who examined the trends in K-12 online learning articles from 1994 to 2016. We identified 62 articles that had 5 or fewer citations, and analyzed them for trends in authorship, publication outlets, dates of publication, and topics that could help explain their low citation numbers. We also analyzed topics to see what contribution they might have made and can still make to the field of K-12 online learning. We found that the majority of these articles had been published in many different, less well-known journals. We also found that these articles may have attracted fewer readers because they addressed topics that seemed to have a narrow focus, often outside of the U.S. The articles were also authored by both well-known researchers in the field, as well as a number of one-time authors. What we did not find were articles that were uninteresting, poorly researched, or irrelevant. Many of the articles described and discussed programs that grappled with and overcame some of the same challenges online learning still faces today: issues of interaction, community, technology, management, etc. Some of the early articles gave interesting insights into the history of K-12 online learning, especially as it involved rural learners and programs. Others addressed less mainstream but still interesting topics such as librarians in online learning, cross-border AP history classes, policies that helped or hindered the growth of online learning, and practical considerations of cost and access.

Keywords: distance education, telelearning, e-learning, K-12 online learning, virtual school, cyber school, citation analysis, journal analysis

Arnesen, K., Walters, S., Barbour, M.K., & Borup, J. (2020). Irrelevant, overlooked, or lost? Trends in 20 years of uncited and low-cited K-12 online learning articles. *Online Learning, 24*(2), 187-206. https://doi.org/10.24059/olj.v24i2.2080

Irrelevant, Overlooked, or Lost?
Trends in 20 Years of Uncited and Low-cited K-12 Online Learning Articles

Systematic reviews of a particular field are useful at periodic intervals. For example, Zawacki-Richter, Baecker, and Vogt (2009) examined the various research areas, research methods, and authorship patterns of the broad field of distance education from 2000 to 2008 based on their analysis of five journals in the field. Bozkurt et al. (2015) similarly conducted a similar analysis of the trends in research topics in the field of distance education based on their review of research articles in seven distance education journals from 2009 to 2013. Within the K-12 environment, Arnesen, Hveem, Short, West, and Barbour (2019) were the first to provide that systematic review of the field of K-12 online learning. Arnesen and her colleagues reviewed 356 articles from 155 journals, representing what they believed was "the majority of published K-12 online learning scholarship" (p. 36), to determine trends in the authors, journals, citations, topics, and research methodology.

As a part of their analysis, Arnesen et al. reported that each of the top 20 cited articles had been cited at least 107 times. That figure rose to at least 241 citations for the top 10 cited articles and at least 350 citations for the top five cited articles. However, the authors did not make any reference to the articles on the opposite end of that spectrum (i.e., those that had not been cited or that had only received a small number of citations). As the authors made their data set available for further analysis (https://tinyurl.com/K12OnlineLearningData), the raw data appeared to indicate that there were 23 possible articles that had not been cited at all and 91 possible articles that had received five or fewer citations. These figures represented almost a third (i.e., 32%) of the overall data set. The large number of uncited or low-cited articles was surprising considering K-12 online learning researchers frequently lament that research in the field is lacking. We believed that while these articles appeared to be overlooked by the field a closer examination of them had the potential to further the fields' efforts. In a discussion of uncited research, Van Noorden (2017) noted, "some researchers might still be tempted to dismiss uncited papers as irrelevant. After all, if they mattered—even a little bit—wouldn't someone have mentioned them?" (p. 164).

This particular question intrigued us in relation to these articles. Arnesen et al. (2019) did not comment on the uncited or low-cited articles in their data set. In doing so they, highlighted patterns in the research that was already recognized in the field, but failed to shed light on those articles previously overlooked by the field. As such, we are unable to determine if there were any patterns to this research when it came to authorship, the journals that the articles were published in, the specific topics researched, or methodologies used. Were there possible patterns in any of these areas? What might be learned from this largely unmentioned body of K-12 online learning research? To address these types of questions, we engaged a study of our own to examine what trends existed in the journal articles identified by Arnesen and her colleagues that had five or fewer citations.

Review of Relevant Literature

We began our exploration of these uncited and low-cited articles by trying to understand exactly how common the phenomenon actually was. For example, in an article in *Science* magazine, Hamilton (1990) suggested that 55% of the articles published in journals indexed by the Institute for Scientific Information (ISI) from 1981 and 1985 were uncited in the five years after their publication. He went on to suggest that—when broken down by discipline—47.4% of

articles in the sciences went uncited, 74.7% of articles in the social sciences went uncited, and 98.0% of articles in the arts and humanities went uncited. However, only three months later, *Science* published numerous letters in response to that article that contested those figures and also suggested that restricting the analysis to five years after publication artificially inflated the number of uncited articles (Tainer et al., 1991). More recently, Van Noorden's (2017) analysis of more than 39 million articles representing over 12,000 journals in the Web of Science from 1990 to 2015 found that approximately 21% were uncited. Van Noorden did acknowledge that the true number of uncited articles was or would be much lower, as many journals and other publication outlets were not indexed by the Web of Science. Similarly, if the author made a typographical error in their manuscript when citing an article, the automated features of the indexing service might not attach the citation to the correct reference. Finally, as his article was published in 2017, it was likely that many of the articles from 2015 and other more recent years would eventually be cited once they had achieved sufficient longevity in the body of knowledge in their respective field. Simply put, there were likely fewer uncited articles than we believe and could be any number of reasons why that was the case.

The issue of publications not being indexed by various services is a particularly relevant one for the field of K-12 online learning. For example, Barbour and Reeves (2009) indicated that "much of the literature for virtual schooling has primarily been disseminated through private research centers, evaluations or doctoral dissertations" (p. 403). More recently, Lowes and Lin (2018) described the field as regularly publishing chapters in edited collections, book-length academic studies, program evaluations, guidelines and standards, popular media articles, and reports written by research organizations—often designed for policy or advocacy purposes; along with journal articles. Clark (2018) underscored the importance of program evaluation and the significant impact that it has had on the early scholarship in K-12 online learning. Essentially, scholars have regularly reported that significant portions of K-12 online learning research has been published in outlets not indexed by most services.

Who is publishing research on K-12 online learning is as important, and complicated, as where that research has been published. Earlier Barbour (2007), who wrote about various individuals who were publishing or presenting in the field of K-12 distance and online learning, described seven recent graduates who "completed thesis or dissertations over the last five or six years that have been based upon a variety of aspects dealing with virtual schooling" (p. 9), out of a total of 15 researchers referenced in the article. Seven years later Lowes (2014) wrote that "as the body of research grows, the field attracts more researchers; and as these researchers take faculty positions, research on online teaching and learning becomes an increasingly acceptable academic pursuit for their graduate students" (p. 100). However, as Arnesen et al. (2019) reported, 276 of the 384 authors who had published an article related to K-12 online learning had published only a single article, which might suggest many of these authors were graduate students that were publishing the results of their Master's thesis or doctoral dissertation (and never published in the field again). Barbour lamented that the "additional fragmentation of where and how scholarship [was] published further complicates researchers' ability to situate their own studies within the historical origin and conceptual growth of the field" (Molnar et al., 2019, p. 62).

In fact, there have only been a few systematic examinations of the scholarship related to K-12 distance and online learning. One examination was conducted by Barbour (2011), who reviewed 262 articles from 2005 to 2009 published in a major distance education journal published in Australia, Canada, New Zealand, and the United States. Barbour found only 24 articles (or less

than 10%) related to K-12 distance and online learning, with 18 of those 24 articles having a North America focus. More recently, Barbour (2018) analyzed the *Journal of Online Learning Research* from 2015 to 2017 and found that the vast majority of articles that had been published focused on the U.S. As a follow-up to those results, Hu, Arnesen, Barbour, and Leary (2019) analyzed all 51 articles published between 2015 and 2018 (inclusive) in the *Journal of Online Learning Research* and found that 42 had a geographic focus on the U.S. There was only one article each focused on Turkey, Brazil, and India, as well as one focused on multiple countries. Finally, there were five articles that had no specific geographic focus. Barbour (2018) summarized the situation when he wrote that "the vast majority of the scholarship that [was] published focused on the United States (and to a lesser extent North America), even though there [was] a great deal of K-12 online... learning occurring outside of the United States" (p. 23).

Beyond these general observations, the Arnesen et al. (2019) study represents the most systematic review of research in the field of K-12 distance and online learning. This examination found that the field had grown significantly in recent years—both in terms of the number of articles and the introduction of new authors. The authors also reported that the field had initially focused on theoretical articles but was maturing and included more data-driven articles. Finally, Arnesen and her colleagues found the research was scattered among many journals. As the most detailed examination of journal articles in the field of K-12 distance and online learning, this review is not only worthy of further investigation, but the open data set begs further analysis.

Methods

The purpose of the Arnesen et al. (2019) study was to "analyze K-12 online learning research based on the journal articles that [had] been published in the field from 1994 to 2016" (p. 33). The purpose of this study was to examine what trends existed in the journal articles identified by Arnesen and her colleagues that had five or fewer citations. Using the articles published prior to the end of 2015 in the data set provided by Arnesen et al.[1] (see pages 35–36 of that article to review the methods utilized to select those articles), we confirmed all of the articles that had five or fewer citations as of 31 August 2018 and updated the list appropriately. We excluded articles from 2016 as we felt these were two recent to have significant citations and would skew our overall data set. These data were then divided into two data sets: uncited articles (i.e., articles with no citations) and low-cited articles (i.e., articles with five or fewer citations).

Journal Analysis Procedures

We analyzed the collected articles for trends in citations, authorship, publishing year, and publishing journal using procedures consistent with the procedures used by Arnesen et al. (2019) for the complete data set (who followed the procedures outlined in "Journal Analysis Series" [West 2011, 2016]).

Authorship. In order to determine any trends of authors with uncited or low-cited articles, we first pulled a list of articles from the Arnesen et al. (2019) data set that appeared to have no citations or were identified as having low citations according to Google Scholar. Once the articles were identified we separated them into uncited and low-cited lists. From these lists we analyzed the authors for each article to identify those who had authored multiple articles in the sample.

[1] The full data set was provided by those authors at https://tinyurl.com/K12OnlineLearningData.

Specifically, we assigned points to each author based on their position of authorship: three points for first authorship, two points for second author, and one point for third author or beyond. When the point totals were finalized, we then organized the authors based on their rank.

Publishing year. All of the articles were in two spreadsheets, one for uncited and one for low-cited. In order to determine how many were published each year, we filtered the spreadsheets by publishing year. We then determined how many articles were published for each year separately before combining them to determine the total number of uncited and low-cited articles per year.

Journal publishings. Similar to publishing year, we sorted the spreadsheets by journal to determine how many journals were represented and how many articles were published from each journal. After determining how many uncited and low-cited articles were within each journal, we went back to the complete Arnesen et al. data set to determine the number of journals in the complete set. Finally, we then established the overall journal ranking, analyzing the journals for any trends within cited and uncited articles and their corresponding journals.

Analysis of Uncited and Low-cited Articles

Two researchers read each of the uncited and low articles, and took notes separately regarding the articles' focus, research questions, context, findings, and stated implications. Each researcher then independently listed possible reasons why the article had not been cited as well as possible contributions the article could make to the current K-12 online and blended learning research. Each researcher then individually examined their notes across all articles to identify trends which they then listed. Lastly, one researcher reviewed both sets of notes and wrote a summary of the trends which the other researcher reviewed for accuracy.

Results and Discussion

In the following sections we describe and discuss the results of the journal analysis procedures, the analysis of the population of uncited articles, and the analysis of the population of low-cited articles.

Journal Analysis Procedures

Prior to drawing overall conclusions, we will discuss the findings for the different types of analyses conducted for this study. This study included 62 total articles written by 97 distinct authors. The average number of authors per article was 1.85 (SD = 0.95) with 26 of the articles being single-authored. Table 1 shows the ranking of the authors according to their authorship of uncited and low-cited articles. It is important to remember that the articles in the uncited population were not included in the population of low-cited articles. As such, it is interesting to see that three of the authors appeared on both lists (i.e., Barbour, Greer, and Stevens). Further, along with these three individuals, Beck, Cavanaugh, Davis, Murphy, Oliver, Russell, and Smith (or 10 of the 22 names listed), all appeared on the list compiled by Arnesen et al. (2019) of authors who published the most articles. This consistency would seem to indicate that the authors who were uncited or low-cited were still well known authors and their work should have been known in the field. Murphy, who for this study was one of the low-cited authors, was among the most cited authors from the 2001–2010 analysis of the *British Journal of Educational Technology* (Halverson et al., 2014). Cavanaugh was referenced as a most cited author between the years of 2002–2011 for *International Review of Research in Online and Distance Learning* (Olsen et al., 2013). Both of

these examples further support that authors who are on this list of uncited or low-cited articles can still be well known.

Table 1

Top Authors by Number of Publications for Uncited and Low-cited Articles

# of Uncited Articles	Uncited Author	Uncited Points	Rank	# of Low-cited articles	Low-Cited Author	Low-Cited Points
2	Barbour, M. K.	6	**1**	5	Barbour, M. K.	15
1	Carr-Chellman, A. A.	3	**2**	5	Stevens, K	15
1	Cavanaugh, C.	3	**3**	3	Beck, D.	7
1	Davis, N. E.	3	**4**	2	Coy, K.	6
1	Greer, D. L.	3	**5**	2	Garrett Dikkers, A.	6
1	Haughey, M.	3	**6**	2	Russell, G.	6
1	Mayse, D.	3	**7**	2	Greer, D. L.	5
1	McWatters, G.	3	**8**	2	Murphy, E.	5
1	Stevens, K.	3	**9**	2	Hirschmann, K. R.	4
1	Dibbon, D.	2	**10**	2	Oliver, K. M.	4
1	Kinsella, J.	2	**11**	1	31 authors	3
1	Muirhead, B.	2	**12**	1	27 authors	2
1	Smith, S. J.	2	**13**	1	14 authors	1
1	Thompson, L. A.	2	**14**			
1	Basham, J. D.	1	**15**			

Further Table 2 provides the ranking of authorship by combining the data for the low- and non-cited articles together. From the total list of 62 articles, 33 (i.e., 53%) of them were written by the top 11 authors. The number of articles written by the top authors were either five, three, or two. The top two authors, Barbour and Stevens, are both first authors on each of their articles represented in this data. Of the seven articles Barbour authored, he wrote four independently, and brought in coauthors on three more. Stevens was the sole author on five of his articles and a coauthor on the sixth. This could potentially suggest the authors' high interest in the field; however, this data does not include all of their articles and therefore a further analysis of these authors may reveal different interests.

Table 2

Top Authors by Number of Publications When Combining Uncited and Low-cited articles

# of Articles	Author	Points
7	Barbour, M. K.	21
6	Stevens, K	18
3	Beck, D.	7
2	Coy, K.	6
2	Garrett Dikkers, A.	6
2	Russell, G.	6
3	Greer, D. L.	8
2	Murphy, E.	5
2	Hirschmann, K. R.	4
2	Oliver, K. M.	4
2	Smith, S. J.	5
1	38 authors (first author)	3
1	31 authors (second author)	2
1	15 authors (third or later author)	1

Table 3 looks at the number of articles written per year for uncited and low-cited articles.

Table 3

Number of Articles per Year for Uncited Low-cited Articles

Year	Uncited Articles	Low-cited Articles	Total
1995	0	1	1
1996	0	0	0
1997	1	1	2
1998	0	2	2
1999	1	0	1
2000	0	1	1
2001	0	2	2
2002	2	0	2
2003	1	1	2
2004	0	1	1
2005	0	2	2
2006	0	1	1
2007	0	2	2
2008	1	1	2
2009	0	2	2
2010	0	1	1
2011	0	3	3
2012	1	2	3
2013	0	5	5
2014	1	10	11
2015	2	14	16
Total	**10**	**52**	**62**

Of the 62 articles, 27 of them (i.e., 43.5%) were written in the final two years represented in our data (i.e., 2014 and 2015). Furthermore, the year 2013 was the first instance of more than three articles. This growth suggests a number of possibilities. The most probable possibility is that articles published so recently have not had much time to accrue citations. Another possibility is that there was an increase of focus within the field starting in 2013, with the majority of the increase taking place in 2014 at approximately 17% and 2015 at approximately 26%. Barbour (2011) referenced a large growth in the number of students enrolled in online schooling from the year 2000–2009, which would support an increase of focus in the field. However, while interest in the subject area may have expanded during the later years, because these articles are uncited and low-cited, this may indicate that the focus of these articles have not aligned with the focus of many other researchers. Furthermore, Barbour (2007) identified several of the authors (Cavanaugh, Murphy, Stevens, and Muirhead) in this data set as individuals who were already researching in this field, in particular virtual schools, prior to the year 2007. Therefore, an analysis consisting of a greater data set would be needed to further support this inference of growth in the later years.

Previously, we looked at the top authors in both the cited and uncited articles. Of the top 11 authors, only two were authors within the journals that published the most K-12 online learning research. Owens authored one article from the *Journal of Online Learning Research* and Beck authored an article in the *Journal of Open, Flexible and Distance Learning*. This data suggests that even though they are authoring the highest number of articles, the top 10 authors in this sample are not always publishing in the top publishing journals. It is important to note, that while this is the case for this data set, the authors may have more articles that are not covered in this analysis.

Table 4 shows the number of uncited and low-cited articles published by each journal in the data set. Arnesen et al.'s (2019) study included a corpus of journal articles focused on K-12 online and distance learning totaling over 350 articles. This table includes the data from that study, and shows the number of articles written in the original or complete data set gathered for this study and its overall ranking as a top publishing journal in the field of K-12 online learning (Arnesen et al., 2019).

As might be expected, the majority of the articles, 32 articles (i.e., 52%) of the 62 low-cited or uncited articles, fell into the lowest ranking of journals (i.e., twenty-ninth and forty-ninth) from the original data set in Arnesen et al. (2019). Because of the low ranking of these journals, it is likely that their exposure to the field of K-12 online learning is low, thus indicating that the articles published within them would be less likely to be cited in other research. Conversely, the top overall ranked journal (i.e., *Journal of Online Learning Research*) in the original data set represented 16% of the uncited and low-cited articles that were published. This might suggest that being published in Arnesen et al.'s top journals does not guarantee an article will be cited in other's research. However, all of the uncited and low-cited articles in the *Journal of Online Learning Research* were published in the last year of this study, so the high percentage might also represent insufficient time for these articles to accrue a significant number of citations.

Table 4

Top Publishing Journals of Uncited and Low-Cited K-12 Online Learning Articles

	# of uncited articles	# of low-cited articles	Total # of uncited and low-cited articles	Overall # of articles in Arnesen et al.'s (2019) complete data set	Overall actual ranking of journals by Arnesen et al.'s (2019) complete data set
Journal of Online Learning Research	1	9	10	25	1
International Journal of E-Learning & Distance Education[2]	1	1	2	14	3
Journal of Open Flexible and Distance Learning[3]	0	3	3	13	4
TechTrends	0	1	1	12	T5
The Morning Watch	0	3	3	9	7
Distance Learning	0	3	3	8	T8
Journal of Research on Technology in Education	0	1	1	7	T11
Teaching Exceptional Children	0	1	1	7	T11
British Journal of Educational Technology	0	1	1	6	T14
Computers in New Zealand Schools	1	0	1	6	T14
Turkish Online Journal of Distance Education	0	2	2	5	T19
Educational Considerations	0	1	1	4	20
International Electronic Journal for Leadership in Learning	1	0	1	3	T21
Six journals	0	6	7	2	T29
Twenty-six journals	6	20	26	1	T49

[2] Formerly the *Journal of Distance Education*
[3] Formerly the *Journal of Distance Learning*

Analysis of Uncited Articles

When examining the list of uncited articles and working to obtain the actual articles, it became clear that some were published in more obscure outlets. For instance, we were unable to access articles published in the *Journal of the Illinois Council for the Social Studies* (Barbour & Kinsella, 2003) and *Computers in New Zealand Schools* (Davis, 2012) through our universities' robust library subscriptions and had to obtain them through interlibrary loans. Ease of access can impact how widely research is read and thus cited. Research has found that open access journals tend to have higher CiteScores (Li, Wu, Yan, & Li, 2018) and that open access articles receive an average of 18% more citations than paywalled articles (Piwowar et al., 2018). However, ease of access does not ensure that an article is cited and some of the publication outlets on our list of uncited articles were open access such as the *Journal of Online Learning Research* (Mayse, 2015), the *E-Learn Magazine* (Carr-Chellman, 2015), and the *Journal of Distance Education* (McWatters & Thompson, 1997). As a result, access is likely an important factor for some articles but was perhaps not the most important reason that some articles went uncited. It is also important to note that publishing in more obscure journals may reduce the likelihood that the article is cited by other researchers, but it can help researchers to reach smaller but important audiences.

In reading the articles, the first trend that we noticed was that of the 10 uncited articles, six were focused on K-12 online and blended learning contexts outside of the U.S. Of those six articles, five focused on Canada (Barbour, 2002; Barbour & Kinsella, 2003; Haughey & Muirhead, 1999; McWalters & Thompson, 1997; Stevens & Dibbon, 2002) and the other focused on New Zealand (Davis, 2012). As a field we tend to focus on online and blended learning in the U.S., which may help to explain why research articles focused on the U.S. were underrepresented in our list of uncited articles. Barbour (2018) stated:

> Many of us who have been involved in K-12 online and blended learning, both practitioners and researchers, are familiar with the development of the field within the United States. Unfortunately, many who are involved in the field cannot say they have the same level of familiarity of the history, development, and/or current status of K-12 online and blended learning outside of the United States. (p. 21)

As a field, we should begin to expand our focus beyond the borders of the U.S. As we do, the six international articles on this list may provide helpful context. This is especially true because many of the articles actually described the history and development of online and blended learning in Canada and New Zealand. Four of the uncited articles specifically discussed online learning in rural settings and would be of particular interest to those who are interested in online learning in those types of settings. Furthermore, Davis's (2012) uncited article provides a helpful snapshot of issues and events related to K-12 online learning in New Zealand and stated that online and blended learning "is essential for New Zealand's rural populations and also of benefit to many more, including underserved Maori and Pacifika students" (p. 70). As a result, those wishing to learn more about how online and blended learning can address the needs of underserved students can look to New Zealand for examples.

Of the 10 uncited articles, six did not formally collect and analyze original data. Valuable research does not require original data collection and analysis. For instance, an analysis of articles published between 2001–2010 in 10 major journals in the field of instructional design and technology found that seven of the nine top-cited articles were labeled as theoretical or "non-data based papers" (West & Borup, 2014, p. 548). However, unlike the articles in our list of uncited

articles, the most cited non-data-based articles that West and Borup identified presented theoretical or design frameworks or rigorous literature reviews. In contrast, the uncited, non-data-based articles that we identified tended to focus on describing specific programs or practices, not on making broad theoretical contributions. The articles also varied in how much they referenced and cited previous research themselves. For instance, Carr-Chellman's (2015) article was peer-reviewed, but was a short (i.e., about 1,300 words) commentary based on only a few articles and blog postings, as well as her personal experiences with cyber school advertising. Regardless, Carr-Chellman's commentary provided an interesting and helpful critique of cyber- school funding, as well as how that funding was (mis)spent. While these types of commentaries may not have been cited in research articles, Carr-Chellman's commentary could still make an important contribution to conversations that may lead to rigorous research. Similarly, much of Davis's (2012) uncited article actually highlighted keynotes and other presentations at the Distance Education Association of New Zealand 2012 conference. It is possible that Davis' article has helped researchers to identify helpful research, even though it has not been cited itself.

The other uncited, non-data-based articles described valuable online teaching strategies that researchers should be aware of. For instance, research examining learner-learner collaboration and communication is especially lacking. A national survey of online charter schools in the U.S. found that only 32% of online high schools frequently engaged students in teacher-guided synchronous discussions and only 21% frequently engaged students in collaborative learning where two or more students worked together to complete a project (Gill et al., 2015). As a result, Barbour and Kinsella's (2003) article was especially insightful despite being uncited and published 17 years ago. In the article they described a Canadian online teacher who was able to form a collaborative relationship with another AP European History teacher in the U.S. Throughout the year the two classes engaged in regular communication and collaborative projects that the two online teachers took turns evaluating. Barbour and Kinsella (2003) explained, "in essence, these two classes from two sides of the border became one class, completing the same assignments, taking the same tests, being instructed by the same teacher" (p. 31). While this case was not typical, it showed the potential of learner-learner interactions in online and blended courses. Other articles also touched on under-researched topics such as instructional design (Cavanaugh, 2008; Haughey & Muirhead, 1999; McWalters & Thompson, 1997; Mayse, 2015), parental support (Barbour, 2002; Cavanaugh, 2008; Haughey & Muirhead, 1999; Mayse, 2015), on-site facilitators (Cavanaugh, 2008; McWalters & Thompson, 1997), students with disabilities (Greer, Smith, & Basham, 2014), homeschooling (Haughey & Muirhead, 1999), and the need for and obstacles to online teacher professional development (Haughey & Muirhead, 1999; McWalters & Thompson, 1997).

The four data-based articles relied on surveys (Barbour, 2002; Greer, et al., 2014), interviews (Haughey & Muirhead, 2009), observations (Mayse, 2015), and login data (Barbour, 2002). Two were in the top three most recently published articles in our data. As a result, the timeliness of their research may make them particularly valuable. For example, Greer et al. (2014) focused on practitioners' perceptions of online learners with disabilities and their perceived abilities to meet those students' needs at a distance. This research could be particularly helpful because research examining online students with disabilities is especially limited and much of the existing research has been published in outlets other than peer-reviewed journals (Rice & Dykman, 2018).

Mayse's (2015) uncited research examined students' use of resources in an online science course. This research was interesting because of its mixed methods that included student observations. The findings could also provide important insights to instructional designers who wish to improve students' use of online resources. However, the article's primary limitation was its reliance on the debunked theory of learning styles (see Kirschner & van Merrienboer, 2013). While more research in the field needs to use and develop theoretical perspectives and frameworks (Lokey-Vega, Jorrin-Abellan, & Pourreau, 2018), relying on unsound theories can be unproductive.

Analysis of Low-cited Articles

There were several patterns that emerged within the low-cited literature. The most consistent and overwhelming pattern was that the vast majority reported a specific case focused on a single program or context. In many of these cases various aspects of virtual schools in a specific jurisdiction were described (e.g., Florida in Burgess-Watkins, 2011; Georgia in Goss, 2011; Ohio in Wang & Decker, 2014; Pennsylvania in Mann & Barkauskas, 2014; Newfoundland and Labrador, Canada in Furey & Murphy, 2005; Northwest Territories, Canada in McAuley, 1998; Australia in Stevens, 2009; New Zealand in Stevens, 2000; and Turkey in Sakar, 2011). These articles examined such diverse issues as demographics, multiculturalism, and social justice. Interestingly, an additional three articles discussed foreign language classes (Jeurissen, 2015; Lim & Kim, 2008; Lin & Zheng, 2015). For example, Jeurissen (2015) examined a virtual course on Te Reo Maori. Finally, these case studies also presented research ranging from the need for online librarians (Beck, 2015) to online personal fitness courses (Kane, 2004); from credit recovery courses (Pettyjohn & LaFrance, 2014) to Advanced Placement courses (Barbour, 2001); and from parents' involvement in helping their children succeed in online courses (Curtis & Werth, 2015) to the experiences of dyslexic students in an online class (Coy & Hirschmann, 2014). These studies, although they have been low-cited to date, illustrate the rich history and diversity of K-12 online learning research.

Even within this group of case studies, additional patterns emerged. For example, there were 19 cases focused on international (i.e., non-American) settings, published in international journals, or written by international scholars. These 19 articles were written by 22 authors, 20 of whom were non-Americans. The international settings of their research are outlined above and included the countries of Australia, Canada, Korea, New Zealand, and Turkey. The international focus was also reflected in the journals in which these articles were published. Ten of the articles were published in journals outside of the U.S. (e.g., the *Journal of Open Flexible and Distance Learning* from New Zealand, the *Canadian Journal of Career Development* from Canada, the *Welsh Journal of Education* from Wales, the *Australian Journal of Education* from Australia, the *Turkish Online Journal of Distance Education* from Turkey, and *Géocarrefour* from France, just to highlight a few of these journals). Several scholars have found that the majority of research into K-12 online learning has been focused on the U.S. (Arnesen et al., 2019; Barbour, 2011, 2018), which may explain why many of these articles have been overlooked and thus remain low-cited. Interestingly, many of these journals are published in open access format and, for those journals that are not, many of these authors have provided copies of their articles through open scholarship networks (e.g., Academia.edu or ResearchGate).

As it was referenced above, another pattern within the case studies was a focus on rural education. There were 33 articles from Arnesen et al.'s (2019) data set that were published between the years of 1994 and 2001 (inclusive). Every low-cited article published during those years was

focused on rural education. These articles examined the difficulties in K-12 distance education in those early years by exploring topics such as teachers' lack of preparation and pedagogical adaptations (Stevens, 1997), coordinating schedules among different entities (Benson, 1998), startup costs (Stevens 1997), and students' uncertainty about interacting with instructors and peers (Stevens, 2000). But, researchers also highlighted the advantages to rural students of distance education, such as more class choices (Barbour, 2001; Benson, 1998; Stevens, 2000), connections with other students who lived far away (McAuley, 1998), and the ability of high school students to stay in their communities to learn instead of being sent to urban centers (Stevens, 2000; 2001). While there were four other low-cited articles dealing with rural education that were published much later (Barbour & Mulcahy, 2013; Barbour, Siko, & Simuel-Everage, 2013; Kirby & Sharpe, 2010; Stevens, 2009), these early articles highlight themes that have become foundational to K-12 distance and online learning: a focus on personalization, access, and flexibility in addressing the needs of all learners.

A second pattern that emerged from the low-cited literature was a focus on exploring the benefits, challenges, and/or potential of K-12 distance, online, and blended learning, often based solely on the authors' or stakeholders' perceptions. For example, there were several perceived benefits that were documented, such as individualization and flexibility (Furey & Murphy, 2005; Kane 2004; Russell, 2006; Stevens, 1997) and the ability of online courses to serve diverse populations (Furey & Murphy, 2005; Kane, 2004). These authors saw the flexibility and increased academic offerings of online courses as potentially helping populations as diverse as athletes and homeschoolers and students who had health issues or who needed accelerated learning opportunities or credit recovery. In contrast, there were six articles over a period of eight years listing perceived challenges of virtual learning, which have remained fairly constant. These challenges included providing for the initial costs, access issues, teacher hesitancy, and lack of teacher preparation (Benson, 1998; Furey, & Murphy, 2005; Russell, 2003; Stevens, 1997). Benson (1998), for example, discussed helping teachers feel more comfortable in their new role as online teachers by giving them access to the technology they would be using and allowing them to experiment with it. Other perceived challenges included student attitudes and lack of the self-regulation and self-efficacy abilities needed to succeed in online settings (Russell, 2003, 2006).

Additionally, these articles spoke optimistically about the potential of online learning. These authors saw the benefits as growing over time and the challenges as distractions that could be overcome. In one example, Cavanaugh, Sessums, and Drexler (2015) discussed the potential for significant research as changes in pedagogy and context invite teachers—and even students—into the research process. Similarly, Russell (2006) portrayed the increased potential for parents, educators, administrators, designers, technology personnel, and the students themselves to be involved in and responsible for students' education. As the title of Benson (1998) suggested, online learning opened educational "opportunities by closing the distance," increasing the potential for more individuals to benefit from the advantages offered in online and blended contexts.

Finally, many of these low-cited articles could also be organized around additional topical themes. For example, as might be expected, there were a number of articles that focused on comparing student performance based on delivery modality in some fashion or another (Curtis & Werth, 2015; Lowes, Lin, & Kinghorn, 2015; Lueken, Ritter, & Beck, 2015). There were nine articles that focused on issues related to teaching in the online environment. To highlight just two examples, Stevens (2009) explored opportunities for urban, preservice teachers to interact with rural students, while Murphy and Rodríguez-Manzanares (2008) examined teachers' beliefs about

learner-centered e-learning. Similarly, there were five articles that focused on issues related to online course design. Ryan and Beaulieu (2009) reviewed articles in an attempt to delineate elements of good online courses, while Smith and Harvey (2014) examined Khan Academy videos through the lens of the universal design for learning to explore K-12 online lesson alignment. Another topic that has seen significant coverage in the literature is policy issues related to K-12 online learning, which is also represented with eight low-cited articles. For example, Russell (2003, 2006) explored a variety of general policy issues that were raised by K-12 online learning environments, while others have explored policy issues in a specific jurisdiction (Barbour, 2005; Barbour & Mulcahy, 2013; Stevens, 1995). Interestingly, a topic that has primarily received interest since the creation of the Center on Online Learning and Students with Disabilities (see http://www.centerononlinelearning.res.ku.edu/) is the topic of K-12 online learning and populations with special needs. Yet the low-cited articles in our data set included five articles that fell under this broad topic and were published prior to the creation of the center. For example, Greer, Crutchfield, and Woods (2013) summarized the cognitive theory of multimedia learning and how it related to students with learning disabilities, while Tysinger, Tysinger, Diamanduros, and Kennedy (2013) focused on issues related to school psychologists who work in online schools. In terms of a topical analysis, the only article that did not fall into a specific topic with other articles was Barbour (2007), which discussed the major researchers in the field of K-12 online learning at the time and made the case for more scholars in the discipline of instructional technology.

Conclusions and Implications

In this study we analyzed 62 uncited and low-cited articles from the data collected by Arnesen et al. (2019). We wondered if these articles were simply irrelevant to current interests in K-12 online learning or if other factors influenced their low citation numbers. We found the articles to be both interesting and relevant, but they shared several attributes that may have contributed to the low citation counts. First, many of the articles were still relatively newly published, with almost half (43.5%) of the articles being published in 2014–15. It is possible that these articles will be cited more frequently during the coming years.

Second, about half the articles were written in less well-known journals or journals that were difficult to access. In addition, the 62 articles of this study were scattered across 45 journals, with 39 of the journals each publishing only a single article from the original data set. The lack of journals dedicated to K-12 online learning may lead to valuable articles being missed (i.e., the single exception being *Journal of Online Learning Research,* which began publishing in 2015). Researchers may want to carefully consider their publication outlets if their goal is to have a greater impact on future research.

Third, many authors of these uncited and low-cited articles were well known in the field. For example, Barbour, who published 52 articles in the Arnesen et al. (2019) study, and Stevens, who published 18, may have published articles in smaller, more specific journals in order to reach more specific audiences. Stevens, for example, published an article entitled "Perceptions of educational opportunities in small schools in rural Australia and Canada" in *Rural Society Journal*, a narrow subject in a lesser-known journal. Similarly, Barbour published an article entitled "Enrichment opportunities for gifted students in rural areas: Online AP social studies sources," a program situated partly in Ohio and published in *Ohio Council for the Social Studies Review*. Barbour's and Stevens's articles also illustrate an important point. These uncited and low-cited

articles may not actually be irrelevant but may be valuable and helpful to broader audiences and contexts.

Fourth, the topics of many of these articles had a narrow focus, investigating specific programs or jurisdictions, giving them seemingly limited application to other contexts. For example, just under half (i.e., 40%) were written about contexts outside of the U.S. Because so much of K-12 online research is focused on the U.S., articles about other settings could attract less attention. Finally, many of the topics were focused on specific aspects of online learning, such as online librarians, home schoolers, Te Reo Maori language instruction, and dyslexic students, to name just a few. Researchers may have excluded these articles when researching broader topics. However, the articles' methods and findings should not be ignored and have the potential to make meaningful contributions to the field.

Finally, this study suggests several avenues for further research. Researchers could analyze the difference between specific authors' high, low, and uncited articles as well as the differences between low- and high-cited articles on the same subject. Further research could also address the readership of low and uncited articles. Are these articles useful to audiences that are looking for practical solutions? An understanding of the role of these articles and the contributions they can make can further benefit a growing and compelling field of scholarship.

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Student Perceptions of Their Interactions with Peers at a Cyber Charter High School

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Abstract
K-12 online students are increasingly communicating and collaborating with their peers; however, research on the topic is limited—especially research examining students' perceptions and experiences. Guided by the Adolescent Community of Engagement framework's concept of peer engagement, this qualitative descriptive case study examined learner-learner interactions at a cyber charter high school. Ten students were selected by teachers based on their ability to independently engage in learning activities—five students were more independent and five required more support from others. Each student took part in two, hour-long interviews for a total of 20 interviews. The interviewers covered students' perceptions and experiences regarding teachers, parents, and peers. This report only focuses on peers. Iterative emic coding and thematic analysis revealed that their interactions with peers allowed them to develop friendships, improve their motivation, receive peer instruction, and collaborate effectively with others. Challenges are also covered. The article concludes with recommendations for research and practice.

Keywords: learner-learner interaction, online communication, online collaboration, K-12 online learning, cyber charter school

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Student Perceptions of Their Interactions with Peers at a Cyber Charter High School

High school students are increasingly enrolling in online courses (Digital Learning Collaborative, 2019; Gemin & Pape, 2017). While the majority of online students only take online courses to supplement their in-person coursework, enrollments at full-time online programs, commonly called cyber schools, are quickly growing making it especially important to examine the learning strategies used in these schools (Gemin & Pape, 2017).

A national survey of 100 cyber charter high schools found that 60% frequently relied on independent study models and 40% rarely or never employed "collaborative learning involving two of more students working together" (Gill et al., 2015, p. 51). While lacking in many cyber charter schools, learner-learner interactions are seen as a critical component to meaningful

educational experiences because they allow students to co-construct understanding of the course material (Garrison, Anderson, & Archer, 2000). Furthermore, there has been an increased focus on leveraging learner-learner interactions in ways that allow students to develop twenty-first century skills such as communication, collaboration, creativity, and critical thinking—commonly referred to as the 4Cs (National Education Association, n.d.). As a result, it is especially important for students in cyber schools to have quality learner-learner interactions because, unlike students who are enrolled in supplemental online courses, cyber charter students do not have the opportunity to develop the 4Cs in in-person environments.

Little research exists that examines learner-learner interaction in cyber high schools—especially from the students' perspective. As the primary stakeholder within any educational context, students provide important insights that can help increase and improve learner-learner interactions in cyber charter schools. In this study we interviewed 10 students at a cyber charter high school that attempted to facilitate high levels of learner-learner interactions. The student interviews addressed the following question: What are students' perceived advantages and disadvantages of their interactions with other students at a cyber charter high school?

Review of Relevant Literature

Frameworks

Anderson (2009) explained that learner-learner interactions in distance education settings are dependent on available communication technologies. Prior to the internet, learner-learner interactions were limited, and courses instead focused on learners' interactions with the content and instructors (Garrison, 2009). Moore (1989) was one of the first to draw researchers' attention to learner-learner interactions by explaining that "learner-learner interaction among members of a class or other group is sometimes an extremely valuable resource for learning, and is sometimes even essential" (p. 4) because it helps students develop communication skills and can have a stimulating and motivating effect—especially for younger learners. At the time, Moore admitted that the field knew little of the potential of learner-learner interactions to transform students' learning and predicted that this potential would "be a challenge to our thinking and practice" (p. 4).

To describe a more collaborative constructivist approach to learning online, Garrison et al. (2000) developed the Community of Inquiry (CoI) framework. The framework identified and defined the following three presences:

- Cognitive presence: "the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained communication" (Garrison et al., 2000, p. 89).
- Social presence: "the ability of participants in the Community of Inquiry to project their personal characteristics into the community, thereby presenting themselves to the other participants as 'real people'" (Garrison et al., 2000, p. 89).
- Teaching presence: "the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes" (Anderson, Rourke, Garrison, & Archer, 2001, p. 5).

The biggest contribution of the framework was illustrating the interconnections of the different presences. For instance, while social presence was not a new concept (see Short, Williams, & Christie, 1976), the CoI framework moved the field's understanding forward by explaining that social presence supports the development of cognitive presence because it allows participants to more freely exchange ideas in ways that allow them to co-construct their understanding of the course content.

It is important to note that Garrison and his colleagues (Anderson, Rourke, Garrison, & Archer, 2001; Garrison, Anderson, & Archer, 2001; Rourke, Anderson, Garrison, & Archer, 2001) identified the indicators of cognitive, social, and teaching presences by analyzing discussion board comments. As a result, CoI does not describe the presences in other types of activities. Archer (2010), one of the original authors of the CoI framework, challenged researchers to move beyond discussion boards to other aspects of the course. Archer recognized that "this attempt to broaden the scope of the CoI framework entails a new look at the overall rationale for the framework" (p. 69). The framework also needs to be reexamined for K-12 online learning due to differences in the context and students.

To better describe the K-12 online learning environment, Borup, West, Graham, and Davies (2014) developed the Adolescent Community of Engagement (ACE) framework, which identified four types of engagement: teacher engagement, parent engagement, peer engagement, and student engagement. Student engagement was the target variable and the other three types of engagement were viewed as supports. Teacher engagement and parent engagement are beyond the scope of this article. The remainder of this section will focus on peer engagement.

The ACE framework identified the following three indicators of peer engagement:

- Instructing: occurs when students share previously obtained content knowledge or learning strategies with other students.
- Collaborating: occurs when students engage in sustained communication to co-construct an understanding of the course material and/or collaborate to complete tasks.
- Motivating: occurs when students intentionally or unintentionally encourage or stimulate others to engage more fully in learning activities.

The ACE framework also viewed social presence as an "enabling variable" (p. 21) because students are more likely to impact others' engagement once they have established their social presence and "a sense of closeness has been formed" (Borup, West, Graham, & Davies, 2014, p. 21). Of the types of engagement identified in the ACE framework, peer engagement is the most under-researched and only one research study has used the framework to examine learner-learner interactions at a cyber charter school. Furthermore, that previous study only examined teachers' perceptions and we intend on adding additional insights by examining students' perceptions. While case studies are not intended to *test* a framework, they can be helpful in expanding and refining definitions and indicators (Merriam, 1998).

Learner-Learner Research

While the frameworks described above argue the importance of learner-learner interaction, empirical research on the topic of K-12 online courses is lacking (Lin, Zheng, & Zhang, 2017). Zhang, Liu, and Lin (2018) explained that learner-learner interaction in online courses "generally takes place through online discussions" (p. 278) but other types of collaborative learning also

occur. For instance, a national survey of cyber charter schools found that 21% of high schools frequently used "collaborative learning involving two or more students working together" (Gill et al., 2015. p. xiv). Some cyber charter schools also foster a sense of community among students by providing students opportunities for social or academic in-person activities, "such as (but not limited to): field trips, study sessions, additional orientation/training assistance, open houses, conferences, end-of-year celebrations" (Watson, Murin, Vashaw, Gemin, & Rapp, 2010, p. 87).

Gill et al.'s (2015) national survey research found that 60% of cyber charter high schools largely relied on an independent study model with little or no learner-learner interactions. There is also some indication that online students experience less learner-learner interactions than their peers taking in-person courses. Carver and Koloski (2015) compared the perceptions of 41 online high school students with those of 543 in-person students enrolled in a career and technical education course. They found that online students reported significantly less learner-learner interactions and collaboration than did in-person students. The authors concluded that online course designers and teachers need to be more deliberate in promoting and facilitating learner-learner interactions and collaboration.

In a larger study, Oliver, Osborn, and Brady (2009) surveyed 1,648 students enrolled in online courses offered by North Carolina Virtual Public School. While the majority of the survey used Likert scales to assess students' expectations for their teachers, students also had the opportunity to type in comments regarding other aspects of their online learning. Following the qualitative analysis of students' statements, Oliver et al. (2009) recommended that online courses provide students with more learner-learner interactions in response to "the numerous comments by NCVPS students who expected their teachers to incorporate more collaborative activities with their peers" (p. 39).

The amount and types of learner-learner interactions also vary across online programs and across individual students within the program. For instance, student survey research that included 77 participants at a cyber charter high school found that the student respondents reported spending an average of 91 minutes per week engaging in learner-learner interactions (Borup, Graham, & Davies, 2013). However, student responses had a standard deviation of 125 minutes and 17 students reported no learner-learner interactions. The large majority of the students also perceived that their learner-learner interactions were valuable to their learning (83%) and motivational (81%). It was also found that the amount of time students spent engaging in learner-learner interactions was significantly correlated with students' satisfaction and end-of-semester grade whereas neither of the other interactions (i.e., learner-parent and learner-content) were significantly correlated with those course outcomes. Similarly, Lin et al. (2017) conducted a regression analysis on 466 completed surveys from high school students who enrolled in online world language courses to supplement their in-person course work. While students' interactions with the content and their teacher appeared to have an impact on their satisfaction, their interactions with other students were found to have no significant impact when controlling for student demographics and learning strategies. Furthermore, only learner-content interactions impacted students' perceived progress in the course. While the findings from these two studies appear contradictory, it is important to note that they were conducted in different settings and it is possible that learner-learner interactions are more valuable in full-time online schools as compared to supplemental online programs.

Beldarrain's (2008) dissertation research is especially important because it examined the actual learner-learner interactions for 30 online students including their emails, discussion board

comments, and instant messages. They found a significant relationship between the frequency that students interacted with other students and student achievement. Students were also surveyed regarding their preferences and perceptions. The large majority of students (73.9%) reported that they felt comfortable communicating with peers online. The majority of students (60.9%) believed that communicating with other students helped them to succeed in the course and 69.6% reported that they would communicate more with peers regarding course assignments if given the opportunity.

Learner-learner interactions have also been highlighted as a way to lessen students' isolation by developing a sense of social presence. Garret Dikkers, Whiteside, and Lewis (2013) conducted student and teacher surveys followed by interviews and focus groups with teachers. The majority of surveyed students and teachers agreed that the five measured aspects of social presence were either important or very important. While students largely agreed that class cohesion and community were important, many students also discussed "how little community they sense in their online environment" (p. 162). Teachers also noted some students' unwillingness to engage with peers. Some students also shared that they only interacted with peers during discussion board activities. While learner-learner interactions appeared limited, students noted the interactions with peers could help them on assignments, stay motived, maintain interest in the course, and progress through the course.

Borup (2016) examined teachers' perceptions at a cyber charter school with relatively high levels of learner-learner interactions and found that teachers valued learner-learner interactions because they provided students with important friendships and motivated students to engage in learning activities. The teachers also shared examples of how students collaborated together on projects and how more knowledgeable students tutored other students. However, teachers also found that not all learner-learner interactions were beneficial and shared examples of cheating and bullying. While student and teacher surveys and interviews with teachers have helped us to better understand learner-learner interactions in online courses, more research is needed that provides rich descriptions of students' perceptions of their interactions with other students.

Methods

This article forms part of a larger research agenda at the cyber charter school that has focused on expanding and refining the elements identified in the ACE framework. Articles sharing the findings describing students' perceptions of teacher engagement and parent engagement have been previously published. This qualitative descriptive case study focuses on students' perceptions of and experiences with peer engagement.

Research Setting

The school was selected because it offered students several opportunities to interact with peers. For instance, in our previous research (see Borup, 2016) we found that the school held optional monthly academic and social in-person activities throughout the state. Students were also encouraged to communicate via social media platforms for academic and social purposes. Within the online course teachers frequently required students to participate in online discussion activities. However, they tended to make student collaboration on course projects optional to provide student flexibility. Similarly, the courses had weekly deadlines but students were provided with an extra week where they could turn in assignment without penalty. Courses were delivered

asynchronously with only optional synchronous study sessions. Teachers also held weekly office hours where students could receive synchronous support. Furthermore, the school's Honor Society created and facilitated a peer mentoring program. Lastly, each teacher was assigned to 20 students and tasked with "shepherding" them by developing relationships with the student, monitoring their progress, and facilitating support when needed.

Participants and Data Collection

We believed that students' experiences were likely different based on the course subject so we sampled a teacher in each of the core subjects (i.e., language arts, social studies, math, and science) and one of the elective teachers. The teachers were also sampled because they were identified as particularly active shepherds following focus groups that we conducted for another research project. Each of the five teachers, then identified potential student interview participants. The potential participants were students that the teachers had shepherded the previous semester. This helped to ensure that the teacher was familiar with the students' performance, tendencies, and needs.

Specifically, we asked each of the five teachers to recommend a student who was highly dependent on their shepherding support and a student who was able to engage in their coursework more independently. Of the 10 sampled students, six were male, four were seniors, two were juniors, three were sophomores, and one was a freshman. Each of the 10 students then participated in two one-hour interviews for a total of 20 interviews. The semi-structured interview protocol focused on the elements identified in each of the three types of engagement—peer, teacher, and parent engagements—but this research only focuses on student comments regarding peer engagement. Specifically the interviewer started by asking students more general questions regarding their perceived importance of peers and how frequently they interacted with other students. Students then shared the subjects and purposes of their interactions with peers. Following, students were asked if they were able to develop friendships with others, how those friendships were developed, and what obstacles they encountered when forming friendships. Students were then asked to list the ways that other students could benefit their learning experience. Each response was then discussed further, and students were asked to elaborate on the type of peer engagement and share any experiences they had regarding it. Finally, the interviewer asked students regarding any indicator of peer engagement that had not been discussed earlier but identified in the ACE framework. For accuracy, the interviews were transcribed and sent to the students for review prior to analysis.

Data Analysis

Because we were interested in how our data might inform the ACE framework, we decided to approach this data in a completely emic way; that is, we did not let preexisting theories, including the ACE framework, dictate how we coded the data. First, one of the authors went through the entire set of data and coded for emergent themes, following Carspecken's (1996) approach. She began by becoming very familiar with the data, reading through all the interview transcripts multiple times, and conducting what Carspecken refers to as low-level coding, "which is coding that falls close to the primary record and requires little abstraction" (p. 146) from a participant's words or actions. Upon completion of this process, the coder submitted her list of "raw codes" (p. 150) to the other two authors separately for peer debriefing to check inference levels and to start to organize the codes into potential broader categories and themes. Each of the peer debriefings were first conducted separately followed by a combined meeting with all three

authors to discuss any questions we had about the low-level coding as well as to make suggestions for ways in which the codes might take on added levels of abstraction. Carspecken notes that this iterative process of collaborative coding and peer debriefing is useful and adds to the validity of the data analysis and subsequent findings. Upon completion of this process, the original coder engaged in high-level coding, requiring a greater degree of abstraction from the actual words of the participants. This high-level coding was conducted only on select passages of interview data that were chosen for this more intensive analysis. These passages were selected by all three authors because of their potential to offer additional nuances to the ACE framework.

Results

While students shared various benefits of engaging with their peers (see Table 1), they also disclosed drawbacks and obstacles (see Table 2). While the identified advantages were not purposefully aligned with the ACE framework, as the analysis was synthesized there was a strong link between the themes identified in this data and those within the ACE framework, including instructing, befriending, collaborating, and motivating. The following sections will discuss each theme. Pseudonyms were used when quoting students to protect their identity.

Table 1

Themes Highlighting Students' Perceived Benefits

Benefits	**# of Students**	**# of References**	**Example Quote**
Instructing	9	36	"Peers are very important...in your class. I relied on a lot of them too."
Befriending	7	23	"It was something that I looked forward to everyday—getting online and knowing that I could talk to them."
Collaborating	7	15	"You get to share your opinions and ideas with each other and you get a lot of perspective concerning the topic and then it just sticks."
Motivating	6	29	"When they would come to me and ask if I could help them with an assignment, it made me want to do well on the assignment."

Table 2

Themes Highlighting Students' Perceived Drawbacks

Drawbacks	# of Students	# of References	Example Quote
Distracting or discouraging	7	12	"Sometimes if people G-chat me while I'm working on something, sometimes it is really kind of a bother to have to go G-chat them back."
Communicating was difficult	4	9	"I was kind of really shy and so I got embarrassed working with other peers because I didn't know who to be online."
Collaborating was a negative experience	4	8	"We didn't get his part of the project until the very, very last minute and we barely had enough time to put it in the SlideRocket and even when it was there, it wasn't that good."
Bullying	2	9	"[They] had taken—some of my pictures from either the school website or my personal Facebook which I had assumed I'd made private, so I don't know how they got them—and were just drawing rude things on my face."

Instructing

One of the major themes identified is that students provided each other with instructional support in ways that helped them learn the material and complete learning activities. Several students, like Amy, "would ask others [peers] how to do things before going to [their] teachers." We found three reasons why students turned to peers before their teachers. First, and most commonly, students believed their teachers were too busy to help—especially when it was outside of their office hours. As Amy stated, "teachers were there for students, of course, but sometimes they're busy." Second, Everly pointed out that she was more comfortable communicating with other students than her teachers making it "easier to come to a friend to ask for help." Third, Fiona added that she turned to her peers rather than her teacher so that she would appear to her teacher to be more of an original thinker and independent learner: "If I were going to the same teacher that was grading an assignment, my work wouldn't seem as original because they helped me with it."

Much of the peer instruction occurred as part of a peer mentoring program that was established by the school's Honor Society. Eamon described this program as "a class that's set up for students who are more experienced with [online learning]. It allows them to help kids and reach out to kids that aren't doing so well or need a friend." Students who excelled in the online environment and earned strong grades were identified by teachers and asked to join the peer mentor program to assist other students. When students had subject dependent questions, they would reach out to the peer mentor who was designated to that subject area. Karl, who "turned to peer mentors

multiple times," found that the mentorship program was beneficial to him, especially when they assisted him with the uncertainties he had—mostly with math.

Some of the methods peer mentors used to assist others included showing the steps of solving a problem, providing examples, reviewing work, and sharing learning strategies. Students shared their experiences of how peers approached them for instructional support. Everly, a peer mentor, said, "They would ask me for help, but they don't ask me straight for the answers," which would have been considered cheating. Amber described her role as a peer mentor as one that was filled with many students reaching out to her for help throughout the school year. According to Amber, this help included technical assistance with the online structure as well as subject-specific content. Students also tended to use more synchronous modes of communication such as instant messaging so they would receive or provide help quickly. Often when students needed to demonstrate something such as solving math equations, they shared their screen so they could show the required steps.

Motivating

Peer-to-peer motivation was illustrated in two ways—students explicitly encouraging one another and students wanting to present themselves in certain ways to their peers. Students appeared to appreciate it when their peers provided encouraging support when they lacked confidence or the desire to work in classes that were "not as fun as other classes." Avery described how she and her friends always gave "each other pep talks saying, 'You know, you just need to believe in yourself. You can do this, you just don't have the confidence right now.'" Avery also spoke of how her peers supported each other by cheering one another on through the use of "mock cheerleading routines" by shouting "You can do it!" while waving "pompoms." Amy said that when she was "really stressed on assignments" her friends checked in on her using G-chat to see how her work was going and to keep her calm.

Students reported that to appear intelligent and competent to their peers, they were motivated to put out more effort and do better on class assignments. Similarly, some students were competitive and wanted to do better than their peers. Amy stated, "I basically want my work to stand out compared to my peers" and described her desire to prove to others, in addition to herself, that she was capable of achieving great things. Eamon explained that the visibility of a students' individual class rank in the learning management system motivated him: "I found out that when I login where it shows my grades down below, it says the class rank.... It was my determination to be number one." He also described feeling encouraged when people gave him compliments on his ideas in discussion forums and on projects he completed. When students came to Fiona for help it motivated her to do well on the assignment. She explained, "If it was something like an essay question and they asked if they could read what I wrote for the questions, I would quickly change a few things to make it better and make me seem smarter" and "if I knew that someone besides the teacher and myself would be looking at an assignment, it made me want to do my best and impress not just my teachers, but my peers as well."

Collaborating

Students tended to have positive views of collaborative projects as illustrated by Avery when she stated, "not only is your own workload slightly lessened, but you get to share your opinions and ideas with each other and you get a lot of perspective concerning the topic and then it just sticks." Fiona mirrored this positive outlook: "I really liked it because I liked working with people, whether it [was] my friends or new people. I think group projects are really important."

Karl described the communication that took place during group work as key because "commenting on what each other is doing helps us more to engage in what we're doing and to comment and to help each other on what part we decided to work on." Mitchell discussed how he and a friend went to each other's homes to sit side-by-side working on different projects but occasionally would collaborate together to complete the same project.

While students were generally open to the idea of collaboration on projects, in practice they found it could be a frustrating process because some of their peers were not good collaborators. Students spoke of times when they worked with peers who did not complete their work until the very end of the deadline and thus left the rest of the group minimal time to complete the project. Avery added,

> There are some kids that procrastinate and some that don't, or some that accept a lower grade and some that don't really want to. I think it makes it harder because in the end you're scrambling to finish the project because either your partner's not doing it or you're procrastinating.

Mitchell also did not like collaborative projects because of the inconvenience of contacting other students. These drawbacks led to students opting out of group work when given the opportunity.

Discussion boards were also another form of collaboration. Teachers would post questions or ask students to respond to prompts and students were required to post a response and respond to at least two of their peers. Despite this being a common practice, only two students referred to discussion questions in their interviews. Both students identified the potential for learning but found that they were largely ineffective at their school. Mitchell described them as "time-consuming and pointless." He recognized the benefit of discussing content specific things and sharing opinions, but he felt that all his classes used "literally the same question every time," which in turn, made it "pointless." Eamon similarly found that while the discussion boards could be motivational they tended to lack value because his peers were only posting because it was "assignment-based" and there was "not a lot of depth" in the discussion threads.

Befriending

The interviewed students valued making friends in the online environment. In fact, these relationships appeared to make the other types of student engagement more effective. However, forming relationships was a task that for some proved difficult to do outside of the in-person classroom setting. Fiona stated that making friends was really important to her and that it was something she "looked forward to everyday — getting online and knowing that I could talk to [friends]…it was a big part of the schooling experience." Amy said that making friends online was something that was outside of what she was used to. She explained, "we would chat not knowing what you looked like. It was really nice, but it was different."

Students were also required to attend a start-of-the-year orientation. Then during the academic year, the school would put together optional in-person functions that were academic and social. Charity described that the school "sets up a time and a place to meet where you can kind of get to know the students." Charity enjoyed these times because she liked being with friends and talking to people: "It was just fun to get to know students and classmates better than I would know just by talking to them online." Eamon added that the in-person events actually improved his online interactions with those he connected with in-person. Some students who wanted to attend in-person events found it difficult to do so due to distance and demanding schedules. Everly explained, "I

wish that I could just hang out with a couple more of them, but we're spread throughout the whole state."

Not all students had positive experiences making friends online. Everly described herself as "not having many friends" and admitted, "I wish sometimes that I had more interaction [with peers]." However, she said she had increased her efforts and was "getting to know [her peers] better." While Avery was successful at making friends, she also acknowledged that at times her friendships proved distracting. She spoke of excessive chatting and interactions with friends through social media. She said if she "would see something funny" she would feel obliged to "screenshot" and send it to her friends, which was a "real distraction." Eamon agreed that the two biggest distractions for him were chatting with friends and social media. Furthermore, Fiona spoke of times when she befriended people who were not the "best" because they actively distracted her from her work.

While communicating and interacting with friends was identified by some students to be a distraction, other students spoke to the fact that communicating with people they did not know was very difficult. Everly described herself as really shy and found that she was "embarrassed working with other peers" because she was unsure how to act online. She expanded on this notion by describing her difficulty with acknowledging that when she interacted with others online there was someone on the other end who was going to be "listening" to what she had to say. Conversely, Eamon was not worried about reaching out to other students; however, he found that even after emailing peers multiple times only a few ever responded. The lack of responses could be due to the fact that students like Mitchell was not interested in communicating with other students online. He stated, "it's not like I don't know them...I don't want to know them." He wanted to focus his time on getting "stuff done." He also described communicating with others online as being awkward and that he doesn't like "straightforward contact."

One final negative perspective was bullying. Bullying was not common but did occur. Eamon commented that he had heard of bullying occurring at the school at one point but that it had been resolved. Only Avery shared a direct experience that she had with bullying. It has started when she and a boy were frequently communicating on Skype. According to Avery, she decided she no longer wanted to interact with him and he responded by "screaming and cussing" at her. He then turned "all her best friends" against her and continued this behavior for "over a year." The bullying progressed to an "anti-Avery" Facebook page where they posted demeaning messages. For help Avery turned to two other students who became "absolutely livid." Her friends informed the school administrators and "reported the Facebook group to Facebook and they deleted it."

Discussion and Conclusion

In this research we examined students' perceptions and experiences at a single cyber charter school. In other words, our goal was to understand "how things work" at a single school (Stake, 2010, p. 14). While the "complex specificness" (Wolcott, 1994, p. 107) prevents generalizations, the rich descriptions provided in our findings can provide important clarity to this under-researched topic and offer theoretical insights. We appreciate Merriam and Tisdell's (2009) argument, based on Lincoln and Guba's (1985) landmark contribution, that *transferability* is an appropriate and useful goal for a single case study; therefore, we offer these findings as "extrapolations [or] modest speculations on the likely applicability of findings to other situations under similar, but not identical, conditions" (Patton, 2002, p. 584).The findings from this study

highlighted several benefits of learner-learner interactions at the cyber charter school. Specifically, the majority of students believed that interactions with their peers were beneficial because their peers could engage in instructing, befriending, collaborating, and motivating support. This supports the indicators originally identified in ACE framework (i.e,. instructing, collaborating, and motivating) as well as befriending that was identified in Borup's (2016) follow-up research examining online teachers' perceptions of peer engagement. Interestingly, the ACE and CoI frameworks have focused on the need to establish social presence rather than forming close friendships. Befriending moves beyond the concept of social presence or participants' ability to simply "project their personal characteristics" into mediated communication (Garrison et al., 2000, p. 89). Similar to Garrison et al.'s (2000) claim that students' social presence was foundational to students' cognitive presence, students' ability to form relationships and friendships with other students appeared to improve students' other support efforts. While a strong sense of social presence can be developed using asynchronous text (Rouke et al., 2001), students in this research found that friendships were best formed in synchronous communication. Specifically, in-person events appeared to be especially helpful when developing relationships. It is also important to note that not all students had the opportunity to attend these events which could leave them feeling isolated. When providing in-person events schools should work to make them as inclusive as possible or they run the risk of actually forming close school communities with some students while others are left outside looking in. However, those students who cannot attend in-person events may find online synchronous communication helpful at forming friendships. Similar to Velasquez, Graham, and West (2013), we found that K-12 online students tend to prefer communicating using text instant messaging. Some students also communicated via video, including screensharing programs. The use of asynchronous and synchronous video communication appears especially helpful and efficient in developing a sense of closeness in higher education (Borup, West, Thomas, & Graham, 2014; Thomas, West, & Borup, 2017), and may have similar results in K-12 online courses. More research is needed that explores how students form relationships with peers both online and in-person.

The schools' peer-mentoring program appeared successful at providing students with instructional support at times when the teacher was unavailable. There was also some indication that in some cases students felt more comfortable contacting a peer as compared to their teacher. Research on peer tutoring programs has focused largely on literacy and math (Zeneli, Thurston, & Roseth, 2016), the two subjects that students in this research also appeared to benefit most from the program. Research examining how peer tutoring programs impact learning outcomes have been mixed but a meta-analysis of 41 articles found that programs are likely to be the most beneficial at the elementary school level as compared to high school (Zeneli et al., 2016). This may be due to the complexity of the high school curriculum—especially in subjects such as math. As a result, online high schools looking to implement peer tutoring programs should not become overreliant on them and also provide other tutoring options with content experts. Researchers can also help schools to better understand the impact that peer tutoring programs have on student learning.

Students were generally positive regarding their interactions with peers. However, they did highlight some drawbacks and obstacles. While bullying was uncommon, one student shared a direct experience when she was being bullied online for a prolonged period of time. There is some indication that bullying occurs less frequently in online courses as compared to in-person courses (Harvey, Greer, Basham, and Hu, 2014). Rice (2012) added that online learning "puts everybody on equal footing" (p. 154) because communication commonly lacks visual cues. However, when bullying does occur in online courses it can be especially harmful considering students frequently

turn to online learning to avoid bullying at brick-and-mortar schools (Beck, Maranto, & Lo, 2013). Bullying also appears to be more common with students with disabilities as compared to general education students (Beck, Egalite, & Maranto, 2014). Teachers have shared that they believe "students unintentionally bullied their peers" (Borup, 2016, p. 242) because they do not fully understand how to communicate online or how peers receive their communications. As a result, harmful interactions between peers could be avoided if schools taught their students to follow netiquette so that they communicate in open and accepting ways that avoid misconceptions. At the same time online teachers may not be receiving adequate professional development regarding cyberbulling and other related issues (see Dawley, Rice, & Hinck, 2010). While bullying did not appear to be common in this research, online programs should still use preventative measures so that bullying does not become a bigger issue—especially as online programs move to more collaborative forms of learning. We also agree with previous calls (Harvey et al., 2014; Tysinger, Tysinger, & Diamanduros, 2018) that more research is needed that examines existing anti-bullying programs and policies in online courses.

Despite how common they were in online courses, only two students volunteered their perceptions regarding discussion board activities. Both students identified the potential for having discussion activities, however both felt that the discussions tended to lack "depth" or were "time-consuming and pointless." We recommend more targeted research on student perceptions of and experiences with discussion boards. We also recommend that researchers analyze actual discussion board comments similar to previous research in higher education (Anderson et al., 2001; Garrison et al., 2001; Rourke et al., 2001).

While students generally believed that collaboration on projects could be helpful, they tended to avoid them because in practice they were difficult to arrange and could be frustrating when students' goals and efforts were not aligned. This is clearly not a challenge unique to online learning but it may be more difficult to overcome in asynchronous learning environments. While it would remove some of students' learning flexibility, more effective collaboration may be more easily facilitated in synchronous environments.

Currently there exists a tension between providing students with a highly flexible learning environment while also providing them with a collaborative and interaction rich learning experience (Garrison, 2009). Flexibility is likely more important in supplemental programs that enroll students across many school districts, each with slightly different academic calendars. Supplemental online students can also vary greatly in when they work on their courses due to their in-person class schedules. These factors make it difficult to have common assignment start and end dates that make collaboration and discussion easier. However, meaningful collaboration is also lacking in many full-time cyber charter schools where students share the same academic calendar and learning during similar times of day (Gill et al., 2015). It could also be argued that collaboration is especially important in cyber high schools because students are taking all or most of their courses online making it feasible that some students are graduating having never formally collaborated with their peers on school projects. As a result, additional research is needed that specifically focuses of effective collaboration strategies that find a balance between flexibility and structure.

Garrett Dikkers (2018) explained that discussion and collaboration tools are now in place, but we lack quality research that highlights how to use them well to create discussion- and collaboration-rich environments that strengthen student engagement and learning outcomes. This will require researchers to develop a more coordinated research agenda that works closely with

practitioners and students. This will also require that researchers use common terminology and frameworks. Graham, Henrie, and Gibbons (2014) stated, "Well-established scholarly domains have common terminology and widely accepted models and theories that guide inquiry and practice, while researchers in less mature domains struggle to define terms and establish relevant models" (p. 13). Based on these criteria, it is clear that research on this topic "is still in its infancy" (Lin et al., 2017, p. 732).

Over thirty years ago when learner-learner interaction was still a largely new "dimension of distance education" (p. 4), Moore (1989) predicted that it would "be a challenge to our thinking and practice" (p. 4). While learner-learner interactions are more prevalent in online courses, it seems as though learner-learner interactions remain a "challenge to our thinking and practice" (Moore, 1989, p. 4). The ACE framework proved helpful in guiding this research and identifying indicators of peer engagement. However, this and other research (Borup, 2016) found that the ACE framework did not capture an important indicator of peer engagement—developing relationships. Additionally, an important limitation of the ACE framework is that it largely focuses on the peer engagement that occurs within the course community. This is important limitation because earlier research found that students actually received more support from their in-person peers than their peers enrolled in their online course (Oviatt, Graham, Davies, & Borup, 2018). Borup, Graham, West, Archambault, and Spring (2020) recently revised the ACE framework and renamed it the Academic Communities of Engagement framework in part to better describe how both a student's course community (e.g., teachers, peers, mentors who make up the course or program) and personal community (e.g., parents, friends, other individuals who support the student but are not officially members of the course or program) can support the student's engagement in online and blended courses (see Figure 1).

We call on researchers to build on our efforts to apply the Academic Communities of Engagement framework using a variety of research methods in a diversity of settings. While difficult, this coordinated research effort has the potential to improve learning outcomes and better prepare students for higher education and future employment.

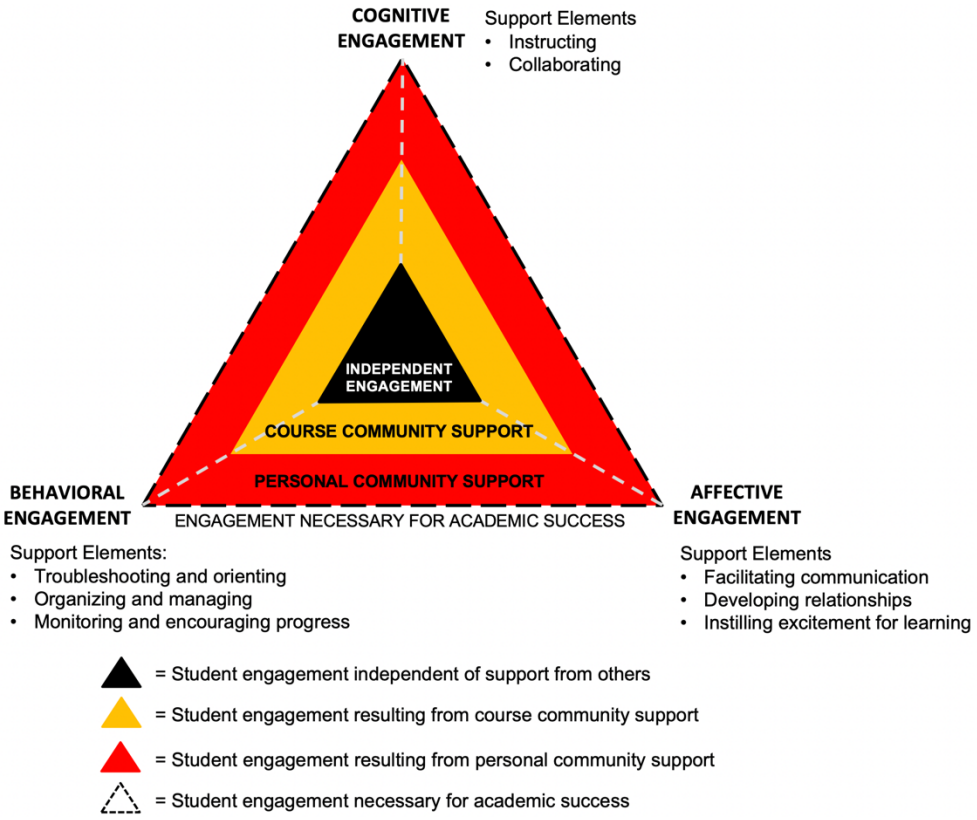

Figure 1. The area of the inner black triangle represents a student's ability to independently engage behaviorally, affectively, and cognitively in learning activities. In order to achieve academic success, as indicated by the outer dotted triangle, the student likely requires supports from those in the course community (e.g., teachers, peers, mentors) and personal community (e.g., parents, friends). The framework also aligns support elements with each type of engagement rather than specific support actor (Borup et al., 2020, p. 810).

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A Review of Ten-Year Research through Co-citation Analysis: Online Learning, Distance Learning, and Blended Learning

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Abstract
This study reviewed evolving research trends in online, distance, and blended learning over the past ten years through co-citation analysis. Related peer-reviewed research articles in the Web of Science were obtained and the references in the articles were analyzed. The result showed that literature review and meta-analysis studies on distance education and studies on learners' discourse in asynchronous discussion were most cited in the first half of the ten year period. In the second period, the focus moved to online learners' satisfaction and self-regulation, informal learning, and learning through MOOCs. The Community of Inquiry framework was continually researched throughout the entire ten year period. Overall, this study identified features and changes in research trends in online, distance, and blended learning, providing a unique contribution to our understanding of publications and research themes in these fields. Direction for further research, which was derived from the findings, is discussed.

Keywords: research review, online learning, distance learning, blended learning, co-citation analysis

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A Review of Ten-Year Research through Co-citation Analysis: Online Learning, Distance Learning, and Blended Learning

The advent of the Internet has facilitated learning in diverse formats, especially enhancing learning from remote locations. Distance learning has long supported the democratization of higher education (Larreamendy-Joerns & Leinhardt, 2006), allowing anyone willing to learn to gain access to do so. Moreover, mixed forms of face-to-face learning and online learning provides blended learning in which students obtain knowledge through the combination of traditional and online learning (Siemens, Gašević, & Dawson, 2015).

As knowledge becomes more easily shareable with other students and teachers on the web, various aspects of online learning have been studied and reviewed (e.g., Spring & Graham, 2017; Zhou, 2015), including elements and features of learning in the online community (Garrison, Anderson, & Archer, 2000; Garrison & Cleveland-Innes, 2005; Hrastinski, 2009; Shea & Bidjerano, 2011). Further, researchers need to systematically investigate the development of the field as time passes to understand evolving research trends in this field (Bradea, Delcea, & Paun, 2015; Chen, 2006). In line with this need, the present study reviews highly cited and co-cited publications and research topics in online, distance, and blended learning ("online learning," hereafter) from 2008 to 2017.

Review of Relevant Literature

Evolution of Online, Distance, and Blended Learnings

The form of delivering knowledge has changed with the advent of the Internet. The channels have been diversified in and out of the virtual world with various combinations of the channels such as *online learning*, *distance learning*, and *blended learning*. According to Siemens et al. (2015), online learning means "a form of distance education where technology mediates the learning process, teaching is delivered completely using the Internet" (p. 101) and blended learning is "the practices that combine (or blend) traditional face-to-face instruction with online learning" (p. 101). Meanwhile, distance learning, more converging on achieving knowledge, has close meaning with distance education, which "is teaching and planned learning where the teaching occurs in a different place from learning" (p. 101). Distance learning has supported people who have difficulty attending classes by giving them a chance to learn. Students learning from distant locations were given instructions, assignments, and feedback through correspondence methods, typically through the mail (Holmberg, 2005). Methods for distance learning changed and expanded with technology advances and have included the use of radio, cinema, telephone, television, and other technological delivery methods. In the twentieth century, online learning was getting popular, along with computer networking (Harasim, 2000). Moving on to the late twentieth and the early twenty-first centuries, the emergence of new technology and the Internet accessed through World Wide Web (Berners-Lee, Cailliau, & Groff, 1992) facilitated the two-way online communication between instructors and students via email, computer conferencing, and synchronous and asynchronous discussions (Holmberg, 2005). Learning on the Internet from a distance enhanced both independent learning of those who prefer learning individually as well as collaborative learning through group activities (Harasim, 2000; Holmberg, 2005), and blending online and face-to-face learning offered students more fruitful channels of getting linked with peers and instructors (Shea & Bidjerano, 2011).

In order to review previous studies on the different forms of distance learning with the Internet and technology, previous researchers have summarized relevant papers in terms of types of papers, participants, published years, or major topics (e.g., Bernard et al., 2004; Siemens et al., 2015; Tallent-Runnels et al., 2006). Nonetheless, for a more in-depth investigation of the field, researchers still need to examine emerging research topics (Chen, 2006). They need to explore scholarly works and scholars that influence the growth of the field and project the fertile topics for future research. One method that shows promise is co-citation analysis. This approach prioritizes frequently cited and co-cited research for inclusion and analysis in reviewing the literature in a field of study.

Co-citation Analysis

When it comes to writing research papers, researchers reference academic knowledge in specific fields from other scholars and cite the knowledge in the references of the publications to support research outcomes and scholarly ideas. They read and cite other scholars' research when they acknowledge its scholarly impact and novelty (Case & Higgins, 2000). Influential research is likely to be cited frequently; thus, measuring the number of citations is one of the indicators to evaluate the importance of research (Merton, 1973; Thelwall, 2007). The investigation of citations patterns between research publications can reveal hidden features and research topics as publications referenced in the same paper tend to share relevant topics.

The initial idea of systematic evaluation of research impact began in the mid-1990s. Garfield (1955) proposed that counting citations evaluates the influence of research journals scientifically. Instead of calculating the absolute number of total citations to journal articles, *impact factor* measures "ratio obtained from dividing citations received in one year by papers published in the two previous years" (Garfield, 1996, p. 411). Another systematic way of evaluating the research impact is *co-citation analysis* (Marshakova, 1973; Small, 1973). *Co-citation* occurs when two different publications are referenced in the same publication. For instance, if a research paper A cites papers B and C simultaneously, this means the papers B and C are co-cited in the paper A. The analysis of co-citations investigates citation patterns of co-cited research items and their research impact (Tang et al., 2015). Since researchers tend to cite different publications in their single study if those publications deal with topics and contents related to their research, co-citation patterns show a scholarly connection between co-cited studies (Small, 1973). In this sense, co-cited documents can identify salient research topics and publications and describe characteristics of a scholarly field (Chen, Ibekwe-SanJuan, & Hou, 2010; Kuo & Yang, 2012; Zhao & Strotmann, 2008).

Cluster Analysis

Co-citation analysis examines specialized research topics that are classified into groups, which are called *clusters*, through *cluster analysis.* Cluster analysis analyzes shared themes among individual papers in clusters based on proximity between papers (Anderberg, 1973; Kaufman & Rousseeuw, 2009), assuming that papers in same clusters discuss similar research topics (Kaufman & Rousseeuw, 2009). It often adopts mapping techniques for co-citation analysis. While sorting out frequently cited papers across academic areas is critical to building a scholarly map, clustering cited papers enhances the analysis of the dynamic interrelationship between papers and its comprehensive structure in academic fields (Small, 2003). The combination of cluster analysis and visualization unfolds configuration of components in the citation network. Components that have strong relationships attract each other; on the other hand, those who have weak relationships push

each other away (Waltman, Van Eck, & Noyons, 2010). While there are various co-citation clustering indexes, the similarity between papers is generally calculated, which is measured by the number of simultaneous citations to two papers (see Chen et al., 2010 for examples of clustering algorithms). Beyond the number of co-citations, abruptly emerging co-cited papers and topics within a short period are also observed to figure out rising stars in disciplines (Chen, 2006).

This study, which replicates co-citation research in corpus linguistics (Park & Nam, 2017), reviews frequently cited and co-cited research items and unfolds clusters of co-cited documents to reveal evolving research trends in online learning (Chen et al., 2010; Tang et al., 2015). The present study examines notable journals, publications, and emerging research topics over time in online, distance, and blended learning (referred to as "online learning," hereafter) from 2008 to 2017. The following questions are addressed:

(a) What were the most cited journals and publications in online, distance, and blended learning over the past ten years?

(b) What were the most co-cited publications and research themes in online, distance, and blended learning over the past ten years? Also, how have the research trends evolved?

Methods

The data for this study was obtained from the Web of Science (WoS). The WoS is one of the biggest databases; it holds peer-reviewed articles, conference proceedings, book chapters, and other academic papers (Bradea et al., 2015). It has been used as a major dataset in citation research across diverse fields to investigate the relationship between academic papers or authors (e.g., Chen, 2006; Ozcinar, 2015; Palmblad & Eck, 2018; Tang, Tsai, & Lin, 2014). We used three search queries that were discussed in a review paper by Siemens et al. (2015) as follows: "online learning" OR "distance learning" OR "blended learning." As the combinational form of instruction using the Internet was diversified in the early twenty-first century (Holmberg, 2005) and to review online learning-related research trends of the recent decade, peer-reviewed journal articles published from 2008 to 2017 were downloaded. Since the purpose of the present study is to examine the evolutionary change of research trends over time (Chen, 2006; Park & Nam, 2017), the entire period was divided into the first time span between 2008 and 2012 and the second time span between 2013 and 2017. We included Social Sciences Citation Index (SSCI), Science Citation Index Expanded (SCIE), and Art & Humanities Citation Index (A&HCI) to include peer-reviewed journal articles only. The areas where our data belonged were limited to "education educational research," "education scientific discipline," "psychology educational," and "education special." As a result, a total of 2,780 journal articles were obtained for the first time period and 2,919 journal articles for the second time period. The articles in the first period had 71,512 references and those in the second period had 88,379 references.

Co-citation analysis was conducted to investigate research trends in online learning, identifying studies cited in the same paper simultaneously (Chen et al., 2010). In this study, *CiteSpace* (Chen et al., 2010) was utilized to probe co-citation patterns and calculate citations to research publications and journals. Analyzing the retrieved WoS dataset through CiteSpace built clusters of co-cited documents based on the words in the documents (e.g., titles, keywords, abstracts) and used burst-detection algorithms to capture suddenly emerging research trends in a timeline (Chen, 2006; Kleinberg, 2002). According to Chen (2006), "burst-detection algorithms

can identify emergent terms regardless of how many times their host articles are cited. Therefore, a new research front can be featured in the big picture even before it attracts enough citations" (p. 364). Thus, using this tool find the abruptly co-cited publications and their themes beyond the frequency of the co-citations to those publications. The present study by utilizing this tool figured out the clusters of abruptly emerging research articles in online learning, further revealing the noticeable research themes over the past decade.

Results

Most Cited Journals and Publications

Most Cited Journals. Table 1 presents journal titles most frequently cited in the collected peer-reviewed articles between 2008 and 2017. Two five-year time spans examined the most cited journals by the collected studies. Overall, six journals were found in both periods, while some journals were found in only one period. The most highly cited journals in both periods discussed research on diverse themes under the umbrella of educational technology and instruction.

More specifically, the six journals which appeared in the top rank in the whole ten years include *Computers & Education*, *The Internet and Higher Education, Journal of Asynchronous Learning Networks, Review of Educational Research*, *British Journal of Educational Technology*, and *Computers in Human Behavior*. In particular, *Computers & Education* and *The Internet and Higher Education* were on the first and second rank for the past ten years, respectively. *Computers & Education* started to be published in 1976. This journal publishes a wide range of research issues about using computers and technology to facilitate learning (*Computers & Education*, n.d.). *The Internet and Higher Education* has been published since 1998 on teaching and learning using the Internet in the higher education context. This journal was cited more than two times as frequently between 2013 and 2017 than in the previous five years (*The Internet and Higher Education*, n.d.). Both journals focus on the effects and implications of using computers and the Internet in educational settings in diverse disciplines.

The first period between 2008 and 2012 had five journals that did not appear in the next period—*American Journal of Distance Education*, *Distance Education*, *Teachers College Record*, *Instructional Science*, and *The Journal of the American Medical Association* (JAMA). Of them, three journals had articles primarily related to distance learning. *American Journal of Distance Education* has published articles since 1987, focusing on U.S. distance learning explicitly. Initially, the research focus was on older tools and methods (e.g., radio, television, or teleconferencing tools); more recently, it has been on state-of-the-art approaches like the Internet (*American Journal of Distance Education*, n.d.). The journal, *Distance Education* (*Distance Education*, n.d.), which began in 1980 and is managed by the Open and Distance Learning Association of Australia Inc. (ODLAA, n.d.), publishes research on learning from the distance. The third journal featured exclusively in the period span is *JAMA,* which is specialized in medical research while having research on distance learning in health education (e.g., Cook et al., 2008). This journal has been published since 1883 and belongs to an association of 13 peer-reviewed journals, including *JAMA Network Open* and 11 other specialized journals in medicine and health. The articles in this journal are openly accessible on its website, and each journal issue is provided with an audio summary of research (*JAMA*, n.d.).

Four highly-cited journals were found exclusively in the second period from 2013 and 2017—*The International Review of Research in Open and Distributed Learning*, *Research & Practice in Assessment*, *Educational Technology Research and Development*, and *Educational Technology & Society*. *The International Review of Research in Open and Distributed Learning*, which began publication in 2000 with its former name, *the International Review of Research in Open and Distance Learning*, provides open and free peer-reviewed research articles on the topic of open and distributed learning. This journal includes various topics in technology-enhanced learning, such as mobile learning, online learning, distance learning, and other related fields (*IRRODL*, n.d.). *Research & Practice in Assessment* has issued online articles since 2006. It publishes articles two times a year, covering diverse issues in education, using technology, big data, and learning analytics (*Research & Practice in Assessment*, n.d.). In particular, articles related to Massive Open Online Courses (MOOCs) and assessment (e.g., Balfour, 2013; Meyer & Zhu, 2013; Sandeen, 2013) and MOOCs and analytics (e.g., O'Reilly & Veeramachaneni, 2014) were published in this journal. *Educational Technology Research and Development* started publishing articles in 1953 on a broad range of methodological and educational contexts with regards to instruction and technology (*Educational Technology Research and Development*, n.d.). *Educational Technology & Society* has published articles four times every year since 1998. This journal was the only one in the list, which is published by a university in Asia. It covers a wide range of topics, from game-based learning to technology to big data and knowledge management (*Educational Technology & Society*, n.d.).

Table 1
Journals Frequently Cited in Collected Peer-reviewed Articles Published from 2008 to 2017

Period	Journal	Citations
2008–2012	*Computers & Education*	415
	The Internet and Higher Education	151
	Journal of Asynchronous Learning Networks	123
	Review of Educational Research	112
	British Journal of Educational Technology	93
	American Journal of Distance Education	83
	Computers in Human Behavior	39
	Teachers College Record	32
	Instructional Science	30
	Distance Education	30
	The Journal of the American Medical Association (JAMA)	26

Table 1 (continued)
Journals Frequently Cited in Collected Peer-reviewed Articles Published from 2008 to 2017

Period	Journal	Citations
2013–2017	*Computers & Education*	549
	The Internet and Higher Education	386
	The International Review of Research in Open and Distributed Learning	180
	Review of Educational Research	116
	British Journal of Educational Technology	92
	Research & Practice in Assessment	49
	Educational Technology Research and Development	36
	Journal of Asynchronous Learning Networks	34
	Educational Technology & Society	32
	Computers in Human Behavior	30

Most Cited Publications. Table 2 presents publications most cited in the collected peer-reviewed journal articles over the ten years from 2008–2017. D. Randy Garrison and Robert M. Bernard were steadily found in the top rank of the most cited publications. Garrison's (Garrison, 2011; Garrison & Anderson, 2003) book entitled *E-learning in the 21st century: A framework for research and practice* was frequently cited. Its first edition was on the top rank in the first period while the second edition was found in the second period. In addition to that, his research papers on the Community of Inquiry (CoI) framework were often referenced by other researchers. In the case of Bernard, his two meta-analyses of distance education were most cited in each period, respectively (Bernard et al., 2004; Bernard et al., 2009).

Some papers were frequently cited in each period. In the first period, research articles that discussed asynchronous discussion on the online community were frequently cited. For instance, De Wever and his colleagues (2006) reviewed theoretical frameworks of content analysis instruments for the investigation of online discourse. Two other empirical papers regarding online discussion were also frequently cited in this time. Schrire (2006) quantitatively and qualitatively investigated discourse in collaborative learning of doctoral students for their knowledge building, in terms of interactions between an instructor and students as well as the process of learning. Another paper by Pena-Shaff and Nicholls (2004) discussed a similar topic on students' interaction and their knowledge development in a bulletin board on the web.

In the second period between 2013 and 2017, research articles related to previous studies on the CoI framework and distance learning were frequently cited. For instance, in line with the studies on the CoI, Shea and Bidjerano (2009) tested relations between teaching, social, and cognitive presences. In the following year, they (Shea & Bidjerano, 2010) found teaching presence and social presence are correlated with learners' self-efficacy in online learning, suggesting an additional element to include in the framework—learning presence. On the one hand, articles on MOOCs were also found as frequently cited research. More specifically, Liyanagunawardena, Adams, and Williams (2013) reviewed 45 research papers discussing MOOCs, which were published from 2008 to 2012, discovering an increasing number of MOOCs-related articles. They found that many of the articles were published in journals and talked about the concept of MOOCs. Another frequently cited study by Breslow et al. (2013) analyzed learning data of students who took a course on edX, a MOOC platform created by Massachusetts Institute of Technology, revealing characteristics of MOOC course-takers and their learning patterns.

Table 2

Publications Frequently Cited in Collected Peer-reviewed Articles Published from 2008 to 2017

Period	Publication	Citations
2008–2012	Garrison, D., & Anderson, T. (2003). *E-learning in the 21st century: A framework for research and practice.* New York, NY: Routledge.	50
	Bernard, R., Abrami, P., Lou, Y., Borokhovski, E., Wade, A., Wozney, L.,…Huang, B. (2004). How does distance education compare with classroom instruction? A meta-analysis of the empirical literature. *Review of Educational Research, 74*(3), 379–439.	47
	Garrison, D., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education, 7*(2), 95–105.	44
	De Wever, B., Schellens, T., Valcke, M., & Keer, H. (2006). Content analysis schemes to analyze transcripts of online asynchronous discussion groups: A review. *Computers & Education, 46*(1), 6–28.	44
	Tallent-Runnels, M. K., Thomas, J. A., Lan, W. Y., Cooper, S., Ahern, T. C., Shaw, S. M., & Liu, X. (2006). Teaching courses online: A review of the research. *Review of Educational Research, 76*(1), 93–135.	43
	Garrison, D., & Cleveland-Innes, M. (2005). Facilitating cognitive presence in online learning: Interaction is not enough. *American Journal of Distance Education, 19*(3), 133–148.	38
	Schrire, S. (2006). Knowledge building in asynchronous discussion groups: Going beyond quantitative analysis. *Computers & Education, 46*(1), 49–70.	34
	Laurillard, D. (2002). *Rethinking university teaching: A conversational framework for the effective use of learning technologies* (2nd ed.). London: Routledge Falmer.	33
	Gee, J. P. (2003). *What video games have to teach us about learning and literacy.* New York: Palgrave Macmillan.	29
	Pena-Shaff, J., & Nicholls, C. (2004). Analyzing student interactions and meaning construction in computer bulletin board discussions. *Computers & Education, 43*(3), 243–265.	29

Table 2 (continued)
Publications Frequently Cited in Collected Peer-reviewed Articles Published from 2008 to 2017

Period	Publication	Citations
2013–2017	Garrison, D., Cleveland-Innes, M., & Fung, T. (2010). Exploring causal relationships among teaching, cognitive, and social presence: Student perceptions of the community of inquiry framework. *The Internet and Higher Education, 13*(1–2), 31–36.	52
	Bernard, R., Abrami, P., Borokhovski, E., Wade, C. A., Tamim, R., Surkes, M., & Bethel, E. (2009). A meta-analysis of three types of interaction treatments in distance education. *Review of Educational Research, 79*(3), 1243–1289.	52
	Liyanagunawardena, T., Adams, A., & Williams, S. (2013). MOOCs: A systematic study of the published literature 2008–2012. *The International Review of Research in Open and Distributed Learning, 14*(3), 202-227.	51
	Breslow, L., Pritchard, D., DeBoer, J., Stump, G., Ho, A., & Seaton, D. (2013). Studying learning in the worldwide classroom research into edX's first MOOC. *Research & Practice in Assessment, 8*, 13–25.	49
	Sun, P.-C., Tsai, R., Finger, G., Chen, Y.-Y., & Yeh, D. (2008). What drives a successful e-learning? An empirical investigation of the critical factors influencing learner satisfaction. *Computers & Education, 50*(4), 1183–1202.	47
	Allen, E., & Seaman, J. (2013). *Changing course: Ten years of tracking online education in the United States.* Babson Survey Research Group Report. http://www.onlinelearningsurvey.com/reports/changingcourse.pdf	46
	Garrison, D. (2011). *E-learning in the 21st century: A framework for research and practice* (2nd ed.). New York, NY: Routledge.	46
	Shea, P., & Bidjerano, T. (2010). Learning presence: Towards a theory of self-efficacy, self-regulation, and the development of a communities of inquiry in online and blended learning environments. *Computers & Education, 55*(4), 1721-1731.	45
	Shea, P., & Bidjerano, T. (2009). Community of inquiry as a theoretical framework to foster "epistemic engagement" and "cognitive presence" in online education. *Computers & Education, 52*(3), 543-553.	41
	Means, B., Toyama,Y., Murphy. R., Bakia, M., & Jones, K. (2009). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online-learning studies*. Washington, D.C.: U.S. Department of Education.	37

Co-cited Publications and Research Themes

With regards to clusters of major themes discussed in the online learning field during the past decade, Table 3 shows themes extracted from co-cited references of the collected peer-reviewed articles, with the number of co-cited references and average publication year of them. As a result, a total of 23 clustered themes were discovered—12 themes were found in the first

period, while 11 themes were revealed in the second. More specifically, the clustered themes in the first period included "knowledge construction," "blended learning," "inquiry framework," "online learning," "distance education," "clinical reasoning skill," "referencing skill," "epistemological belief," "faculty development," "effective feedback," "expertise," and "participation." In the next time span, the clustered themes were related to "cognitive presence," "MOOC," "blended learning," "satisfaction," "homework," "argumentative knowledge construction," "flipped classroom," "Facebook," "peer feedback," "podcast," "content knowledge," and "teacher community."

Table 3
Research Themes Extracted from Co-cited References

Period	Theme	Co-cited Reference	Average year of co-cited references
2008–2012	Knowledge construction	33	2004
	Blended learning	27	2006
	Inquiry framework	23	2004
	Online learning	18	2003
	Distance education	17	2005
	Online social software application	15	2006
	Referencing skill	11	2002
	Epistemological belief	11	2006
	Faculty development	10	2004
	Formative feedback	4	2006
	Expertise	2	2003
	Participation	2	2002
2013–2017	Cognitive presence	31	2008
	MOOC	26	2012
	Blended learning	24	2009
	Satisfaction	23	2008
	Homework	22	2008
	Argumentative knowledge construction	21	2007
	Flipped classroom	17	2013
	Facebook	17	2010
	Peer feedback	9	2007
	Podcast	9	2009
	Content knowledge	2	2005
	Teacher community	2	2009

Co-cited studies with suddenly increasing citations were further investigated to discover emerging research trends (Chen, 2006). In the first period, meta-analysis research or literature review papers on distance learning were found, including in health education. The CoI framework was also discussed in terms of knowledge advancement in asynchronous online learning. The more recent period discussed the CoI framework; in this period, they primarily focused on cognitive presence, such as review of the CoI framework or metacognitive constructs in collaborative learning that may be underrepresented in the CoI model. Also, using online platforms like social media and MOOCs was researched, and students' satisfaction in social platforms in informal learning was examined (see Table 3). The detailed findings with abruptly co-cited articles are presented in the following sections.

First Period (2008–2012)

Themes in the first period included "knowledge construction," "blended learning," "inquiry framework," "online learning," "distance education," "online social software education," "referencing skill," "epistemological belief," "faculty development," "formative feedback," "expertise," and "participation" (see Table 3). The network of co-cited articles across these themes is presented in Figure 1. According to Chen (2017), color in a co-citation network indicates the year in which two different publications in a themed cluster were co-cited for the first time. For instance, in the first time period as shown in Figure 1, themes in blue had the first co-citation in 2008 (online learning, referencing skill), sky blue in 2009 (knowledge construction, faculty development), green in 2010 (inquiry framework, distance education, epistemological belief), and yellow-orange in 2011 (blended learning, online social software application, formative assessment), respectively. Further, pink and relatively bigger-size publications are those with a sudden increase of co-citations (Chen, 2006).

Of the themes in this period, research articles were found in terms of knowledge construction, the CoI framework, and meta-analysis or review studies on distance education. Regarding knowledge construction, three articles were found—"Analyzing student interactions and meaning construction in computer bulletin board discussions" (Pena-Shaff & Nicholls, 2004); "Content analysis schemes to analyze transcripts of online asynchronous discussion groups: A review" (De Wever et al., 2006); and "Knowledge building in asynchronous discussion groups: Going beyond quantitative analysis" (Schrire, 2006). These articles were listed in Table 2.

The CoI framework was discussed in empirical studies on social and teaching presence. The book entitled *E-learning in the 21st century: A framework for research and practice* (Garrison & Anderson, 2003) appeared co-cited abruptly, which was also listed in the most cited publications shown in Table 2. Empirical research by Garrison and Cleveland-Innes (2005), also listed in Table 2, suggested the need for an adaptation of teaching presence and interaction in order for deeper knowledge improvement in asynchronous online learning. Richardson and Swan (2003) investigated the social presence level of students who took an online course, revealing that those with high social presence levels had high perceptions about their deep learning and were satisfied with the course instruction.

Meta-analysis and review studies appeared noticeable with regards to distance education. For instance, Bernard et al. (2004) conducted a meta-analysis to investigate comparative studies in distance education in diverse contexts such as age, type of media, assessment of the instructional method, and learning outcomes. Tallent-Runnels et al. (2006) reviewed 76 prior studies on online education, identifying features of learning settings and learners along with the administrative

aspects of schools. These two articles were included in the most cited publications as well (see Table 2). One study in a specific disciplinary field was also discovered—Cook et al. (2008) conducted a meta-analysis of online learning in health education. They compared the effect of using the Internet and that of not using it to instruct learners in health and medical fields.

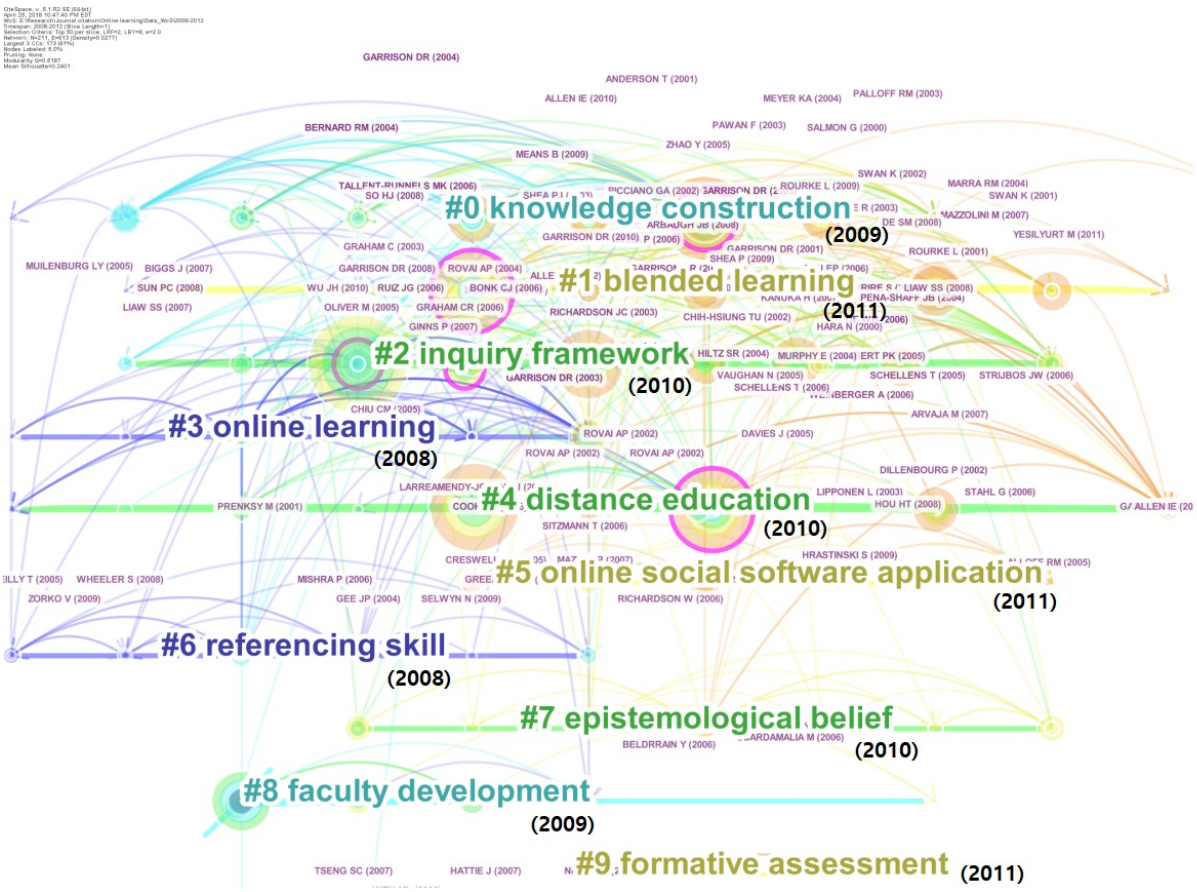

Figure 1. A network of co-cited publications and themes from 2008 to 2012. Themes in blue had the first co-citation in 2008 (online learning, referencing skill), while those in sky blue in 2009 (knowledge construction, faculty development), green in 2010 (inquiry framework, distance education, epistemological belief), and yellow-orange in 2011 (blended learning, online social software application, formative assessment). The colored rings represent co-cited publications with a sudden increase of co-citations. The size of the rings gets bigger as they have co-citations.

Second Period (2013–2017)

Themes in the second period were "cognitive presence," "MOOC," "blended learning," "satisfaction," "homework," "argumentative knowledge construction," "flipped classroom," "Facebook," "peer feedback," "podcast," "content knowledge," and "teacher community" (see Table 3). Co-cited papers in these themes discussed the CoI framework, especially with the direction for future research, metacognitive constructs, educational and economic aspects of MOOCs, features of MOOCs learners, students' satisfaction with online learning, and online social platforms in informal learning.

During this period, research with abruptly emergent co-citations addressed cognitive presence (see Figure 2). As in the previous time span, Garrison's publications were searched as well under this theme. His book *E-learning in the 21st century: A framework for research and practice* (Garrison, 2011) and journal article (Garrison & Cleveland-Innes, 2005) were found here again. Also, Garrison and Arbaugh (2007) reviewed existing literature on the CoI framework and suggested direction for future research regarding the framework. More recently, Garrison and Akyol (2013) claimed that the CoI framework could help create an instrument to examine metacognitive constructs in collective learning. Other experimental studies applied the CoI framework in online learning environments (Akyol & Garrison, 2008; Akyol & Garrison, 2011; Arbaugh et al., 2008).

About MOOCs, social learning on MOOC platforms and features of learning on MOOCs were investigated. For example, Fini (2009) surveyed MOOC takers to identify learner characteristics. Rita (2011) pointed out three capabilities that learners need to have for their connectivist learning in MOOCs—directing learning themselves, having an adequate literacy level, and utilizing technology and tools to learn through interaction with other learners. A common aspect of these two papers (Fini, 2009; Rita, 2011) was that they discussed social engagement and interaction of learners for obtaining knowledge on the Internet in large scale online course formats. Besides, two reports were found to comprehensively illustrate the history and feature of MOOCs—one was written by Yuan and Powell (2013), which especially focused on the significance of MOOCs in the higher education context, and the other one by McAuley, Stewart, Siemens, and Cormier (2010), which described implications of MOOCs from the perspectives of economy and education.

Studies on students' satisfaction and informal learning settings on the Internet were found in recent years. Experimental research was conducted to reveal elements that influence student satisfaction, such as competency to use computers, positive attitudes from teachers, features of online courses and evaluation methods (Sun, Tsai, Finger, Chen, & Yeh, 2008) and importance of teachers' role and qualification to enhance students' motivation and satisfaction in online learning (Paechter, Maier, & Macher, 2010). In addition, an empirical study showed the possibility of using social media for social learning in higher education (Madge, Meek, Wellens, & Hooley, 2009). A theoretical framework was suggested with the idea that social media can be an informal learning platform to enhance students' self-regulated learning (Dabbagh & Kitsantas, 2012).

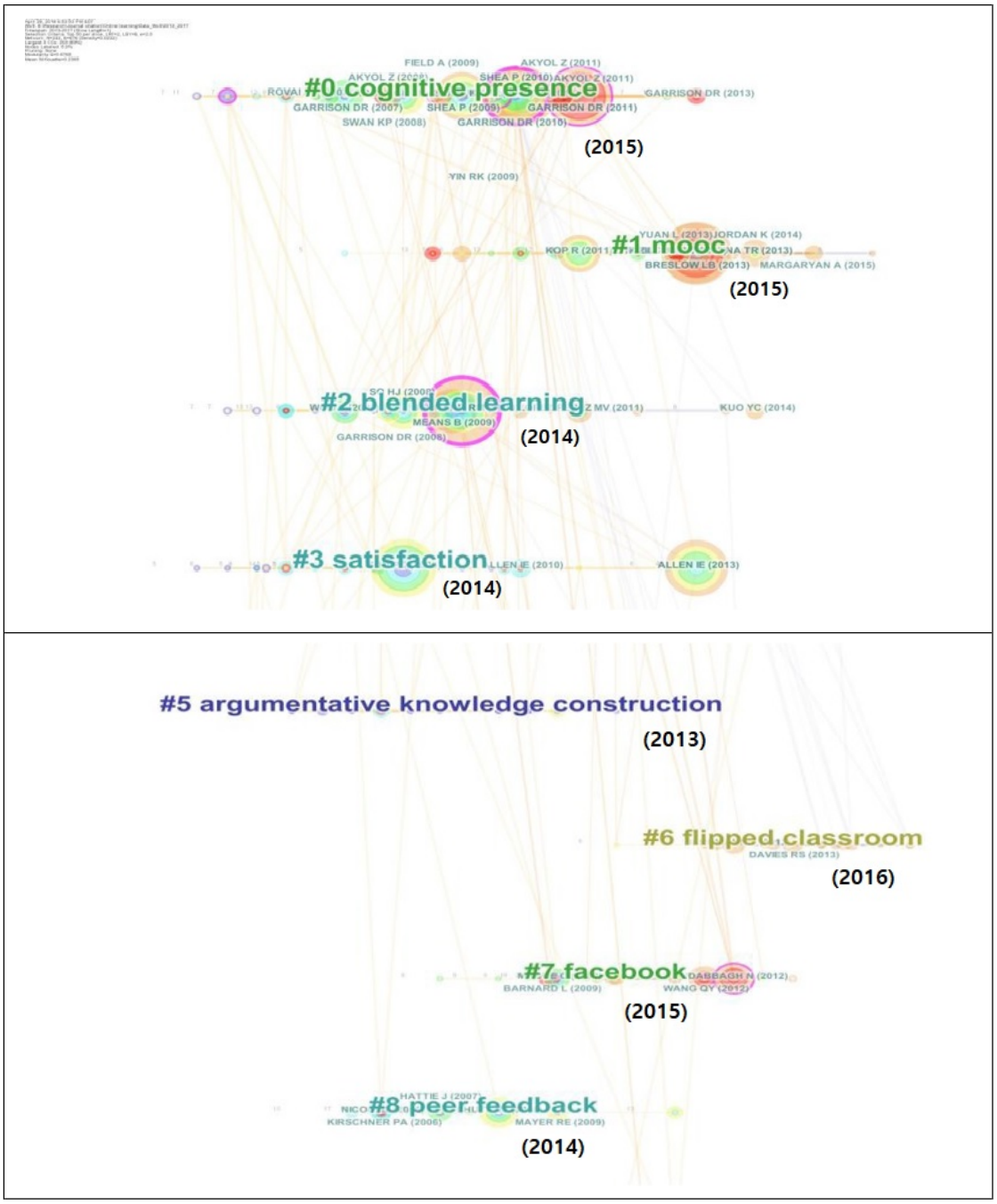

Figure 2. A network of co-cited publications and themes from 2013 to 2017. Themes in blue had the first co-citation in 2013 (argumentative knowledge construction), while those in sky blue in 2014 (blended learning, satisfaction, peer feedback), green in 2015 (cognitive presence, MOOC, Facebook), and yellow-orange in 2016 (flipped classroom). The colored rings represent major co-cited publications with the sudden increase of co-citations. The size of the rings gets bigger as they have more co-citations.

Conclusion and Discussion

The present study investigated emerging research trends in online learning over the past ten years. Frequently cited journals and publications, emergent co-cited publications, and research themes by clustering co-cited publications were revealed and discussed in this study. As a result, journals about using technology and the Internet in education in various domains were steadily cited for the past ten years. Specifically, journals discussing research on distance education were frequently cited in the first five years. In more recent five years, journals publishing articles about adopting relatively new tools and technology in education were often cited, broadly covering big data, MOOCs, learning analytics, game-based learning, and other related topics.

Similar phenomena were identified when examining highly cited and co-cited research publications. In general, review studies and meta-analytic studies on distance education were highly cited for the first five years, leading to research on the use of MOOCs in learning and analysis of learners' interaction and their features on MOOCs platforms. Additionally, learners' discourse in asynchronous discussion in the virtual learning community was investigated in the first period, while students' satisfaction and self-regulation were studied in recent years. More recent studies discussed informal learning in online platforms such as social media. One more significant finding was that the CoI framework was continually researched over the past decade. This topic was discussed in journal articles and books, covering components of the framework and their relationship with other aspects of online learners such as interaction, perception, and metacognitive constructs in collaborative learning.

This study examined features and changes in research trends in online learning through co-citation analysis and discussed promising future research trends (Gmur, 2003). The visualized network of clustered themes enhanced our understanding of the configuration of important topics and academic publications in online learning based on a 10-year timeframe (Chen et al., 2010; Liang, Liu, Yang, & Wang, 2008). It is now getting more critical to consider online learners' characteristics, including their learning type, self-regulation, and motivation in online learning research. In recent years, the Internet played a significant role in facilitating learners' ubiquitous learning, along with their cognitive improvement in both formal and informal learning environments. For learners' intellectual advancement, it is highly necessary to design online courses beyond the simple use of online platforms. Appropriate pedagogy is as critical as state-of-the-art technology to take the best advantage of utilizing the technology in education. Without decent pedagogy for learning and teaching, the effectiveness of using educational technology will be diminishing. It is also important to facilitate interactions between students and students, students and instructors, and students and course content/assessment tools with timely feedback and monitoring of students' learning (Siemens et al., 2015). Students need to understand their learning progress and how to select and use reliable educational resources from the Internet to deepen high-quality knowledge. Meanwhile, it needs to be pointed out that the database in this study was only retrieved from the WoS, which might limit the range of the results. Further study should include expanded datasets such as Scopus or Google Scholar (Kuo, & Yang, 2012; Park Yoon, & Leydesdorff, 2016). Also, this study examined peer-reviewed articles downloaded using the three search queries. In order to cover more comprehensive data, future research can use more diverse search queries. Finally, conducting cluster analysis with supplementary analysis may improve the comprehensiveness of exploring citation patterns (Boyack, & Klavans, 2010; Braam, Moed, & Raan, 1991).

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Making Instant Adjustments in Online Journalism Education: Responding to Continuous Needs Assessments in Asynchronous Courses

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Abstract
The creation of an effective learning environment is always a challenge, but when the environment is online and the learners are a diverse group of adults in a specialized content area, the challenges become more complex. This best practices study used the intersection of the importance of the learner, Knowles's andragogy concepts, and the Dick and Carey instructional design model to make continuous needs assessment the cornerstone of three, graduate-level online courses during a single summer session. Through the use of recursive needs assessment, the instructor was able to provide a personal and practical level of instruction in the asynchronous courses that ultimately benefited the students.

Keywords: online learning, andragogy, needs assessment, instructional design, asynchronous, differentiated instruction

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Making Instant Adjustments in Online Journalism Education: Responding to Continuous Needs Assessments in Asynchronous Courses

Truly differentiated instruction—where learning meets each student's unique needs—is one of an educator's greatest desires, and it has transitioned in rhetoric from preferable to principle at all levels of learning. According to Murray (2017), student needs have become paramount at learning institutions, where instructors often employ technological tools in order to design instruction specifically for individual learners.

Although we know education that is responsive to each student is part of best practice, the method for making it both possible and viable can be elusive. How can a single instructor meet individual learners where they are at, set individual learning outcomes for each person, and

see each of those goals come to fruition by the end of a single semester? This notion is particularly constrained when the learners are college-level adults coming from sometimes remarkably disparate levels of knowledge and ability. It is even more complex when the course delivery is online, which means transformed options for student engagement and the ability to understand what each learner needs to thrive. Sometimes, technology drives this part of the conversation, but according to a thirty-year analysis of online learning theories by Mayer (2019), a recurring theme to address this complexity should be "instructional methods rather than instructional media" (p. 152).

In a face-to-face learning setting where so many needs and wants are competing within a certain timeframe, to meet each student where he or she is at can be to derail or deviate in a way that compromises other learners. Yet in online education, and particularly with adult learners who have a clear sense of their own capabilities and desires, there is a real opportunity for implementing instructional methods that are highly responsive and individualized—most notably through an enhanced focus on continual and recursive needs assessment in a way that we have only begun to fully exploit in distance education.

Review of Relevant Literature

Meeting students' needs so they can learn at their highest potential is the crux of the challenge in education—whether inside a physical classroom or not. Abrami, Bernard, Bures, Borokhovski, & Tamim (2011), in an extensive meta-analysis, identified self-regulation, motivation and collaboration as needed areas in learning, particularly in online environments. In a comprehensive study in 2012, three researchers who studied online learning in higher education in the southeast of the U.S. found that a number of factors complicate good pedagogy when learning at a distance. Limited resources in funding and technology, coupled with increased demands from institutions on faculty time and output, are key concerns (Lloyd, Byrne, & McCoy, 2012).

It should be noted that although the challenges are clearly explicated, the focus, in the end, is on student needs and their learning outcomes. The emphasis then is on those methodologies employed to reach learners successfully online.

Another argument within distance education has to do with the instructor him or herself, as if some professors are more equipped to teach online than others regarding this concept of individualized learning. Robert Ubell (2016), vice dean for online learning at New York University's Tandon School of Engineering and author of the book *Going Online: Reflections on Digital Education*, denies that premise. Instead, he asserts that good faculty members succeed in both face-to-face and online environments, particularly because they are focused on individual learners and not only who they are but also what they need to succeed as people (Ubell, 2016).

Again, the quality of online learning is tied back to an understanding of the students and an instructor's ability to meet those specific learners' needs. Although universities and educators may want to focus on technology, training, content rigor, or other issues, some academics assert that teaching is about knowing where students are and where instructors can help them be next, in regard to meaningful cognitive learning that transforms individually.

Knowles's Andragogy Regarding Adult Learners

If online learning's key foundational aspect is the learner him or herself, it makes sense to pivot toward a general notion of who these distance education patrons are before the attempt is made to understand them as separate people. Murry (2017) cites research from the National Center for Education Statistics, where more than one third of college students are over age 25 and one quarter are older than 30. In addition, growth is expected in these older age ranges, as students over the age 25 will grow within the college population by another 23 percent by 2019 (Murray, 2017). This was echoed by Jill Buban, senior director of research and innovation with the Online Learning Consortium, who, in pointing out flaws in the recent Caroline Hoxby study on online learning, noted that since distance learning has begun in earnest, older learners have greatly benefitted by online access to education (Lederman & Dimeo, 2017).

Using these two pieces of evidence as guides, it is then useful to employ the seminal work of Malcolm Knowles (1990) on the concept of the adult learner. His research showed the desires involved in andragogy—the method and practice of teaching adult learners—as a clear set of expectations and transparent communications; it's the notion the course will not be preloaded from the start, but will change around individual learner's goals. Through an exhaustive study of models, theories, and pedagogies, Knowles (1990) asserted instructors for younger learners should be "concerned with transmitting information and skills" as a content-driven model, whereas for adults, a process model should be used that provides "procedures and resources for helping learners acquire information and skills" (pp. 102–103). This subtly worded difference is quite radical in practice, as andragogical instructors change their role to be one that facilitates, consults, and advises through the framework of understanding and opportunity for individuals to make meaning for themselves, at the level of their own achievement.

Dick and Carey's Instructional Design Focus on Needs Assessment

Often, even for adult learners, the learning goals or outcomes for a course are set long before instruction is designed and far before any students are known. Although this is quite useful for building course catalogs and program tracks, it does not address the needs of individual learners, nor does it adhere to many of the tenets of Knowles's andragogy where learners take the lead. Abrami, Bernard, Bures, Borokhovski, & Tamim (2011) acknowledge that instructional design is a key element to crafting effective online learning, specifically when designing objectives for learners to accomplish. This is where knowledge of instructional design comes into play, and the Dick and Carey Instructional Design Model is one of the more comprehensive methods developed to place emphasis on the knowledge gained about students at the beginning, as well as throughout the learning process. Instructional design, defined as the systematic development of learning that employs theory, has two parts for the learner in this model: the first is a full-bodied, front-end analysis that asks for an in-depth needs and learner assessment before instruction ever begins. According to Dick, Carey, & Carey (2009), this needs assessment is essential to the total design of instruction for a number of reasons, including the fact that meaningless learning activities waste not only time and resources but also can be demoralizing and counterproductive for the learners themselves. The Dick and Carey model works to address this lack of prior knowledge of student needs for this reason.

When educators understand the learners, the context in which skills or knowledge will be used, and the tools that will be possible within an educational context, the ability to reach students where they are is greatly enhanced. Although some keen instructors can do this

intuitively during the first few days of class, online learning means a literal and philosophical distance, making this intentional step all the more valuable, whether through surveys, student interviews, or research and observations (Dick, Carey, & Carey, 2009).

The second aspect of this model is a clear acknowledgement that continuous improvement or a sense of concurrent processes is vital because so often "planning, development, implementation, and revision all occur at the same time or in multiple cycles of simultaneous activities" (Dick, Carey, & Carey, 2009, p. 4). Learning is not a linear process as often as it is a cyclical or recursive one, and this model's awareness of how often a plan goes astray, requires more input, and therefore some revision, is quite applicable and adaptable to an online learning situation.

Methods

Setting

This trifold research foundation—focus on the requirements of the students, theories of best practice for adult learners, and needs and learner assessment constructs in instructional design—were the driving factors for studying three online-only, graduate-level courses for high school journalism advisers. The courses were hosted through a public regional university of approximately 7,000 students. When these courses were first taught in the 1990s, the professor who designed them was on the cutting edge of distance education.

Although the courses were groundbreaking at the time, technology has changed, and their resurrection of the asynchronous classes in the summer of 2017 meant complete reinvention. There were 10 total participants in the one-credit hour, graduate-level courses and they were diverse as they came from different states, educational backgrounds, level of advising experience, and journalistic knowledge.

At the beginning and the end of each three-week, online course, students were asked to take a short online survey, using Typeform, to explain their background, expectations, and fears/reactions regarding online learning. All 10 students who participated in each of the three courses (in various configurations) responded to the survey, which was comprised of six new journalism advisers, two experienced advisers (one to five years of experience), and two veteran advisers (five or more years of experience).

The preassessment provided the needs assessment asked for by the Dick and Carey Instructional Design Model. Then, the fact that there was demonstrated change from the pre- to postassessment reflected the individualized learning and emphasis of a clear set of expectations and transparent communication for adult learners. During the pre- and postassessments for online learning, advisers answered the following questions:

Table 1.

PRE: What do you most hope to gain from this course? POST: Now that this course is complete, what learning outcome was most valuable for you?	**Percentage Preassessment**	**Percentage Postassessment**
Specific lesson plans that can be used next school year	70%	60%
More ideas about various areas of advising	60%	70%
Framework or structure for a student media course	50%	40%
Collaboration with colleagues about advising	20%	10%
General knowledge about what advising entails	0%	50%

Table 2.

PRE: What are your concerns, if any, with taking an online journalism-advising course? POST: Now that the course is over, what were the biggest struggles with taking a journalism-advising course online?	**Percentage Preassessment**	**Percentage Postassessment**
Clarity of instructions and assignments	40%	0%
Lack of face-to-face interaction with instructor	30%	30%
Time management for online deadlines	30%	50%
Lack of face-to-face interaction with peers	10%	30%

Table 3.

PRE: What ways do you learn best, specifically in an online or hybrid environment? POST: What methods or techniques within the course worked the best for you, specifically in this online environment?	**Percentage Preassessment**	**Percentage Postassessment**
Readings	60%	80%
Discussions	50%	40%
Interaction with others	50%	10%
Reflection-based assignments	40%	70%
Essays or other academic writings	20%	20%
Projects	20%	60%
Experiential learning	0%	0%

Again, it was not that this sample was quantitatively significant in size, but that the process of asking the students, and then being responsive to their answers, altered their perceptions and effectiveness of online learning.

Results

More specifically, based on the initial data from the preassessment, a number of alterations were made in the courses *before* they formally began. Because students overwhelmingly desired specific lesson plans that could be used in their classrooms, as in Table 1, extra assignment sheets were added and artifacts from programs both in the readings and as optional choices. When students identified clarity of instructions and assignments as a concern (see Table 2), explicit learning outcomes were added on the syllabus in each module, with detailed assignment descriptions. Emails were sent once during nearly every module regarding expectations for assignments and level of completion, and then feedback was provided to each student within 24 hours of posting to formatively assess if they were progressing regarding performance. Based on the postassessment in Table 2, clarity was well-addressed overall. Lastly, in Table 3, when students noted that readings and discussions were the way they would learn best, each individual post received a comment in some way, expanded and revised the reading selections based on student feedback on those blogs or posts, and connected students to each other within those responses, in order to propel the desired interaction with others, another component of the responses.

Self-Assessments for Skills and Knowledge

Although much was gained from those initial pre- and postassessments regarding online learning, there was also a need to understand the adult students' grasp on content, particularly in such a specialized online course. So, a self-assessment regarding perceived strengths and weaknesses regarding journalism advising was administered. From these qualitative findings, the results were coded into three main themes: structure for the courses taught, issues of motivation and working with students, and tools and materials for enhancing programs. To this end, more readings (some which were optional) about various areas of advising were added, particularly those that had advisers speaking to advisers from real, and sometimes harrowing, experiences with student media staffs. Specific examples of syllabi and assignments were also added so students could use them as a starting point for their own programs.

Content Adjustments

After two initial needs assessments, the courses began, and although they were already built, they were updated constantly throughout each three-week course.

Instructor Reading Alterations. The readings in the course stayed fluid. There was not a textbook, just a varied set of open educational resources, so readings could be added and subtracted and examples could be posted a day before the next module started. By paying attention to blogs and discussions, individual students' needs were clear, and with a small change in the learning management system, adjustments to readings could focus on their needs and goals, while still maintaining core pieces that were foundational to the theme of the module.

Student-led Reading Selections. After the first course, a few students mentioned in postassessments that some readings did not apply to their situation. So, in addition to responsiveness within discussions, the second two courses provided the chance for each student to add one or two readings of his or her own to one module of choice. The effectiveness of this technique was shown when students mentioned the texts others chose in their blogs:

> After reviewing the readings in module 5, I felt like there was a ton of valuable information that will help the yearbook be successful. In the reading, "Managing A High

> School Yearbook Staff: Photographer" it states, "Managing a high school yearbook staff can be a full-time job in and of itself; show your students the basics of photography and manage your equipment and their time with ease." This is a great point; you are limited to one school year to teach your students the basics of building a yearbook.

This allowed for adult, experienced students to drive the content even more, which supports Knowles's andragogy theory, and more auxiliary readings were taken off the list to accommodate the student-chosen readings. In blogs and discussions, students referred to these peer-selected readings often, as in the above example. The data in Table 2 provide evidence for a readings system that worked for students.

Interactive Discussions

Along with this monitoring of student needs, the instructor kept note of which learner was interested in what outcomes and then researched and provided resources and responses for those goals through discussion/responses. The time investments seemed to mean a lot to the individual students who often mentioned they would use those specific resources in the coming school year. Also, there was an increase in frequency of similar posts from other students. "I also like that idea of getting into the ethics of journalism right away, helping students understand some of the 'why?' behind what they're doing. There's a good chance you've already seen this TED Talk, but Simon Sinek's thinking on the importance of 'Why?' has helped reframe my teaching philosophy over the past few years," one student posted in response to another. This increase in specific, resource-based interaction made the online course not only more interesting but also more tailored to the needs and goals of other individual students.

After one particular postassessment comment, another structural change was made in the courses. "The discussions weren't much of a discussion. It would have been nice to have assignments that were a little more informal that inspired more Q and A discourse amongst the advisers." This student comment indicated that not enough cohesion was occurring between student posts, which were, at that point, self-select regarding topic. So, three suggested ideas for responses to that module's readings were inserted, allowing for more commonality among various students' postings.

In the first set of pre- and postassessments, there was some concern about a lack of face-to-face interaction with the instructor, so a few more videos—beyond just an introduction and conclusion multimedia presence—that contained the types of comments or questions posed in a typical classroom setting were added. Through these introduction videos to each module, the instructor shared stories from advising experiences. "To start, I love the ideas talked about in her video on how to be creative with the writing in the yearbook," one student wrote. Particularly in the third course, the videos were more informal and conversational, and there was a clear increase in students referencing what was said in the videos during blog posts.

Summative Assessments Individualized

Making final, summative projects practical and applicable to individuals was one of the final goals to ensure a recursive, needs-assessment driven online course. At first, there were more academic-style, capstone assignments, as would befit a graduate-level course, but as the pre- and postassessment data was gathered, reflection was ranked as much more valuable for these learners, so they could bring the ideas into their classrooms and newsrooms. Therefore, the summatives were adjusted to include both scholarly and reflective components. The scholarly

pieces were to be built gradually through the responses and discussions on the readings, with citations and references, but the miniprojects and full summative projects allowed for those academic notions to be vetted and applied within the adviser's own context. The key, of course, was that these essays, projects, and artifacts created would be shared, and at the end of each course, all materials were posted for consumption and replication to continue the interaction and practical application that was desired by these students. According to the post-assessment data, the change in both the projects and reflection categories were evidence of a positive reaction.

Conclusion

This experiment in a recursive, needs-assessment based strategy to provide instant adjustments to an online course was far from easy. In fact, it was quite time-consuming; most online courses take high levels of investment in design at the outset, but once they begin, the intensity lessens. This model was the opposite. The instructor spent at least two to three hours in adjustments and upkeep every day when two of the courses were running concurrently, which did not include grading time. The attempt to differentiate for individual learners and be fully responsive did have limitations. First, 10 students is a small sample size regarding data, so likely more emphasis should be based on the qualitative findings regarding statistical versus anecdotal validity. Also, some student needs did slip through the cracks, and students mentioned those on the postassessment. "You might be more fully able to address the problems faced by instructors of small single-year journalism programs by having some of your optional readings (like the policy manual) come from smaller programs," one student wrote. And, indeed, most were for larger high school journalism programs, which meant that individual need was not met.

However, there were also moments of responsiveness that allowed students to engage in a way they did not expect in distance learning. "Personally, I thought that this course was amazing; thoughtfully conceived; and well-executed," one student asserted. "Not to suck up literally after submitting an assignment, but I just wanted to say that this is one of the best courses I've taken online or otherwise. You have already eased a lot of my worry about this coming year, so thank you for that!" another wrote. Although these types of comments are the cause for elation for any instructor, both of these students, and others, went on to note that it was the clear application to their own interests and programs that meant the most, as one student wrote on a blog post:

> Wow, what a great group of readings! Thank you. I have become that teacher when, upon hearing that a PD is planned for what our school calls Professional Learning Mornings (PLMs for short), my brow furrows and I wonder what I will be able to take away from the session and apply to my classroom. Sadly, PLMs often disappoint, leaving feeling frustrated because I don't always feel that I have learned anything. Give me something I can apply and I will try it out the next day. I blather on about this because, Module 5—like what I perceive to be a "successful" PD—has given me much with which to ruminate.

Due to the focus on the learner as the heart of the online experience, the notions of Knowles regarding andragogy and the unique traits of the adult learner, as well as the systematic nature of needs assessment exemplified in the Dick and Carey Instructional Design Model, these courses were able to accomplish the task of being responsive to learners. For that and the quality educational experience they gained, both time and effort were keenly invested.

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Ensuring Online Learning Quality: Perspectives from the State University of New York

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Abstract
As participation in online learning continues to expand, higher education institutions must implement policies and procedures to ensure quality at the course, program, and institution levels. In this paper, the authors describe a process that the State University of New York (SUNY) System implemented, utilizing the OLC Quality Scorecard, to help individual campuses examine the quality of their online offerings and develop strategies to support continuous improvement.

Keywords: assessment; evaluation; administration

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Ensuring Online Learning Quality: Perspectives from the State University of New York

In fall 2016, 31.6% of all students at colleges and universities in the United States enrolled in at least one online course and over 3 million of those students took all of their courses online (Seaman, Allen, & Seaman, 2018). In a 2017 survey of chief academic officers, 83% of respondents indicated that they were likely to increase online offerings in the following year (Jaschik & Lederman, 2018). As opportunities for enrollment in online courses and programs continue to expand, it is imperative to ensure quality.

This paper discusses best practices regarding the evaluation and assessment of online learning from the institutional perspective, drawing upon practices from the State University of New York (SUNY) System. Open SUNY, the system-wide office that supports campus online learning efforts, has developed a process using the Online Learning Consortium's (OLC) *Quality Scorecard for the Administration of Online Programs* to help SUNY campuses examine and improve the quality of online learning. The first half of this paper describes the development and implementation of that process and the second half delves deeper into the standards related to evaluation and assessment using examples from four different SUNY community colleges.

Online Learning Quality

How do we determine the quality of online education? In the late 1990s, there were no guidelines or research that clearly defined a set of comprehensive standards that could be applied in a systematic way to assess or ensure the quality of the administration of online programs. In 2000, the Institute for Higher Education Policy (IHEP) published a set of 24 benchmarks to assist policymakers, faculty, students, and others in making reasonable and informed judgments with regard to the quality of internet-based distance education (Phipps & Merisotis, 2000). In 2010, Dr. Kaye Shelton, using the Delphi method, convened a panel of experts to determine if the 24 IHEP standards were still relevant to online education, and what, if any, revisions, additions, and modifications were necessary. Shelton's (2010) process resulted in an instrument, or rubric, with nine distinct categories comprised of 70 standards necessary to ensure quality in the administration of an online program: Institutional Support, Technology Support Course Development and Instructional Design, Course Structure, Teaching and Learning, Social and Student Engagement, Faculty Support, Student Support, and Evaluation and Assessment. The panel also agreed on guidelines for scoring the standards on a scale of 0 to 3 points. The rubric was adopted by the OLC and launched in 2011 as the *Quality Scorecard for the Administration of Online Programs*. The rubric was updated and revised in 2014, increasing the number of standards from 70 to 75. The authors also provided a handbook to explain the standards and make recommendations for implementing them.

Open SUNY adopted the OLC Quality Scorecard as the underlying framework for the Open SUNY Institutional Readiness (IR) Process, which was developed to prepare SUNY campuses to take online learning to scale, and as an institutional approach to ensure online program quality. Using the OLC Quality Scorecard, campuses can self-assess against a set of nationally recognized standards to identify gaps and areas for improvements resulting in the development of an actionable Implementation Plan.

Participation in the process is free and voluntary and is generally initiated and/or supported by the chief academic officer on a particular campus. The IR Process is designed to engage a campus team made up of campus academic leadership, as well as representatives from all functional and infrastructure areas identified in the scorecard standards. This aspect of the process is essential for campus impact, credibility, and systemic change to occur. The campus agrees to commit to the 3-step engagement (see Figure 1) and is required to engage a campus leadership team comprised for representatives from across campus. After the three meetings, campuses are asked to complete an Implementation Plan, which addresses any deficiencies and outlines plans for improvement. The plan is signed by the campus president and submitted to Open SUNY.

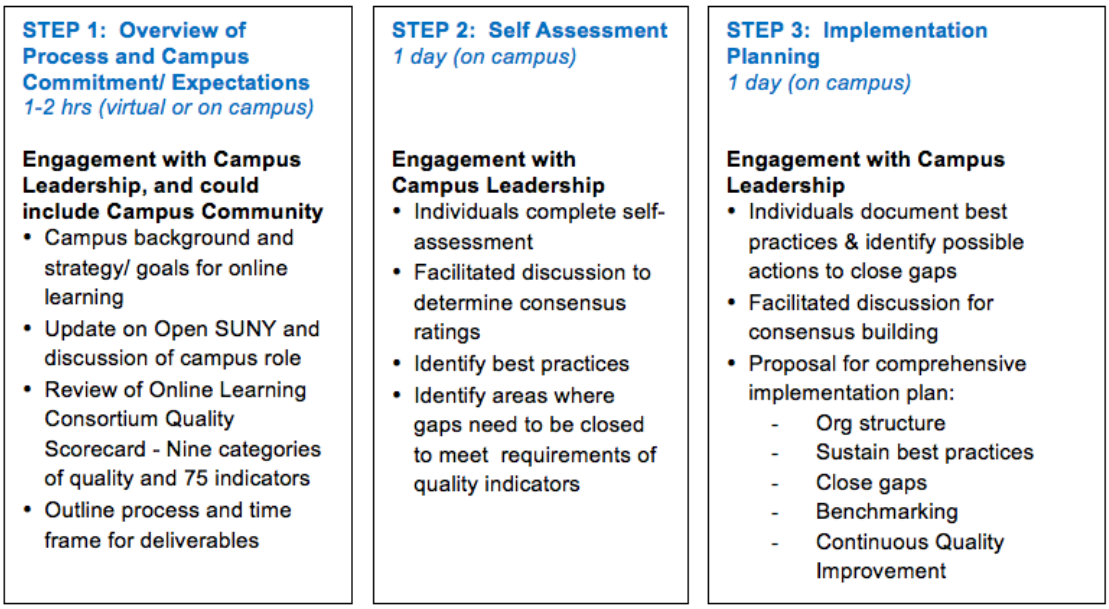

Figure 1. 3-Step Engagement Process

Since launching the IR Process in April 2013, 53 SUNY campuses have expressed interest in or started the process, 33 have completed the third session, and 19 have submitted their Implementation Plan. The online learning leaders at the campuses that have engaged in the process believe it is valuable for enhancing cross-campus awareness of online learning quality, benchmarking their current practices with established standards, and documenting plans for continuous improvement.

Online Learning Evaluation and Assessment

Although the entire IR Process can be considered an assessment in and of itself, the second half of this paper will focus specifically on the standards in the Evaluation and Assessment section of the OLC Quality Scorecard, which help campuses establish procedures necessary for continually ensuring online learning quality after the IR Process is complete.

Standard 9.1—The program is assessed through an evaluation process that applies specific established standards.

For the purposes of the IR Process, *the program* is defined as the campus's distance learning initiative to include the delivery and support of both online courses and programs. The process addresses the institution's capability to ensure quality in online learning across the campus, not just for particular academic programs. SUNY campuses are expected to have a regular process or mechanism for assessing the outcomes of their distance learning initiative against an established quality standard and the goals they have for that initiative.

At most institutions, there are assessment processes for academic programs, academic departments, and nonacademic administrative units. In New York, guidance for this process is provided by our regional accreditation body, Middle States Commission on Higher Education, in Standards V and VI (MSCHE, 2014). Where those processes are in place for ongoing

functional/departmental reviews, they can be leveraged to fulfill the requirement for this OLC Quality Scorecard standard. In fact, we encourage institutions to build upon existing processes in order to minimize the perception of new or additional work and to strengthen the existing processes.

One of the challenges with Standard 9.1 is the uncertainty or question around the basis for the evaluation—against what standards, goals, or models should institutions assess their online learning initiative? There are a couple of options here that we suggest campuses consider. An important priority for SUNY is scaling online learning with quality, so we have established a quality framework in SUNY that is based on the OLC Quality Scorecard as a first option. The second can come from the campus if there are clearly articulated goals for the online learning initiative that can serve as the basis for assessment and be folded into a regular evaluation process. This can be complementary to the use of the OLC Quality Scorecard and does not have to be one or the other.

Standard 9.2—A variety of data (academic and administrative information) are used to regularly and frequently evaluate program effectiveness and to guide changes toward continual improvement.

Online learning quality must be evaluated using a variety of data from multiple perspectives. Institutions are to develop a holistic review plan that incorporates multiple aspects of quality such as online course and program enrollment trends, student learning outcomes, student success standards (i.e., grades, course completion rates, retention rates, and degree completion rates), and measures of student and faculty satisfaction. In addition to evaluating the online course and programs themselves, it is important to examine the effectiveness of support services and technology related to online learning. Institutions must use a broad lens to determine what data is meaningful, and then create a plan for collecting and using it.

In order to ensure that any data collected is valuable, institutions should also establish goals for the process, benchmarks for comparison, and mechanisms for reporting findings and making improvements. Goals could be set based on prior evaluation and assessment efforts or existing institutional priorities; they serve to clarify how the institution views online learning quality. Benchmarks, either data from previous years or data from peer institutions, can provide context for setting quality standards. Lastly, the findings from these processes should be continually communicated back to stakeholders so the data can be used to make positive changes. The point of collecting a variety of data is to use it for improvement, not to just write reports about it or file it away.

Of course, to make all of this possible, it is necessary to have appropriate organizational structures and institutional supports in place. In addition to an office of institutional research and/or an assessment professional, many institutions have an online learning professional and/or an online learning committee with representation from areas across campus that can help to oversee the online learning quality review process. The degree to which online learning is recognized as an institutional priority and adequately supported is also crucial. When areas in need of improvement are identified through the evaluation and assessment process, senior-level administrators must understand and support the recommendations in order to bring about change.

Standard 9.3—Intended learning outcomes at the course and program level are reviewed regularly to ensure alignment, clarity, utility, appropriateness, and effectiveness.

At many institutions, the processes used to ensure quality student learning outcomes in online courses and programs may not differ from the processes used for face-to-face courses and programs. However, if those processes do not work well for evaluating student learning outcomes for online courses and programs, institutions need to make sure that new processes are developed and followed. It is also important for instructors to be intentional and creative when designing their courses to ensure that students have opportunities to demonstrate particular learning outcomes that may seem to be difficult to assess in an online environment, such as oral communication. Depending on the particular learning objectives, this could be a challenge and may need to be addressed through support from instructional designers and/or the use of innovative technology. Nevertheless, it is crucial that institutions ensure that they have a regularly conducted process for reviewing student learning outcomes in online courses and programs and that they document and utilize the finding to promote continuous improvement.

For example, Herkimer College has employed the following strategies to ensure that student learning outcomes for online course and programs are reviewed regularly:

- A campus-wide assessment process is in place to ensure alignment of learning outcomes from course to course. Instructors meet regularly to review the common course objectives and discuss strategies to align assessments to evaluate student learning outcomes. The alignment of learning outcomes and assessments is integrated into the course management system and provides empirical data to inform the twice yearly Assessment Day discussions.
- All course outlines are reviewed and/or revised every two years to assure relevance and comprehensiveness of content, appropriateness of course learning objectives, and assessment of student learning outcomes.
- Quantitative results of student learning outcomes assessments are reviewed every semester by the faculty and modifications to the instructional design, content, and/or assessment strategies are proposed for subsequent semesters.
- Programs are reviewed and revised every five to seven years by the program faculty and Associate Dean. This process requires input from graduates, current students, instructors, institutional research, and, where appropriate, program advisory committees.
- The Curriculum Committee reviews and approves all course and program revisions. This assures that changes are reflected in all college documents and forms.
- All online programs have been reviewed to adhere to SUNY's new Seamless Transfer initiative and are fully compliant. This assures that transfer students from, and graduates of, a Herkimer program have achieved the learning outcomes required for successful continuation of their education or entry into their chosen career.
- Observation of the online classes occurs on a regular schedule. Some faculty have volunteered to have their courses observed on a more frequent basis by the Internet Academy. Observers are experienced online faculty and administrators, who use the same consistent rubric to monitor how effectively the course addresses the achievement of the stated student learning outcomes.

- At the conclusion of each full semester, all full-time faculty meet for a "Closing the Loop" workshop (previously referred to as "Assessment Day") at which they compare their course student learning outcomes assessments and discuss strategies for improvement.
- The college has also created the "Herkimer College Assessment Handbook," which is an online vehicle for instructing the processes of assessment, data collection, and results dissemination for course, program, and institutional objectives and learning outcomes assessment.

Standard 9.4—A process is in place and followed for the assessment of support services for faculty and students.

Assessing the support services offered to both faculty and students is critical to positively impacting the learning outcomes within face-to-face and online courses and programs. Without knowing whether the support services are meeting the needs of their users, it is impossible to determine if the best possible support is being provided to enhance the online learning environment. "Student support services would include library services, tutoring, bookstore, counseling, advising, online student orientations, financial aid, and cashier services. Faculty support services would include technical support, course development support, professional development activities, and ongoing support during the teaching process" (Shelton et al., 2014, p. 89). Surveys are often employed as the primary mechanism for assessing support services, but focus groups and individual interviews can be used as well. Surveys can either be short and targeted toward users of individual services, or longer and distributed to a sample of all students/faculty to obtain their perspectives about multiple services. In many cases, surveys may already exist to evaluate some of these services, but institutions may need to disaggregate the data between face-to-face and online faculty and students. Institutions must determine which methods work best for obtaining the data needed to evaluate the quality of these services and make any necessary changes. After these methods are identified, they should be included as part of the broader online learning quality review process.

At Finger Lakes Community College (FLCC), each service area (defined as any office that is not an academic department) is required to participate in a "Service Area Assessment" process on a five-year rotating schedule, which is coordinated by the Office of Assessment, Planning, and Continuous Improvement. This directly connects to online learning in that the Office of Online Learning goes through this process, but also because online students depend upon many of the services areas who also go through this process. Student success is not housed in one office; it is a campus-wide effort. The Service Area Assessment process begins with trainings for the service areas on the improvement process and the assessment language that is utilized throughout. After successful completion of training, each service area begins by crafting a mission and a vision statement. Upon completion of the mission/vision statements, the service area director, working with members of their department and in consultation with the executive sponsor, crafts three to five goals to cover the next three years. The created goals are required to have, where applicable, data to support the goals as well as any supporting documentation. Once the mission/vision and goals have been approved by the Vice President and the Chief Assessment Officer, the service area begins crafting their program review packet.

The program review is where the mission/vision, goals, and resources are outlined and explained in-depth so that when external reviewers come to campus, they have a solid understanding of the current state of the program. The program review includes all aspects of the

service area and its operation. The program review document can range anywhere from 30–100 pages, beginning with an executive summary and including a field analysis, history, report on departmental personnel, financial considerations, facilities, and culminating in outcomes. This comprehensive review of the department not only serves to offer a snapshot of each department to those not intimately involved in daily operations, but also serves to create a true understanding of and alignment to each department's functions. It also establishes a plan for the assessment and evaluation of each service area and, depending on the department, documents how the data will be disaggregated to examine the experiences of online students. Following the creation of the program review, the service area has an external review with members of the field who work at other, similar, institutions. After the external review the service area presents their program review and the external review findings to the Board of Trustees, which offers the opportunity to showcase the service area as well as to point out any areas in which the service area could use greater support.

The service area assessment process at FLCC is truly about continuous improvement. When service areas function at their highest levels, it makes it easier for students to achieve success. There are numerous advantages to the service areas as they go through this process including face time with the Board of Trustees, the ability to determine areas for improvement, the ability to spotlight fantastic work by staff members, and to create a greater understanding of how all service areas fit into the greater umbrella of student success.

Standard 9.5—A process is in place and followed for the assessment of student retention in online courses and programs.

Student retention in online courses and programs must be monitored in order to ensure student success. Institutions should analyze a variety of metrics including course completion rates, course grades, and student retention from semester-to-semester and year-to-year. The online quality review plan should specifically indicate goals or benchmarks for these measures that are meaningful for the institution. For example, aggregated online course completion rates could be compared to aggregated face-to-face course completion rates at that institution, or, instead, they could be compared to an online benchmark from a peer institution. The individual metrics must be placed in context to have any meaning. It also may be useful to disaggregate the data to analyze courses by subject or level and programs by major/CIP code. Alternatively or additionally, the data could be disaggregated by student characteristics (i.e., race, gender, age, etc.) to determine if any targeted intervention strategies are necessary. Since prior research has found differences for student success in online courses based on students' demographic characteristics and academic program (Bull, 2015), these types of analyses could promote practices to enhance equity.

Since the inception of online courses at Herkimer College in 1997, the institution has compared the course completion rates and academic achievement (grades) of students taking courses taught by the same instructors in both the online and face-to-face learning environments. The aggregated completion rates for face-to-face courses have been consistently higher than completion rates for online courses, but the differences are statistically significant in only about half of the individual course comparisons. The significant differences have been addressed in two ways:

1. Herkimer's award-winning "Course Refresh Initiative" was a 2-year project that provided retraining and course revision assistance to all full-time and 90% of the adjunct online instructors.
2. Herkimer has a "Closing the Loop" session twice each year where instructors meet to share course completion and success information and discuss strategies for improvement.

In terms of academic achievement (grades), aggregated online course achievement has only been statistically significantly lower than face-to-face course achievement four times out of the 36 semesters reported; the two aforementioned initiatives have addressed this issue as well.

Once processes for collecting and analyzing student retention data are in place, it is then necessary to establish mechanisms for enhancing student retention. One effective practice for enhancing student retention seems to be the implementation of an early alerts system, which can help to streamline communication strategies with students, develop student success networks, and provide ways to identify barriers to student success. Finger Lakes Community College has had great success in increasing their online course completion rates over the last three years by implementing an early alert system and delivering interventions in the first seven days. Students who are flagged by faculty as lacking in participation within the first week of a course are contacted via email and a personalized telephone call. This has led to an increase in course completion rates of 8% from fall 2014 to spring 2017. Similarly, at Monroe Community College (MCC), an early alert system was put into place and the result was a retention rate through census of 89% in the spring of 2017. Understanding the reasons for failures to complete, as well as the addition of the early alerts process, made a significant difference in online student success. MCC is also in the process of using current data to create a more robust predictive analytics model. This model, based on both student activity and demographic histories, will help identify potential long-term success potential in students.

Standard 9.6 - A process is in place and followed for the assessment of recruitment practices.

Marketing online programs is a new and growing field that demands that new strategies be implemented. No longer can colleges depend on traditional marketing methods. Online learning has broken the mold of limitations to geographic constraints and offers opportunities for students to effectively study at a chosen college or university without the need to actually relocate to that location. It is also important to make sure that students being recruited understand the course and program requirements and that students are not admitted or enrolled who do not meet those requirements.

Campuses do not always think about recruitment as a factor in ensuring quality in online learning; however, there are implications for resource investment and ultimately for course and program retention. Assessment of recruitment practices includes both understanding whether or not recruitment practices are effective in generating new students or enrollments, as well as whether or not the recruited students can successfully complete the online courses or programs in which they are enrolled. This includes being able to track and compare the outcomes of recruitment practices through the recruitment funnel—from inquiry to applicant to enrollment—and being able to differentiate recruitment of online students from recruitment of campus-based students. It is also important to differentiate student outcomes, such as course completion, program retention, and graduation rates, based on recruitment practice for both online and campus-based students. This is sometimes done within the overall enrollment function of the college, but can also be done separately within a unit responsible for online learning.

Monroe Community College (MCC) has a long history of offering online courses and has many programs that are available online. Most recently, the campus has started to think more strategically about increasing enrollment in online programs and how they can reach new markets with those programs. The process they followed for those new programs is outlined below:

1. Identify the target market. Most degree programs now require a justification as to market demand for the degree. Colleges need to get more specific with this requirement by including market demand in a larger geographic area and being able to identify areas where student demand for the degree matches the need. MCC recently created two new online degree programs: Math and Sports Management. First, they identified areas in the state where math would be in high demand and landed on geographic regions around the SUNY university centers, specifically around Stony Brook University on Long Island. The potential audience for math degrees and programs were similar to the engineering programs at Stony Brook. They were able to geotarget students in a 10-mile radius that fit the demographic profile of their successful math students. As a result, MCC is offering more online math classes during key semesters than any other subject.
2. Campuses should measure program inquires, or leads, all the way through the enrollment funnel. Normally, the only way to determine the source of the lead was by direct questionnaire. It is now possible to align return on investment based on lead generation. Campuses can also dig deeper and analyze the demographic return versus the target in very specific ways. This was impossible with the more traditional marketing methods.
3. Lastly, use data to drive future enrollments. The "big data" generated by online marketing programs gives MCC the ability to even more specifically geotarget populations. Additionally, they are able to use more psychographic targeting strategies by aligning message delivery to the psychographic profiles of those students who traditionally respond to specific messages. It is critical that successful campaigns are analyzed and "deep data mined" so that the psychographic profile of the successful students can be aggregated and thereby targeted.

Standard 9.7—Program demonstrates compliance and review of accessibility standards (Section 508, etc.)

Access to higher education includes online courses and degree programs. The American Disabilities Act (ADA) of 1990, Section 504 of the Rehabilitation Act (1973), and the 1998 Amendment to Section 508 of the Rehabilitation Act articulate the foundational requirements for making online education accessible to all students. This standard aims to ensure accessibility compliance for students with disabilities in all aspects of the online program, including student support services, and online course materials, resources, and platforms.

Open SUNY developed an online course design rubric and process that addresses both the instructional design and accessibility of an online course. The Open SUNY Course Quality Review (OSCQR) rubric and process is aimed to assist online instructional designers and online faculty with improving the quality and accessibility of their online courses, while also providing a system-wide approach to collect data that informs faculty development and supports large-scale online course design review and refresh efforts systematically and consistently. The OSCQR rubric and process are currently being used by 56 SUNY institutions and the rubric was adopted by the OLC in November 2016 as their online course quality scorecard. The OSCQR Accessibility standards are based on the recommendations of SUNY's Office of General Counsel and address the legal

considerations required to be compliant with Section 508 of the Rehabilitation Act (1973), the New York State Enterprise IT Policy NYS-P08-005, Section 504 of the Rehabilitation Act (1998), and the Americans with Disabilities Act.

At Niagara County Community College, the institution identified a need to enhance compliance with accessibility as an outcome of participating in the Open SUNY IR Process. As a result, they implemented a compliance program through a SUNY grant to ensure compliance with accessibility standards. The compliance program was completed over a one-year period and continues to be used for course reviews and new online course development. Some of the strategies employed include the following:

- Implementation of Compliance Team consisting of eLearning staff and an online faculty member.
- Creation of resources posted to NCCC Online Learning Faculty Center website and Blackboard community.
- Creation of a compliance checklist used to review all online courses. The Compliance Team reviewed one online course for each online faculty member. The faculty members were provided with detailed resources to make updates.
- The team held "30 Minute Mentor Monday" sessions throughout the semester based on results from review findings. Each session revolved around a specific need such as making documents compliant (e.g., Word documents, PDF documents, captions for videos, PowerPoints, etc.). Sessions were recorded and sent to all online faculty.
- Creation of Accessibility Training in Blackboard. Online faculty were asked to complete the training and take a short quiz to complete the process.
- Implementation of Blackboard Ally campus wide to evaluate course content. A team was assembled that included accessibility services staff, faculty and instructional designers. This team was tasked with the development of communication and training materials.

Standard 9.8—Course evaluations collect feedback on the effectiveness of instruction in relation to faculty performance evaluations.

Course evaluations represent an opportunity for assessing quality in the online course from the students' perspective and provide feedback that can be helpful as an input into the performance evaluation process for faculty who teach online. For this to be meaningful and have an impact on quality, two conditions must be met. First, there should be a regular process for soliciting student input on course evaluations. This means course evaluations should be conducted for online courses on a regular basis and should have a high enough response rate to represent the perspectives of the students in the online courses. Second, there must be specific questions on the course evaluation that gathers relevant insights from students on the instruction provided by the faculty. The questions can vary from campus to campus or between academic units but should align with the expectations set for faculty who teach online within a particular campus or academic unit. The results of course evaluations can be looked at separately for individual courses or in aggregate if an instructor is teaching multiple courses within the evaluation period. What is important is that there is a deliberate strategy for collecting student input on the effectiveness of instruction in online courses that it is systematic across the institution, and that the feedback serves as one input into the continuous improvement of online teaching.

Standard 9.9—A process is in place and followed for the institutional assessment of faculty online teaching performance.

On most campuses, there is a process for the institutional assessment of faculty performance, and that can vary significantly from campus to campus or even between academic units for an individual institution in terms of how regularly it is done, what types of activities comprise the assessment and how the feedback or outcomes from such a process help to ensure quality online teaching. For any faculty assessment process to really impact the quality of online teaching, it must include a component for online teaching performance and be based on clear expectations for faculty who teach online courses. Expectations can be outlined in faculty position descriptions, faculty handbook, policy documents for online learning, or other formal documents related to faculty performance or online learning.

Assuming expectations are in place for online teaching performance, there should be a consistent process or mechanism for assessing faculty performance that includes a variety of inputs. Examples include, but are not limited to, student course evaluations, as discussed in the previous standard, peer evaluation by other faculty, self-assessment, and online course observations. The performance evaluation process should result in an individual development plan for the faculty based on all the inputs and against the established standards or expectations. Use of a quality review rubric can be helpful to ensure that performance standards are assessed consistently and fairly for all faculty who teach online.

Niagara County Community College has implemented two strategies to ensure the quality of their online courses and one specifically to assess faculty online teaching performance as listed below:

Quality Peer Review Project: NCCC implemented an online quality peer-review initiative to ensure quality course design and compliance of online courses using the Open SUNY OSCQR rubric and process. The NCCC Quality Review and Refresh process is a faculty-driven, collegial process, which is voluntary and not a part of the faculty evaluation process. These reviews help maintain quality and compliance through this process of continuous improvement. NCCC currently has 51 faculty that teach online and 100% of those that have taught more than one semester have completed this review and refresh process. Additional information on the NCCC Quality Review Project can be found on the faculty website at: https://nccconlinelearning.com/nccc-quality-review-project/

Online Course Observations: In the fall 2016 semester, NCCC started online course observations as a part of the official faculty evaluation process. Through this process, 33 faculty had an online course observed. They will continue observing five faculty each fall and spring semester. One of the action items from the IR process was to include online courses and those teaching online in the faculty evaluation process.

1. The Online Learning Advisory Council was tasked to come up with a process and rubric for the completion of the online course observations. They learned about a rubric created by faculty at Penn State that based it is observation around the "Seven Principles for Good Practice in Higher Education."
2. The council modified the rubric to provide examples, terminology, and resources specific to NCCC and presented the recommended observation process and rubric to their campus

VP of Academic Affairs and her Academic Council. The process and rubric were approved as the official faculty evaluation process for online courses.

3. The VP of Academic Affairs hired a consultant to conduct the observations with the faculty member. The consultant is an experienced online educator and administrator and was well received by those faculty scheduled for a course observation because of such experience. The consultant and faculty meet virtually and the faculty member provides a course tour so the consultant can get the required information to complete the course observation rubric and provide notes and recommendations. Once completed, the faculty member signs off on each principle. They can agree or disagree and add a rebuttal for each of the seven principles. Once the faculty member signs the document, copies of the observation go to the VP of Academic Affairs, the Coordinator of Online Learning, and the appropriate division chair. The eLearning Coordinator or VP of Academic Affairs meets with the faculty member to discuss the observation and create any necessary action plans.
4. There are 25 faculty members who had one of their courses go through both the quality peer review and had an online course observation. All 25 courses show an increase in successful course completion rates. The average increase for all 25 courses from fall 2016 through spring 2019 is 6.22%.

Standard 9.10—A process is in place and followed for the assessment of stakeholder (e.g., learners, faculty, staff) satisfaction with the online program.

It is important to regularly solicit feedback and suggestions and assess stakeholder satisfaction with online programs, broadly speaking, at an institution. Student, faculty, and staff perspectives should be considered when determining the overall effectiveness of an online program and planning improvements. Some of these efforts might be covered by practices employed to address Standard 9.4 depending on how the assessment mechanisms are designed. A regular survey cycle is recommended, but it also may be useful to solicit informal feedback on an ongoing basis. Sometimes the findings may reveal that some aspects of the delivery of the online program need to be improved, whereas in some cases, a low level of satisfaction may indicate that individuals are simply not aware of existing policies, procedures, or resources and a marketing campaign might be needed instead. Thus, even though this satisfaction assessment effort pertains to the overall online program, the assessment instrument needs to be designed in a way that collects information specific enough to produce actionable findings.

Standard 9.11—Course evaluations collect student feedback on quality of online course materials.

This standard represents another place where course evaluations can be a helpful tool for ensuring quality, specifically in regard to the appropriateness of electronic materials used in online courses. Similar to 9.8, there should be a regular process in place for conducting course evaluations for online courses and there must be questions that address instructional materials within the course website and as part of the learning activities. Examples include online content (text, video, etc.), online activities (quizzes, discussions, assignments, etc.), and any other materials used in the online course. Feedback from students on the relevance and quality of materials as well as how well they supported or contributed to their learning outcomes would be helpful to the instructor and would provide a basis for continuous improvement of the course materials in future course offerings. While it is helpful to look at evaluations on an individual course basis, it might also be

helpful to look in aggregate across all online courses to identify opportunities for professional development or where policy changes might be helpful to ensure quality.

Niagara County Community College collects student feedback on online course materials through their online course evaluation process using the *Smart Evals* online course evaluation software. *Smart Evals* is a program deployed through Blackboard so that all students can easily access the evaluations and provide feedback anonymously at the end of each semester. For online courses, there are specific questions to get feedback on course management and course design. Faculty can also add their own questions to get feedback to help with future course improvements. Faculty obtain access to the *Smart Evals* results at the end of the semester and use the tool to make continuous improvements to their online courses. If the faculty member is an adjunct, the program coordinator can review the evaluations and provide support and recommendations for course improvements. Full-time faculty evaluations are monitored by the office of Academic Affairs and are included in the promotion and tenure and full-time faculty evaluation cycle, set forth by our Chief Academic Officer.

Impact

The primary goal of the Open SUNY IR Process is to systematically increase the capacity of our SUNY campuses to ensure quality and success in online learning. In Spring 2017, we conducted an impact study, considering of focus groups, with representatives from 12 campuses that completed the IR Process to understand the extent to which the process was beneficial to their online learning initiatives. We learned that as a result of completing the Open SUNY IR Process, many of our campuses have made changes to resource allocations, organization or governance structures, policies and procedures, and/or technology infrastructure. Our campuses also explained that the IR Process, especially the Implementation Plan, was useful for Middle States accreditation reports, strategic planning, and other campus planning processes. The Open SUNY IR Process had benefits for the individuals involved as well as for the institutions. Participants in the study noted that the process furthered their own personal knowledge of what is necessary to facilitate quality online learning, gave them the opportunity to learn about perceptions of online learning from faculty/staff across campus, and enhanced their understanding of policies and procedures within different offices. They also explained that the process helped to inspire institutional culture change as it pertains to online learning. It encouraged a wide-range of campus constituents to develop a more comprehensive view of online learning quality and determine what actions and/or resources are needed to make improvements.

The Open SUNY IR Process, and the OLC Quality Scorecard Evaluation & Assessment Standards in particular, provide campuses with a systematic framework to ensure quality online learning. After the Open SUNY IR Process is completed, these particular standards help to ensure continuous improvement. It is difficult to parse out the impact of any one particular evaluation and assessment practice, but the implementation of a comprehensive set of practices embedded across campus indicates the value placed on ensuring online learning quality.

Conclusion

When Open SUNY was launched in 2014, one of the main priorities was to ensure quality of online learning at the course, program, and institution level. Using the OLC Quality Scorecard, the Open SUNY IR Process, has helped to support positive campus culture change regarding online learning at numerous SUNY campuses. As described in this paper, the Open SUNY IR Process is an assessment mechanism by itself, but the Evaluation & Assessment Standards promote the development of sustainable, ongoing, and comprehensive continuous improvement efforts. We are confident that campuses that have completed the Open SUNY IR Process are continually striving to offer optimal online learning experiences for their students.

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