Introduction to the Special Issue:
Select Papers Presented at the 2020 OLC Accelerate Conference and the 2021 OLC Innovate Conference

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Abstract
Each year, *Online Learning* (OLJ) presents a special section devoted to research shared at the Online Learning Consortium conferences. We are happy to present five research articles selected from the many presented at OLC Accelerate, held virtually November 9-18, 2020, and OLC Innovate, held virtually March 15-19, 2021. We invite the readers to consider presenting their research to OLC conferences in the future and submitting to the journal to share their work with others in the field.

Keywords: Alfred P. Sloan Foundation, Online Learning Consortium (OLC), OLC conferences, academic conferences, distance education conferences, journal special issues

The Online Learning Consortium (OLC) was formed in the 1990s when a small community of higher education professionals united to promote the idea that online learning could help provide access to a quality education. Originally branded the Sloan Consortium (Sloan-C) and funded by the Alfred P. Sloan Foundation, this community sponsored many activities and events designed to promote the concept that the design and implementation of high quality online and blended learning should be strategic and based on sound pedagogical principles.

OLC conferences began in 1995 with what became an annual meeting of the Alfred P. Sloan Foundation's Anytime, Anyplace Learning Program grant recipients. Out of that small group of early online learning innovators, came the focus of a conference – providing a community for the dissemination of practice and research centered around quality online learning. In 2001, the University of Central Florida in Orlando, Florida, hosted the first Sloan-C International Conference on Online Learning fall conference. A second event, the Sloan-C Blended Learning Conference and Workshop, was held in 2003.

In 2016, the Online Learning Consortium rebranded its two flagship conferences to be named OLC Accelerate, held in the fall, and OLC Innovate, held jointly with MERLOT each spring. The most recent offerings, OLC Accelerate 2020 and OLC Innovate 2021, were converted to virtual events due to the COVID-19 pandemic after some fantastic planning and strategic organization by the OLC team. The virtual conference allowed for many more sessions and attendees, and with more international participants than typically attended when the conference was held as an in-person event.

OLC Accelerate 2020, held November 9-18, attracted nearly 4,000 participants from over 400 institutions and organizations with 14 countries and 43 states, plus the District of Columbia represented. The conference featured over 400 sessions, 20 workshops, discovery sessions, a new Exposition Foundry session format, and workshops for attendees interested in online learning at Historically Black Colleges and Universities. Topic-based summits provided deep dives into high demand themes for participants. These summits included instructional design, research, and participation in the annual OLC Leadership Network.

OLC Innovate 2021 was held virtually on March 15-19 with over 4,800 attendees. A variety of registration opportunities resulted in a 149 organizations and institutions taking advantage of an unlimited group package and nearly 4,300 participants registered with a buy 2, get 1 free pass. Nine countries and 48 states, including the District of Columbia, Puerto Rico and Guam were represented. Because of the virtual format, sessions were made available for a year, post-conference, resulting in 259 participants registering after the conference occurred – a new phenomenon to investigate for the future inquiry!

Each year, the Online Learning Journal solicits research papers from those who have presented at the most recent OLC Accelerate and Innovate conferences. This year, we selected five articles from experts in the field of online learning. We hope you will find them helpful and informative.

In *Does Mode of Access Make a Difference? Mobile Learning and Online Student Engagement*, Sarah Nichter examined the impact of mobile device use on student engagement and student success in online courses. Online Self-Regulated Learning Questionnaire (OSLQ) scores were used to measure engagement and to examine the self-regulated learning (SRL) constructs of environment structuring, task strategies, and time management.

In Nichter's study, mobile learning was based on frequency of device use (low, moderate, or high). Results indicated that mobile learning had an impact on engagement and that the effect varied with use for the three SRL constructs. Discussion and recommendations are provided related to online course design and pedagogy.

In *Student Performance in Online Classes at a Hispanic-Serving Institution: A Study of the Impact of Student Characteristics in Online Learning*, Rebecca Cottrell used propensity score analyses (PSA) to control for 15 covariates in examining the effect of student enrollment in online courses at a Hispanic-serving institution. Student grades and withdrawal rates were compared by course modality (online vs in-person) from a dataset of 7,765 students, spanning the 2017-2018 and 2018-2019 academic years. The researcher's comparison of three PSA models and final analyses illustrate the use of PSA to account for bias. The near-neighbor 1:2 matching PSA method found no significant difference between online and in-person students' composite GPA, but significantly higher withdrawal rates among those online. Recommendations for practice as well as areas of future research are discussed.

Dr. Jason Drysdale, in *The Story is in the Structure: A Multi-Case Study of Instructional Design Teams,* provided a detailed comparison of the organization structure of instructional design teams at three public, nonprofit universities with both physical campuses and significant online presence. Data was collected through semi-structured interviews with instructional designers, online faculty, and online learning administrators at each campus, with a total of 12 participant in-depth interviews. Findings highlighted how the instructional design team with academic reporting lines had clearer role definitions, was empowered by administrators to pursue pedagogical work, enjoyed largely positive relationships with faculty. There was also a perception of more opportunities for leadership. The researcher provides a thorough comparison of the three organizational structures and challenges with each. The recommendations provided are beneficial for those institutions attempting to establish support for online learning or restructuring existing organizational models in facilitating online learning course development.

Suzanne Ensmann, Aimee Whiteside, Lina Gomez-Vasquez, and Ronda Sturgill in *Connections Before Curriculum: The Role of Social Presence During COVID-19 Emergency Remote Learning for Students*, used the framework of the Social Presence Model to examine students' experiences during the transition to remote learning during spring 2020. Analyses of the 507 valid survey responses found that freshmen students struggled more with remote instruction, and significantly more than graduate students. Graduate students better appreciated the flexibility and potential for future online learning possibilities. In addition, many students had less than a year of experience with online education prior, contributing to student stress and dissatisfaction with remote instruction. Analyses of student comments are discussed through the five elements of the Social Presence model: Affective Association, Community Cohesion, Instructor Involvement, Interaction Intensity, and Knowledge and Experience, focusing on the impact that remote instruction had on students. Findings from this study provide insight for proactive planning for future unanticipated emergencies and illustrate how social presence can be used as a lens to better help educators improve the student experience.

Finally, in *Troublesome Knowledge: Identifying Barriers to Innovate for Breakthroughs in Learning to Teach Online*, Lorna Gonzalez and Christopher Ozuna examine difficulties in learning to teach online through Perkins' (1999) framework of 'troublesome knowledge.' They examined 123 unique cases of troublesome knowledge collected through surveying instructional designers, technologists, and educational developers at institutions of higher education.

The analyses from Gonzales and Ozuna will be valuable to those in support positions who are responsible for teaching and/or training faculty to teach online and provide insight for better understanding the challenges new online faculty face.

The editors of this special issue would like to acknowledge the OLC staff and numerous conference support staff from the OLC community who did a fantastic job this year to help make 2020 OLC Accelerate and 2021 OLC Innovate a success. We also are grateful to Mary Rice, managing editor, and Peter Shea, editor, of *Online Learning*, for their continuing guidance and help in continuing this focus on OLC Conferences.

Finally, to the OLJ readers, we invite you to consider submitting your research for presentation to OLC Accelerate in fall, or OLC Innovate in spring as it is critical to share your lessons learned with others in the field. Please consider submitting your original research here to *Online Learning* in the future.

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Does Mode of Access Make a Difference?
Mobile Learning and Online Student Engagement

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Abstract
Even though student use of mobile devices for educational purposes has increased in recent years, the research on the possible impact on student success or engagement has been minimal. This study investigated the impact of mobile device use on student engagement and student success in online courses. The theory of Self-Regulated Learning (SRL) was a foundation for understanding and measuring engagement behaviors of online students. The Online Self-Regulated Learning Questionnaire (OSLQ) was the basis of the survey instrument. Participants were categorized into three groups of mobile device use (low, moderate, high). These three groups were used for comparison in each of the research questions. The research questions ask what impacts mobile learning has on student engagement, as measured with SRL; what impact mobile learning has on the SRL constructs of environment structuring, task management, and time management; and what associations mobile learning might have with student success and persistence. The ANOVA showed that mobile learning had a moderate impact on engagement for students in the high group. Students in each group engaged in environment structuring behaviors more than task strategies or time management behaviors. Students in the moderate and high groups engaged in task strategies more than the low group. Students in the high group engaged in time management behaviors more than the other groups. The Crosstab analysis did not show an association between levels of mobile learning and course grade or persistence. These findings have positive implications for online pedagogy and course design.

Keywords: mobile learning; online learning; student engagement; self-regulated learning; student success

Mobile devices have become commonplace in our culture, with users finding many applications beyond basic functions. Pew Research reports that smartphone ownership by U.S. adults has now reached 85%, with 95% of adults aged 18-49 owning smartphones, with about half of the same population also owning a tablet (2021). As ubiquitous as these devices are, it seems a natural progression of acceptance that students are using their mobile devices for educational purposes. Longitudinal data have established the intention of students to use their mobile devices as an education tool (Capranos, & Dyers, 2020; Gierdowski, 2019; Magda et al., 2020). Currently, most students surveyed noted they want to be able to use their mobile devices for their coursework and that mobile-friendly websites and courses are extremely important (Capranos, & Dyers, 2020; Gierdowski, 2019; Magda et al., 2020).

Even with this growth, the research on the impact of mobile device use has been sparse. Early research on mobile devices, smartphones, or tablets, focused on student readiness to use these devices for educational purposes, then moved to study how mobile devices might mediate learning (Martin et al., 2013; Puzziferro, 2008; Sharples et al., 2016). Still, little of the research investigated the influence of mobile device use on students' academic success. This present study focuses on the possible impact of mobile device use on students' engagement and academic success in online courses. Knowing more about student behavior with mobile devices and its impact on engagement and success can influence online pedagogy, course design, and student preparation.

What follows is a brief review of the relevant literature that will establish the theoretical framework for this study. Research questions guiding the inquiry will follow and an explanation of the research methods, the results, and a discussion of the findings.

Review of Literature

Research on mobile device application and usage has increased over the past decade. During this time, two parallel perceptions of mobile learning developed, while the theory of mobile learning itself has also evolved. Early approaches to mobile device use focused on and established student readiness for mobile use (Cheon et al., 2012; Martin et al., 2013; Vilkonis et al., 2013). Around 2015, researchers began to focus on mobile device use as a mediator for learning (Sharples et al., 2016), such as the self-regulatory and reflective practice with learning analytics making students aware of their behavior (Tabuenca et al., 2015).

Mobile Learning

These evolutions and conceptual changes concerning mobile device use led to the development of Mobile Learning theory. Mobile Learning theory is in its infancy, and defining Mobile Learning is challenging as several perspectives compete for dominance (Grant, 2019). A notable shift in the theory development occurred as researchers began to stress that the technology employed is not mobile learning, but rather that mobile learning is merely a method of accessing technology (El-Hussein & Cronje, 2010; Sharples et al., 2016). A theory of mobile learning must be significantly different from other theories of learning situated in physical environments; it must encompass formal, informal, and non-formal learning; it must theorize learning as a constructive and social process; and it must analyze learning as personal, contextual, and mediated by technology (Sharpels et al., 2016). Mobile Learning is connected to online learning but is not confined to the traditional barriers of online education and traditional education. Even with the flexibility of online education, students are still tethered to a place with desktop computers and even laptops. Few online learners find it ideal to engage in their courses with a laptop while waiting for public transit, and they may not have a computer available when

time offers the opportunity to engage in their classes. However, a mobile device offers an online student the opportunity to ask a question in the class or read course content during a lunch break or while waiting for the bus. Mobile Learning centers on the fluidity of learning through different contexts, allowing for "anytime, anywhere" access and learning.

These assertions about mobile learning can be brought together in this definition: mobile learning is situationally based on the mobility of learners and learning contexts, allowing for fluidity of personal learning in time, content, and context, and mediated through technology (El-Hussein & Cronje, 2010; Sharples et al., 2016).

Research investigating and applying mobile learning has progressed along two main channels: mobile learning as support to traditional learning and mobile learning as the mediator of learning. 2010 became a notable year for mobile technologies and its researchers, as tablet popularity boomed, and researchers were eager to test its educational possibilities. A notable focus in research on mobile learning after 2010 was on student readiness or student motivators and behaviors for learning in the mobile environment (Cheon et al., 2012; Gikas & Grant, 2013; Khaddage et al., 2016; Liu et al., 2010; Martin et al., 2013; Rossing et al., 2012; Vilkonis et al., 2013). Among these studies, common motivating factors or benefits of mobile learning expressed by students were quick and easy access to information, course content, and learning resources; the ability to upload content; participating in discussion boards; and the immediacy of contact between students and with faculty (Gikas, & Grant, 2013; Martin et al., 2013; Vázquez-Cano, 2014).

The transition from mobile learning as support for learning to mobile learning as a mediator of learning signifies a conceptual change of mobile learning. Such a shift influences the applicability and development of mobile learning within institutions and the broader higher education landscape. Mobile learning is linked with e-learning. It encapsulates the learning design best practices through the online environment; after all, education is essentially communication, and mobile learning is a new avenue for communication. The development of learning analytics and what it can show of students' anytime, anywhere engagement is evidence of this conceptual change. Learning analytics has been tested as not just a tracking tool but a self-reflective and regulatory tool for learners (Tabuenca et al., 2015). When teachers' estimates of time for a task were compared with students' time-logs for the task, Tabuenca et al. (2015) found that students' time management showed significant improvement by being aware of how much time they were or were not spending on learning activities occurring through mobile learning.

A notable absence in the literature on Mobile Learning is a connection to an established theory of learning and empirical research of the impact of Mobile Learning on learning and academic success. If we consider mobile devices as educational tools, a conceptual framework including learning theory must be tested to establish applicability and credibility. A concentrated group of researchers has tested the applicability of Self-Regulated Learning theory with Mobile Learning to develop such a framework.

Self-Regulated Learning

Self-Regulated Learning (SRL) theory grew from the research of Zimmerman (2008, 2001) and Pintrich (2004, 1999) and focused on cognitive, motivational, and behavioral skills of learners to become masters of their own learning. SRL transforms this focus into three categories that can be observed and measured: cognitive learning strategies, self-regulatory strategies to control cognition, and resource management strategies (Pintrich, 2004, 1999; Zimmerman, 2008, 2001). Zimmerman (2001) defines the theory as "neither a mental ability nor an academic performance skill, self-regulation refers instead to the self-directed process through which

learners transform their mental abilities into task-related academic skills. This approach views learning as an activity that students do for themselves in a proactive way" (p. 1).

The two most relevant assumptions of SRL for online learning and mobile learning are the potential for control assumption and the assumption that SRL activities are "mediators between personal and contextual characteristics and actual achievement or performance" (Pintrich, 2004, p.388). Viewing online student behavior through the lens of SRL highlights how students regulate their motivation, cognition, and behaviors to benefit their academic success. For example, many students cite a reason for choosing online classes is that online is a better opportunity to regulate their time and academic abilities in the learning environment.

The research on measuring SRL within the context of online learning is still minimal but noteworthy. Puzziferro's (2008) study began to establish the impact of SRL behaviors on online students' academic performance. Puzziferro surveyed a wide range of fully online community college students and found the study environment, time management, and effort regulation were significant to these students' academic performance in general, and that effort regulation was significant for course grade (2008). These results suggest that students who received higher final course grades were more likely to manage their study time (the planning, scheduling, and execution) and their study environment, further suggesting that these students could more effectively match their study habits to their study style.

In Cho & Shen's research (2013), intrinsic goal orientation and academic self-efficacy were positively associated with and mediated by the SRL strategies of metacognitive regulation, effort regulation, and interaction regulation. Additionally, the total amount of time students spent in the LMS plus their effort regulation together were significant positive predictors of the course grade (Cho & Shen, 2013).

Broadbent and Poon's (2015) systematic review of the literature on SRL strategies and academic achievement brought to light several categories of SRL that proved significant in the online learning environment. Among the 12 studies included in the analysis, the SRL categories of time management, effort regulation, metacognition, and critical thinking had positive correlations with academic achievement (Broadbent & Poon, 2015). The follow-up to this study compared fully online and blended learners' SRL strategies and academic success. For both groups, time management, elaboration, and effort regulation were the most used SRL strategies (Broadbent, 2017). For fully online learners, the use of elaboration, organization, metacognition, time management, and effort management were significantly higher than for blended learners; peer learning and help-seeking strategies occurred at a higher rate for blended learners (Broadbent, 2017). These results suggest that the online environment requires students to implement time management and effort regulation more than other learning environments and contexts. Additionally, Broadbent's (2017) study found that only effort regulation and time management positively predicted course grades for online students. Despite this limited body of research, these categories continue to show evidence of positively impacting students' academic success in the online environment.

Limited research exists testing the impact of SRL in the mobile learning environment. Much of the theory application has been with behavior theories such as the Technology Acceptance Model and the Theory of Planned Behavior. Sha, Looi, Chen, and Zhang (2011) note the sparse theory development for mobile learning and SRL across different fields. Sha et al. (2011) state, "mobile learning environments presumably provide a means by which students can exercise agency to control their own [behavior] and cognition" (p. 367). SRL is an applicable theory because the "knowledge and skills of SRL can be seen as a precursor to mobile

learning, as well as one of the desired outcomes of mobile learning given that the design and implementation of mobile learning systems fit the principles of SRL" (p. 368).

Student Success and Engagement

Any discussion about student success online is also a discussion of engagement. Student engagement performs a distinct role in the online learning environment since it requires a different set of behaviors from online learners. That student behaviors can be changed or influenced is foundational for any discussion of student engagement, and even more so for online learners. The term student engagement is used widely in the literature for multiple aspects of higher education. Hu and Ku (2002) assert that student engagement is "the quality of effort students themselves devote to educationally purposeful activities that contribute directly to desired outcomes" (p. 555). Much of the research on engagement and higher education still centers on the traditional contexts. Dumford & Miller (2018) note this gap in the literature as a motivating factor for their research on the engagement of students who access their online classes at varying levels. Using NSSE engagement measures, they found that first-year students increased the time spent on quantitative reasoning with the more online class they took, and more online classes were overall related to more engagement (2018). However, for seniors in the study, time spent on quantitative reasoning decreased with more online classes they took and decreased with other measures of engagement (2018). However, NSSE data does not measure self-directed or self-regulatory behaviors such as students' choices about how often they engage with online courses and other behaviors to adapt study skills to the environment.

Similar to engagement, research on student success is vast and varied even within higher education. When focusing student success on academic success at the student level, student success is conceptualized as the interaction of these three categories: grade performance, completion, and satisfaction (Puzziferro, 2008). The connectedness of these three categories is essential to a complete picture of student success. A trend in recent research has been to use the GPA as a single measure of student success; however, such an isolating view can leave the researcher with an incomplete understanding. Additionally, focusing on just completion can ignore other significant academic information since successful students may pace their course completion differently, and successful students also leave by transfer, stop-out, or pause-out. Student satisfaction measured alone could result in meaningless information since satisfaction is typically a self-reported measure that can be effect by a broad number of factors. Therefore, measures of student success that consider more than one of these categories can provide a complete understanding of student success.

This study brings together the research on Mobile Learning, Self-Regulated Learning, and student success to investigate the impact of Mobile Learning on the engagement and success of students in online classes. Student success online is a composite of the tools available to students, the flexibility online classes can afford to learners, and the self-regulatory and self-aware behaviors they engage in while learning.

Research Questions

1. What impact does mobile learning have on student engagement in an online class?
2. What is the extent of the impact of mobile learning on Self-Regulated Learning constructs?
3. How does mobile learning affect student success online?

Methods

Population and sampling

The population for the study was undergraduate students at one mid-sized university taking fully online courses (n=1,641). Convenience sampling was used, and all actively enrolled students in the population had the opportunity to participate by choosing to complete the survey. The survey instrument was distributed to students in the population during the Spring semester (March 2020) to report on their current activities in their online class. In total, 162 students opted-in to participate by taking the survey.

Survey

The Online Self-Regulated Learning Questionnaire (OSLQ) was used for the survey instrument, which uses a 5 point Likert-type scale with responses ranging from strongly agree (5) to strongly disagree (1). The short form of the OSLQ was chosen because six Self-Regulated Learning constructs for the online environment organize it: environment structuring, goal-setting, help-seeking, task strategies, time management, and self-evaluation (Barnard et al., 2008). Eleven items from the OSLQ were chosen to measure the SRL constructs of environment structuring, task strategies, and time management. These constructs proved to be the most relevant and were most likely to show significance based on previous research (Alanazi & Brown, 2016; Barnard-Brak et al., 2010; Cho & Shen, 2013; Puzziffero, 2008). Several demographic questions were added to the survey instrument, as well as questions about mobile device use.

Data Collection and Analysis

The survey instrument measured mobile learning usage with self-reported responses on the frequency of course access with a mobile device (smartphone or tablet) and the activities engaged in via a mobile device. Respondents were grouped by levels of mobile learning use based on the frequency of course access with a mobile device: Low (accessed 1-3 times a week), Moderate (accessed 4-8 times a week), and high (accessed 9+ times a week). The three mobile learning levels were independent variables for each of the three research questions, with the summed SRL measures, course grades, and course persistence as dependent variables. One-Way Analysis of Variance (ANOVA), Tukey post hoc tests, and Chi-Square Crosstabs analysis were used to analyze the data for the research questions. During the analysis, three constructs of SRL were isolated for analysis: environment structuring, task strategies, and time management.

Results

Demographics

Of the 162 respondents, 40 (24.7%) of the respondents reported their age as 18-25 years; 59 (36.4%) reported their age as 26-35 years; 43 (26.5%) reported their age as 36-45 years; 18 (11.1%) reported their age as 46-55 years; 2 (1.2%) reported their age as over 55 years. These age demographics are representative of the overall online student population of the institution.

An initial question on the survey asked students to indicate how often they accessed their online course with a mobile device: 1-3 times a week, 4-8 times a week, or 9 or more times a week. This categorized respondents into three mobile learning usage groups: low, moderate, and high (Table 1). The groups were the basis of comparison for each research question.

Table 1
Mobile Learning Group Membership by Level of Mobile Use

		Frequency	Percent
Valid	1-3 times weekly	70	43.2
	4-8 times weekly	55	34.0
	9 or more times weekly	37	22.8
	Total	162	100.0

Note. "times weekly" represents the number of times a student engaged in the online course via a mobile device.

Results by Research Question

Research question 1 tested the impact of mobile learning on student engagement in an online class. The one-way ANOVA showed a statistically significant difference between the three levels of mobile learning use, with SRL scores as the measure of engagement ($F(2, 159) = 6.570$, $p = .002$, $d = .275$). The Tukey post hoc test revealed that the SRL scores for the low group were significantly lower than the high group (HSD = -4.581, $p = .001$, $d = .719$). The variation between groups was not significantly different between the other group comparisons.

Research question 2 tested the extent of the impact of mobile learning on the Self-Regulated Learning constructs of environment structuring, task strategies, and time management. Three separate one-way ANOVA were conducted for each SRL construct. The ANOVA with environment structuring as the dependent variable did not show significant variance between the groups of mobile learning use. The ANOVA with task strategies showed a statistically significant difference between groups ($F(2, 159) = 8.065$, $p =.000$, $d =.303$), as well as a statistically significant difference between groups for time management ($F(2, 159) = 3.448$, $p =.034$, $d = .202$). A Tukey post hoc analysis was performed for both task strategies and time management (Table 2). The analysis showed that the task strategy construct scores for the low group were significantly lower than the scores for the high group (HSD= -2.624, $p =.000$, $d =.796$). The scores for the moderate group were also significantly lower than the scores for the high group (HSD = -1.681, $p = .040$, $d =.494$). The analysis showed that the time management construct scores for the low group were significantly lower than the scores for the high group (HSD = -1.293, $p = .026$, $d =.505$).

Table 2
Tukey HSD, between groups comparison, SRL Task Strategies and Time Management

Dependent Variable	(I) Mobile Use	(J) Mobile Use	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound	d
SRL Task Strat Score	Low	Moderate	-0.943	.579	.237	-2.31	.43	.301
		High	-2.624**	.653	.000	-4.17	-1.08	.796
	Moderate	Low	0.943	.579	.237	-.43	2.31	.301
		High	-1.681*	.684	.040	-3.30	-.06	.494
	High	Low	2.624**	.653	.000	1.08	4.17	.796
		Moderate	1.681*	.684	.040	.06	3.30	.494

SRL Time Mgmt Score	Low	Moderate	-0.405	.437	.624	-1.44	.63	.169
		High	-1.293**	.493	.026	-2.46	-.13	.505
	Moderate	Low	0.405	.437	.624	-.63	1.44	.169
		High	-0.887	.515	.200	-2.11	.33	.376
	High	Low	1.293**	.493	.026	.13	2.46	.505
		Moderate	0.887	.515	.200	-.33	2.11	.376

*. The mean difference is significant at < .05.
**. The mean difference is significant at < .01.

Research question 3 tested how mobile learning affects student success online, measured by course grade and persistence to the next term. A Chi-Square Crosstab analysis was performed to analyze the association between the levels of mobile learning use with course grade and persistence to the next term. The overall analysis of mobile learning use levels and course grade levels did not show a significant association ($X^2 = 8.553$, df (10), $p = 0.575$). The analysis of levels of mobile learning use with persistence to the next term also did not show a significant association ($X^2 =12.786$, df (2), $p =.242$). The descriptive count tables for both course grade and persistence to the next term showed a lack of variance among the variables and low cell count for persistence to the next term. Overall, most students in the sample earned A and B grades and persisted to active enrollment for the next term.

Discussion

Among the initial questions on the survey, students were asked to identify which activities they engaged in while using a mobile device. Reading content had the highest percentage of use (90%), participating on discussion boards was the following highest percentage of activity (75.3%), watching videos was the third-highest percentage activity (60.5%), and submitting work was the fourth-highest activity engagement while using a mobile device (40.7%). Using a mobile device to take a test only occurred 31.5% of the time and using a mobile device to ask a question occurred the least at 26.5% of the time.

From the analysis results, mobile learning use has an impact on engagement. However, the effect is not the same for all groups and varies among the three SRL constructs tested. Previous research (Broadbent, 2017; Broadbent & Poon, 2015; Puzziferro, 2008; Tabuenca et al., 2015) supports the assumption that time on task has a beneficial effect on student engagement and various measures of student success online. This current research also supports such findings and shows that the more students engage in mobile learning, the more they engage in self-directed choices about managing time and managing task strategies. Examples of task strategies are working on extra problems, preparing questions ahead of time, and reading aloud to increase concentration. Examples of time management strategies used by self-regulated learners are engaging in the online course at regular and planned intervals, scheduling study time, and spacing study time across days.

Though the variation among the groups for the environment structuring construct was not statistically significant, the students in the sample engaged in environment structuring behaviors more than task strategies or time management strategies (Table 3). Considering these results and the significance of task strategies and time management strategies, it seems that choosing mobile learning may itself be a SRL behavior for these students.

Table 3
Descriptive Statistics: SRL Environment Structuring Scores

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	*Upper Bound*		
Low	70	16.96	2.590	.310	16.34	17.57	12	20
Moderate	55	17.31	2.340	.316	16.68	17.94	12	20
High	37	17.62	2.639	.434	16.74	18.50	8	20
Total	162	17.23	2.518	.198	16.84	17.62	8	20

The students in the low and moderate groups engaged in SRL at lower levels less than those in the high group. Nevertheless, most students in the sample earned grades of A and B in their course, and students in the low mobile use group earned grades of B more than any other grade. This might indicate that using a mobile device to access their courses was in addition to other types of access, such as laptops or desktop computers.

Two limitations of this study are the small sample size and the self-selection. The timing of data collection at the beginning of a term may not have appealed to less successful students discouraged by their recent lack of academic achievement. This would explain the lack of variance with the course grade and persistence data. However, the non-response bias for small sample size is reduced somewhat by the uniformity of the group, being all undergraduate online students at the same institution who are responding to a survey about that shared quality of the group (Bethlehem, 2010; Leslie, 1972).

Recommendations

This research can help improve practice in the realm of course design and online pedagogy. Online course design must consider the mobile learner to engage all learners and course users better. While many companies in the online learning marketplace offer numerous tips for making online learning content more mobile-friendly, very little research has been done to establish quality norms or best practices for mobile learning course design (Baldwin & Ching, 2020). Knowing how students are engaging in Mobile Learning should inform how course designers incorporate mobile design. More research is needed to help develop the theory of Mobile Learning, which should inform the needed research on mobile learning course design.

Increased research on Mobile Learning should also improve online pedagogy. Current research suggests that many faculty members either do not consider that students use mobile devices as educational tools or faculty have false beliefs about student use of mobile devices (Gierdowski, 2019). Just as course design should consider the mobile learning user, so should content creation and teaching stance online. Knowing that students will be using a mobile device to engage with at least some of the course content should encourage faculty to ensure the content is compatible with mobile device users. From a pedagogical perspective, that could mean the choice to add short instructional videos to provide chunks of information in different formats. Even more simply, it could mean testing the mobile compatibility of a website before linking with course content. The more we know about mobile learning, the more we can purposefully expand pedagogy to include the experience of mobile learning users.

The disruption to the norms of higher education caused by the COVID-19 pandemic may be an opportunity for more meaningful consideration of Mobile Learning. Online learners may

not have experienced disruption to their online learning environment, such as the students in this study. However, other disruptions in their lives may have caused an increased reliance on mobile devices. The sudden increase of hybrid and hyflex course delivery certainly brought mobile device use to the forefront over the recent academic year. As high school and college students gained more experience with their mobile devices as educational tools, they will expect to continue to be mobile in their college learning. Mobile learning offers great potential to reach a diversity of learners. Higher education must meet the demand for more mobile learning access and use.

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Student Performance in Online Classes at a Hispanic-Serving Institution: A Study of the Impact of Student Characteristics in Online Learning

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Abstract
As online enrollment increases in the United States, it is important to understand the impact of course modality on student outcomes. In particular, there has been limited research on the effect of course enrollment at Hispanic-serving institutions (HSI). The current study evaluated the effect of online course enrollment on student grades and on student withdrawal rates by comparing outcomes in online and face-to-face classes. The main innovation of this study is to use propensity score analysis to control for 15 different student characteristics as a way to control for the selection bias introduced when students self-select into different course modalities. The study used data from a large, public, HSI in the mountain west during the 2017-2018 and 2018-2019 academic years. Baseline results on a two-sample *t*-test indicated that online students have significantly higher course grades, and non-significantly different withdrawal rates before controlling for student characteristics. The study used a propensity score analysis (PSA) to control for 15 confounding covariates after testing three different PSA models: near-neighbor matching, Mahalanobis' metric, and optimal matching. After evaluating each model for validity and sensitivity, a near-neighbor 1:2 matching PSA shows a non-significant difference in student grades, and higher withdrawal rates in online classes than face-to-face classes. Given these results, institutions should ensure that they are providing adequate academic support for online students to improve retention and success rates for online students.

Keywords: distance education, online education, higher education, success rates, educational indicators, propensity score analysis

Over the past decades, online course enrollment in the United States has been steadily increasing. As of fall semester 2019, 16.6% of students at degree-granting postsecondary institutions were taking exclusively distance education courses, with 35.3% taking one or more distance education courses (National Center for Education Statistics, 2019). Over the past two decades, online enrollment in the U.S. has increased from 9.6% in 2002 to 31.6% in 2016 (Allen & Seaman, 2014; Seaman, Allen & Seaman, 2018). In recent years, postsecondary institutions have seen an increase in online and distance learning, even with the national trend of overall enrollment decline (Seaman et al., 2018).

Given these long-term online enrollment trends, that many anticipate increasing in the wake of the 2020 pandemic (Green, 2020; Kim, 2020; McCauley, 2020), it is important to understand the impact of online course enrollment on student outcomes, particularly at Hispanic-serving institutions, where there has been limited previous research. Current study of online outcomes has mixed results. Some research indicates that there is no significant difference between outcomes in online and face-to-face course enrollments (Hurlbut, 2018; Tseng & Walsh, 2016). Contrasting publications indicate that either there is either a negative effect of online course enrollment (Gregory, 2016; Johnson & Palmer, 2015), or a positive effect (Bunn, Fischer & Treba, 2014; Kaupp, 2012; Verhoeven & Wakeling, 2011).

These inconclusive results are particularly important when considering that many of these studies use an observational research design that does not account for the selection bias inherent when students self-select into different course types (Coates & Humphreys, 2004; Koch, 2005a). Student self-selection does not allow the researcher to identify and control for student characteristics in different course modalities in a randomized control trial. Smith (2017) found only five studies that used rigorous statistical methods to control for this selection bias by examining student characteristics such as race, gender, and other demographic data during statistical analysis.

The purpose of this study is to explore online course outcomes in the form of course grades and withdrawal rates at a four-year, public, Hispanic-serving institution, using a propensity score statistical method to control for selection bias. In doing this research, the researcher controlled for 15 different student covariates, including factors related to demographic data, academic performance, and personal and family factors. The current study explores student achievement at an HSI and uses a propensity score analysis to answer two questions:

1. To what extent does enrollment in a fully online class at an HSI affect course grades for undergraduate students who complete the course?
2. To what extent does enrollment in a fully online course affect course withdrawal rates for undergraduate students at an HSI?

This paper will review the current literature in the field of online and distance education as they relate to student course outcomes. It will then explore the setting and methodology for the current study and will discuss results of the study using a propensity score statistical method to evaluate student outcomes. Finally, the paper will discuss implications of the research results on online education at HSIs.

Review of Literature

Tinto's student integration theory (1975, 1993), and Rovai's subsequent student integration model (2003) both suggest that student characteristics such as demographics, academic performance, and institutional and motivational factors all contribute to their course outcomes and persistence in higher education.

Additionally, there is a large body of research related to student outcomes in online spaces, with mixed results regarding the effect of online course enrollment on student course outcomes (Bunn et al., 2014; Gregory, 2016; Johnson & Palmer, 2015; Kaupp, 2012; Verhoeven & Wakeling, 2011). However, little current research in the field of online learning specifically controls for selection bias by examining the characteristics suggested by student integration theory (Rovai, 2003; Tinto, 1975, 1993) and their impact on online course outcomes.

Student Outcomes for Hispanic Students in Higher Education

The National Center for Education Statistics (2012) indicates that Hispanic students have lower persistence rates, with only 52% earning some type of degree or certification after five years of post-secondary education. This rate was 21% lower than the persistence rate for White students. This disparity implies long-term inequity in employment, salary, and earning potential.

Hispanic students benefit from attending an HSI, which provides a positive culture that is more conducive to student success, particularly when first-generation students, or those with lower parental education, lack the social capital to succeed at other institutions (Crisp & Nora, 2010; Hurtado & Ponjuan, 2005). Exelencia in Education (2019) suggests that over the past decade, there has been a steady increase in the number of HSIs. This designation allows institutions to request additional funds to help support Hispanic students. However, additional evidence suggests that attending an HSI has no significant impact on Hispanic student performance and retention (Flores & Park, 2015; Kelly, Schneider, and Carey, 2010).

This literature review explores the impact of a variety of student factors in online success rates as suggested by Tinto (1975, 1993) and Rovai (2003). It will also review current literature as it relates to online student outcomes at Hispanic-serving institutions.

Student Outcomes in Online Classes

Literature related to statistical outcomes in online classes provides mixed results, with some research suggesting that there is no significant difference between student outcomes in online and face-to-face classes, while other research suggests that there is either a positive or a negative effect of enrollment in online classes. The first group of research suggesting no significant difference between online and face-to-face course outcomes is consistent with Russell's (1999) no significant difference phenomenon. Many of the studies that found no significant difference between outcomes in different course modalities use a small sample in discipline-specific research that focuses on a specific subject (Dellana, Collins, & West, 2000; Euzent, Martin, Moskal, & Moskal, 2011; Gutierrez & Russo, 2005; Leasure, Davis, & Theivon, 2000; McDonough, Roberts, & Hummel, 2014; Reuter, 2009; Rivera & Rice 2002; Summers, Waigandt, & Whittaker, 2005; Tseng & Walsh, 2016; Waschull, 2001; Werhner, 2010).

Other research, including several studies with larger data sets, suggests a significant difference between online and face-to-face student outcomes. In some instances, students enrolled in face-to-face classes recorded better outcomes than did online students (Arias, Swinton, & Anderson, 2018; Bunn et al., 2014; Coates & Humphreys, 2004; Johnson & Palmer, 2015; Kaupp, 2012; Verhoeven & Wakeling, 2011). At the same time, another body of research found that online students outperformed face-to-face students (Amro, Mundy, & Kupczynski,

2015; Ashby, Sadera, & McNary, 2011; Atchley, Wingenback, & Akers 2013; Cavanaugh & Jacquemin 2015; Cooper 2001; Gulacar, Damkaci, & Bowman 2013; Jorczak & Dupuis, 2014).

Impact of student characteristics on course outcomes. Some research about online student outcomes specifically focuses on the impact of student characteristics on their academic performance. These characteristics align with categories provided in student integration models (Rovai, 2003; Tinto, 1975, 1993), and they help to account for the selection bias inherent in student self-enrollment into college courses. Commonly examined characteristics include race, gender, age, and ACT or SAT scores. Even controlling for these characteristics, research indicates a variety of results. Some of these studies suggest that student characteristics are not significant predictors of their success (Ashby et al., 2011; Larson & Sung 2009; Reuter, 2009). Other research found that after controlling for student covariates, there was no significant difference among online and face-to-face performance (Cavanaugh & Jacquemin, 2015; Dellana et al., 2000; Euzent et al., 2011; LaMeres & Plumb, 2014; Leasure et al., 2000).

Alternatively, other research suggests that after controlling for a variety of student characteristics, face-to-face students showed better outcomes than did online students (Arias et al., 2018; Bunn et al., 2014; Johnson & Palmer, 2015; Kaupp, 2012; Verhoeven & Wakeling, 2011). Finally, among the research that intentionally controlled for student characteristics, some found that online students had better outcomes than face-to-face students (Amro et al., 2015; Dotterweich & Rochelle, 2012; Koch, 2005a, 2005b; Lapsley, Kulik, Moody, & Arbaugh, 2008). Even after controlling for one or more student characteristics that could contribute to selection bias, there is no clear pattern of student outcomes in online or face-to-face classes.

Despite Tinto (1975, 1993) and Rovai's (2003) assertion that student characteristics have an impact on performance and retention, it is difficult to draw strong statistical conclusions about student performance and the causality of online enrollment because students self-select into different course types, and observational studies have no way to control for these characteristics. Coates and Humphreys (2004) suggest that "self-selection into online classes is an important issue in the assessment of the effectiveness of online education. . . . Failure to account for the effects of selection leads to biased and inconsistent coefficient estimates" (p. 545). One way to evaluate the effect of student characteristics in an observational study is to use a propensity score statistical analysis.

Propensity Score Analysis

The propensity score analysis (PSA) is a statistical method that allows the researcher to control for many different variables included in observational datasets. Rosenbaum and Rubin (1983) suggested that this could be a way to estimate causal effects in this type of data. Random control trials are not always ethical or practical and PSA allows the researcher to estimate causality using a list of possible confounding covariates. The statistical results reveal imbalance between treatment and control groups and can estimate treatment effect through correcting this type of imbalance.

For this literature review, the researcher found only six studies that specifically use a PSA method to evaluate the effect of online course enrollment on student course outcomes. These studies provided a rigorous statistical analysis of student data, and all found a negative effect of online course enrollment: online students had higher withdrawal rates than did face-to-face students (Smith, 2017; Wladis, Conway, and Hachey, 2015; Xu and Jaggars, 2011a, 2011b, 2013, 2014). They also earned lower course grades than face-to-face students (Smith, 2017; Xu and Jaggars, 2011a, 2011b, 2013). Despite the inconsistencies in other research that did not use a rigorous statistical method to control for a wide variety of factors, when researchers used a PSA

to control for these covariates, they were unanimous in finding a negative effect of online course enrollment.

Online Outcomes at Hispanic-Serving Institutions

Although there has been a large body of research exploring course outcomes in online and face-to-face classes, the author found only two articles specifically focused on outcomes at HSIs. In one study, online students had better outcomes than face-to-face students (Wladis et al., 2015), while the other did not explore specific outcomes, but did find that age and ethnicity contributed to student success (Camara, 2016). The limited number of research studies that rigorously control for student characteristics, combined with the paucity of literature related to online student outcomes at an HSI suggest the need for a large-scale study at an HSI that incorporates Tinto (1975, 1993) and Rovai's (2003) student integration characteristics with a robust statistical method.

Methods

This study used a propensity score analysis to evaluate a large, institutional dataset from Russell University (pseudonym), a four-year, public HSI in the mountain west. Russell University has a diverse student population, with 38.9% of students enrolled in one or more online class as of fall 2018, (AVP, personal communication, July 18, 2019).

Data Collection

Russell University provided a de-identified dataset with secondary data related student grades and withdrawal rates for AY 2017-2018 and AY 2018-2019. Original data included all degree-seeking, undergraduate students who had enrolled in either a face-to-face or a fully online section of a course taught in both modalities. Because many students were enrolled in more than one class, the data were aggregated, and students who were taking 75% or more online classes were assigned to the online group, while those taking 75% or more face-to-face classes were assigned to the control, or face-to-face group. Data for students in the middle 50% who took a mixed selection of classes were eliminated from the study. Finally, student cases with missing data were eliminated in a list-wise case deletion because PSA is sensitive to missing data. The final dataset included data for 7,765 students.

Variables

For this study, the treatment variable was course modality, divided into online enrollment groups (treatment) and or face-to-face groups (control). This study had two outcome variables: (a) composite course GPA for completed courses, and (b) student withdrawal rate.

The study also explored 15 confounding covariates related to student demographics, student skills, internal, and external factors based on the four categories of the student integration model (Rovai, 2003). Student characteristics included were race, gender, age, first-generation student status, veteran status, and zip code. The one variable related to student academic skills was ACT scores as the missingness rate of SAT scores was too high to include it in the study. Internal institutional factors were current GPA, a declared major, number of credits completed, and student enrollment status (full or part-time). Finally, external student factors were marital status, employment status, income bracket, and Pell grant eligibility. Controlling for these covariates allowed for a robust statistical study of the dataset based on student integration theory (Rovai, 2003; Tinto, 1975, 1993).

Data Analysis

After collecting and coding these data, the R statistical package was used to conduct a series of propensity score analyses on the data. The first test conducted was a two-sample *t*-test to establish baseline data before controlling for additional variables. Next, to determine the best model fit for these data, the researcher conducted a series of three propensity score models before conducting a sensitivity analysis (Leite, 2017; Rosenbaum, 2002) to determine the robustness of each model. For this study, the three propensity score models tested were near-neighbor matching, Mahalanobis' distance metric, and optimal matching tests. After evaluation, the near-neighbor 1:2 matching technique was selected and the researcher conducted a follow-up two-sample *t*-test to evaluate the effect of course enrollment on student outcomes.

Results

Baseline Data

Prior to conducting a PSA to control for confounding covariates and estimate treatment effect, the researcher conducted baseline statistical testing to determine effect of enrollment prior to controlling for selection bias. For R1, results from a two-sample *t*-test indicated that online students had a significantly higher course GPA ($m = 2.55$), than did face-to-face students ($m = 2.34$), $t(7763) = -5.80$, $p < .001$). These data suggest that prior to controlling for confounding covariates, online students outperformed face-to-face students in terms of course grades. See Figure 1.

Figure 1.
Boxplot of student GPA based on course enrollment at Russell University before PSA.
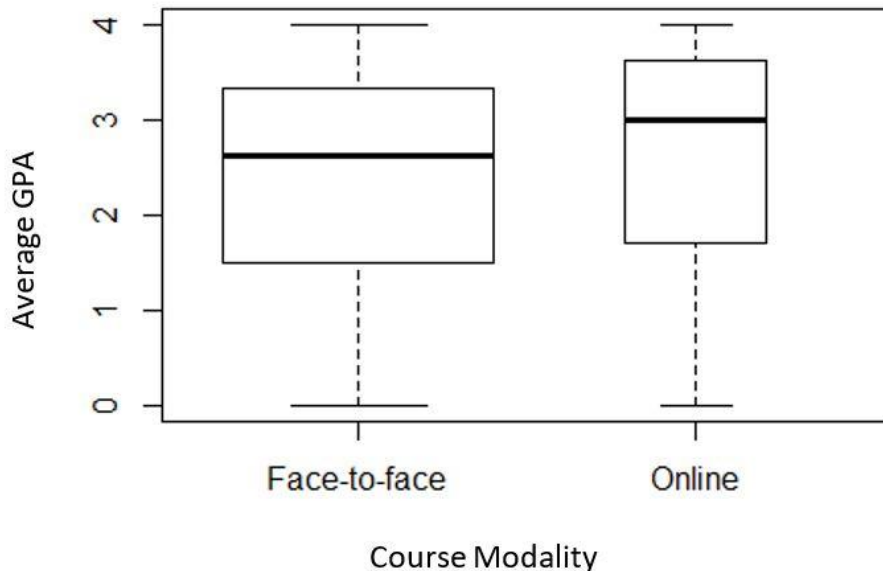

For R2, related to student withdrawal rates, baseline data indicated that there was no statistically significant difference between withdrawal rates among the two groups of online and face-to-face students, $t(7763) = -1.07$, $p = 0.28$). Together, these two baseline statistics indicate that without

conducting a PSA, online students earned better grades than did face-to-face students, and that students in each group withdrew from classes at similar rates. See Figure 2.

Figure 2.
Bar chart of student withdrawal rates based on course enrollment at Russell University prior to PSA.
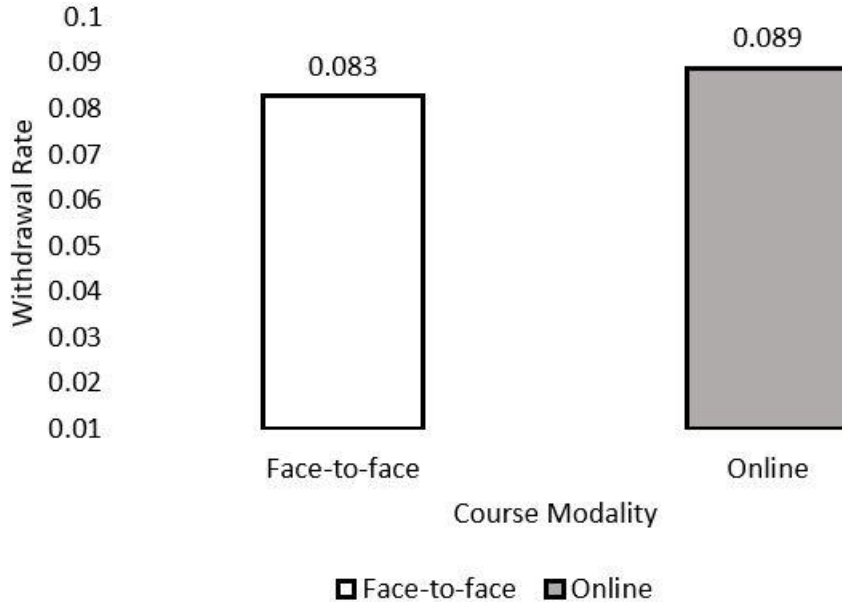
The same baseline testing also evaluated balance between online and face-to-face groups of students, by measuring the relationship between covariates and course grades or withdrawal rates. The association between these measures was statistically significant, as measured by a chi square test, $\chi^2 (15) = 1407$, $p < .001$. This relationship indicated that eight of the 15 covariates were contributing to the significant imbalance between online and face-to-face groups. These eight contributing covariates were: number of credits earned, GPA, declared major, sex, enrollment status, ACT score, transfer status, and age.

Based on these data, the average online student profile as compared to face-to-face students at Russell is summarized as follows: 66% female; attended part-time; had higher ACT scores; was more likely to be a transfer student; was nearly one year older; had completed more credit hours; had a higher GPA; and had more frequently declared a major. These data suggested that generally, these students were older and had more academic experience than their face-to-face peers. The imbalance between online and face-to-face groups on multiple variables suggested a need to control for these confounding covariates to make an accurate determination of treatment effect, and the researcher conducted a series of propensity score analyses to make that determination.

Propensity Score Matching

To reduce threats to the statistical validity of the baseline results, three different PSAs were conducted: (a) near-neighbor matching with 1:1 and 1:2 ratios, (b) Mahalanobis' distance matching, and (c) optimal matching with 1:1 and 1:3 ratios. Each of these tests showed different results, so their efficacy was evaluated by monitoring balance, retention of cases, and by using a sensitivity analysis. High sensitivity to hidden bias could suggest that these models were not a

good fit for the data, or that they were influenced by hidden bias coming from missing covariates (Rosenbaum, 2002).

Near-neighbor Propensity Score Matching

With near-neighbor PSA and 1:1 matching, each individual in the treatment group (n =1681) was matched with one student in the control group (n =1681) to create a balanced model. A chi square test after matching showed no significant imbalance remaining after matching, χ^2 (15) = 13.2, p = .59. Rosenbaum's sensitivity analysis showed that for 1:1 matching, $\Gamma \geq 1.20$, which suggests that at this point the association would no longer be significant between online enrollment and student course grades (p = .12) or withdrawal rates (p = .07).

The near-neighbor PSA with 1:2 matching used a similar method but matched each online student (n =1681), with two face-to-face students (n = 3,362). This ratio kept a larger number of cases, but also decreased the balance. A follow-up chi square test showed a significant improvement in balance over the baseline but retained a significant level of imbalance between online and face-to-face groups, χ^2 (15) = 314, p < 0.001. Sensitivity analysis showed that when $\Gamma \geq 1.20$, association would no longer be significant for course grades (p = .14) and for withdrawal rates (p = .07).

Mahalanobis' Matching

The next model tested with these data was the Mahalanobis' metric method. This method matched one face-to-face student (n = 1,681) with each online student (n = 1,681), to find the closest match for each student using a different matching model. This method showed improvement on balance, but a chi square test showed that there was still a significant remaining imbalance between groups, χ^2 (15) = 98.3, p < 0.001. This model was highly sensitive to missing data, as when $\Gamma \geq 1.05$, there was no longer a significant association between course enrollment and grades (p = .09), or withdrawal rates (p = .05).

Optimal Matching

The final statistical model tested with these data was optimal matching with a 1:1 and a 1:3 ratio. Optimal 1:1 matching again matched one online student (n = 1,681) with a similar face-to-face student (n = 1,681), using a method that estimates the best fit for all of the data. The 1:1 model was not able to fully eliminate the imbalance between groups, and although it showed significant improvement, a follow-up chi square test showed a remaining statistically significant imbalance after matching, χ^2 (15) = 232, p < 0.001. Sensitivity tests suggest that when $\Gamma \geq 1.20$, the association between online enrollment and course grades would no longer be significant (p = .08). For the association between online enrollment and withdrawal rates, sensitivity to hidden bias was even higher, as when $\Gamma \geq 1.15$, the association would no longer be significant (p = .10).

Optimal matching with a 1:3 ratio retained the most cases, as online students (n = 1,681) were each matched with three face-to-face students (n = 5,043). This had a negative impact on balance between groups, with the smallest change in balance of all models tested. A chi square test showed the significant imbalance that remained after matching, χ^2 (15) = 987, p < 0.001. This model also showed the most sensitivity to hidden bias: when $\Gamma \geq 1.05$, the association would no longer be significant between course modality and student grades (p = .09). Similarly, when $\Gamma \geq 1.15$ the association between course enrollment and withdrawal rates would no longer be significant (p = .10).

Model Selection and Results

Given the differences between these three models, the researcher examined each for the best fit for these data, comparing case retention, balance, and sensitivity to hidden bias. Using these measures for validity and sensitivity, the near-neighbor 1:2 matching was selected as the

most robust model. This model retained a higher number of cases than the 1:1 matching techniques, including the Mahalanobis metric. This made it a better choice than the near-neighbor 1:1 matching model, despite having greater imbalance. The near-neighbor 1:2 matching model did see an improvement in matching for all but one of the eight unbalanced covariates identified in the baseline data. Finally, this model had was less sensitive to hidden bias than all but one of the other tested models, with a score of $\Gamma \geq 1.20$ for both student grades and withdrawal rates.

Using the near-neighbor 1:2 matching PSA, the researcher conducted final two-sample t-tests on these matched results to determine the effect of online course enrollment on student course outcomes. The first research question was about the impact of online course enrollment on course grades. After matching, there was no statistically significant difference between online and face-to-face students with regards to their composite GPA, $t(3067) = 1.17$, $p = 0.24$. These results contrasted with baseline results, which had indicated a higher GPA for online students ($m = 2.55$) than for face-to-face students ($m = 2.34$), $t(7763) = -5.80$, $p < .001$. See figure 3.

Figure 3.
Boxplot of student average GPA based on course enrollment after near-neighbor 1:2 matching.
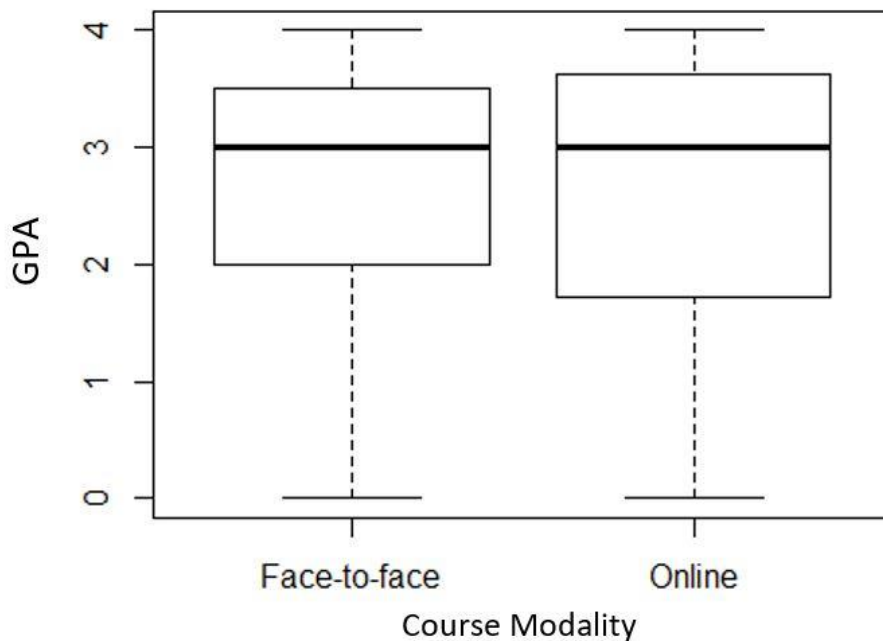
To answer the second research question about the effect of online course enrollment on course withdrawal rates, the researcher again used a two-sample t-test after using near-neighbor 1:2 matching, the results of which indicated that online students had significantly higher withdrawal rates ($m = 0.09$) than did face-to-face students ($m = 0.07$), $t(5041) = -2.76$, $p < .01$). Again, these results contrasted with baseline data, which had suggested that there was no significant difference between withdrawal rates based on course enrollment decisions $t(7763) = -1.07$, $p = 0.28$). See Figure 4.

Figure 4.
Bar chart of student withdrawal rates based on course enrollment after near-neighbor 1:2 matching.
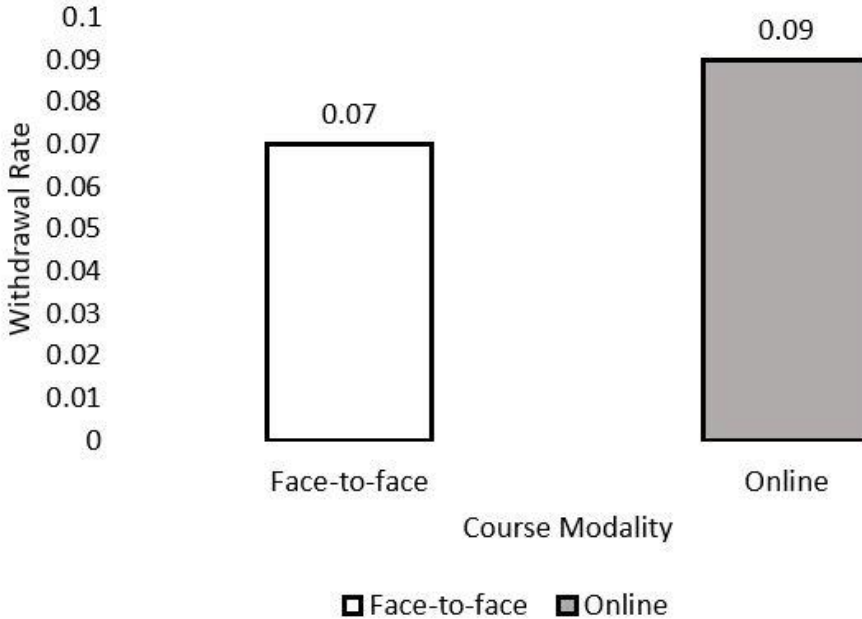
In considering these results, it is important to consider the sensitivity of these tests to hidden bias. In both cases, when $\Gamma \geq 1.20$, the association between course grades ($p = .14$) and withdrawal rates ($p = .07$) and online course enrollment would no longer be significant. This suggests that the odds of these results occurring as a result of course enrollment rather than at random is only 1.2, or that these outcomes are only 1.2 times more likely to occur as an effect of course enrollment than they are to happen randomly. This is not a robust result and indicates the possibility of one or more source of hidden bias, or other confounding covariates that may be missing from the model that would impact student success in online courses.

Discussion

This study used a propensity score analysis method as a robust statistical test to estimate causality in determining the effect of student enrollment in online courses. In circumstances where it is impractical to conduct a randomized control trial, such as observational studies in higher education, the PSA can provide a statistical method to approximate these results by balancing out the selection bias introduced by student self-enrollment into online or face-to-face courses.

Baseline Data Compared to PSA Results

The contrast between baseline results and results from the PSA validate theory by Tinto (1975, 1993) and Rovai (2003), who posit that student characteristics, including demographic, academic and personal factors all contribute to student success in higher education. Baseline results indicated a statistically significant imbalance between online and face-to-face student groups. Prior to balancing that sample, students enrolled primarily in online classes had significantly higher grades than did face-to-face students, and the two groups had no significant

difference in withdrawal rates. However, after balancing the sample and accounting for 15 confounding covariates, results of a near-neighbor 1:2 matching technique demonstrated that while online and face-to-face students had no significant difference in course grades, online students did have significantly higher withdrawal rates. The reason for this disparity between baseline and PSA results may be that students who enroll in online classes tend to be older, have more academic experience, and better past academic performance.

Student Course Grades

A result of no significant difference in course grades between the two groups is particularly relevant in this context. It supports the idea of the no significant difference phenomenon developed by Russell (1999), and a large body of literature that suggests that there is no significant difference in online course outcomes when compared with face-to-face classes (Dellana et al., 2000; Gutierrez & Russo, 2005; Leasure et al., 2000; McDonough, et al., 2014; Reuter, 2009; Rivera & Rice 2002; Summers et al., 2005; Waschull, 2001; Werhner, 2010). This study is unique in scope, however, with a larger sample size from an institutional dataset that incorporated data across many disciplines and used a robust statistical method to evaluate results by accounting for selection bias.

Student Withdrawal Rates

In contrast to the above results related to student course grades, this study found that after near-neighbor 1:2 matching, online students had significantly higher withdrawal rates than face-to-face students, while the baseline data had found no significant differences between the two groups. A current body of literature has found better course performance in face-to-face classes, but none of the studies reviewed here specifically examined student withdrawal rates (Arias et al., 2018; Bunn et al., 2014; Johnson & Palmer, 2015; Kaupp, 2012; Verhoeven & Wakeling, 2011). Interestingly, the results from this current study did echo the consistent results found in the three previous studies using a robust PSA, which also found higher withdrawal rates among online students (Smith, 2017; Xu and Jaggars, 2011a, 2011b).

Student Outcomes and the Student Integration Model

Previous research has generally used a simple statistical analysis that fails to control for characteristics identified in the student integration model (Rovai, 2003; Tinto, 1975, 1993). This body of research typically controlled for only one to five covariates (Dellana et al., 2000; Gutierrez & Russo, 2005; Leasure et al., 2000; McDonough et al., 2014; Reuter, 2009; Rivera & Rice, 2002; Summers et al., 2005; Waschull, 2001; Werhner, 2010), with some research failing to control for any additional covariates in their study design (Gutierrez & Russo, 2005; McDonough et al., 2014; Rivera & Rice, 2002; Summers et al., 2005). The disparity between baseline results from the current study with results from a more robust PSA that controls for 15 confounding covariates indicates the importance of accounting for a wide variety of student characteristics in research related to online learning.

Limitations

Propensity score analysis is highly sensitive to missing data (Guo & Fraser, 2015). As a result, this research used a list-wise strategy to delete any student cases that were missing data. Four covariates from the study had missing data: first-generation status, ACT scores, high school GPA, and income. The only covariate with missingness that contributed to imbalance in the model was ACT scores, but deleting these cases reduced the number of total cases in the study. Deleting cases in this way may have introduced additional bias, since the deleted cases were not missing completely at random (MCAR).

Implications

The implications of these results could affect stakeholders at Russell and other large public HSIs. With the increase in online education over the past two decades (Allen & Seaman, 2014; Seaman, Allen, & Seaman, 2018) and a yet-to-be-determined long-term effect of the COVID-19 pandemic on online course enrollments, ensuring equitable access to education in both online and face-to-face modalities is important. This equitable access is particularly important at an HSI, where there has been limited research on the value of online learning for all students, and how it effects course outcomes for students at these institutions.

The statistically significant difference in withdrawal rates between online and face-to-face students in this study is particularly concerning, and other research has suggested methods for supporting and engaging students at HSIs to improve retention and graduation rates (DiSanto & Guevara, 2019; Espinosa & Espinosa, 2012; Garcia & Ramirez, 2018; Martin & Meyer, 2010; Meling, 2012; Wolfe, Lyons & Guevara, 2019). One way to do this is to ensure that students enrolled in both online and face-to-face classes are offered a way to develop collaborative relationships with faculty through personalized instruction and undergraduate research opportunities (Garcia & Ramirez, 2018; Martin & Meyer, 2010).

Faculty support and connection with online students can help improve retention, but so can adequate institutional support services for online students, such as academic advising, mental health services, registration, and financial aid (Espinosa & Espinosa, 2012; Museus & Ravello, 2010). Providing these services to all students, including online students, in a meaningful and personal way provides access to the social capital that many first-generation students lack (Garcia & Ramirez, 2018). Fortunately, although there were gaps in availability of online support services pre-COVID-19, the pandemic has pushed institutions to provide additional, high-quality support for online students (Bouchey, Gratz & Kurland, 2021; Sorrells & Wittmer, 2020). While it is not yet known what the long-term availability of this support will be, the pandemic has pushed institutions to make greater efforts in supporting online students, which may have a positive impact on student retention in the future.

Future Research

This study attempts to fill a gap in research related to online course outcomes at HSIs but is still only part of a small body of research. The existing studies indicate an emerging pattern of unique student performance outcomes at HSIs (Wladis et al., 2015; Cottrell, 2020), but more research is needed to confirm this data pattern.

The results from the current study indicate that there is high sensitivity to hidden bias that could be impacting results. To add additional measures to balance this bias, future research could include a student survey that supplements institutional data. This survey could include measures such as information literacy, time management, social belonging, program fit, learning style, and student satisfaction as they relate to the student integration model (Rovai, 2003; Tinto, 1975, 1993). However, these factors may not be available in an institutional dataset. A survey could also introduce qualitative measures that help researchers better understand student withdrawal decisions. A mixed-method study would have a smaller sample size, but more robust data that allows for analysis of additional covariates that could impact student outcomes in online classes.

Finally, the COVID-19 pandemic has contributed to rapidly changing online environments, with additional supports for online students (Bouchey et al., 2021; Sorrells & Wittmer, 2020), changing enrollment patterns and new course formats (Miller, 2021). These

changes may have long lasting effects that impact student success in online classes both positively and negatively into the future. Future research should focus on these changes and compare pre-COVID-19 data with post-COVID-19 online student data to understand current trends and implications for online learning.

In summary, understanding student course outcomes through a robust statistical method shed new light on student performance at an HSI, and demonstrated the need for future research that controls for the selection bias inherent in an observational study. As the demand for online learning continues to grow, it is important to continue to improve our understanding of how to support diverse online learners in an equitable way.

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Connections Before Curriculum:
The Role of Social Presence During COVID-19 Emergency Remote Learning for Students

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Abstract

This study examined the student experience (n=507) during emergency remote learning at a medium-sized private southeastern university during the COVID-19 pandemic, leveraging the Social Presence Model (SPM) as a guiding framework. Tensions were high at this critical time as students were stressed with financial burdens, supply shortages, overlapping work and educational schedules, and shared technological resources and physical spaces. Therefore, this study helps educators better understand students' emotional needs and experiences during the March 2020 lockdown transition to remote learning. Specifically, examining the student experience in a time of crisis offers critical lessons about the importance of connectedness, online readiness, cultivating relationships, adaptability during transitions, and class interaction. The data revealed the depth of anxiety felt by students and suggests the need for increased empathy, communication, interaction, and flexibility from their instructor and course community to proceed with academic coursework, particularly for first-year college students. The findings elevate the importance of social presence as a literacy for learning in any modality, underscore the need to support the mental health of our students, and stress the urgency for online and remote learning readiness for current and future public emergencies.

Keywords: Social presence, connectedness, COVID-19, online learning, remote learning, online readiness

As the pandemic's first wave surged across the globe in March 2020, instructors dove headfirst into the previously uncharted waters of remote emergency learning during the COVID-19 lockdown. Millions of educators learned to quickly adapt their course materials and teaching styles to different modalities in its wake. Students who previously navigated their on-campus courses on autopilot suddenly became online learning project managers as they organized their new schedules and adjusted to each instructor's online and remote course adaptations as well as their new learning spaces.

As a result of the tidal wave of change, an understandable lack of online readiness resulted in diminished social presence in learning environments (Cutri et al., 2020). This deficiency stems from faculty getting courses ready for remote learning with short notice. Cutri and her colleagues (2020) noted,

> *Faculty, including teacher educators, were asked to transition, create, and implement online teaching due to university closures with no choice but to teach online even if they did not feel properly prepared to do so, or formerly had little interest in online teaching (p. 523).*

Moreover, technology laggards got caught in the undertow of a completely new paradigm of teaching and learning. With little or no professional development, they struggled to keep their heads above the water (Ensmann et al., 2021; Whiteside, 2017).

Faculty members' lack of readiness had a domino effect on students who already lacked online readiness (Cutri et al. 2020; Tang et al. 2021). Additionally, many students faced challenges, including not having their books, quickly moving away from campus, and managing courses taught in synchronous and asynchronous formats. Family stress and tensions were high and even compounded for international students. Faculty navigated the best way while underestimating the importance of connectedness for students, the emotional impact of COVID, and the overall importance of social presence at the time. Emerging studies on the 2020-21 student experience showcase numerous constraints, large cultural disparities, mixed emotions, and varied scholastic results (Nguyen et al., 2021).

Building from this foundation, this study is part of a larger study that explores the holistic student experience during COVID-19 emergency remote learning. The purpose of this specific study was to explore the student experience of needing connections and support in a time of considerable disconnection and confusion in higher education. It employs the Social Presence Model (SPM) as a framework because of its unique positioning as a heuristic developed to explore social presence in both connectedness and experience. The authors begin with a summary of the literature on COVID-19 remote learning and social presence. It presents the social presence methodology, methods, and findings, and it ends with the study's implications.

Research Questions

This study focused on the following research questions:
1. What was the student experience in the transition to remote learning?
2. How can we better understand the experience through the lens of the social presence model?

Focusing on the results related to SPM from the students' perspective, this article provides the first in a series of data analysis reports that examine the depth of the different categories of student and faculty data collected.

Literature Review

This study fills a gap by helping us to better understand students' emotional needs and experiences during the March 2020 lockdown transition. This section situates the study within the social presence and COVID-19 remote learning consideration.

Social Presence

The importance of connections, interactions, and the socio-emotional aspects of learning are often underrated and overlooked. As humans, we crave these connections, and, in learning environments, we need them even more. Lave and Wenger (1991) and Wenger (1998) addressed the importance of relationships, networking, and connections for meaning-making within a discipline. To thrive with a learning community, students need to "engage directly in activities, conversations, reflections, and other forms of personal participation" while simultaneously interacting with the material and learning "artifacts" (Wenger, 2000, p. 225). Learning is a powerful negotiation of meaning among participants in an "informal and dynamic social structure" (p. 226). Wenger viewed learning as a "process of realignment between socially defined competence and personal experience," which involves a careful toggling of "identification and dis-identification" within the learning community (p. 226-227). Zhao and Kuh (2004) drew from their research to address how learning communities involve the social construction of information for "learning [that] is deeper, more personally relevant, and becomes a part of who the student is, not just something the student has" (p. 117).

Not only is learning, at its core, a social activity within a learning community, but it is also a deeply personal process of trust and relationship building. Conrad and Donaldson (2012) suggested, in their phases of engagement framework, that relationship building is the first phase of engaging the online learner, and it is not to be skipped. They suggested that social negotiation through icebreakers and social interaction and establishing community norms and orientation allows instructors to leverage those connections in the academic content in the subsequent weeks of the course.

As Wenger (2000) suggested, "Learning is a social becoming" (p. 227). This social becoming forms the basis of social presence, the framework for this study. Social presence is a concept dating back to the mid-1960s, long before the advent of online learning. Originating from the research of social psychologists Short, Williams, and Christy (1976), social presence was considered the lack of the "real person" in the teleconferencing experience. These experts described social presence as the "degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships" in what became known as Social Presence Theory (Short et al., p. 72-73).

Then, as technology gained prominence in K12 and higher education in the early 1990s, educators began exploring various advances in instructional technology, including interactive television (ITV), video, and blended and online learning. At this time, the concept of social presence became increasingly more popular and nuanced. Gunawardena and Zittle (1997) defined social presence as "the degree to which a person is perceived as 'real' in mediated communication" (p. 9). Swan and Shui (2005) suggested the need for "explicit training for students in the importance of social presence, ways of presenting themselves online, and the nature of online discussion might help particular students better adapt to the medium" (p. 131).

Whiteside, Garrett Dikkers, and Swan (2017) classified social presence into multiple perspectives. The first perspective derives from Short et al.'s, (1976) Social Presence Theory and focuses on the role of technology in facilitating social presence. The second perspective suggests that social presence is learner-centered. The central framework for the first two perspectives is

the Community of Inquiry framework, a framework centered on three components: social presence, teacher presence, and cognitive presence. (Garrison, 2007; Garrison, 2018; Garrison et al., 2010; Swan et al., 2009).

The third and final perspective focuses on Whiteside's (2007; 2011; 2015) Social Presence Model, the framework for this study. This model views social presence as the culmination of the whole social learning system, including affect/emotion, interaction level, community building, instructor involvement, and the learners' knowledge and experience (Garrett Dikkers, Whiteside, & Tapp, 2017). Today, social presence research draws from a wide range of disciplinary research, frameworks, and philosophical ideologies.

COVID-19 Remote Learning Considerations

Social presence becomes even more fundamental when considering the complexities involved in understanding the skills and support students need during the 2020 COVID-19 emergency remote learning. For example, students often cannot anticipate or articulate what they need before they need it, or they are unfamiliar with the terminology, forethought, and planning involved in learning across modalities, e.g., synchronous, and asynchronous. Martin and colleagues offered a body of literature dedicated to student online learning readiness (Martin & Bollinger, 2018; Martin & Parker, 2014; Martin et al., 2020). These experts contended, "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" (Martin et al., 2020, p. 54). Students' self-reflections and the corresponding support systems become even more critical during an emergency pandemic to avoid disillusionment, disengagement, and attrition. For example, Bird et al. at the Annenberg Institute for School Reform (2020) noted a 6.7% decrease in course completion at one large eastern university due to the pandemic. Furthermore, to reduce student anxiety about the online learning experience, preparedness for a course through online learning orientations can improve student satisfaction (Abdous, 2019).

To sustain retention levels and engagement as well as help better prepare students for remote and online learning, Rapanta et al. (2020) suggested that the pandemic shift requires reconsideration of Anderson et al.'s (2001) tri-fold focus on cognitive, social, and teaching presence, taking into "consideration students' preparedness to participate in the online learning experience" (p. 939). Likewise, Conklin and Garrett Dikkers (2021) found in their study that during the COVID 19 pandemic, students felt more connected when instructors leveraged video, used a conversational tone, incorporated empathy into messaging, and provided timely feedback. While students may never be truly prepared for something like the March 2020 shift to emergency remote learning, faculty development programs and online academic communities can help faculty understand students' socio-emotional needs better as they move into learning in different modalities. Additionally, Chiu (2021) contended that "a positive attitude and enthusiasm online to foster relatedness can help positive teacher-student relationships and better emotionally engage students in learning" (p.13). Specifically, Chiu suggests using emojis messages and offering "feedback...as warm and friendly audio messages" (p.13). Further, Nguyen et al. (2021) recommended social presence in remote learning in a study with almost 5,000 participants. The isolation from the pandemic heightens the need for social presence in online learning.

Although Chiu suggested that students require an increase of social presence during crises, such as the COVID-19 pandemic, Rutherford et al. (2021) observe that many faculty members became considerably less socially present during this time. Rutherford et al. (2021) noted that instructors tended to shift from "highly-supportive F2F profiles to less supportive profiles," which "emphasizes the need for universities to support instructors transitioning to online learning" (p. 107). It is also likely that faculty had to attend to their own families, assisting with their own kids' e-learning, struggle to find working spaces, technology, and equipment, and search for professional development opportunities to advance their upcoming lessons. Therefore, the professional-personal tensions made it difficult for faculty to model social presence and be socially present for their students at this critical time.

Guiding Framework

The researchers selected social presence as the lens for this study because of its unique focus on both experience and connectedness. Thus, the guiding framework for this study is the Social Presence Model (SPM), which consists of five essential overlapping elements: Affective Association, Community Cohesion, Instructor Involvement, Interaction Intensity, and Knowledge and Experience. We define social presence as participants' motivation to take an active role in their own and their peers' meaning-making processes (Whiteside, 2007, 2011, 2015, 2017). Figure 1 illustrates the Social Presence Model and its five components.
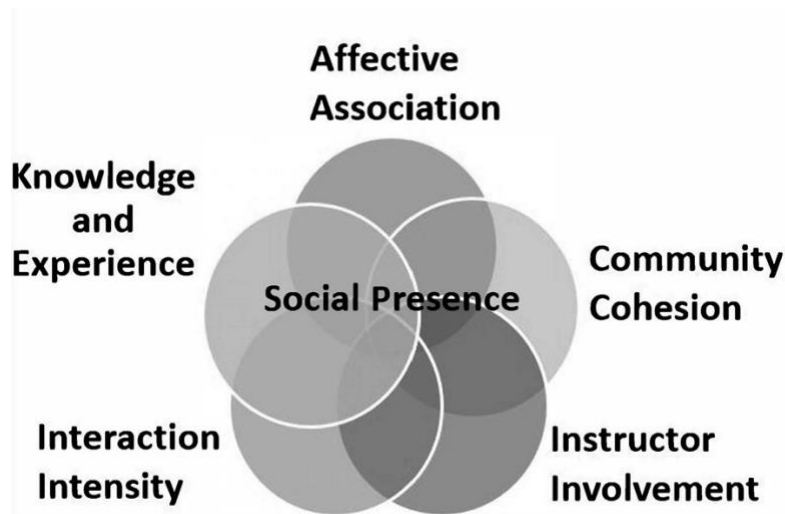
Figure 1
Social Presence Model

Table 1 defines each of the elements of the SPM: Affective Association, Community Cohesion, Instructor Involvement, Interaction Intensity, and Knowledge and Experience.

Table 1

Definitions of Social Presence Model Elements

SPM Element	Definition
Affective Association	The Affective Association category addresses the emotional connection, including instances of emotion (e.g., sadness, anger, frustration, regret, and joy), humor, and personal self-disclosure.
Community Cohesion	Community Cohesion relates to the whole course community. It involves greetings, sharing resources and information with the group, and seeing the group as a cohesive whole (e.g., we or our).
Instructor Involvement	Instructor Involvement encompasses the actions the instructors take within a learning environment and how students react to them.
Interaction Intensity	Interaction Intensity consists of the level of interaction among students and instructors.
Knowledge and Experience	Knowledge and Experience primarily involves the knowledge and prior experiences a student brings into the learning environment and what they share from those experiences.

The SPM intends to highlight the critical importance of connections within teaching and learning in different modalities and how cultivating relationships in learning communities can increase student motivation, participation, and learning outcomes. This model can serve as a heuristic for students and instructors who are teaching and learning remotely as well as for those supporting them, including instructional designers, information technologists, and academic leaders (Garrett Dikkers, Whiteside, & Lewis, 2017; Garrett Dikkers, Whiteside, & Tapp, 2017; Whiteside, 2007, 2015, 2017; Whiteside, Garrett Dikkers, Lewis, 2017; Whiteside, Garrett Dikkers, & Swan, 2017). The five elements of the SPM contribute to developing a connected and engaged classroom community, which may also provide indications on how to encourage faculty-student connections in times of emergencies like the COVID-19 pandemic. Our study sheds light on the importance of considering the SPM elements to improve connections during crises.

Methods

This study employed a quantitative and qualitative single-case design approach to examine students' experience at a mid-sized, private university in the southeastern region of the United States in the transition to remote emergency learning in March 2020. This institution prides itself on quality face-to-face teaching, with just under 10,000 students enrolled in over 200 undergraduate and graduate programs. Before the pandemic, instruction at this school was primarily face-to-face with a small percentage of highly vetted, peer-reviewed online and blended learning courses (included in this study).

Survey and Dyadic Interviews Data Collection

Researchers used a quantitative and qualitative approach to triangulate the data from multiple perspectives to gain more insight into a complex real-world phenomenon, as suggested by the literature (Creswell, 2014). Since the literature points to survey methods to offer the quickest response rate and cost-effective advantages for mid-to-large-sized populations (Babbie, 1973; Fowler, 2009; Creswell, 2014), a mix of closed-choice and open-ended questions focused on the guiding questions. As an interdisciplinary team of researchers, we developed questions

encompassing demographics consistent with the university standard categories, health and wellness, remote transition experience, and technology. The questions were then distributed to the university committee that reviews and evaluates all online and hybrid courses and revised based upon consensus agreement (Creswell, 2014). The survey included a combination of seven multiple-choice demographic questions, Likert-scale and open-ended questions in each consecutive section, and matrices in the technology section. Additionally, we offered a question at the end of the survey to ask students to volunteer if they were interested in participating in an interview or focus group session elaborating about their experience. The survey was housed in the Qualtrics platform and tested by three students and faculty who provided comments for improvement. After making revisions, the Dean of Students delivered a link to all university students through a global campus email on May 7, 2020 and sent a follow-up email on May 13, 2020. The survey is available upon request.

Additionally, out of six consenting volunteers, two accepted to participate in an interview held in July 2020, and two accepted to participate in an interview held in August 2020 (n=4). Two semi-structured dyadic interviews were conducted to triangulate the data. Dyadic interviews offer a small comfortable environment for participants to build from each other's thoughts, creating a conversational transaction (Morgan, et al., 2013; Morgan, et al., 2016). A semi-structured protocol was used with questions taken from the original survey as a guide to prompt discourse by and between the interviewees. Questions used were discussed and selected through a consensus agreement of all four researchers. The dyadic interviews were completed in a webinar room, and participants were allowed to change their profile names and keep their videos off. Two researchers conducted the interviews while rotating questions. All four interviewees kept their videos on and appeared eager to share their experiences.

Data Analysis

This study analyzes and synthesizes data to understand more about the specific experiences of students during the pandemic situation framed with the SPM. Using a transformative explanatory sequential approach (Hodgkin, 2008; Creswell, 2014) to analyze the data exported from Qualtrics, researchers initially reviewed and cleaned the total participants who agreed to participate (n=711). Researchers quantitatively analyzed results by running descriptive and inferential statistical tests through SPSS and qualitatively coded the open-ended questions and dyadic interview transcripts using ATLAS.ti (Strauss & Corbin, 1990) to encase the study with the SPM codes. The categorization for qualitative coding data was derived deductively using all five themes or elements of the SPM (affective association, community cohesion, instructor involvement, interaction intensity, and knowledge and experience).

Quantitative Analysis

Beginning with the 711 students who participated in the survey from a total of approximately 9600 (7% response rate), the lead researcher reviewed the data for large gaps in responses to reduce the potential of bias. Through a series of discussions and consensus agreements (Creswell, 2014), the four researchers removed several incomplete records from the data; 47 completely blank records; 31 records that only completed the demographic section; 51 records that were completed through the health section; 31 that were completed through the remote experience section; and 44 records that stopped before the technology matrices that decreased the total number to 507 participants who completed 50% or more of all sections on the survey. The final number of 507 respondents is a representative sample to get statistically significant results using a confidence level of 95% and a margin error of 5%. Excluding data

pools provided a specific focus of this study to use a complete data set of those engaged in all survey parts leveraging the SPM as a guiding framework.

The researchers ran one-way analysis of variance (ANOVA) tests to compare the means of multiple variables and determine if any statistically significant differences existed between the means of three or more independent groups. Upon finding statistical significance, Levene's Homogeneity of Variance tests were run to determine variances. If the test passed as not significantly variant, post hoc tests were then run to confirm or reject statistical significance (Green & Salkind, 2005).

Qualitative Analysis and Coding

To understand students' emotional needs during emergency remote learning based on the SPM, data analysis focused on coding for the five elements of the Social Presence Model: Affective Association, Community Cohesion, Instructor Involvement, Interaction Intensity, and Knowledge and Experience in a qualitative tool called ATLAS.ti 9. Three artifacts were coded: open-ended survey results for challenges, open-ended survey results for instructional strategies, and two dyadic interviews transcripts. Two researchers coded approximately 30% of the data with interrater reliability of 83.33%. Researchers also met on multiple occasions to address the coding and resolve questions through consensus agreement. The categories coded were not mutually exclusive. Table 2 lists examples of these codes.

Table 2
Sample Coding

Student Open-Ended Responses	Codes
I liked when professors uploaded PowerPoints to blackboard	Affective Association, Instructor Involvement
My teacher also used Canvas to post PowerPoints during every class instead of teaching them live. It was easier for me to learn with those PowerPoints. Zoom really gave me a headache.	Instructor Involvement, Knowledge and Experience, Affective Association, Interaction Intensity
Having all of us use zoom and requiring that we share video to have us all be engaged.	Interaction Intensity
My teacher made a podcast and she made power-points with voiceover.	Instructor Involvement
Having open office hours to clarify assignments with the teacher.	Instructor Involvement
open hours on zoom and being able to talk to the instructor instead of waiting for them to email you back	Instructor Involvement

The researchers acknowledge important limitations of the data. To complete a large questionnaire during a pandemic may have been a daunting task for participants. The 204 respondents eliminated due to incomplete sections may offer valuable information in their responses but could not be generalized. Likewise, students experiencing the greatest challenges with technology and internet connectivity may not have contributed valuable perspectives to this study without the necessary electronic access. The number of qualitative interviews conducted in comparison to survey responses is also low. Due to this study occurring during a pandemic, students were challenged to participate in an interview but seemed to want to share their experiences through the survey.

Furthermore, reporting the results from instruments administered during the initial onslaught of the emergency might reflect different views of students' experiences than from a longitudinal study given more time to cope with learning through a pandemic. It is also important

to highlight that this paper does not include the faculty perspective during COVID-19 emergency remote learning. Faculty results are part of the future reports of our extensive study in instructor-student connections in times of crisis. The authors also acknowledge the short-term nature of the data (e.g., student remote learning experiences from March to May 2020). This limitation suggests avenues for future studies. Finally, the researchers recognize that the unique characteristics of this higher ed private university with a history of the face-to-face student population are not generalizable to all schools.

Results

Student Demographics

Overall, demographics of respondents included a broad range of students across all four colleges at the university, with 33% from the College of Business, 33% from the College of Natural and Health Sciences, 18% from the College of Arts and Letters, 16% from the College of Social Sciences, Mathematics, and Education. Gender encompassed 74% female, 25% male, 1% non-binary. Categorizing participants' ages into generations (Dimock, 2019), student ages fell primarily within 88% of Z generation (1995 - 2010, with the lowest age in this higher educational institution being 17 to 25-year-olds), 9% of Y generation (1980 - 1994, 26 to 40-year-olds), and 3% of X generation (1960 - 1979, 41 to 60-year-olds). Table 3 provides the demographic descriptors of the study.

Table 3
Demographic Descriptors of the Study

Ethnicity	72% White, non-Hispanic	12% Hispanic/Latino	5% Black or African American, non-Hispanic	4% Asian, non-Hispanic	4% two or more races
Gender	74% Female	25% Male	1% non-binary		
Age	88% 17-25 years old	9% 26-40 years old	3% 41-60 years old		
Classification	26% Junior	22% Freshmen	21% Senior	17% Sophomore	15% Graduate
Discipline	33% Business	33% Natural and Health Sciences	18% Arts and Letters	16% Social Science, Math, and Ed	
Prior online/hybrid courses	83% None or < 1 year	15% 1-3 years	3% 4+ years		

Ethnicities included 72% White/non-Hispanic, 12% Hispanic/Latino, 5% Black or African American/non-Hispanic, 4% Asian/non-Hispanic, 4% two or more races, non-Hispanic, 3% two or more races including Hispanic, 1% other. Regarding classification, respondents were 26% juniors, 22% freshmen, 21% seniors, 17% sophomores, and 15% graduates. Students' years of online or hybrid classes reflected the teaching methodology offered at the university before COVID, with 83% having less than one year experience, 15% one to three years of experience, 3% four-plus years. Respondent demographics align with the overall student population at the

university. Respondents were overwhelmingly female; however, this matches the institution demographics for 2019-2020, with the university's overall undergraduate population as 60% female and 40% male. Additionally, Table 3 reflects that 86% of the respondents were undergraduate, which aligns with the university demographics of 90% undergraduate.

Remote Learning Experience: Overall

ANOVA test results, confirmed with post hoc tests, found statistical significance when Classification and Years of Online Class Experience factors were compared to *Remote learning worked well for me.* This variable used a five-star scale, where students were asked to rate their experience. Within the Classification factor, statistical significance was reflected between the graduate to freshmen groups, with first-year students averaging closer to two stars and graduate students averaging over three stars. The data also reflects a steady incline in the mean as the education classification increased. The statistics are reported in Tables 4 and 5.

Table 4

Classification: Remote Learning Worked Well for Me—Highlight Stars to Rate Agreement

Classification	N	Mean	Valid Percent	Std. Dev.
Freshmen	95	2.42	21.9%	1.334
Sophomore	79	2.53	17.1%	1.279
Junior	117	2.57	25.7%	1.289
Senior	99	2.66	20.5%	1.268
Graduate	70	3.10	14.9%	1.543
Total	460	2.64	100.0%	1.345

Table 5

Multiple Comparisons: Tukey HSD post hoc Test Results

Classification A	Classification B	Mean Difference (A-B)	Std. Error.	Sig.
Freshmen	Graduate	-.679	.210	.011*
	Senior	-.256	.192	.670
	Junior	-.152	.184	.923
	Sophomore	-.111	.203	.963

Note: * The mean difference is significant at the 0.05 level.

Regarding the Years of Online/Hybrid Class Experience factor, the researchers reached a consensus agreement to merge the one outlier in the six to seven years of experience group with the population of four to five years of experience for a variable of four-plus years. ANOVA factorial results and confirmatory post hoc tests reflected statistical significance for those with less than one year compared with those in the one-to-three years group when run against the *Remote learning worked well for me* variable as displayed in Tables 6 and 7. On average, students with less than one year of experience with online or hybrid learning highlighted less than three stars that remote learning worked well for them. Students having one or more years of experience highlighted more than three stars.

Table 6

Online Experience Descriptive Statistics: Remote Learning Worked Well—Highlight Stars to Rate Agreement

Years of Online Experience	N	Mean	Valid Percent	Std. Dev.
< 1	375	2.51	82.4%	1.304
1 – 3	67	3.28	14.7%	1.444
4 +	13	3.08	2.9%	1.256
Total	455	2.94	100.0%	1.351

Table 7

Multiple Comparisons: Tukey HSD post hoc Test Results

| Years of Online Experience A	Years of Online Experience B	Mean Difference (A-B)	Std. Error.	Sig.
< 1	1 – 3	-.774	.176	.000*
	4 +	-.568	.374	.283

Note: * The mean difference is significant at the 0.05 level.

Researchers observed that the recurring theme of an investment of time in online courses improved the experience, which was also supported by qualitative responses. One student reflected, "Time improved the experience and use of technologies; students and teachers learning together became a more self-driven [conscious] effort; self-reflections improved learning experience."

Remote Learning Experience: Findings from the SPM

The Social Presence Model coding revealed findings of the student remote learning experience through the three coded artifacts: (a) open-ended survey results for challenges, (b) open-ended survey results for instructional strategies, and (c) dyadic interview transcripts. The results in this section, using deductive reasoning, identify themes about the student experience within the five elements of the Social Presence Model: Affective Association, Community Cohesion, Instructor Involvement, Interaction Intensity, and Knowledge and Experience which are explained and defined in this section. The coding yielded 305 SPM codes across the three artifacts using the qualitative coding software ATLAS.ti 9. Figure 2 illustrates the coding breakdown for the frequency of each element of the SPM.

Figure 2

SPM Codes on Student Remote Experiences (Frequencies)
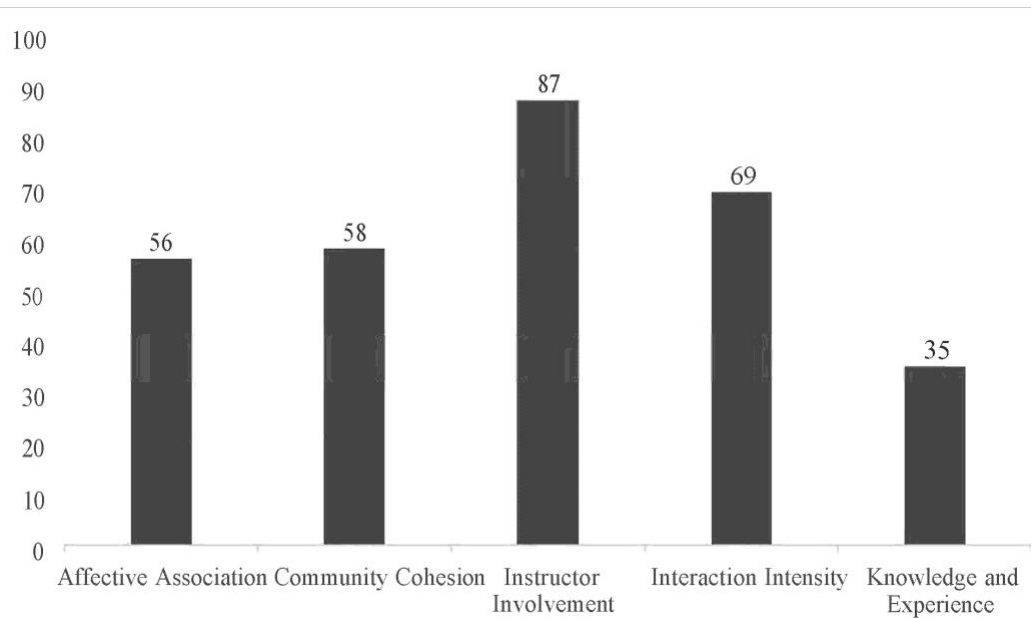
Each code revealed a pattern of responses about students' emergency remote learning experience. The subsections—one for each of the elements of the SPM—provide further detail about those patterns and responses.

Affective Association

The Affective Association code addresses the students' emotions in the remote learning situation. Researchers coded feelings of concern, sadness, anger, frustration, regret, joy, and elation in this area. Students' responses featured three main themes: (a) loneliness/isolation, b) anxiety/depression, and c) stress. Students addressed how the pandemic affected them. One student addressed the challenges as "loneliness, lack of motivation and a lot of mixed emotions." Another student elaborated a bit further:

> *The whole thing was a shock that I couldn't have prepared myself for. I went home for spring break thinking I'd be here for a week and learned I'd be home for 6 months. Transitioning to online school was very hard for me because it's not how I like to learn.*

Likewise, several students commented about "not having a schedule" and felt as though they were "in this all by" themselves.

Feeling stressed emerged often for student respondents. One student offered a lot of emotion about the pandemic in a very emotionally charged answer: "Adapting to a completely new system of learning, coping with professors' confusion, stress from being socially isolated, stress from an international pandemic occurring that is killing thousands EVERY DAY." Another student addressed the stress of "managing the changing expectations of 5-7 instructors who were also learning-on-the-fly." Not only were students coping with multiple professors handling remote learning in different ways, but many reported unreliable or no Internet connection, which intensified their stress. One student explained, "During this transition, it was challenging to have unreliable Internet services at home. As all my classes depended on

Blackboard, Zoom, and other mediums, it was unbelievably stressful to have to do it all with spotty Internet." If those factors were not enough, many students commented on the stress of moving back in with their families. One student explained,

> *Of course, my family was a huge distraction that made concentrating on work a million times harder. It was stressful being home when my relationship with my family is not the best. I missed…. campus for the freedom, flexibility, and opportunities it provides in comparison with remote learning.*

Unsurprisingly, numerous students reported missing peer connections and facing anxiety and depression, resulting in loneliness and stress. One explained, "Graduation was cancelled, my senior year ended before it began, I have anxiety/insomnia and I'm prone to depression, all of which came back in full force." One student noted the overwhelming financial worries that rendered school less important. This student commented, "feeling alone, defeated, anxious. School was not my number one priority as I was worried about unemployment, paying my bills, and the safety of my family."

Community Cohesion

The Community Cohesion code relates to the level of interconnectedness of the course community. Students' responses (58) in this area fell, for the most part, into three main themes: (a) inauthenticity and awkwardness of remote classes, b) missing peers, and c) feeling disconnected.

One common theme that respondents mentioned was the inauthenticity and awkwardness of discussions in the remote learning courses. One student commented about the challenge of "not seeing people face-to-face and the awkwardness of online conversation." Similarly, another student noted their "boredom" and the "forced interaction that did not feel organic in classes." A final student was more candid about the loss of community: They noted, "logging into zoom meeting every time sucked, no one paid attention in classes."

Underlying the inauthenticity noted were many students lamenting missing friends, which amounted to about half of the 58 codes in this area. One student commented, "not seeing my peers, having trouble with motivation, depression." Several students longed for "the classroom situation" or the "lack of the educational social experience." Though most students reported on challenges with remote learning, one proactive student reported "doing homework with my roommate" as a coping strategy.

Along with missing friends, students overwhelmingly noted a feeling of disconnectedness from their course community. One student commented about the strain of "staying in one place to do my learning, lack of face-to-face interaction, lack of motivation, and inability to gather with friends." Numerous students pointed to feeling lost and "disconnected from school" due to other priorities with the pandemic situation.

Instructor Involvement (Student Perceptions)

The most heavily coded element of the Social Presence Model was Instructor Involvement, which relates to the instructors' actions within a learning environment and how students react to them. The 87 codes for this category are separated into three main areas: empathy, planning, and flexibility.

In terms of empathy, student respondents noted the amount of care on the part of instructors. One commented about "two professors who really showed they care about us and our well-being." Students commented on how caring professors distracted them from the pandemic

with office hours and trying to create a new "normal" while they could be "mentally engaged." Students appreciated and equated accommodations made for them outside the structured class with being cared about. One student wrote, "Teachers were accommodating, despite a dreadful situation."

While professors may offer a range of office hours on Zoom to support international students and students in other time zones, some students viewed this as inconsistent and having "office hours at random times throughout the day." Students also mentioned several instances of professors not communicating fast enough and equated that with a lack of care, concern, and empathy. One student noted needing much less from the university and much more care and communication from her instructors: "Lack of communication with professors and an OBNOXIOUS amount of spam from the school." Interestingly, some students equated the instructors that did synchronous learning, or what they called "screen sharing through Zoom," and who had "built-in office hours" as "when the professor actually cared." On the other hand, asynchronous instruction was often described as "just professors assigning work" or an "academic farce."

In terms of planning, another key theme, students noted that successful professors used "effective communication through email and [followed] a revised schedule." Another agreed, noting, "One of my teachers took the time to lay out her strategy for the rest of the semester so that we would know what to expect. The same teacher also made it clear that she was open to questions, encouraging us to ask about it if we didn't understand something." Students seemed to point to instructor planning and preparation as equating to caring for them and their well-being, as time management and scheduling were frequently mentioned as a challenge.

Finally, flexibility also emerged as a key consideration among students. One student noted the importance of "extra flexibility" from professors because "technology doesn't always work well." Another student noted, "All of my professors were understanding, compassionate, and flexible during this transition, which is very much appreciated."

Interaction Intensity

In the Social Presence Model, the Interaction Intensity code consists of the level of interaction among students and instructors. This code emerged in 69 codes in this study, mainly as a lack of interaction or a severe need for it. Two themes emerged: human interaction and engagement.

The theme of lack of human interaction came up frequently in the emergency remote learning experience. In a question about the challenges they faced, student respondents often commented on "being alone with little human interaction" or "lack of face to face interaction" or "lack of social interaction." Many students connected this lack of interaction to learning. One student noted, "not learning anything, little real interaction, hard to retain any information when online." Another student commented that "staying in one place to do my learning" was difficult and not as fruitful.

Other students missed the debates among friends, noting "lack on [sic] interaction and spirited conversations" and the "inability to gather with friends." The final connection students noted was the lack of interaction and the long hours on the screen. One student explained, "The transition to constantly being in front of a computer screen and typing so much more was the biggest struggle. I often don't want to zoom with family or friends or look at social media after being in front of the computer for work and school." So, for this student, the lack of human interaction was a problem for learning, but Zoom fatigue also affected her personal life.

Additionally, students commented on finding newfound engagement and interactions with professors. One student noted, "Zoom was good for engaging (depends on professor personality)." Another student agreed, suggesting "teachers that [sic] took the extra step to engage with the class" were "there for their students if they ever needed it." Additionally, students noted the use of video to engage, interact, and connect with the whole course community. In a question about instructor strategies, one student noted, "Being required to have videos on and being required to participate made my classes more enjoyable and felt more regular. Classes that didn't require that or didn't allow that were very hard to sit through." Overall, several students noted positive interactions with their professors via various web conferencing and messaging tools.

Knowledge and Experience

The Knowledge and Experience code traditionally refers to the knowledge and prior experiences students bring into the learning environment and what they share from those experiences. This study also referred to the overall learning experience. While this code appeared less often than the other codes, two themes emerged from the 35 codes: lack of support and an unmotivating experience.

The data showed multiple instances of lack of support for moving forward with their studies and knowledge. In answering a question about effective instructor strategies, one student noted that effective instruction involved "communication with students, answer[ing] all queries, and support[ing] students throughout remote classes." Many students noted being unsupported to learn and retain the material in the emergency remote learning situation. One noted, "Teaching myself, no support, etc. here." Another agreed, suggesting "basically having to teach myself everything." Another student commented, "not learning anything, little real interaction, hard to retain any information when online." The data also suggested that some students perceived professors who didn't use synchronous technology as not supporting them. One student explained, "It [not using Zoom] really made me feel like my professors did not support me and had no interest in my success."

Finally, student respondents often addressed how they were not getting the face-to-face, hands-on experience for which they paid. One student explained, "I didn't want to go to class or study. I was very unmotivated. It's hard to learn as a marine bio major online. I'm not getting the hands-on expirence [sic]." Another student agreed, suggesting they were "[f]eeling disconnected from school and unmotivated." This student continued to explain, "Work didn't feel important and therefore it was harder to do. Without the school environment I really lost touch. I'm normally a good student and I found it really hard to teach myself and continue to learn." Many other students felt they deserve a refund from the university. One student explained, "I don't think the professors could have done any better, considering they were given as much assistance as the students with the online transition. They should all get bonuses, and we should get refunds."

Discussion

RQ1. What was the student experience in the transition to remote learning?

It was overwhelming for undergraduate students to balance a pandemic, travel, move, and shift academic expectations. Statistically, we uncovered that our first-year college students struggled the most, and graduate students had an easier transition. Many of our first-year students noted that it was a difficult transition for them, while graduate students recognized the flexibility

and possibilities. One graduate student noted, "[The university] should use this opportunity to expand their curriculum to include online learning to reach more potential students."

Students addressed how the gravity of the pandemic situation affected their mental health, which also impacted their ability to learn. Many of them reported feeling "in a really dark place." Several reported that they were shocked and overwhelmed by the global public pandemic. As a result, students noted feeling lonely and stressed as well as missing peer connections and facing mild to severe anxiety and depression.

Likewise, the data suggests that more online preparedness (Abdous, 2019; Cutri et al., 2020) with planned instructor professional development and student orientations for online learning would have helped students transition more smoothly. The university in this study offers predominantly face-to-face courses and, as a result, attracts students who have less online experience. This fact was reflected in the results with most students (407) reporting that they had less than one year of experience with online classes. These results align with the quantitative data results since most students (83%) had none or less than a year of previous online/hybrid course experience. The Knowledge and Experience in the SPM was also the lowest element found in the qualitative data coded, showing a lack of prior online experiences among students. This indicates that students did not have adequate knowledge and prior experience in managing online coursework and what it involves. Still, students reported more time and years of online experience worked better during the emergency remote learning. One student suggested,

> So I guess the problem was more in the beginning in terms of preparation, like in the beginning, those professors that had to give classes at that specific period of time had the most challenge from my experience. But later on, it started to become more smooth. And I guess now in the fall, it might even get, um, easier or fully smooth. I might say that [worked] the most [smooth]

RQ2. What lessons can we learn moving forward to better prepare for future public emergencies using the SPM as the guiding framework?

The main lesson learned from the SPM is the importance of social presence as a literacy. The data revealed the depth of anxiety felt by students and that they needed far more empathy, communication, and flexibility from their instructors to even proceed with academic coursework. The Affective Association SPM codes suggested that students were lonely, anxious, and stressed. Time provided to improve preparedness eases these tensions and fears (Abdous, 2019). The Knowledge and Experience and Instructor Involvement SPM codes unveiled that the students needed empathy, planning, flexibility, support, and motivation to learn. The scope of our study was not to propose a modified SPM for emergency remote learning. Instead, our purpose was to uncover the usefulness of SPM as a guiding framework for remote learning in times of crisis to reduce student stress, anxiety, and lack of motivation.

Students reported benefitting more when instructors' instructional activities involve connecting to them personally (Garrett Dikkers, Whiteside, & Lewis, 2017; Garrett Dikkers, Whiteside, & Tapp, 2017; Whiteside, 2007, 2015, 2017; Whiteside, Garrett Dikkers, Lewis, 2017; Whiteside, Garrett Dikkers, & Swan, 2017), such as referring to them by name and incorporating pandemic icebreakers and interaction. The Interaction Intensity SPM code unveiled the need for human interaction and engagement from this study. The younger students equated synchronous learning with caring about their well-being, while strategies like videos can personalize the experience (Conklin & Garrett Dikkers, 2021).

During future remote learning emergencies, the elements of SPM should be considered to encourage empathy, interaction, and engagement with students for promoting a cohesive course community.

Conclusion

Universities must carefully consider the implications this study offers to plan for future unanticipated emergencies proactively (e.g., public health crises and disasters). One simple solution is to educate professors and academic leaders about the importance of social presence as a literacy for learning (Whiteside, 2017). Larger, more complex considerations involve how to support the mental health of our students at a distance. Unless students have their basic needs met, they cannot focus on learning the course content.

It is recommended that universities provide training and professional development opportunities that consider SPM elements in remote learning scenarios to improve faculty-student connection and engagement. This study recommends future exploration based on the *Community Cohesion* SPM data that revealed students' feelings of inauthenticity, missing peers, and disconnectedness.

Moreover, students who come into the college having more experience online may be better prepared for emergencies. For example, Florida statute 1003.428 specifies that students must complete at least one course through online learning to achieve a high school diploma (The 2020 Florida Statutes). Findings from this study suggest that students entering college might be better prepared if they have more than one online learning experience. One student detailed this in their survey response: "Their state education system requires some students to take 1 online class before graduation... I think it should be more like 1/year. At the college level, many general education courses could be delivered asynchronously."

Ultimately, universities need to prepare all faculty and students in various forms of online learning to foster interconnectedness and allow faculty to help students to weather the transition more successfully during future emergencies.

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The Story is in the Structure:
A Multi-Case Study of
Instructional Design Teams

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Abstract

Although instructional designers are experienced and positioned to be leaders in online learning, it was not previously known how organizational structures influenced their ability to act as leaders in their institutions. This problem warranted a deep exploration of the organizational structures for instructional design teams in higher education. This qualitative, multi-case study consisted of three individual universities each with a different organizational structure profile. Data were collected through semi-structured interviews and document analysis with participants in three key roles at each institution: dedicated instructional designer, online faculty member, and online learning administrator. The research culminated in within-case analyses of each institution and a comparative case analysis of all three studied institutions. The results of the study revealed that the organizational structure that most positively influenced instructional design leadership was a centralized instructional design team with academic reporting lines. Decentralized instructional designers experienced significant disempowerment, role misperception, and challenges in advocacy and leadership, while instructional designers with administrative reporting lines experienced a high level of role misperception specifically related to technology support. Positional parity between dedicated instructional designers and faculty, in conjunction with implementation of the recommended organizational structure, was found to be critical to empowering designers to be partners and leaders.

Keywords: organizational structure, instructional design, online learning, leadership, shared governance, program design, centralization, decentralization

Online learning is now a ubiquitous format for learners across the United States (Allen & Seaman, 2016). It is a priority for most university administrators, with 72% of online learning leaders indicating that initiatives such as developing new online programs act as "catalysts for change" (Fredericksen, 2017, p. 10). Dedicated, full-time instructional designers are uniquely equipped to lead such online learning initiatives and have a different and complimentary lens of expertise than university faculty (Shaw, 2012).

Instructional designers in higher education are experts in pedagogy; course design and development; teaching with technology; and a host of related skills and practices. They often work alongside faculty to create and redesign courses, equip faculty with new skills through workshops and professional learning, and provide expert coaching on the unique experience of teaching and learning in a digital environment. Instructional designers also conduct and participate in research on teaching and learning (Beirne & Romanoski, 2018). During the early days of the COVID-19 pandemic, online learning professionals, including instructional designers, led the way in distinguishing intentionally designed online learning from emergency remote learning, a frequent designation for courses offered through a rapid shift to digital environments (Hodges et al., 2020). Instructional design teams shifted from a preferred institutional resource to a necessary one.

Instructional designers work in a wide variety of organizational structures, varying from institution to institution across a range of different dimensions: centralization, reporting lines, curricular authority, position classification, and others. Where designers are situated within an organizational structure can enhance or inhibit their ability to lead online learning initiatives and build influence with faculty and administrators (Tran & Tian, 2013). However, little research has been conducted on the influence of these structures and dimensions on instructional designers and their ability to lead online learning initiatives. This qualitative, comparative case study examined the influence of organizational structures on the empowerment and leadership opportunities of instructional designers in higher education to determine which organizational structures most positively influenced instructional design leadership for online learning initiatives.

Literature Review

Universities and university systems are complex organizations with many distinct and interconnected systems and structures. This study focused on the influence of these complex structures and systems and their influence over leadership and empowerment of instructional design teams. As such, the study was framed through systems theory, which offers "conceptual and methodological alternatives for studying and understanding how organizational systems function" (Patton, 2015, p. 139). University systems and structures vary based on many attributes. High-level structural elements include public or private funding, for-profit or nonprofit status, stand-alone campuses, or multi-campus systems, and unionized or non-unionized faculty bodies. Pennisi (2012) indicated that organizational structure elements, which determine the power distribution and decision-making authority in organizations, also influence organizational mission, vision, goal-setting, and strategic plans—critical leadership functions. The structural attributes addressed specifically in this study include leadership, academic or administrative reporting lines; curricular authority and management of online programs; and centralization or decentralization of instructional design teams and resources.

Leadership in Higher Education

Universities have many embedded leadership structures, such as a blend of both centralized and decentralized decision-making authority. As a result, leadership in higher education may take different forms based on the individual university, or even between distinct units in a single organization. As online learning has become a standard element of the culture of most universities, leadership approaches have changed to accommodate the different needs of a distributed organization (Nworie, 2012). Three key leadership theories have shaped the approach that universities take for online learning and instructional design: transformational leadership, authentic leadership, and shared leadership.

Transformational leaders are grounded in "the assumption that the actions of leaders are based on moral, ethical, and equitable consideration of everyone within an organization" (Nworie, 2012, p. 4). Transformational leaders are further characterized by their ability to enact positive change through collaboration and influence. In higher education, such collaboration is a necessity; decision-making authority often rests with faculty, but online learning initiatives involve administrators, faculty, and staff alike. Black (2015) described transformational leadership as an increasingly common leadership structure in higher education due to the emergence of online learning. In this paradigm, leaders act as change agents through relationship-building and experience with their institution's structure and culture, rather than through transactional means (Black, 2015). Fredericksen (2017) suggested that in higher education, "the online learning leader must demonstrate a collaborative approach. There must be an embrace of a transformational leadership style where the leader inspires change—a mandate or directive will not work" (p. 4). Transformational leadership is a necessary leadership approach in higher education online learning due to the distributed power and authority inherent in university organizational structures.

Authentic leadership expanded on the foundations of transformational leadership to focus on leading through trust, transparency, honesty, and consistent decision-making (George, 2003, 2010; George et al., 2007; Kiersch & Byrne, 2015). Authentic leaders also focus on changing organizational practices but integrate care for the well-being of individuals and teams as a core tenant of their approach. Opatokun et al. (2013) discovered four key predictors that pointed toward authentic leadership among higher education administrators: self-awareness, balanced processing of information, an internalized moral perspective, and relational transparency (p. 61). Self-awareness was the highest predictor of authentic leadership, but all four dimensions were positive predictors (Opatokun et al., 2013). Authentic leaders are transparent and open communicators; they work to develop sustainable cultures of openness to change and innovation (Baer et al., 2015). Given the significant change in higher education through online learning, an authentic, collaborative approach is critical for effective change leadership.

Both transformational leadership and authentic leadership have important implications for higher education instructional designer teams. While both emphasize the importance of transparency and collaboration in decision-making toward positive change, some organizational structures restrict opportunities for such collaboration when the formal means of decision-making excludes or deemphasizes the influence of specific groups. Shared leadership theory plays a critical role in bifurcated organizational structures, serving as the basis for leadership functions where vertical administrative leadership converges with faculty governance (Ciabocchi et al., 2016). While a culture of shared leadership is critical to the success of online learning initiatives, the involvement and influence of instructional design teams in these leadership

structures depends heavily on their location within the university. However, instructional design teams are inconsistently organized within these decentralized, bifurcated leadership structures; some design teams are in academic departments, while others are in administrative departments.

Instructional Designer Roles and Reporting Lines

Instructional designers have identified themselves as working within IT departments, continuing education departments, and academic affairs, as well as in centers for teaching and learning, dedicated online learning teams, and university libraries (Intentional Futures, 2016). The roles of these instructional designers vary from team to team, although there are several key attributes that most instructional designers associate with their roles and work such as course design, course development, technology training, pedagogy, and teaching. Kumar and Ritzhaupt (2017) interviewed eight instructional designers to further clarify their roles and responsibilities. These designers perceived faculty as their main audience, and that the work of instructional designers was primarily in partnership with faculty.

While there has been significant debate about the role of higher education instructional designers, many institutions have clearly defined these roles. Brigance (2011) suggested that instructional designers are primarily collaborators and leaders in online course design, partnering with faculty to design their courses as experts in pedagogy, community building, instructional technology, creating learning experiences, and synthesizing those elements into a cohesive course. Brigance (2011) further suggested that instructional designers should act as faculty collaborators rather than support staff, as their expertise in design, development, and the program lifecycle positions them well to lead and collaborate in these areas. Shaw (2012) expanded on this view of instructional designers as leaders by aligning the work of instructional design with leadership functions in higher education. Shaw (2012) listed key leadership functions such as casting a vision, establishing strategic priorities, and developing organizational trust as the core work of higher education instructional design within the context of online learning.

Although instructional designers are equipped to lead through their unique expertise, they may not be positioned to lead. A report from Intentional Futures (2016) identified key barriers that designers face in their work. Three of these key barriers were lack of faculty buy-in, limited time and resources, and challenges with institutional leadership and initiatives. The report also noted that the structures needed to empower and amplify instructional design teams were not in place, both in broader strategic initiatives and for ownership in their own work. For universities to advance online initiatives through the leadership and expertise of instructional designers, these barriers must be considered through the lens of organizational structure.

Instructional design teams are organized inconsistently between academic and administrative lines. Faculty shared governance is the primary structure for academic reporting lines at most universities. Shared governance is intended as a means of protecting faculty from external and internal influences on what and how they choose to research and teach, commonly known as academic freedom (Eastman & Boyles, 2015). This layer of structural protection and associated practices have positioned faculty and administrator relationships as adversarial, resulting in conflict over administrative interests such as enrollment targets, and faculty interests, such as innovative teaching practices (Eastman & Boyles, 2015). As non-faculty educators, instructional design teams that are structured under academic reporting lines do not typically qualify to participate in faculty governance, even as their work and roles are heavily influenced by these structures.

Teams with administrative reporting lines are organized through vertical structures (Ciobocchi at al., 2016). Vertical structures are characterized by hierarchical leadership, with

decision-making power held by those with positional authority. Instructional design teams in administrative reporting lines are commonly organized under departments of information technology, human resources, or under dedicated departments for online learning and technology. Del Favero and Bray (2005) noted that the widely divergent cultures and structures between faculty and administrators are the key reasons for conflict between the two groups. Administrators focus on systems-level initiatives, or decisions that have an impact on the entire organization, while faculty focus more on individual motivations such as research funding, teaching, and service to the department. This difference in scope does not suggest selfish motivations for one group or the other, but that there is a significant difference in perspective and the nature of the work between faculty and administrators, and both have great value for the organization. Instructional designers, however, work at the convergence of these two cultures and perspectives. They work closely with faculty in the design and development of online courses, and with administrators in the strategic work of advancing online learning across their institutions. This convergence of perspectives—both faculty and administrator—equips instructional designers to effectively lead online learning initiatives. However, there is again variance in the structures for the organization and management of online programs, affecting the scope of roles and authority instructional designers may have in online learning initiatives.

Curricular Authority and Management of Online Programs

Legon and Garrett (2017) explored the overarching structures for program delivery and management of online programs as identified by university chief online officers. They discovered that 71% of four-year institutions structured their online program management through independent academic units, while 21% centralized online program management through dedicated online learning teams, such as a global or online campus. They also discovered that four-year private institutions leaned toward institutional ownership of curricula, while public four-year institutions varied. Twenty-nine percent of these participants indicated institutional ownership of the curricula, 21% indicated shared ownership between the institution and the individual faculty, and 21% indicated "case-by-case institutional licensing" of the curricula (p. 30). Paulucci and Gambescia (2007) categorized 239 universities between internal or external structures for managing online programs, with the internal category including resources housed within academic units or centralized teams, while the external category focused on vendor outsourcing or partnerships with other universities, such as consortia. The majority of institutions—90%—used exclusively internal structures for online program management; 62% indicated resources were housed by academic units (Paulucci & Gambescia, 2007).

Andrade (2016) explored similar structures, focusing on the centralization or decentralization of online learning resources within institutions. Andrade (2016) identified key advantages to a centralized online program management structure, including the centralization of instructional designers: consistency, quality, and cost-effective development of online courses. Andrade also indicated that administrators preferred a centralized structure. The decentralized structure focused on departmental control and management of online programs; Andrade noted one significant disadvantage to a decentralized structure: focusing efforts away from institution-wide efforts, which are often more cost-effective and encourage broader adoption. Online program management happened more commonly through internal resources than through external vendor or consortia relationships; it also happened more commonly through a decentralized structure, where individual academic units manage their own online courses and curricula. However, the influence of these structural dimensions for online program management

on instructional design leadership have not been explored, including the focus on centralization or decentralization of instructional design teams.

Centralization or Decentralization of Instructional Design Teams

Reid (2018) indicated that instructional designers in higher education may work within centralized, decentralized, or blended—both centralized and decentralized—structures. According to a study by Fong et al. (2017), nearly half of surveyed instructional designers operated in a centralized organizational structure, while 25% of the respondents indicated that their teams existed as a service within a single academic unit. The researchers also associated the higher rate of centralization with the technical nature of instructional design, aligning the field closely with information technology services to reduce duplication of effort and save costs. However, the work of instructional design is more pedagogical than technical. The researcher's data supported this assertion: two of the highest listed services offered by instructional designers—course design and training for online pedagogy—are not technical in nature, but pedagogical. Additionally, the researchers did not indicate whether the designers who indicated a centralized structure were aligned under academic or administrative reporting lines; without this information, it is unknown from the study if instructional designers were organized closely with IT, other administrative departments, or through academic reporting departments.

Research Questions

The literature review focused on four main dimensions of organizational structure: leadership, academic or administrative reporting lines, management of online programs, and centralization or decentralization of instruction design teams. Although research existed in each structural dimension, no literature could be found on the convergence of these dimensions and their influence on the empowerment and leadership opportunities for higher education instructional design teams. Additionally, the research did not reveal any specific recommendations for structuring instructional design teams for effective leadership in online learning initiatives. As such, this research study addressed the identified gap in the literature through the following research question and sub questions:

1. How do organizational structures in a university or college setting most positively influence the ability of instructional designers to lead online learning initiatives in higher education?
   a. What are the organizational structures in place at colleges and universities for instructional designers?
   b. How do instructional designers in varied higher education organizational structures participate in the design, redesign, and evaluation of university courses and programs?
   c. How do faculty and administrators empower or disempower instructional designers when collaborating on online learning initiatives?

Methods

A qualitative research paradigm was chosen for this study as the best fit to answer the research question and sub questions. The literature warranted a deeper analysis of the experiences of instructional designers, faculty, and administrators within different organizational structures, as well as an evaluation of their respective institutional contexts through a systems theory framework (Merriam & Tisdell, 2016). Although many case studies focus on a single

case, this study called for multiple cases to compare the experiences of instructional designers, faculty, and administrators in a subset of common organizational structures—specifically, universities with instructional design team structured differently in each organization. Three public research universities were selected for the comparative case analysis.

Population and Sampling Method

The population for this study consisted of four-year universities in the United States. Case participants for this study met a short list of criteria to ensure that the research questions could be adequately addressed. First, they were all public, nonprofit institutions with physical campuses and a sizable online presence. Next, the participating universities had a Carnegie classification of at least Doctoral Universities: Moderate Research. Finally, they must have offered at least one fully online graduate degree.

This study warranted a multi-case sampling method to find participants from multiple case sites. Purposive sampling was used to identify specific organizations and participants, ensuring that the data collected was relevant to the research questions (Saldaña & Omasta, 2017). Specifically, purposive sampling was guided by specific sampling criteria for both the organizations and individuals involved in the study. The sampling criteria for case sites were the criteria listed in the population; additionally, selected sites had to have a team of instructional designers and had to fit one of the three organizational structures to be evaluated in this study: a centralized design team with academic reporting lines and distributed curricular authority, a centralized design team with administrative reporting lines and distributed curricular authority, or a decentralized or blended design team with either academic or administrative reporting lines and distributed curricular authority. All three selected case sites had structures with distributed curricular authority.

Approximately 50 institutions were assessed through their public-facing websites to ascertain their compatibility with the scope of the study. After selecting and confirming three case sites which had met the sampling criteria for the study, participants for the semi-structured interviews were identified at each university. Participants consisted of individuals with one of three distinct roles: instructional designer, online faculty member, or online learning administrator. Up to three individuals in each role type were contacted at each participating case site; Semi-structured interviews were conducted with all individuals who agreed to participate, with four participants from the first university, three from the second, and three from the final institution. The three participating institutions and their organizational structures are listed in Table 1; pseudonyms were used for each institution.

Table 1
Institution Names and their Organizational Structures

Institution Name (Pseudonym)	Organizational Structure
Southeast Public University	Academic reporting lines with a centralized instructional design team
Great Plains Public University	Administrative reporting lines with a centralized instructional design team
Midwest Public University	Academic reporting lines with a blended (centralized/decentralized) instructional design team

Research Instruments

Three semi-structured interview protocols were developed—one for each role type. The protocols were field-tested by a focus group of subject matter experts who provided feedback on each question to ensure relevance and validity of the instrument. Interview protocols for each role type may be found in Appendices A, B, and C. Interviews were conducted remotely through Zoom; all interviews were recorded, transcribed, and de-identified to ensure anonymity for all participants.

Data Collection and Analysis

Data collection consisted of a series of semi-structured interviews, 60-90 minutes in length, with instructional designers, online faculty, and online learning administrators from each participating university. Interview questions were developed based on the research question and sub questions, including the following topics: (a) online learning initiatives; (b) organizational structure of the instructional design team; (c) leadership approaches; (d) quality of working relationships between university faculty and staff; (e) program and course design practices; and (f) decision-making processes. These interviews comprised the majority of data collection for the study. Documents relevant to the study, including course syllabi, departmental processes, organizational charts, course design documentation, campus and departmental policies, and university websites, were collected for analysis (Saldaña & Omasta, 2017). Documents used were either publicly accessible or were provided by interview participants for each institution. Data collection took place over a total duration of three months. The ten semi-structured interviews were transcribed verbatim, de-identified, and coded through three a priori and emergent passes in process, values, and causation codes (Saldaña & Omasta, 2017). Three additional experts in the field assessed the coding manual, coded transcripts, and themes for triangulation of the data.

Trustworthiness and Ethical Considerations

To ensure the credibility and trustworthiness of the study, I selected well-established methods and a plan for confirming the validity of all instruments used to collect data (Shenton, 2004). Additionally, I became familiar with the culture of each case site, working to prevent prolonged engagement to ensure no bias was introduced to the study (Shenton, 2004). To support transferability of findings, I ensured that all boundaries were clearly articulated so that readers of the research could make informed judgments on transferability to other situations and contexts (Shenton, 2004). I ensured that replication of the study would result in similar, dependable findings through the careful description of the research design, process, and practices for data collection and analysis (Shenton, 2004). Finally, to ensure confirmability, I chose multiple data collection methods for triangulation, both with individual case sites and for the comparative analysis of the data (Shenton, 2004).

This study was approved by the university's institutional review board (IRB). I followed each case site's procedures for institutional review; each case site deferred to the home institution's IRB approval for the study. All participants received full disclosure of the purpose, methods, and process for all data collected, and I received informed consent from every participant prior to data collection.

Limitations

Although instructional designers are commonly employed by institutions of higher education, they do not all share the same roles and responsibilities. Many instructional designers operate as faculty technology support, while others act as collaborators in the design of academic courses and programs. Others yet may be primarily academic technologists with instructional designer titles. These differences in role definition may have influenced the scope and case

selection for the study. Further, case site conditions, such as leadership transitions or financial hardship, may have influenced the study.

This study focused on research universities in the United States; the case selection was guided by this criterion, and was intended to provide a focused, intentional perspective on the ways organizational structures influence instructional designers in a large subset of United States higher education institutions. Additionally, the study addressed specific role types in higher education, notably those with a focus in online learning. The study may have relevance for traditional university settings, but they were not a direct part of this study. Finally, data collection was conducted at a distance through a video conferencing tool.

Results

The results of this study will be described in four sections: one each for the three cases for an overview and situational context, and one final section for the comparative analysis results and themes.

Southeast Public University

Southeast Public University (pseudonym) is a public research institution located in the southeastern United States with an enrollment of more than 67,000 students. Southeast Public University has a fully online virtual campus with more than 80 available degrees and certificates and is accredited by the Southern Association of Colleges and Schools Commission on Colleges (SACSOC). The institution is respected as a hub of innovation and research in instructional design, blended learning, and online learning. Southeast Public University met the first structure profile for the study: centralized instructional design team with academic reporting lines and distributed curricular authority.
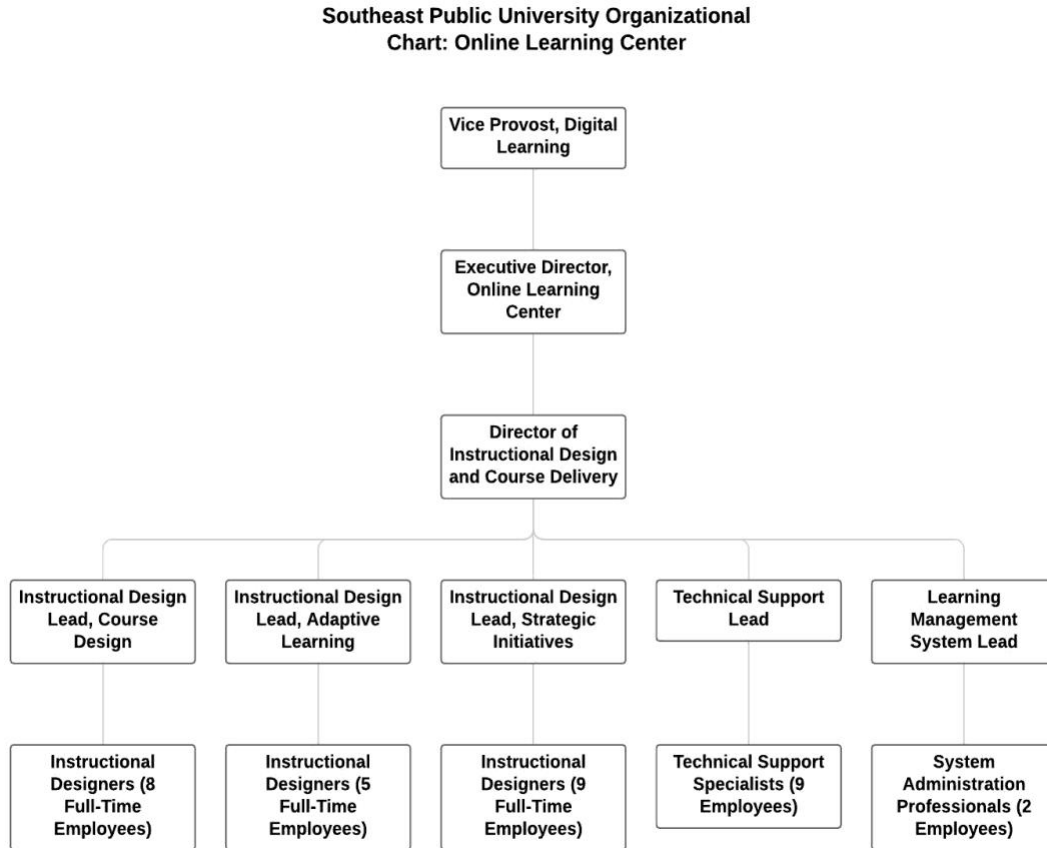
Southeast Public University has a digital learning division comprised of 150 staff. It is led by a vice provost of digital learning with direct reporting lines to the university provost. Its six separate teams oversee initiatives including media development, classroom technology, mobile learning, and an innovation lab. The largest team, the Online Learning Center, acts as the central hub of online learning activity and expertise, and houses the instructional design team.

The instructional design team is comprised of a director, three team leaders, and 20 full-time, faculty rank instructional designers. Each team lead oversees an area of focus within the field of instructional design: course design, adaptive learning, or strategic initiatives; the director of the team also oversees separate teams on technical support and LMS administration. The instructional design team primarily facilitates the design and development of online courses through consultative practices with faculty and by providing ongoing faculty professional development. Instructional designers at Southeast Public University are unionized faculty members and are subject to the university's collective bargaining agreement, with workload percentages as follows: 85% course design and faculty development, 10% scholarly research, and 5% service to the university.

Four individuals (pseudonyms used) were interviewed at Southeast Public University: Julia, an instructional designer from the course design sub-team; Mike, an online nursing faculty and program director; Brian, the executive director of the Online Learning Center; and Demitri, the vice provost for digital learning. All interviewees indicated that the organizational structure at their institution contributed to their individual success, as well as to the success of their teams and the institution itself. The Online Learning Center had broad support from across the institution, a perception the participants indicated was earned through consistent expertise and evidence of effectiveness. One participant, Demitri, indicated that the digital learning division

was seen as "a solution to problems or a toolset for accomplishing objectives" due to its academic reporting lines: "…it's framed as a fundamentally academically serving enterprise, not a technology function."

Figure 1

Southeast Public University Organizational Chart: Online Learning Center

- Vice Provost, Digital Learning
  - Executive Director, Online Learning Center
    - Director of Instructional Design and Course Delivery
      - Instructional Design Lead, Course Design
        - Instructional Designers (8 Full-Time Employees)
      - Instructional Design Lead, Adaptive Learning
        - Instructional Designers (5 Full-Time Employees)
      - Instructional Design Lead, Strategic Initiatives
        - Instructional Designers (9 Full-Time Employees)
      - Technical Support Lead
        - Technical Support Specialists (9 Employees)
      - Learning Management System Lead
        - System Administration Professionals (2 Employees)

Organizational Chart of the Southeast Public University Instructional Design Team

When asked about the clarity of roles for instructional designers and online learning administrators, the participants indicated that the roles were clearly defined, and that the centralized organizational structure strengthened role clarity. Both Mike, the faculty participant, and Demitri, vice provost for digital learning, indicated that a balance of authority between faculty and administration was positive, and that the university empowered both groups in their related but distinct areas of focus. Julia, the instructional designer participant, noted her faculty status as an important part of her success, as well as the advancement opportunities it afforded.

Julia also emphasized that she was empowered in her work by the online learning administrators, as evidenced by the separate technology support teams and a focus on partnering with faculty in course design. However, Brian and Julia both noted that even though instructional designers were respected and valued, they still experienced significant role misperception and

resulting disempowerment. According to Brian, "a lot of faculty [members] don't really understand what an instructional designer is."

At Southeast Public University, the instructional design team is centralized under academic report lines and faculty retain curricular authority. Instructional designers hold formal faculty appointments and see this as empowering and situating them as equal collaborators with teaching faculty, but still experience misperception of their roles as experts in online pedagogy and course design. Finally, Brian, the executive director of the Online Learning Center, had previous experience as an instructional designer in higher education, which he and Julia expressed contributed to his high effectiveness as a leader for instructional designers.

Great Plains Public University

Great Plains Public University (pseudonym), a public research institution in the Great Plains region of the United States, is a university within the Great Plains System, a state-funded office that led public education institutions across its state of origin. With an enrollment of approximately 16,000 students, Great Plains offers 16 degree programs and 11 certificates fully online and is accredited by the Higher Learning Commission (HLC). Great Plains does not hold any distinctions of excellence in instructional design from outside organizations, although its faculty and designers participate in scholarly research and conferences around online learning.

The instructional design team at Great Plains Public University is housed in the Office of Digital Learning, which is led by a director of digital learning, who has a dual reporting structure through information technology (IT) and academic affairs. The team consists of two instructional designers, an instructional technologist, an open education resources (OER) librarian, and a student recruiter for online programs. Great Plains Public University met the second structure profile for the study: a fully centralized online learning team with an administrative reporting structure and distributed curricular authority.

Figure 2

Organizational Chart of the Great Plains Public University Office of Digital Learning
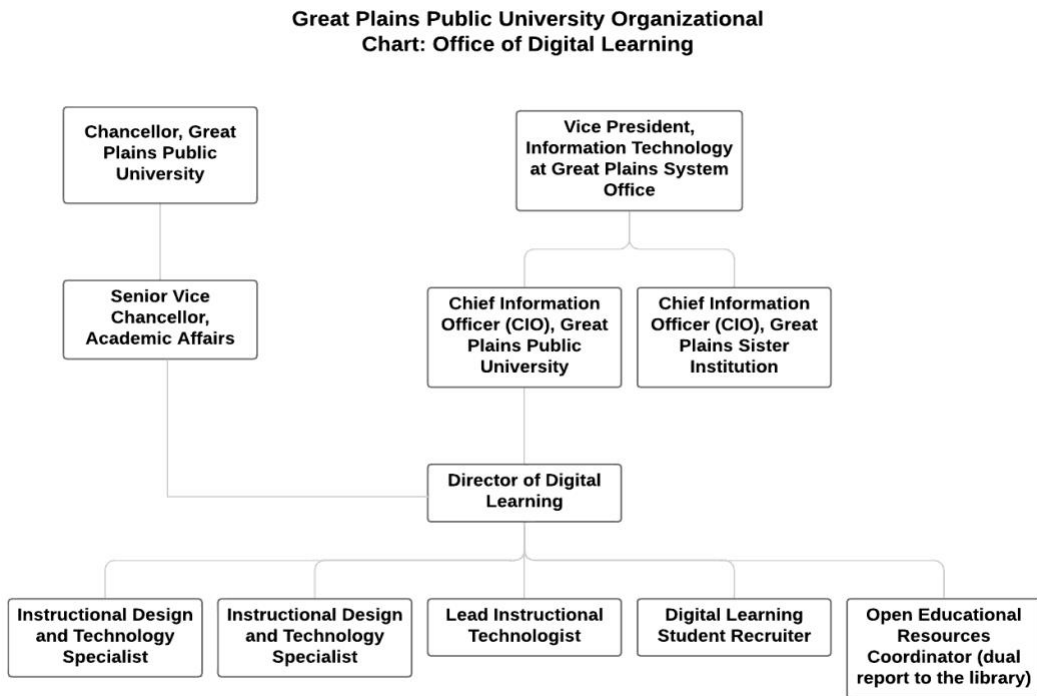
The Office of Digital Learning is structured under the Office of Information Technology and has no direct reporting lines to academic affairs other than through its director. Instructional designers on the team have a wide range of responsibilities including trainings, LMS support, and course design. Course design workload is determined based on faculty interest on a first-come, first-serve basis. The faculty at Great Plains Public University are unionized; the instructional designers do not hold faculty titles or appointments. Three professionals (pseudonyms used) were interviewed: Dora, an instructional designer; Anna, a faculty member in library science and a funded faculty liaison to the Office of Digital Learning; and Carla, the Director of Digital Learning.

Each participant indicated a different perspective on the value of Great Plains Public University's organizational structure. Carla favored the administrative reporting lines but shared that she is often over-affiliated with information technology. Carla indicated that the territorial nature of academic decision-making made it very difficult to work with faculty in instructional design, in part due to their reporting through administrative lines and resistance to a centralized structure. Dora, the instructional designer participant, was favorable to both centralization and the alignment with IT, and similar to Carla favored it for the technology-centric areas of their roles, which comprised the majority of their workload. Anna, the faculty participant, indicated that the decentralized nature of academic units made it challenging to systematize decisions and resources, and suggested that the centralized nature of the Office of Digital Learning was positive as a potential solution to improve connected decision-making. However, Anna also noted that many faculty members, including herself, were not aware of the organizational structure, or that the Office of Digital Learning was structured under IT.

Ambiguity around the organizational structure also extended to faculty perceptions of the roles of the instructional designers; Dora disclosed that she did not know the scope of her director's role, and that her own role was "about as fuzzy as you can get. There's a whole lot of 'other duties as assigned.'" Anna and Carla echoed the role ambiguity, with both participants confirming that a lack of communication and visibility made it difficult for faculty to understand what instructional designers could do, which both indicated was much more than the technology support for which they were most contacted. Further, Carla noted the classist behaviors of many faculty members and the negative power structure of their decentralized faculty: "they can dismiss us, and not have any love lost." Carla further shared that classist faculty behavior frequently characterized the relationships between faculty and her team. The hierarchical structure placed faculty above staff, exacerbating the lack of empowerment, visibility, and role clarity for the instructional designers.
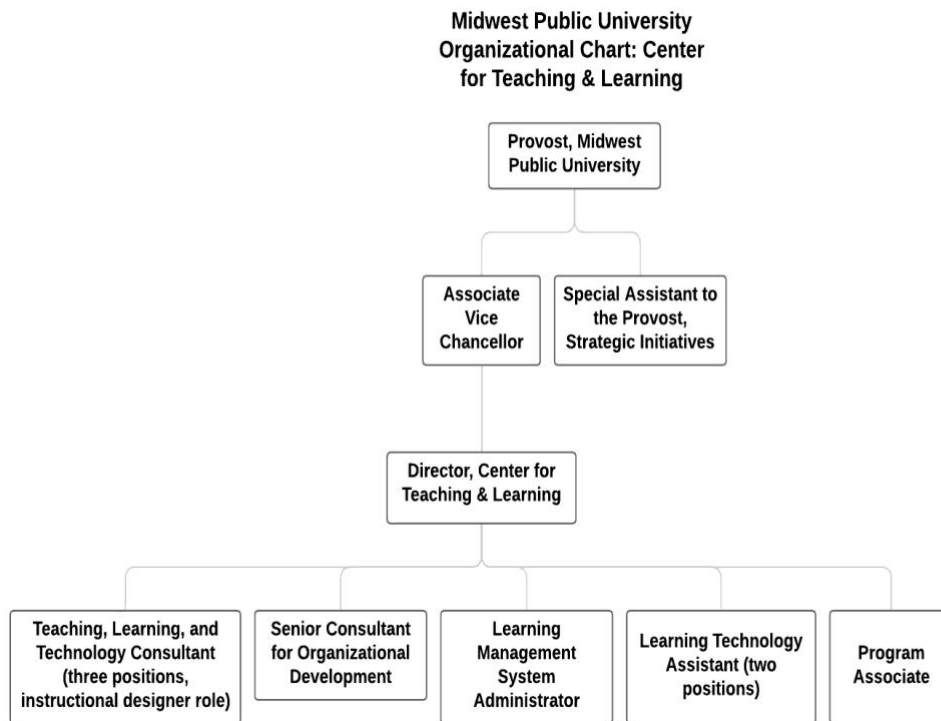
Midwest Public University

Midwest Public University (pseudonym) is a public research institution located in the Midwest region of the United States. With an enrollment of approximately 27,500 students across six campuses, Midwest Public University has 30 fully online degree programs and certificates, with 850 courses offered fully online. Midwest Public University is accredited by HLC and is nationally and internationally respected for its excellence in research for distance education and technology through a funded online learning research center. The institution is a part of the Midwest System of Universities which operates under a single Board of Regents. Midwest Public University met the third structure profile for the study: blended (centralized and decentralized) instructional design teams with academic reporting lines and distributed curricular authority.

The centralized instructional design team at Midwest Public University, known as the Center for Teaching and Learning (CTL), is organized with a flat, non-hierarchical structure, where all employees report to the Director of the Center for Teaching and Learning. The CTL has academic reporting lines up through the provost, and consists of three instructional designers, an organizational development consultant, an LMS administrator, and two learning technologists. The CTL went through a reorganization in 2014 that merged the team focused on face-to-face learning with the team focused on online learning.

Figure 3
Organizational Chart of the Midwest Public University Center for Teaching & Learning

Midwest Public University has a blended structure for its instructional design teams; the CTL is the centralized team, but individual academic units may also house instructional designers, such as the School of Education, which has a single instructional design professional among 150 faculty and staff.

Instructional designers from the CTL focus primarily on consultation with faculty members who teach in any modality, with consultations primarily focused on pedagogy and teaching practice. All instructional designers from the CTL must hold terminal degrees and significant teaching experience, but no formal education in instructional design is required. The decentralized instructional designer from the School of Education focused on both technology and pedagogy, and on school-wide initiatives such as assessment practices and accessibility. However, due to the partially decentralized structure of instructional designers at Midwest Public University, the School of Education may define the role of its instructional designer differently than other academic units. There is no uniform or consistent role clarity for the decentralized

instructional designers at Midwest Public University. Three individuals (pseudonyms used) were interviewed: Sid, the decentralized instructional designer from the School of Education; Alex, the centralized instructional designer; and Nina, a faculty member and special assistant to the provost focused on new online programs and associated services.

According to all participants, there were significant challenges with the blended organizational structure. Alex noted a gap in leadership due to the CTL's flat structure and limited management, with resulting challenges of scope and role clarity. Nina celebrated the effectiveness of the CTL but indicated that the structure was also due to budget constraints limited resources. Sid noted feeling isolated in his academic unit and disconnected from the centralized team. Although Alex indicated that instructional designers in the CTL had roles with a clear focus on consulting with faculty, Sid experienced signification role misperception due to his isolation within a single academic unit.

Figure 4
Organizational Chart of the Midwest Public University School

Midwest Public University School of Education Organizational Chart
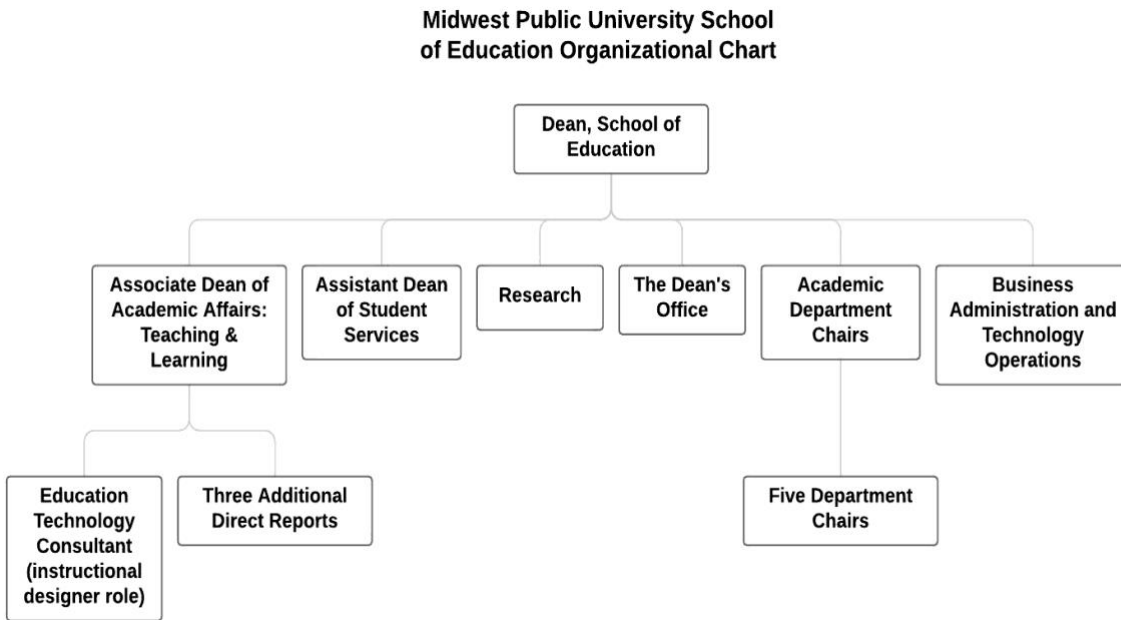
Faculty members described him as a "tech guy,", rather than an expert in online pedagogy and course design, which he indicated as areas of expertise. Sid also struggled with negative relationships with faculty who actively disempowered him and did not see him as a collaborator due to his non-faculty status. Sid also noted that instructional design at the School of Education was severely understaffed; as the sole person responsible for instructional design and technology, he had no advocates to help clarify and focus his work on projects more closely aligned with the work of instructional design. Instead, Sid often worked as faculty technical support, out of convenience for faculty who did not want to use the centralized universities services.

Overall, the centralized instructional design team at Midwest Public University was empowered to lead and work in collaboration with faculty, but the decentralized instructional designer experienced severe role misperception and negative relationships due to understaffing and bias against his non-faculty status. The blended organizational structure indicated disempowerment and poor leadership opportunities for the decentralized instructional designer, but not for the centralized instructional design team.

Comparative Case Analysis

The research questions for this study focused on discovering which organizational structure most positively influenced instructional design leadership over online learning initiatives, including instructional designer roles and empowerment. The comparative case analysis revealed several important results. First, organizational structure strongly affected the role perception, professional advocacy, empowerment, and leadership opportunities for instructional designers. Centralized instructional designers at each case site had more opportunities for leadership and advocacy than the decentralized instructional designer, who had no advocacy, felt isolated and disempowered, and had very few opportunities for leadership. Centralized instructional designers still experienced challenges with role misperception with university faculty; however, participants in centralized structures indicated that centralization enabled clearer role definitions and empowerment to pursue the primary work of instructional design: expertise in pedagogy and course design. The decentralized designer, in contrast, struggled to gain time or empowerment to pursue pedagogical work, noting that faculty often expected his support for simple technology tasks that were not suited to his role, valuing convenience more than his considerable expertise.

The instructional designers in academic reporting structures experienced more positive role perception, while those in administrative structures were severely limited in their ability to pursue pedagogical work. The roles of designers in centralized, academic reporting structures were more oriented toward course design, faculty professional development, pedagogy consulting, and broad initiatives that impacted the entire institution. Designers in administrative structures, however, noted an over-association with information technology and challenges with role clarity due to the expectation of their work being focused on technology.

The comparative analysis also revealed the value of positional parity between faculty and instructional designers. At Southeast Public University, where instructional designers held faculty appointments, designers had a clear scope for their role, broad recognition and respect from faculty, and administrators who both understood and advocated for their work in course design and pedagogy. In contrast, the decentralized instructional designer and designers organized in administrative structures experienced negative relationships, a toxic work environment, faculty classism, and pressure to focus on technology support instead of pedagogy and course design.

All participants noted the struggles of scale within instructional design and the importance of having online learning leaders experienced with instructional design practice in higher education. Issues of scale negatively impacted all participants, specifically their ability to lead online learning initiatives with institution-wide impact. Without enough staff to meet the demand for technology support and course design collaborations, instructional designers were far less likely to pursue systems level change initiatives for online learning.

Discussion

This study sought to uncover the most effective organizational structure for instructional designer leadership and empowerment in higher education institutions. The data analysis revealed that the structure which most positively influenced instructional design leadership over online learning initiatives was a centralized instructional design team with academic reporting lines. Designers in this structure had clearer role definitions, were empowered by their online learning administrators to pursue pedagogical work, had largely positive relationships with faculty, and experienced the professional advocacy necessary for them to lead online learning initiatives. Centralized instructional designers had more opportunities for leadership, while the decentralized instructional designer experienced disempowerment and limited collaboration with faculty.

Instructional designers in academic reporting structures were more closely aligned with faculty in the design of online courses; instructional designers in administrative reporting structures were often over-aligned with their technology skills, resulting in their pedagogical expertise being undervalued. Additionally, the findings indicated the importance of addressing issues of scale for instructional design teams; teams that are understaffed are less likely to lead online learning initiatives. Decentralized instructional designers and those in administrative reporting structures were far more likely to experience role misperception from faculty and to have their work as pedagogy experts undervalued in favor of providing convenient technology support for faculty. Finally, the comparative results indicated the significant value of online learning administrators having direct experience as instructional designers to effectively advocate and empower their instructional design teams to lead.

Recommendations and Conclusions

Given the results of this study, it is recommended that institutions that are restructuring or building new instructional design teams implement centralized structures with academic reporting lines for their teams. The benefits of both centralization and academic reporting lines are clear: better advocacy and empowerment, better alignment with the pedagogical work of both designers and faculty, and less role misperception for instructional designers. Structuring these teams toward empowerment and better definitions of their roles as pedagogy experts may help them sustain their leadership on the initiatives they led, to great effect, during the COVID-19 pandemic. This study also revealed the importance of three additional structural elements: appropriate instructional design staffing for the size and scale of the institution, leadership experience with instructional design, and positional parity with faculty.

Challenges of scale with instructional design are unlikely to be resolved simply by centralizing instructional design teams. Understaffed teams are often unable to lead initiatives because they are oversaturated with other priorities—even more so when the designers are also serving as technology support. As such, it is also recommended to increase the size of instructional design teams to be realistic for the size and scope of the institution's online learning presence, and to reduce the responsibilities of technology support from the instructional designer

role, ideally through a team of dedicated instructional technologists and support specialists. Individuals who lead instructional design teams should be experienced with the work of instructional design to maintain boundaries of responsibility that empower instructional designers to lead online learning initiatives. Leaders who have no experience as instructional designers themselves may struggle to adequately lead instructional design teams. As such, it is critical for the advancement of online learning for instructional designers to gain leadership experience and for institutions to hire and promote instructional designers into formal leadership roles with positional authority.

Based on this study, instructional designers should have positional parity with faculty to generate the shared respect and value necessary for the collaborative work of instructional design and leadership in online learning initiatives. Positional parity does not necessarily mean that all instructional designers need faculty appointments. Parity can be achieved through other means as well, such as shared leadership in academic program design, advancement pathways for instructional designers that mirror the promotion and tenure cycle and normalizing an institutional culture that equally values the contributions and perspectives of both staff and faculty. Finally, for institutions that have a decentralized or blended organizational structure for their instructional designers, it is strongly recommended to implement changes that protect and improve the working conditions, empowerment, effectiveness, and opportunities for leadership for instructional designers.

Instructional designers, in any structure, are a mission-critical resource for institutions of higher education. It is paramount to empower, equip, and position them to lead their organizations alongside faculty into the future of online learning through their unique and valuable expertise. Organizational structures have a significant influence on the empowerment and leadership of instructional designers; intentionality and a well-chosen structure can position our institutions for the right kind of effective leadership as we move further into the digital age.

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Appendix A

Dedicated Instructional Designer Interview Protocol

Thanks for your willingness to participate in this interview. By consenting to this interview, you agree to answering the questions honestly, but may choose not to answer any questions that make you feel uncomfortable. All responses and recordings will be de-identified and kept confidential to protect your identity.

1. Please share with me your position title and an overview of your typical responsibilities in that role, including any major tasks, projects, or initiatives that would help clarify your role.
2. Why did you choose to pursue a professional interest or career in online learning for higher education?
3. Does the organizational structure that your university operates within contribute to your success within the organization? In what ways?
4. Does the organizational structure that your university operates within inhibit your success within the organization? In what ways?
5. What are some of the most important initiatives that your university is pursuing, from your own perspective as a professional?
6. How clearly defined are the roles for online learning administrators and dedicated instructional designers at your institution?
7. Are the relationships between administrators and faculty at your institution positive? If so, why?
8. Are the relationships between administrators and faculty at your institution negative? If so, why?
9. When was the last time your institution restructured its online learning and instructional design teams and resources? What were the reasons?
10. Would you like to see anything change in regard to online learning at your institution? If so, what changes would you like to see?
11. Why did your organization choose to structure your instructional design and online learning resources the way that they did?
12. From your perspective, who should have primary decision making authority over online learning initiatives?
13. What kind of leadership role do your administrators, faculty, and dedicated instructional designers play at this institution?
14. How does your organization make decisions regarding curriculum?
15. What system or model do you use to evaluate student growth on learning outcomes and the quality of your courses and curricula?
16. How do dedicated instructional designers at your institution work with faculty on courses and curriculum?
17. What is your experience working as a dedicated instructional designer?
18. What are the most challenging parts of working with your administration?
19. What are the most challenging parts of working with your faculty?
20. Do your administrators work to ensure the dedicated instructional designers have an equal seat at the table for major decisions around online learning initiatives? If so, what in particular do they do?
21. Does collaboration happen between administrators, faculty, and dedicated instructional designers when creating a new online program? If so, how would you characterize it?
22. What do faculty and administrators at your institution do that empowers or disempowers you?

Appendix B

Online Faculty Member Interview Protocol

Thanks for your willingness to participate in this interview. By consenting to this interview, you agree to answering the questions honestly, but may choose not to answer any questions that make you feel uncomfortable. All responses and recordings will be de-identified and kept confidential to protect your identity.

1. Please share with me your position title and an overview of your typical responsibilities in that role, including any major tasks, projects, or initiatives that would help clarify your role.
2. Why did you choose to pursue a professional interest or career in online learning for higher education?
3. Does the organizational structure that your university operates within contribute to your success within the organization? In what ways?
4. Does the organizational structure that your university operates within inhibit your success within the organization? In what ways?
5. What are some of the most important initiatives that your university is pursuing, from your own perspective as a professional?
6. How clearly defined are the roles for online learning administrators and dedicated instructional designers at your institution?
7. Are the relationships between administrators and faculty at your institution positive? If so, why?
8. Are the relationships between administrators and faculty at your institution negative? If so, why?
9. When was the last time your institution restructured its online learning and instructional design teams and resources? What were the reasons?
10. Would you like to see anything change in regards to online learning at your institution? If so, what changes would you like to see?
11. Why did your organization choose to structure your instructional design and online learning resources the way that they did?
12. From your perspective, who should have primary decision making authority over online learning initiatives?
13. What kind of leadership role do your administrators, faculty, and dedicated instructional designers play at this institution?
14. How does your organization make decisions regarding curriculum?
15. What system or model do you use to evaluate student growth on learning outcomes and the quality of your courses and curricula?
16. How do dedicated instructional designers at your institution work with faculty on courses and curriculum?
17. What is your experience working as a dedicated instructional designer?
18. What are the most challenging parts of working with your administration?
19. What are the most challenging parts of working with your faculty?
20. Do your administrators work to ensure the dedicated instructional designers have an equal seat at the table for major decisions around online learning initiatives? If so, what in particular do they do?
21. Does collaboration happen between administrators, faculty, and dedicated instructional designers when creating a new online program? If so, how would you characterize it?
22. What do faculty and administrators at your institution do that empowers or disempowers you?

Appendix C

Online Learning Administrator Protocol

Thanks for your willingness to participate in this interview. By consenting to this interview, you agree to answering the questions honestly, but may choose not to answer any questions that make you feel uncomfortable. All responses and recordings will be de-identified and kept confidential to protect your identity.

1. Please share with me your position title and an overview of your typical responsibilities in that role, including any major tasks, projects, or initiatives that would help clarify your role.
2. Why did you choose to pursue a professional interest or career in online learning for higher education?
3. Does the organizational structure that your university operates within contribute to your success within the organization? In what ways?
4. Does the organizational structure that your university operates within inhibit your success within the organization? In what ways?
5. What are some of the most important initiatives that your university is pursuing, from your own perspective as a professional?
6. How clearly defined are the roles for online learning administrators and dedicated instructional designers at your institution?
7. Are the relationships between administrators and faculty at your institution positive? If so, why?
8. Are the relationships between administrators and faculty at your institution negative? If so, why?
9. When was the last time your institution restructured its online learning and instructional design teams and resources? What were the reasons?
10. Would you like to see anything change in regard to online learning at your institution? If so, what changes would you like to see?
11. Why did your organization choose to structure your instructional design and online learning resources the way that they did?
12. From your perspective, who should have primary decision making authority over online learning initiatives?
13. What kind of leadership role do your administrators, faculty, and dedicated instructional designers play at this institution?
14. What system or model do you use to evaluate student growth on learning outcomes and the quality of your courses and curricula?
15. How do dedicated instructional designers at your institution work with faculty on courses and curriculum?
16. What do you consider to be the most important role for dedicated instructional designers at your institution?
17. What are the most challenging parts of working with your faculty?
18. What are the most challenging parts of working alongside a dedicated instructional designer?
19. What do your administrators do to ensure the dedicated instructional designers have an equal seat at the table for major decisions around online learning initiatives?
20. Does collaboration happen between administrators, faculty, and dedicated instructional designers when creating a new online program? If so, how would you characterize it?

Troublesome Knowledge: Identifying Barriers to Innovate for Breakthroughs in Learning to Teach Online

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Abstract
Embedded within advice for starting simple with online, blended, or technology-enhanced teaching are practices that can be troublesome for some faculty who are learning to teach this way. For example, embedded within the principle of a clear, organized, navigable course can be the *concept* of chunking content into modules, the *skills* associated with screen casting and posting a course tour, and the *practice* of socializing students to the course organization through demonstration, explanation, and reinforcement. This empirical-qualitative study collected 123 cases of troublesome knowledge from 41 participants and analyzed them through Perkins' troublesome knowledge framework. Results include subcategories and common themes across cases of inert, ritual, conceptually difficult, tacit, and foreign/alien knowledge. From these results, we recommend that faculty development approaches should take specific aspects and cases of troublesome knowledge into consideration for online teaching preparation.

Keywords: Online teaching, troublesome knowledge, faculty development, online teaching preparation

In higher education, new professional roles are evolving with the aim of preparing and supporting faculty to teach in online, blended, and technologically-enhanced modalities. These roles include instructional designers, learning designers, academic technologists, and other educational developers. For clarity in this paper, we use the term "instructional design professional" categorically to include those roles. This introduction begins with an example that illustrates a common dilemma for instructional design professionals in higher education that, when unpacked, reveals larger questions addressed in this research study about how faculty learn how to teach in online, blended, and technologically-enhanced modalities.

Example

> The instructional designer concluded his second consult of the day and knew there would be more to come. An update to the learning management system (LMS) had gone live overnight, and now several of the most commonly used tools—the quiz function, assignment drop box and others—were grouped together in a new submenu. The overall update made the LMS look cleaner and more in-step with modern websites, but it was causing trouble for many instructors. A certain group of faculty members had clearly been using a rigid step-by-step process to access these tools, and now that things had moved around, they were unable to find them again. It seemed clear to the instructional designer: These tools were grouped together under a new heading of "Assess Learning" in the minimized side menu. But something about the way this group of instructors used the LMS made them unable to find these tools they had relied on for years. One thought the apparent disappearance of menu items was his fault: He must have done something to "break" that feature. One became frustrated: "No one told me this was coming and now I have the time-consuming hassle of trying to get this resolved." Another feared that students would have trouble locating class activities and assessments, and that this would reflect poorly on her teaching, or set back the instructional timeline to accommodate the confusion.

This story illustrates the wide range of reactions and experiences that instructional design professionals see during their interactions with faculty, and how challenging it can be to learn to teach online. Even with extensive programming, available starter templates, regular webinars and other resources, there are still challenges that function as barriers to learning to teach online. Our study aims to better understand what these barriers are and how they are unique to online teaching, an especially relevant problem to higher education institutions as they continue to increase their online offerings, and as the number of available tools and features only grows each year. In this paper, we will first outline the current understanding of these barriers and introduce the concept of troublesome knowledge (Perkins, 1999). Then, we will describe our study design (a survey instrument given to instructional designers and those with similar roles), our results, and the implications that our findings have on the field of instructional design.

Research Questions

In this empirical-qualitative study, we sought to investigate sources and stories of *Troublesome Knowledge* (Perkins, 1999) associated with learning how to teach online. Our study examined two, complementary research questions:

1. What aspects of learning to teach online are troublesome for some faculty learners?

2. What experiences of tacit, foreign/alien, conceptually difficult, inert, or ritual knowledge do educational developers encounter in their work with faculty as they learn to teach online, blended, or technology-enhanced modalities?

We predicted that participants would have anecdotes to share from their experiences preparing faculty for multi-modal instruction and that, despite the wide call for participation and anonymous submissions, participant stories would have common themes around the challenges they shared.

Literature Review

Instructional design professionals have long been studying and seeking the most effective ways to teach university faculty how to teach in online, blended, and technology-enhanced modalities. In many, well-documented cases (e.g., Nilson & Goodson, 2018; Wiggins & McTighe, 2012; O'Keefe, Rafferty, Gunder, & Vignare, 2020), one common practice involves working from a set of research-based evaluation criteria, such as those found on the Online Learning Consortium's (OLC) OSCQR Course Design Review Scorecard, the Quality Matters Rubric, and several others. Faculty don the role of a learner in these preparation courses and learn through both the program content and facilitator modeling how online instruction can be achieved. For many faculty-learners, programming designed in this way—coupled with individual consultations and support, as well as ongoing professional development—is enough to help them navigate, and sometimes thrive with, online teaching and learning.

However, we also know that many faculty members continue to struggle with learning how to teach online, even though they may have decades of teaching experience, expertise within their field, or relative comfort with learning new technologies. Depending on several factors, including size and capacity of institutional Centers for Teaching and Learning or Academic Technology, the much-needed support for these faculty learners can be time-consuming and complicated (see Intentional Futures, 2016, p.15). These struggles occur even though instructional design teams are often well-versed in online teaching. For learning/instructional designers, technologists, and faculty developers, this work can be frustrating because it feels like a lack of buy-in, trust, or understanding on the part of the faculty learner about how online learning is different from face-to-face—and recently, how remote learning is even different from online learning (see Hodges, Moore, Lockee, Trust, and Bond, 2020).

Moreover, the COVID-19 pandemic propelled more faculty than ever to learn how to teach in some form of "virtual" modality, whether or not they wanted to, with rosters of students that were also propelled into the online learning, whether or not they wanted to. The online teaching and learning community of practice was tasked with preparing and supporting *all* faculty with this effort (see, for example, Koenig, 2020; Decherney & Levander, 2020; O'Keefe, et al., 2020). While much of the advice for those new to online teaching and learning involves 'keeping it simple' (Cavanagh & Thompson, 2019), members of the online teaching and learning community of practice recognize that, embedded in those simple principles, are practices that can still be difficult. For example, embedded within the principle of a clear, organized, navigable course can be the *concept* of chunking content into modules, the *skills* associated with screen casting and posting a course tour, and the *practice* of socializing students to the course organization through demonstration, explanation, and reinforcement. While these attributes can become fluid with iterative practice, they may not necessarily be intuitive to new learners. Not only are these more than "simple" tasks that can be checked off of a course design list, but they are also potential technological and pedagogical barriers (Mishra & Koehler, 2006) for some

faculty new to teaching this way. Either way, the impacts of inadequate teaching preparation are multifold: The institution's students receive a disservice when their courses are not utilizing well-designed and implemented instruction (Xu & Xu, 2019); equity gaps compound for minoritized students (Plotts, 2020; Wood & Harris III, 2020); and faculty sense of competence and satisfaction in their work can be compromised (Callo & Yazon, 2020).

In this study, we explored the idea that difficulties in learning to teach online do not lie with any one party, either faculty learners or instructional designers, but rather that there are specific aspects of learning to teach online that are difficult all on their own. Similar to the shift in understanding that is common in K-12 education, from students having deficits that education is meant to fix, to using students' strengths to help them grapple with inherently difficult concepts, we want to explore what happens when we shift the discussion from being what the faculty learners can or cannot do, to what is it about online learning that might be difficult for anyone who is not an expert.

Theoretical Framework

We explore this question through Perkins' (1999) framework of troublesome knowledge. Perkins proposes the idea that certain types of knowledge may be troublesome in the context of a constructivist classroom. In this setting, an instructor would want to help learners reach a deeper level of understanding through their own sense-making (to construct the knowledge themselves with the teacher's guidance). However, a skilled instructor recognizes that when a learner is struggling with a concept or skill, there may be different types of struggles, and therefore different ways a teacher would respond. Perkins expands on this and posits that there are four types of troublesome knowledge: inert, ritual, conceptually difficult, and foreign. Later, the category of tacit knowledge is also incorporated into this framework (see Meyer & Land, 2003, who named a knowledge type that Perkins had described but not labeled). Table 1 summarizes each of the five types:

Table 1
Types of Troublesome Knowledge

Knowledge Type	Definition
Conceptually Difficult	Generally, a mixture of new ideas mixed with previously held misunderstandings that conflict.
Foreign	Occurs when there is a perspective that conflicts with the learner's own, often unknowingly.
Inert	Knowledge used in very specific circumstances, that otherwise is not actively used by the learner in other situations.
Ritual	Routinized knowledge that may be accessed often but becomes divorced from its original meaning or intent.
Tacit	Knowledge that becomes implicit or second-nature to someone experienced in this area.

Note. The terms and definitions in this table are paraphrased from Perkins (1999) and Meyer & Land (2003).

This idea, that there are different types of knowledge that can pose problems for learners marks an important shift in approaching the instructor-student relationship, or the instructional designer-faculty learner in this case. Describing the knowledge itself as troublesome shifts the problem onto what it is being learned and away from the learner.

While establishing that learning to teach online contains unique manifestations of troublesome knowledge, it is important to also establish that online teaching itself is a standalone discipline and skillset, and not necessarily one that instructors at higher education institutions will be fluent in, or even recognize as a practice to be developed. Faculty development is a broad area, responsible for many different goals. Providing faculty development specifically in the area of online teaching competes with many other demands on faculty time, many other priorities for faculty development, both pedagogical and non-pedagogical and even with other areas of technology not specific to online teaching (Belt & Lowenthal, 2020).

Applying a constructivist approach to learning how to teach online creates a set of paradigms for instructional design professionals to consider. In scholarship that applies constructivist theory to instructional design contexts, Karagiorgi and Symeou (2005) outline these implications for the three main phases of instructional design: analysis, development, and evaluation. Each of these phases are opportunities to consider how the faculty learner may be grappling with different types of troublesome knowledge. For example, when an instructional designer is analyzing what type of tasks might be most appropriate for their faculty learner's situation, considering how a specific type of troublesome knowledge may be interfering with what the learner knows so far may be most relevant.

Troublesome knowledge is also important as learning designers consider how to design opportunities for authentic learning. In the example story in the introduction, we mention an instructional designer who has seen multiple faculty members struggle with an LMS menu redesign. If we apply a troublesome knowledge perspective to that scenario, the instructional designer could attempt to identify which troublesome knowledge type is at play for that learner in that scenario, and then facilitate scenarios or tasks that attempt to help the learner address the root of the troublesome knowledge, instead of developing a new heuristic to avoid it for the time being. However, before instructional design professionals can develop strategies for addressing individual troublesome knowledge types, it is important to better understand how they are perceiving troublesome knowledge in their existing interactions with faculty learners.

Methods

Participants

Participants were recruited through a combination of methods, including purposeful and "snowball" sampling where participants are encouraged to suggest additional subjects for participation (NSF, n.d.). A survey was distributed through a variety of higher education, instructional design, and educational development listservs. Criteria for participation in this study included the following: 1) minimum of one year employment as an instructional designer, technologist, or educational developer at an institution of higher education; 2) as part of instructional design or education development work, have responsibilities for teaching/training faculty how to teach online. Conditional formatting was incorporated into the research instrument to send people to an end page if they did not meet criteria for participation. The Recruitment Message, Consent Form, and Survey Overview identified the purpose of the research in the following way: "[This is] a study to learn more about the difficulties that some people encounter when they are learning to teach online." The recruitment message also included

the goals for participation: "[W]e hope to draw from your experiences with faculty development around online, blended, and/or digitally-enhanced instruction for this research." Therefore, we were confident that responses collected through the instrument were coming from a place of relative experience and expertise with the learning experiences of faculty who were new to teaching online.

It is important to note that we did not seek participation from faculty learners to self-report about their experiences learning how to teach online. While the first-hand perspectives of learners are relevant, our study design was informed, in part, by the Technological, Pedagogical, Content Knowledge (TPACK) framework (Mishra & Koehler, 2006), which suggests that teachers (in our case, instructional designers and educational developers) have enough content and pedagogical knowledge to plan and address situations where learners (in our case, faculty-learners) get stuck. To offer a more familiar example, let's consider the difficulty that a student might encounter when learning math. He might, for example, be able to calculate the area or perimeter of a rectangle or recite the equation for area as base times height, but struggle with explaining what area or perimeter is, or get stuck with how to proceed on a word problem that requires the learner to recognize which calculation to perform in order to solve it. In this example, there is certainly much to unpack from observing the learner as he works to understand the concepts, but his teacher will be able to speak with some expertise about what is conceptually difficult about this content (area and perimeter) as well as where is the source of the barrier and what pedagogical approaches may help him overcome the barrier. From our perspective as learning innovation researchers, our ideal participants were the instructional design professionals whose professional work includes teaching people how to teach online, blended, and technology-enhanced classes because they possess relative online teaching and learning-related TPACK that would allow them to articulate the areas of difficulty we hoped to uncover through our research instrument.

The study design and protocols were approved by the University Institutional Review Board. Participants were informed that participation was voluntary and that they had the right to withdraw from the study at any time. Familiarity with Perkins' (1999) troublesome knowledge framework was not required or even preferred for participation in this study, though we anticipated that participants would submit stories that could be classified according to that analytical framework.

Instrument

The survey instrument for this study was a qualitative questionnaire, containing three blocks of questions: Demographics (8 questions), open-ended questions related to troublesome knowledge types (5 questions), and one optional, open-ended question about their professional experience considering the COVID-19 pandemic. To control for survey fatigue, where participants might tire of long-form answering, the five open-ended questions in the second block were randomized to ensure that, even if participants exited the survey prior to completion, enough responses would be collected across the five questions to conduct analysis. This mechanism was implemented after a pilot phase revealed that the short survey took up to 30 minutes to complete.

Analysis

The five, open-ended questions on the survey instrument were already drafted using the major categories of troublesome knowledge from Perkins' (1999) framework: inert, tacit, conceptually difficult, ritual, and foreign/alien. These five knowledge types served as initial categories for a first round of analysis. In this first round, entries that contained multiple

examples within a single text field were separated into individual units of meaning. For example, if a participant responded with two examples to a question about rituals that function as barriers to online teaching development, that single response was separated into two, individual entries from the same participant ID. A second round of axial coding (Marshall & Rossman, 2016) was applied to individual entries to identify patterns or subcategories within the troublesome knowledge category.

Following the coding process, an inter-rater reliability analysis (Armstrong, Gosling, Weinman, & Marteau, 1997) was conducted across all entries. Typically applied to quantitative studies, inter-rater reliability testing involves a process whereby multiple researchers (often two or more) independently code a common dataset and then compare the codes for agreement. In empirical-qualitative studies, this process has been used to establish accuracy in data representation and credibility when other qualitative methods, like triangulation, are not applied. To conduct the inter-rater reliability analysis in this study, all individual entries were stripped of both the categories for which they were submitted by participants and secondary codes applied by the researchers during axial coding. The stripped entries were then randomized and re-ordered for the inter-rater reliability analysis, wherein two independent raters with expertise in troublesome knowledge (Perkins, 1999) coded each entry for tacit, ritual, foreign/alien, conceptually difficult, and/or inert knowledge. This round of coding was then compared for agreement and is reported in the Results section. The Results section also includes a metric for agreement between a rater and the participants—in other words, the raters' labels were compared for agreement with the category for which participants submitted their case examples. While agreement with the participant is not a necessary step in inter-rater analysis, this process offers another point of data representation and reliability.

Findings

Demographics

The survey instrument collected information from 48 unique participants, but 7 submissions were omitted from analysis for failing to meet the minimum eligibility for participation. The study's pilot phase included participants who met the criteria, as well, so their entries are counted among the data. Criteria for participation included instructional/learning design, academic technologist, or educational development roles in higher education. Therefore, results are reported for 41 participants ($n=41$).

In the Demographics block, participants were asked to indicate their higher education role(s): 15% ($n=6$) of participants indicated their role as instructional/academic technologists, 54% ($n=22$) were instructional/learning designers, and 31% ($n=13$) selected "Other," with educational developer/administrative responses, like educational developer, faculty, or center for teaching and learning director entered the text field. Because this study positioned the intended participants as professionals with relevant experience and expertise in online, blended, and technology-enhanced educational development, participants were also asked to report their years of educational/instructional design experience. The majority of participants (73%; $n=30$) reported four or more years' experience, while 17% ($n=7$) indicated 2-3 years and 10% ($n=4$) indicated up to one year of experience. Gender participation included 63% female ($n=26$), 32% male ($n=13$), one non-binary participant, and one declined to state.

Troublesome Knowledge

The survey collected 123 unique scenarios from 41 participants. Five, randomly-ordered, open-ended questions prompted participants to self-report stories from their experiences teaching

and supporting faculty with online, blended, and technology-enhanced course design and pedagogical development. Perkins' (1999) troublesome knowledge framework was used to collect and categorize participant submissions as well as to independently code unique responses during a round of inter-rater reliability analysis. Results for this section report only those cases for which raters reached 100% agreement. Those cases for which agreement was not reached continue to be analyzed for patterns and outliers.

Inert Knowledge

Inert knowledge involves concepts and processes that are learned but are seldom accessed. Perkins (1999), citing cognitive psychologists Bransford, Franks, Vye, and Sherwood (1989), and Bereiter and Scardamalia (1985), analogizes inert knowledge as "[sitting] in the mind's attic, unpacked only when specifically called for by a quiz or a direct prompt but otherwise gathering dust" (Perkins, 1999, p.8). In the present practice of online course design and teaching, such knowledge includes technical processes, such as the multiple steps and mouse-clicks involved in uploading a file or embedding a video on a course site. More than just the steps, this knowledge can also include remembering to perform certain tasks that are necessary only once per term, such as making a course visible for students to access or posting grades to the Registrar's database even though the learning management system may house an online gradebook.

In this study, participants submitted 32 cases to the question for inert knowledge. During inter-rater reliability, raters reached 81% agreement with the participant (26/32 cases) and 69% agreement with each other (22/32 cases). Across only those cases for which raters achieved 100% agreement (n=22), patterns observed included new academic terms or courses, checking for or managing updates, roles and processes, and multi-step processes. The brief table, below, shows example participant responses that demonstrate inert knowledge.

Table 2

Inert Knowledge Categories

Inert Knowledge Category	Example Participant Response
Technology Updates	"Lots of things related to the many technology programs we use - our student advising software is clunky and not well used, so every time there's a new push we all have to go back in and relearn how to do everything, which is a huge barrier."
New Academic Term/Course	"Remembering to re-synch various apps such as Flipgrid or Screen-cast-o-matic"
Roles & Processes	"Modifying dashboard - people will hide their classes and then forget how to locate them. Or, they don't know how to modify."
Multi-Step Processes	"Our LMS organizes quizzes separately from the individual quiz questions. When importing between quizzes, you have to remember to bring the 'question bank.' This is not a frequent occurrence and the analogy between a physical quiz and the digital quiz do not align (if you were to "copy" a physical quiz, you never have to worry about the questions being separated). This is a difficult concept to explain and often needs to be repeated even after an instructor has successfully completed it before."

Ritual Knowledge

Perkins (1999) describes ritual knowledge as routine or habitual in nature. He explains that ritual knowledge is "how we answer when asked such-and-such, the routine that we execute to get to a particular result" (pp. 8-9). An innocuous example of ritual knowledge is the series of mouse clicks or keyboard strokes that a person executes to take a screenshot. Depending on the software used for this purpose, the act of taking a precise screenshot can take few or several steps. What makes ritual knowledge troublesome is that it can be difficult to break habits or consciously establish new, more effective routines. In online teaching and learning, there is often more than one way to perform a single function, and troublesome rituals contribute to the frustration of processes taking too long, being overly complicated, or being so inflexible that changes (e.g., technology updates) cause the ritual to break down all together.

Perkins acknowledges that inert knowledge and ritual knowledge can manifest in common ways, clarifying that "Whereas inert knowledge needs more active use, ritual knowledge needs more meaningfulness" (p. 9). Participants submitted 21 scenarios for the question about ritual knowledge; but during inter-rater reliability testing, raters tended to apply other possible labels, such as *inert* or *tacit*, depending on the way the case was presented in writing. Raters did achieve 81% agreement (17/21 cases) with participants, and representative cases for which 100% agreement was reached between raters are shown in Table 3, below. Of those cases for which agreement was reached, common themes included ritualized pedagogies (i.e., a ritualized way of thinking about or approaching one's teaching), task-based rituals, and the problem of trying to perform the same physical ritual to the digital environment.

Table 3
Ritual Knowledge Categories

Ritual Knowledge Category	Example Participant Response
Ritualized Pedagogies	"The biggest one is the lecture. Faculty immediately think that they will just do what they do in class but over Zoom. The toughest are the seminar instructors. They swear they don't lecture at all during their 3hr seminar session, and just automatically assume they can do three hours over Zoom, but also that without a physical presence, learning will be impossible."
Task-based Rituals	"In our campus' LMS, I have seen this knowledge prevent new learning whenever there is an update to the LMS features or interface. For example, managing users in a course has a new, mainstreamed interface, but I have seen instructors continue to use the routine they are familiar with even though it will take longer."
Physical Ritual in Mediated Space	"Teachers of younger children wanting to use highly coloured and varied font styles to make it attractive, as they do for offline materials and then not understanding why the text editor does not allow them to do this online or their instructor does not advise them to do it."

Conceptually Difficult Knowledge

Conceptually difficult knowledge exists in many facets of human experience, and Perkins (1999) describes this knowledge as troublesome as it mixes with misimpressions from learner experience and ritualized responses to new problems (p. 9). Because teaching online is paradigmatically different from teaching face-to-face, there are some aspects of online teaching and learning that can be considered conceptually difficult, especially for some faculty-learners new or skeptical to the paradigm. The term "module," for example, is not new—even in teaching and learning—but the concept of an online module is one with a distinct start and end point, with learning objectives and a series of steps for student learners to take through a learning pathway designed to help them practice and ultimately achieve those outcomes. For faculty who are not thinking about their teaching or organizing their content in this way, the idea and execution of modular course design and instruction can be conceptually difficult.

Twenty-four scenarios were submitted to the question in this study for conceptually difficult knowledge. Raters reached 100% agreement with participants (where at least one rater agreed with the participant) and 54% with each other (13/24) during inter-rater reliability testing. Across those cases where 100% inter-rater agreement was achieved (n=13), patterns included the physical metaphor for the digital application, pedagogical concepts, organization of the digital content, and the idea that not all digital tools are the same. Table 4 includes a brief illustration of participant responses for conceptually difficult knowledge.

Table 4
Conceptually Difficult Knowledge Categories

Conceptually Difficult Knowledge Category	Example Participant Response
Physical Metaphor	"*Groups* is a difficult knowledge piece because while some of the basic features are comparable to how groups would be used in a face-to-face setting, there are additional features that would often help instructors streamline their course, but for many this is hard to understand without prior experience."
Pedagogy	"The role of assessment can be difficult because we often use it as an evaluative tool rather than a learning experience."
Organization of Content	"[...] Last week I worked with a faculty member who wanted modules in their course because they were told they needed them. In a screen share of their course it became apparent that they had learned how to create module headers but didn't know what to do with them, or how the content got attached to a specific module [...]"
Digital Tools (Differences)	"Moving to a new LMS is exactly what I am dealing with. Things are similar but different and instructors are often tempted to 'figure it out on their own' instead of asking for help and this results with confusion for the instructor and more importantly the students."

Tacit Knowledge

Expanding on Perkins' (1999) troublesome knowledge framework and noting that sometimes troublesome are the subtle, often invisible ways of thinking and doing that practitioners with relative expertise employ, threshold concepts theorists Meyer and Land (2003) add tacit knowledge as "understandings [that] are often shared within a specific community of

practice" (Meyer & Land, 2003, p. 7, citing Wenger, 2000). Although learning innovation is an emerging field (Kim & Maloney, 2020), and the nature of technology-enhanced teaching and learning continues to change, instructional design professionals and experienced online educators possess shared ways of thinking and doing that function as tacit knowledge. Examples include internal processes for deciding which academic technology to use for particular pedagogical purposes, or other heuristics for designing learner pathways through a course of study, thinking of the learning management system as a vehicle for experience, rather than a repository for course materials. This knowledge can be troublesome to those new to teaching online because it includes practices and processes that become so internalized that they are invisible to practitioners.

Study participants submitted 22 cases to the question for tacit knowledge. Raters reached 73% agreement with the participant (16/22 cases) during inter-rater reliability testing. Across those cases for which agreement was achieved, patterns included ways of thinking about the learning management system, notions of alignment between intended learning outcomes and course elements (e.g., assignments, resources, etc.), and approaches to the integration of academic technologies with the learning design. Table 5 includes a brief representation of cases upon which agreement was reached for tacit knowledge.

Table 5
Tacit Knowledge Categories

Tacit Knowledge Category	Example Participant Response
Academic Technology (tools)	"Gradebook. Online gradebooks have great potential but without a clear, intentional strategy, they can cause more confusion than necessary. In my experience, many instructors do not think about how an online gradebook functions (especially for students) until towards the end of the academic term or when a student brings it to their attention."
Alignment	"I see this when faculty begin creating a course. The conversation often begins with a 'beginning to end' of course perspective. The focus is immediately on the 'order of topics' without first considering alignment between outcomes - objectives-activities - assessment. Tacit knowledge comes out in the traditional plan to 'teach' through the order of the textbook and give a midterm and final exam. The idea of learner centered and outcome driven design is not often an immediate 'starting' place. Because of this, I begin most design conversations with 'What do you want students to be able to 'do' by the end of this course?' How will you know they've achieved this?"
Learning Management System (Purpose/Possibilities)	"Certain actions are default. When creating a new course, it should be default to hide certain things from the course menu—e.g., pages, assignments, etc., that you don't want students to have access to, or that you might want to release later. There is a time and place when a course should make everything available for users to see; a time where you want to restrict what people have access to. The workflow that you use to release information to users: e.g., using pre-reqs, locking until a certain date."

Foreign/Alien Knowledge

Foreign knowledge, according to Perkins (1999), "[...] comes from a perspective that conflicts with our own" (p. 10). Sometimes, foreign knowledge is simply a perspective that one hadn't thought to consider before (e.g., why to include alt text with images or use proper text formatting on web pages), and sometimes it can stem from an individual's experience, values system, or cultural context. In online teaching and learning, foreign knowledge can be troublesome because the faculty-learner may not recognize this knowledge at play, or they may initially or fundamentally disagree with some of the instructional design advice offered by instructional design professionals.

Across the 24 scenarios submitted by participants for this question, the most common form of foreign knowledge reported was the faculty-learner's failure to consider the student-learner's perspective in the course design or instruction. Other themes included the idea that one's discipline was not conducive to online teaching and learning, and the idea that online teaching and learning should be a replication of face-to-face instruction. During inter-rater reliability testing, raters achieved 100% agreement with participants (24/24 cases) and 83% agreement with each other (*n*=20). Representative cases for which 100% agreement was reached are shown in Table 6.

Table 6
Foreign/Alien Knowledge Categories

Foreign/Alien Knowledge Category	Example Participant Response
Student Perspectives	"Learner Variability/Universal Design for Learning. For some reason, instructors have it in their head that inclusive design means lowering rigor or lowering standards when that is not the case at all. Many faculty want to teach the way they learn best and it is doing a disservice to students, particularly in an online environment. Giving students choice, thinking about equity, etc. does not mean that we are somehow debasing education or lowering the bar."
Inflexible Discipline	"I consistently come across this notion when I work with faculty who believe that their subject area 'cannot be taught online'.They usually phrase this belief in a way that demonstrates an unfamiliarity with the techniques and tools that would allow you to convert or modify a learning experience so that it would work in a virtual format. Nonetheless, their belief immediately contradicts both my philosophy of teaching and learning and established learning frameworks like TPACK, SAMR, or RAT."
Re-Create Face-to-Face	"The idea that face to face teaching is the gold standard so that when teaching online they should just try and replicate that face-to-face style. For example, record 60-minute-long lectures or have 60 minute long, 3 times a week synchronous sessions that replicate the face to face lecture."

Discussion

Although this study was widely distributed and participation came from varied higher education roles and contexts, we saw common cases and categorical patterns during analysis of the 123 unique cases of troublesome knowledge submitted by participants for this study, suggesting that there are common aspects of learning to teach online that are difficult for some faculty learners. Traces of a deficit perspective toward faculty learners surfaced in cases categorized as ritual and foreign knowledge. For example, in a case of ritual knowledge, where the faculty needs to change text formatting habits, particularly for emphasizing important information to students, the participant summarized the problem: "Much of my work is about explaining why those habits no longer serve students." Likewise, foreign/alien knowledge proved to be problematic because of the sheer time it can take to have a breakthrough in perspective or to be able to speak with fluency about online teaching and learning. One participant shared: "When faculty make requests that are unspecific, it is mentally taxing to figure out what exactly their issue is. They don't have robust enough vocabulary to describe their own problems in a way that will help me help them." These descriptions are phrased in a way that places the problem on the learner, whereas viewing these scenarios as examples of troublesome knowledge would reframe the struggle to learning to teach online as a natural thing.

We did see a more constructivist viewpoint with some types of troublesome knowledge. We received the most unique cases for inert knowledge and participants described these as understandable challenges inherent in the technology: "If there are changes made to the LMS, this can be perplexing and lead to anxiety and stress." One implication of this analysis is that development for instructional design professionals to view their work with faculty through the lens of these knowledge types can help dismantle the deficit view of faculty learners. It seems instructional design professionals may be apt to do this for some troublesome knowledge types already, so this could be an entry point for expanding this viewpoint across other types.

Our results add to the growing body of literature on online, blended, and technology-enhanced education, specifically as it relates to the work of instructional/learning design and educational development. With better understanding of the challenges some faculty encounter when they are learning to teach online, instructional design professionals can more effectively support faculty in these areas. Currently, much of the professional development for these roles includes webinars and programs on course design, program development, quality assurance, and a la carte programming on specialized topics, such as assessment models, equity-minded course design, models for teaching in various modalities, high-impact practices, and many others. These opportunities are essential elements in a train-the-trainer model of educational development. What is missing in the professional development of educational development staff is attention to andragogy and ways to help all faculty make breakthroughs for learning innovation. For example, these results could be useful in informing how learning design teams plan their work and programming throughout the academic year. If there is a consistent set of inert knowledge problems that come up at specific times each year (such as setting up new courses at the start of the term), the faculty development calendar could anticipate this with targeted programming or other communication with faculty. Likewise, a learning design team could decide to adopt the troublesome knowledge lens when performing consults with faculty members and use common language to help faculty learners identify for themselves when they are experiencing challenges (e.g., "I notice that the option you are looking for has moved from its familiar place. I can show you how to take a minute to familiarize yourself with a new layout for when this happens").

This study was designed to be replicable and aggregable. Given the consistency across cases for each troublesome knowledge type, we suppose that a re-launch of this study in the short-term would yield similar cases to those already collected. Given rapid changes in academic technology innovations and the teaching modality possibilities explored in a post-COVID-19 era, we would expect that long-term replications might collect a similar distribution of cases across knowledge types, but that the stories themselves will reflect different acute problems. Additionally, some of the cases collected for this study did not organize neatly into one of the five troublesome knowledge categories. Further analysis may reveal additional categories that may be specific to online teaching and learning. Further research with experts in cognitive science, online teaching and learning, educational development, and andragogy may bring evidence-based recommendations for how to address troublesome aspects of learning to teach online. This way, educational developers can approach faculty members with stronger strategies. By more effectively supporting faculty in their teaching, we hope to see improved outcomes for students who take online, blended, and technology-enhanced classes.

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Introduction to OLJ Issue 25:3 Section II

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In addition to the papers associated with the Online Learning Consortium Accelerate and Innovate conferences, we also have a selection of studies that have been reviewed and accepted for publication through our regular submission process. The journal continues to receive hundreds of submissions and the Online Learning Consortium appreciates the opportunity to serve as a nexus for researchers in the field. These studies investigate deep learning processes, motivation, compassion, and a wide range of other student, faculty, and institutional issues in both K-12 and higher education online settings.

The first paper in this section is "Development and Testing of a Roleplaying Gamification Module to Enhance Deeper Learning of Case Studies in an Accelerated Online Management Theory Course" by Audrey Pereira of Fitchburg State University and Monika Wahi of DethWench Professional Services. As the title indicates this paper investigates roleplaying and its benefits for nurturing deeper learning processes through cognitive rehearsal, the visualization of one's application of a skill to a situation through vicarious experience. Research questions asked if using an online roleplaying module results in higher levels of learning, engagement, and satisfaction compared to students using a case study without the module. Scores on the assignment were compared between students who used the module and students who did not; those who did scored statistically significantly higher. One implication of the study is that with relatively simple tools and thoughtful design, gamified online learning modules can be developed that increase deeper learning processes.

The next paper in section two is "The Effects of E-Learning on Students' Motivation to Learn in Higher Education" by Elgilani Elshareif of Canadian University Dubai and Elfadil Mohamed of Ajman University. As the impact of the pandemic continues to reverberate, many new populations of students around the world are engaging with forms of online learning. This study examines motivation to engage in e-learning using the conceptual framing of the ARCS model and investigates which ARCS motivational variables support students to learn online. Results show significant positive correlations between the elements of e-learning, specifically e-teaching materials and e-assessments, and students' motivation to learn but lower motivation concerning e-discussions and feedback. The authors conclude that further faculty development and student orientation may be needed to support student understanding of the importance of online asynchronous interaction to their learning.

The third paper in this section is "Student Self-Disclosure and Faculty Compassion in Online Classrooms" by Colleen Lindecker and Jennifer Danzy Cramer of American Public University System. The authors of this paper investigate the phenomena of compassion fatigue as it relates to online student disclosure of distress. Specifically, the paper investigates the prevalence of student self-disclosure to faculty members as well as the prevalence of compassion fatigue and compassion satisfaction among faculty members. The authors also analyze demographic factors associated with these variables including the relative prevalence of self-disclosure to male and female faculty members. The authors conclude that student disclosure of

personal challenges and trauma was nearly universal and uncover patterns of compassion fatigue among faculty by demographic variables that were explored. These results have significant implications for faculty development and student support.

The next paper is "How Can We Improve Online Learning at Community Colleges? Voices from Online Instructors and Students" by Qiujie Li of New York University, Xuehan Zhou and Di Xu of the University of California Irvine, and Brad Bostian of Central Piedmont Community College. Theses authors note that the community college sector is open access, has a higher percentage of students who have jobs, serves students who have struggled academically while participating at high rates in online learning and therefore has a unique profile of needs, especially relative to four-year public and private colleges. The paper seeks to answer questions about community college instructors' and students' perceptions of effective and ineffective practices in online instruction and critical changes needed to improve online instruction. The study was motivated in part by the existence of a ten-point performance gap between online and classroom instruction in the community college system that was studied. The authors surveyed students and faculty from multiple institutions and analyzed the data with a combination of machine and human coding to identify effective instructional practices from these two sources. The study identifies ways to improve online instruction in community colleges by uncovering specific practices that support and impede teaching and learning in online settings.

The fifth paper in this section is "A Content Analysis of Change Management Strategies for Technological Transitions in Higher Education Institutions" by Ingrid Guerra-López of Wayne State University and Siba El Dallal of the University of Michigan-Ann Arbor. The authors of this study note that research indicates the failure rates of organizational change initiatives are as high as 70%. Since various aspects of online learning represent significant organizational change, it is essential for our research community and practitioners to understand such initiatives. This study examines a specific technological change, migration of the learning management system (LMS). Through the paper, the authors develop a theory-informed framework specific for planning and managing such critical technology change in higher education institutions.

The next paper in section two is "Parents' use of Technological Literacies to Support their Children with Disabilities in Online Learning Environments" by Mary F. Rice of the University of New Mexico and Kelsey Ortiz of the University of Kansas. This study draw attention to the fact that numbers of students with disabilities continues to grow as a significant population served by online education in K-12 settings. Parents of students with disabilities take on extensive oversight of their children's education and therefore need to develop technology skills to perform their roles. Through extensive interviewing, the authors of this paper identify and categorize the various digital literacy skills parents deploy and outline their implications for research and practice.

The seventh paper is "Student Initiative Empowers Engagement for Learning Online" by Houston Heflin and Suzanne Macaluso of Abilene Christian University, Abilene, Texas. The authors of this study seek to understand how online students perceive their independence, engagement, effort, and learning in online courses and the impact of experience in online courses on these variables. They also investigate the online learning experiences that students perceive to be most helpful to their learning. Through survey methods, the study reveals that most students reported being more independent, more engaged, and more effortful in their online course than a typical face-to-face class. The study includes implications for faculty development and future research.

The next paper in this section is "Catching Lightning in a Bottle: Surveying Plagiarism Futures" by Zachery Dixon, Kelly Whealan George, and Tyler Carr of Embry-Riddle Aeronautical University. This paper used a descriptive research design to survey the extent to which students share coursework potentially in violation of university academic integrity standards. The research focused on eight frequently taught online undergraduate courses with multiple sections in which many students enroll. The authors used a web-based application designed to monitor the uploading of university content on CourseHero.com, a commercial website that allows students to share coursework including homework, discussion questions, quizzes, tests, papers, and case studies. Results indicate that almost half of all artifacts collected for the sample courses included graded assignments representing threats to the academic integrity of these courses. The authors conclude that monitoring digital exchange of coursework offers researchers, administrators, and instructors a data-driven means of triangulating academic misconduct.

The ninth paper in this section is "Supporting Student-Initiated Mobile Device Use in Online Learning" by Karen Milheim, Christy Fraenza, and Kim Palermo-Kielb of Walden University. Many students access online courses through mobile devices even though many such courses were not designed for mobile delivery. The purpose of this study was to investigate how and why students use a mobile device for their online courses, the challenges confronted, and strategies to overcome these. Using survey methods with closed and open-ended items the study's authors present results reflecting a set of themes that illuminate student motivations, hurdles to use, and potential solutions. The study provides a foundation of how and why online students proactively employ mobile devices for their coursework and how they may need support from their institutions for effective use.

The next paper is "Hybrid Flexible Instruction: Exploring Faculty Preparedness" by Enilda Romero-Hall and Caldeira Ripine of the University of Tampa. The pandemic has motivated many institutions to implement a variety of flexible options for accessing coursework. The most flexible of these is known as Hyflex instruction in which students can attend in person or either synchronously or asynchronously in an online format. Such flexible designs can require significant planning to be effective and few faculty members have extensive experience with this mode of delivery. Very limited research focuses exclusively on instructors' understanding and preparation for this instructional modality. The authors of this paper investigate faculty perceptions of their preparedness for Hyflex instruction as well as effective pedagogical strategies and support needed to implement it successfully. Data were collected via an electronic survey adapted from the Faculty Readiness to Teach Online (FRTO) instrument with a sample of 121 full- and part-time faculty. Results indicate that faculty feel prepared to engage in some aspects of HyFlex instruction, e.g., those similar to competencies for in-person instruction. However, faculty were far less prepared to handle the more complex features unique, such as managing students in two settings during the same class period, which are germane to the HyFlex modality. The clear takeaway is to make sure to address whether institutions have the infrastructure and resources needed for a HyFlex instructional setting including faculty development and student support.

The final paper in this issue is "Developing Peer Review of Instruction in an Online Master Course Model" by John Haubrick, Deena Levy, and Laura Cruz of The Pennsylvania State University. As online learning has grown many institutions have implemented a master course model in which full-time faculty and instructional designers develop courses that may be taught by others, frequently part-time faculty. The benefits to such a model include efficiency

and consistency across course sections. The downsides may include rigidity and limited options for creativity on the part of the actual instructors. Institutions also frequently employ a peer-review process of instruction to support instructional quality while promoting collegiality. The authors of this paper sought to investigate how participation in a peer-review process of courses utilizing a master course model affects instructor innovation and instructor presence. Results suggest that pedagogical agency and innovation is limited because of the master course model. The authors conclude that these findings point to a need to create a sense of community for the faculty members who teach them.

In closing, I would thank our authors, editors, reviewers, and editorial staff for their valuable contributions to the journal and to the field of online learning. We invite you to read and share this issue with colleagues and to consider submitting your own original work to *Online Learning*.

Development and Testing of a Roleplaying Gamification Module to Enhance Deeper Learning of Case Studies in an Accelerated Online Management Theory Course

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Abstract
Research has established that "cognitive rehearsal," (CR) or the visualization of application of a behavioral response to a situation, can increase self-efficacy through vicarious experience, but is challenging to induce online. Online higher education curricula can include collaborative game-based learning (GBL) in the form or roleplaying, which can facilitate CR. The purpose of this study was to develop an online GBL module to facilitate CR in online business graduate students learning management theory case studies, and to evaluate its ability to induce CR. A convenience sample of students voluntarily participated in a proof-of-conduct study using a mixed-methods design to gauge whether use of the module facilitated CR, a descriptive and thematic analysis was conducted. Data were collected from 106 students within two course sections in an online Master of Business Administration (MBA) program. The module was used as an optional supplement to a management case study assignment and approximately 50% of students used it. Scores on the assignment were compared between students who used the module and students who did not, and those who did scored statistically significantly higher ($p = 0.0003$). Students reported in a survey that the module induced CR about applying management theory. Students also expressed satisfaction with the module and provided feedback for its improvement in the areas of format and content. Our findings suggest that collaborative roleplaying GBL and other methods to induce CR in online higher education should be explored and formally studied.

Keywords: roleplaying, cognitive rehearsal, simulation, game-based learning, deeper learning, total quality management, higher education

The aim of this study was to develop an online gamified roleplaying module to facilitate CR for improving DL in online Master of Business Administration (MBA) students learning management theory case studies and conduct a proof-of-concept study of this module to evaluate how well it succeeded in encouraging DL and CR, and how the module can be improved. The specific research questions were the following:

1. Does using a GBL online roleplaying module along with a case study result in higher levels of learning compared to students using the case study without the module?
2. Do students who use the module report high levels of engagement with the module?
3. Do students who use the module report high levels of satisfaction with the module?

This paper starts with a literature review, which begins by covering how deeper learning principles (DLPs) have been implemented in higher education curricula in both face-to-face (F2F) and online settings. This is followed by a focus on roleplaying as part of game-based learning (GBL) and a description of how the concept of cognitive rehearsal (CR) has guided the use of roleplay in teaching soft skills in higher education in clinical occupations. The literature review ends with a description of study designs used to assess the efficacy of GBL implementations.

Next, research questions are presented, then the methodology for the study is delineated. This includes a description of the online, asynchronous GBL roleplaying module designed around DLPs and intended to induce CR that we tested in an online MBA management theory course. It also includes a description of our proof-of-concept study design and mixed-methods data collection and analysis. Finally, our results are presented, and our findings discussed.

Review of Related Literature

Online learning has been increasing in higher education settings, and instructors are faced with the challenge of gaining skills at curriculum development and delivery in an online setting (Pereira & Wahi, 2017, 2018, 2019). One theory that has been used to guide the development of educational curricula both in F2F classrooms and online is deeper learning (DL) theory (Wickersham & McGee, 2008). Wickersham and McGee (2008) proposed ways to incorporate DL or learning that "engages the learner who actively explores, reflects, and produces knowledge," into online teaching (p. 74). To incorporate deeper learning principles (DLPs), the authors encourage designers of online curricula to induce "active learning" by using real-world problems as examples, and "engaged learning" and "engaged activities" by providing the user choices about how to use the online functions, and different ways to interact with the curriculum (Wickersham & McGee, 2008). In addition, the online curriculum should consider "learner context" and "learner ownership," providing independence to the learner to self-set goals and self-manage utilization of the online module for learning (Wickersham & McGee, 2008).

Deeper Learning Principles in Higher Education

We recently conducted a review of articles reporting the results of testing of DL educational modules used in both online and F2F higher education settings over the recent two decades and found that the modules tested were most directed at undergraduates (63%) (Pereira & Wahi, 2019). When we stratified by type of profession for which the students using the modules were in training, we found undergraduates who were studying a clinical profession were less likely to be exposed to DL educational modules compared to those studying an education profession (Pereira & Wahi, 2019). We also found that among the DL methods tested, only 9%

included "interactive, game-based and simulation" activities, even though those are seen to reflect many DLPs, such as active learning, engaged learning, learner context, and learner ownership (Pereira & Wahi, 2019). Simulation specifically taps into the DLP of solving real-world problems.

There are reasons why different types of educational modules reflecting DLPs are implemented disproportionately across higher education, especially in an online setting. First, some topics are easier to teach online in such a way that students excel at learning the material. We conducted a different study comparing the uptake of didactic knowledge, technical skills, and role modeling in students in a F2F undergraduate computer information systems course to the online version of the same course (Pereira & Wahi, 2018). We found that while uptake was comparable between F2F and online, students overall excelled at different tasks in the F2F compared to online setting (Pereira & Wahi, 2018).

Next, certain DLPs are more intuitive to emphasize in higher education curricula than others. As an example, in our review of articles reporting research on modules incorporating DL in higher education, we found that modules emphasizing "collaborative peer learning," which were the most popular type of DL modules in the articles we reviewed, were implemented in similar rates in both F2F and online settings (Pereira & Wahi, 2019). We found that this bias towards certain types of DL modules over others influences how topics are taught using DL modules in higher education, in those topics where collaborative peer learning was easy to incorporate were more likely to have DL modules developed about them (Pereira & Wahi, 2019). As an illustration of this, in many countries, the COVID-19 pandemic provided a natural experiment in comparing F2F learning prepandemic to learning in hastily assembled online settings that emerged during the pandemic. In an article written about the medical student experience in Saudi Arabia, students found that collaborative peer learning increased during the pandemic out of necessity as courses moved from F2F to online (Hamad et al., 2020). While the authors anecdotally felt that this transition improved stress management and social learning (which is a DLP), they point out that scientific investigations need to be done about the true impact, as the peer learning strategy may not have been effective for all topics, and they could tell that not all students could adequately adjust (Hamad et al., 2020).

A third reason why different types of online educational modules reflecting DLPs are represented disproportionately across higher education is that some types of DLP-associated modules are easier to design and implement than others. GBL modules can be especially effective at reflecting DLPs but can be a challenge to incorporate into a curriculum successfully. One study of the implementation of a GBL module for teaching geography education called Farmtasia found that it appealed only to students who were interested in competition (Jong, 2015). While the Farmtasia module described was quite extensive, the article did not cover the actual development of the module in terms of cost, effort, and expertise needed (Jong, 2015). Another article describes very explicitly the design of a collaborative GBL module designed to encourage multi-stakeholder dialogue in rural communities in Zimbabwe and how challenging the actual design can be, even if the GBL module is not meant to be a competitive but a collaborative one (Perrotton et al., 2017).

Roleplaying as Part of Game-based Learning in Education

As a result of the diverse nature of these various challenges, certain types of DLP-associated modules are less commonly developed for online higher education settings. As alluded to earlier, a particular challenge has been encountered in developing roleplaying modules as a GBL implementation associated with DLPs in the online space in higher education, although

new approaches are being seen, especially in online settings. A few recent examples can be provided here. In one report, as a response to COVID-19, a F2F patient roleplaying simulation in an undergraduate nursing program was changed to simulate a telehealth setting so it could be conducted online, and potentially be more authentic to a real-world situation (Whited et al., 2021). In a different study, pre-service music teachers were placed in the setting of an alternative reality game (ARG), where they learned social and managerial skills through interaction with live actors via telephone, email, and social media (Overland, 2017). Both types of roleplaying modules could be seen as collaborative GBL, although it could be argued that the module with pre-service music teachers had a greater gamified component than with the nursing students. Still, in both cases, there are actors involved providing a simulated experience, and the student and the actors worked together to use collaborative GBL skills to arrive at common goals (Wang & Huang, 2021).

Although collaborative GBL roleplaying educational modules are less likely to be developed for a higher education student audience, when they are, they are more likely to be developed around certain learning domains. Wang and Huang (2021) recently conducted a comprehensive review of articles reporting on collaborative roleplaying GBL modules intended for education, many of which were implemented in the higher education space. They included 22 papers in their systematic review and in their summary of these papers, certain learning domains were favored over others as the subject of these GBL modules (Wang & Huang, 2021). The most common learning domains included language, programming, scientific fields, and general collaborative problem solving (Wang & Huang, 2021). None of the articles reviewed reflected GBL modules aimed at developing social and behavioral skills in a specific domain, the way the nursing program simulation was intended to develop patient interaction skills, and the pre-service music teacher simulation was intended to develop student interaction skills (Overland, 2017; Wang & Huang, 2021; Whited et al., 2021). Another observation that can be made about the articles reviewed is that many were missing basic information, preventing the authors from comprehensively appraising the module being described in the article (Wang & Huang, 2021). In a table summarizing the articles included in the review, the learning domain was listed as "null" on over a third of the articles reviewed (Wang & Huang, 2021). Further, some articles did not characterize the type of study participants, and therefore "null" was entered under the column "participants" in the table (Wang & Huang, 2021).

An additional observation that can be made about the GBL articles reviewed is that there is currently no standard way of assessing and comparing GBL educational modules tested with students (Wang & Huang, 2021). One of the criteria the articles needed to meet to be included in the systematic review is they needed to "provide empirical assessment of descriptions of the effectiveness of the game" (Wang & Huang, 2021, p. 90). While the article focused on summarizing the frameworks, components, and mechanics of various modules tested in the articles reviewed and not on the empirical assessments, it pointed out that there are various in-game metrics that can be gathered to measure the level of collaboration being engendered by the module (Wang & Huang, 2021). Further, the authors encouraged conducting analytics on elements of the modules that may include game logs, chat logs, and behavior logs, as well as conducting prospective data collection to gather data from users about their experience with collaboration, social learning, and knowledge uptake with respect to the module (Wang & Huang, 2021). This recommendation synthesized the different ways the authors observed that these items were assessed in learners using the modules in the articles reviewed (Wang & Huang, 2021).

Teaching Soft Skills Using Roleplay: Cognitive Rehearsal

A general focus of higher education is to develop "soft skills" in students, with soft skills being defined as the interpersonal, socio-behavioral skills that are required to apply technical skills and knowledge in a real workplace setting (Sousa & Rocha, 2017). To that end, several studies have focused on gamified roleplay in higher education students for the purpose of teaching soft skills. Examples include class roleplaying scenarios intended to improve project management skills (Sousa & Rocha, 2017) and skills interacting on a business team (Jabbarova, 2020). Consistent with previous findings, both examples were designed for F2F courses, and not for the online setting (Jabbarova, 2020; Sousa & Rocha, 2017).

A term from the clinical education literature is helpful to introduce here, and that is "cognitive rehearsal" (CR). CR is the mental visualization of one's application of a skill or one's behavioral response to a situation which can increase self-efficacy in applying the skill or handling the situation through vicarious experience (Longo, 2017). Roleplaying modules in higher education using CR have been aimed at nursing students to teach optimal ways to cope with interpersonal stress on-the-job, and as an effort to prevent bullying and incivility (Clark & Gorton, 2019; Iheduru-Anderson & Wahi, 2017). CR has also been the framework used in roleplaying educational modules used by social workers and surgical trainees (Delich, 2017; Finnesgard et al., 2016). As with the previous examples, these higher education modules with roleplaying to induce CR were developed for an F2F rather than online setting (Clark & Gorton, 2019; Delich, 2017; Finnesgard et al., 2016; Iheduru-Anderson & Wahi, 2017).

CR is a useful concept to apply to gamified roleplay in non-clinical fields, such as management, where the goals of the roleplay are collaborative rather than competitive in terms of GBL, and the intention of the activity is to develop soft skills (Wang & Huang, 2021). The concept of CR could be said to apply to gamified roleplay for developing skills for collaborative problem-solving, as was seen in some of the GBL modules described in two different proof-of-concept studies of gamification in teaching various subjects to undergraduates in an F2F setting (Crocco et al., 2016; Dias, 2017). CR could also be used to characterize the student experience of participating in the virtual, online roleplaying module to teach software project management skills described in an article by Maratou and colleagues (2016).

Study Designs in Game-based Learning and Roleplaying Research

Studies on roleplaying as part of GBL or CR implementations are greatly limited by the educational context for which they were developed. As an example, in a study of a CR module to teach lateral violence prevention in nursing students, only eight students participated (Iheduru-Anderson & Wahi, 2017). The study was mixed methods in design, in that authors reported descriptive results from quantitative analysis, as well as themes from qualitative analysis (Iheduru-Anderson & Wahi, 2017). In GBL implementations, a study design like this is often called a "proof-of-concept study" (Crocco et al., 2016). Proof-of-concept study designs of educational modules are not intended to test whether there is superiority of the module in terms of teaching and learning compared traditional educational methods. Rather, they are intended to gauge whether the application of the educational module had any impact on the learning experience, positive or negative. This applies not only to the students, but the educators as well (Crocco et al., 2016). It is intended to provide initial evidence of utility, such that if utility is not realized, the module can be redesigned before being tested again.

Proof-of-concept study designs are admittedly biased, but efforts can be made in the study design to reduce bias for the purposes of getting a clearer picture of whether the novel educational module is effective. For example, in their research on incorporating GBL into

undergraduate math, English, and science courses, Crocco et al. (2016) designed their study so that there were control sections of students that were not exposed to the GBL so that some comparisons could be made. By contrast, Dias (2017), who was testing a competitive GBL module on an undergraduate management class, used a pre- and post-test study design as well as comparisons with historical classes to assess the impact of the GBL implementation. As recommended by Wang and Huang (2021), proof-of-concept studies on GBL should propose research questions related to the desired learning outcomes and learning experience the GBL module is meant to induce and gather both quantitative and qualitative data to determine whether these outcomes were met.

Methods

We developed an online DL gamified roleplaying simulation module to induce CR in higher education students to support the learning in one unit of an online management theory course that is part of an accelerated online MBA degree program. We conducted a proof-of-concept observational study with a convenience sample of students using a mixed-methods design to gauge whether use of the module facilitated learning, engagement, and satisfaction in the students who chose to use it. Students were offered to use the online module as a supplement to opportunities to learn the regular material in exchange for extra credit on an essay associated with the material.

Characteristics of those who chose to use the module were compared to those of the rest of the class to assess selection bias. Essay and course grades were compared between those who chose to use the module and those who did not (with extra credit points for using the module subtracted to ensure a fair comparison). Those who used the module were given a survey about their opinions of the module, which included both closed- and open-ended questions (see Appendix A for a complete list of survey questions). We analyzed the responses from the survey to answer the research questions and to assess whether students reported engaging in DL and CR as a result of using the module. This section describes these procedures in detail.

Study Population/Sampling

The study sample consisted of students enrolled in an online accelerated MBA program offered at a state university in the northeastern United States (Fitchburg State University, 2019). Each student took one of two consecutive online classes in Management Theory and Process (MGMT 9080). MGMT 9080 is one of ten courses required for MBA students concentrating in management. The course examines management theories in relation to how they may influence managerial practices. Each class was seven weeks long, and took place in Fall 2019, with the first (Fall A) taking place over September and October 2019, and the second (Fall B) taking place over November and December 2019. Table 1 summarizes the course plan for each section of the class.

Table 1

Course Plan for Management Theory and Process Class

Unit (Week)	Topic	Case Study	Online GBL Roleplaying Module
1	Scientific Management Theory (Classical/Taylor)	X	
2	Bureaucratic Management Theory (Weber)		
3	Human Relations Theory & Theory of X and Y	X	
4	Systems Theory		
5	Total Quality Management (TQM)	X	X
6	Agile		
7	Final Paper		

As shown in Table 1, there were three case studies assigned throughout the course (in Units 1, 3, and 5), and the online GBL roleplaying module was designed as a supplement to the Unit 5 topic, Total Quality Management (TQM). We chose to add the module to Unit 5, the last unit in the course where a case study was assigned, to allow students who used the module to compare their experience in Unit 5 with their experience in prior case study units that did not include a supplemental module. The Unit 5 case study assignment was based on a published case study about how British Airways (BA) implemented TQM (Madar, 2015). Briefly, TQM theory holds that to ensure quality throughout the business processes of design, manufacturing, and delivering services, every level of employee should be empowered to contribute to the improvement of quality, although the nature of their contribution will be different depending upon their role in the organization (Kiran, 2017). The case study described how BA trained their employees to engage in TQM at all levels and presented data tables reporting the impact of those efforts over time (Madar, 2015).

For all case study assignments, learning objectives were developed. The learning objectives for the Unit 5 TQM assignment were that at the end of this unit, students will be able to:

1. State at least two performance metrics that could be measured about an organization and explain how they could be changed through a management intervention.
2. Identify a TQM principle that could guide a management intervention at an organization designed to improve quality and state your rationale as to how the principle could guide the intervention.
3. Describe how two different departments in the same global organization might implement the same TQM principle differently to improve quality, and
4. State one of the steps to implementing TQM and describe challenges that may be associated with this step.

Each case study was associated with an essay assignment consisting of three essay questions designed to reveal the extent to which learning objectives were met. The essay questions for the Unit 5 assignment were:

Question 1. In the case study, [a table in the case study article] presents metrics about BA for March 2008. Imagine you were on the BA executive team, which was meeting to set goals for these metrics for the next fiscal year in 2009. Imagine the team wanted to use TQM principles as a guide setting the new goals.

State two (2) metrics from [the case study table] that you think you could improve through a management intervention. Describe the management intervention, and how you think it would improve the stated metrics. Explain how at least two (2) principles of TQM relate to your management intervention.

Question 2. In 2010, although BA attributed their success at increasing inventory turnover and reducing number of employees as resulting from their TQM, unfortunately, they were suffering profit losses. Reflecting on how British Airways used TQM in the past, how might you shift the focus of the TQM if you were leading BA in 2010?

State one (1) TQM principle you would de-emphasize, and one (1) TQM principle you would emphasize and explain your rationale. Based on your choice of a priority TQM principle, suggest a management intervention that you think would bring a turnaround in profit and emphasize the TQM principle you stated. What metrics (aside from profit) would show you were successful at implementing the new TQM goals? [The table in] the case study can provide ideas for metrics, but you can come up with your own, as well – so long as they are measurable, and you can explain how they would be measured.

Question 3. In 2013, BA was doing well making a profit and having a high passenger load without many employees (see [case study table]). Part of their success was that they were able to keep their inventory turnover high, which they found was closely associated with a high passenger load factor and a larger number of aircraft. What TQM strategy would you recommend using to keep inventory turnover high at BA? What is your rationale for choosing this strategy? Which TQM steps do you think would be most impacted by this strategy, and why?

Students uploaded their papers to the learning management system used in the course, Blackboard (Blackboard, Inc., 2021a). Each essay assignment was graded according to a scoring guide (see Appendix B for the Unit 5 assignment scoring guide). In addition, the Blackboard anonymous grading option "Grade with Usernames Hidden" was used to help eliminate grading bias (Blackboard, Inc., 2021b). Specifically, because the grader did not know which student she was grading, she was not influenced by factors such as the student's race, gender, previous performance, or perceived aptitude (Blackboard, Inc., 2021b).

The essay assignment for Unit 5 had a total of 25 points (see Appendix B). For the participating classes, students were told that they could earn 2.5 extra credit points (10% of total) for participating in the online deeper simulation module. The 2.5 extra credit points would be added to their grand total calculated from their scoring guide.

Online Deeper Learning Roleplaying Module
Module Format
　　　　The online deeper learning roleplaying module consisted of five web pages: an introduction page, three scenario pages, and a module completion page. The introduction page included text explaining how to use the module, the case study and background resources for the module, and module learning objectives. Additionally, the introduction page described five different departments that were the subject of the simulation: Human Resources, Finance, Operations, Engineering, and Customer Service. Each department was represented by a fictional executive leader with a back story (see Appendix C, Figure C1 for an example of an introduction page description of department and executive leader from the online learning module.)
　　　　Each of the three scenario pages started by relating the events in a meeting of the executives of the five departments described in the introduction where metrics from the case study were presented. In addition, a challenge was given to the group by one of the executives (see Appendix C, Figure C2 for an example of a scenario introduction from the online learning module). On each scenario page, below the scenario description, each character provided both their thoughts about the scenario, as well as the dialogue they say in the meeting (see Appendix C, Figure C3 for an example of the thoughts and dialogue by a character in a scenario in the online learning module). In addition, below each character's thoughts and dialogue were audio versions, allowing users to listen to voice actors reading scripts (see Appendix C, Figure C3).
　　　　Finally, on the module completion page, there was a short debriefing video covering the learning objectives of the module and reviewing the scenarios. For students to get extra credit for completing the module, they were assigned to click on a link on the module completion page and fill out a survey in the online survey software SurveyMonkey. The survey collected their college email addresses to identify which students completed the module.
Module Elements Reflecting DLPs and CR
　　　　As described earlier, some DLPs that could be reflected in online curricula include active and engaged learning, learner context and ownership, and working with real-world problems (Wickersham & McGee, 2008). To inspire active and engaged learning, different types of media were presented involving text, a variety of images including data visualizations, video, and audio. To inspire the students to own their learning experience, the module was presented in a simple manner with navigable web pages that could be accessed in the order preferred by the learner. Also, the learner was not required to use any part of the module; as an example, learners could entirely skip choosing to listen to the audio or watch the debriefing video and could choose not to complete all three scenarios. Finally, to inspire authenticity, each scenario was built around a problem that was imagined from visualizing actual data presented in the published case study (see Appendix C, Figure C2).
　　　　The presentation of thoughts and dialogue in a meeting for each character about each scenario was designed to induce CR in the students. By explaining their dialogue through using their thoughts, the characters were intended to role model how CR may be used so that the students could understand this strategy and personally apply it if they wanted.
Survey Design and Data Collection
　　　　Two sets of data were collected in this study: data from all students in participating classes, and data from the survey completed by students who used the module. The following data were collected for all students in the participating classes: class membership (Fall A or Fall B), point score on Unit 5 essay assignment (before adding extra credit if earned), final percentage score in course (minus extra credit), and whether or not student used the online

deeper learning roleplaying module. Consistent with other proof-of-concept study designs, demographics of the students were not collected, as demographic classifications did not relate to our research questions (Crocco et al., 2016; Dias, 2017).

For the second dataset, those who participated in the online module were able to earn extra credit points if they completed an online survey and included their email address for identification purposes (see Appendix A for survey). The survey link was presented at the completion of the online module, as described earlier. The survey included a quantitative and qualitative portion, and the quantitative part included two sections. The first section asked the respondent to rate statements about how the module helped the student achieve the assignment learning objectives on a Likert scale, where 1 = did not help me learn at all and 5 = helped me learn a lot. One statement per learning objective was included (total = 4) and rated on this scale. The purpose of these items was to gauge whether the respondent believed knowledge uptake was enhanced by the module.

In the next quantitative section of the survey, using a scale of 1 = strongly disagree and 5 = strongly agree, respondents were asked to rate twelve statements about how well the module performed for them technically. These included eight statements that were positive if answered in the affirmative (e.g., "The layout of the module was clear"), and four that were positive if answered in the negative (reverse-coded, e.g., "The module was too complicated"). In addition, respondents were asked if they thought the use of the module in future classes should be required (with possible answers: "Yes, it should be required," "No, it should not be required, but it should be extra credit," and "No, I do not think the module should be used at all"). These items were included to provide practical guidance as to ways to improve the module, and whether the respondents felt it was of any value to implement above and beyond what was already being taught in the classroom.

Finally, respondents were asked four open-ended questions about the module: comments about how the module could be improved to help them achieve learning objectives, any specific complaints about the module, any parts of the module that stood out to them as excellent, and what improvements they would recommend to the module. The purpose of this qualitative portion was to elicit evidence of DLPs and evidence of CR. We considered expressions of active engagement with the module, learner context and ownership, and practicing real-world problems as evidence of DLPs. We considered expressions of rehearsing future behavior as evidence of CR.

Data Analysis

R was used for analysis (R Core Team, 2014). To characterize the sample, a descriptive analysis was conducted on the data from all students in participating classes. Proportions of students in Fall A and Fall B choosing to use the online DL GBL roleplaying module were compared via chi-squared analysis. To attempt to answer the first research question as to whether use of the module was associated with higher knowledge uptake, using a *t*-test, student grades on the assignment were compared between those using the online module (before adding extra credit) and those who did not use it (with alpha set at 0.05). However, we recognize that this is a biased analysis in those students who have higher grades in general may have chosen to use the module. To assess whether use of the module was biased toward higher performing students, a correlation analysis was done between assignment score (without extra credit included) and final course score (without extra credit included). We used this analysis as a way to rule out the module, in that if a higher-performing group of students who chose to use the module did not

demonstrate a higher knowledge uptake than the lower-performing group who did not, the value of the module would be seriously in question.

For the quantitative data from the survey questions, a descriptive analysis was done. Responses to Likert scale questions were visualized using the Likert package (Bryer & Speerschneider, 2016). The results of this analysis were used in part to answer the second and third research questions, which are whether students report a high level of engagement and satisfaction with the module. The results of this analysis were also used to troubleshoot and improve the content and implementation of the module.

Finally, qualitative data from the open-ended survey questions were analyzed using an approach recommended by Burnard and colleagues (2008) in which text from the answers is first coded into an initial coding framework, and from these results, themes are then assembled into a final coding framework. The results from this thematic analysis were also used to answer the second and third research questions. As part of answering these research questions, as stated before, we looked for evidence of DLPs and CR in the qualitative responses. As with the quantitative analysis, we also used the qualitative results as guidance as to how to improve the content and implementation of the module.

Results

Overall Results

A total of 113 students participated in the MGMT 9080 classes taking place in Fall A (n = 59, 55%) and Fall B (n = 49, 45%). Of those, 108 (96%) completed the Unit 5 assignment and were therefore included in this analysis (see Table 2).

Table 2

Descriptive Characteristics of Sample

Characteristic	All (n = 108)	Used Module (n = 58)	Did Not Use Module (n = 50)	*p*-value*
Fall A (n, %)	59, 55%	30, 52%	29, 58%	0.9140
Fall B (n, %)	49, 45%	28, 48%	21, 42%	
Score on assignment (mean, SD)	22.5, 2.7	23.4, 2.2	21.5, 2.8	0.0003
Score in course (mean, SD)	94.3, 5.8	96.5, 4.7	91.6, 6	<0.0001

Note. * For categorical test, chi-squared test was used. For continuous test, *t*-test was used. SD = standard deviation.

Of the 108 who completed the assignment, 60 (56%) chose to additionally use the module and submitted a survey providing feedback. The proportion choosing to use the module did not significantly differ between classes (chi-squared p = 0.9140).

As shown in Table 2, the average score on the 25-point essay assignment (before adding extra credit) for Unit 5 was statistically significantly higher for those who used the module compared to those who did not (23.4 vs. 21.5, *t*-test p = 0.0003). However, because students were given the option of using the module, these results may be biased, as students who generally have better grades may have been the ones to choose the module.

To assess this potential bias, an analysis was done comparing final percentage score in the course to Unit 5 essay scores (with extra credit subtracted from both values). As shown in

Table 2, those who used the module also had a statistically significantly average higher score in the entire course compared to those who did not use the module (96.5 vs. 91.6, p < 0.0001), lending support for the existence of bias. A scatter plot and correlation analysis support this theory (see Figure 1).

Figure 1
Scatter Plot and Correlation Analysis: Assignment Score vs. Score in Course
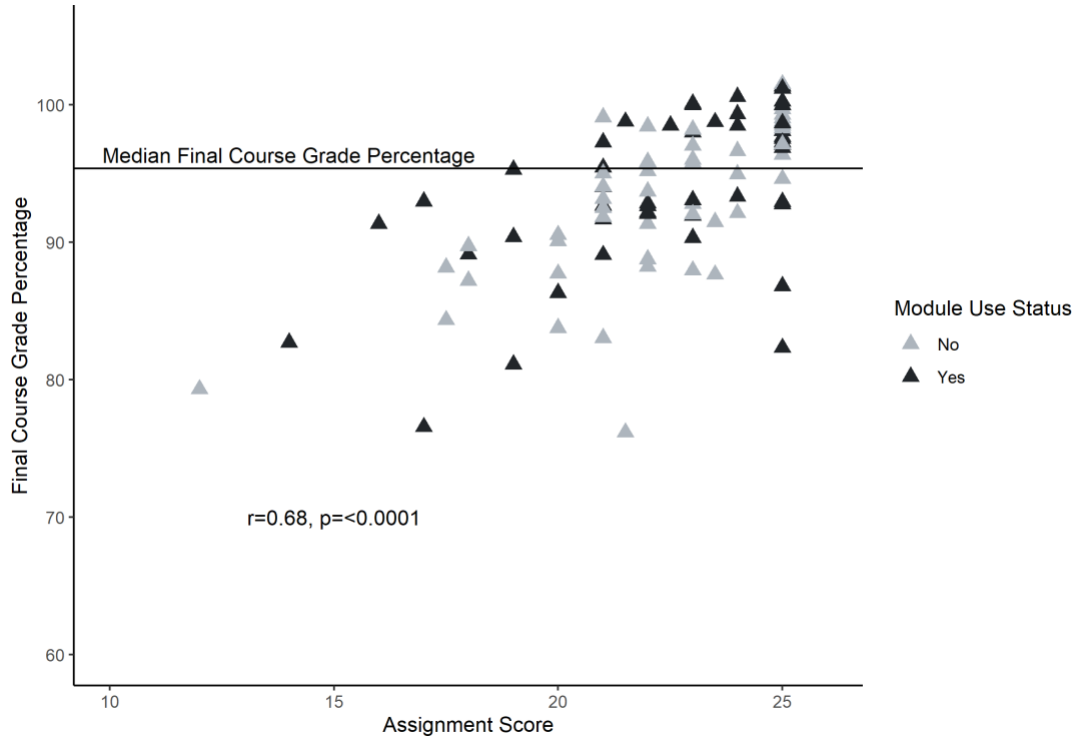
As shown in Figure 1, assignment and course grades were highly correlated (Pearson r = 0.68, p < 0.0001), and students who used the module were more likely to be higher scorers in general, as seen by the fact that they group into the upper right quadrant on the scatter plot.
Quantitative Survey Results
Figure 2 shows the Likert results for how the respondents rated how well the module helped them achieve the four learning objectives, and Table 3 decodes the labels used in Figure 2.

Figure 2

Likert Scale Plot for Course Objective Statements
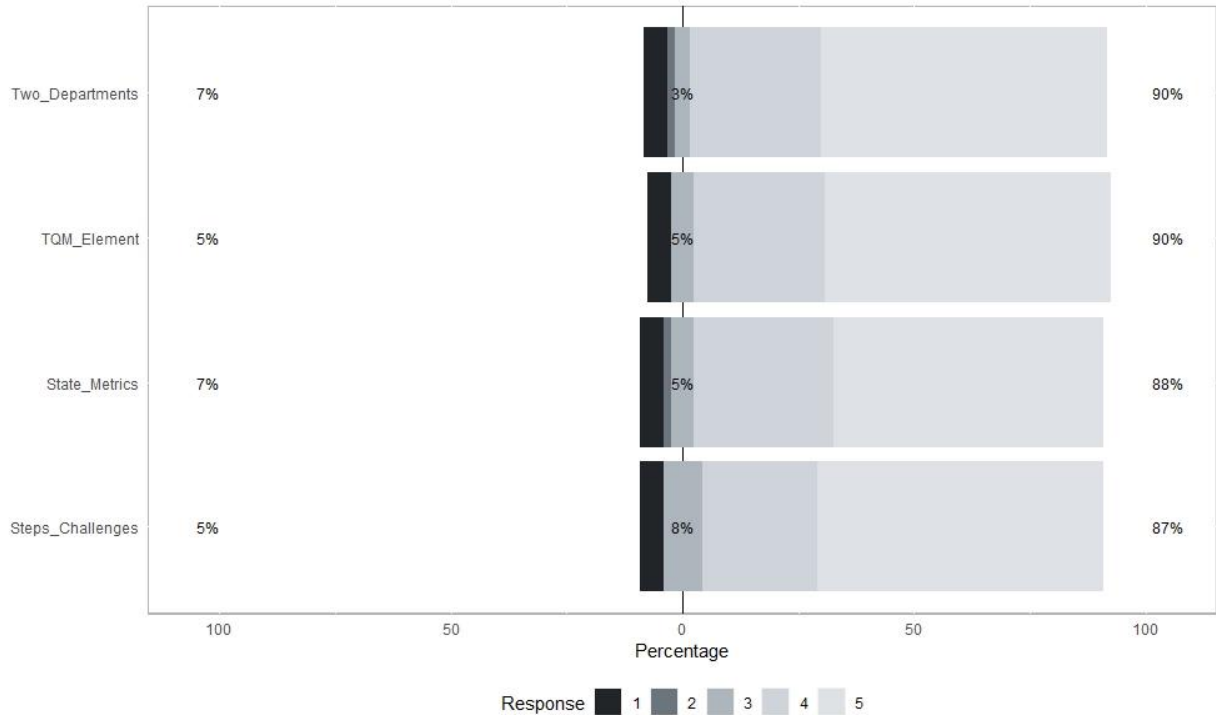
Note. Response codes: 1 = Did not help me learn at all, 2 = Did not help me learn very much, 3 = Neither helped nor did not help me learn, 4 = Helped me learn a little, and 5 = Helped me learn a lot. Labels and their learning objectives described in Table 3 below.

Table 3

Labels and Items for Figure 2

Label	Learning Objective
Two_Departments	Describe how two different departments in the same global organization might implement the same TQM element differently to improve quality.
TQM_Element	Identify a TQM element that could guide a management intervention at an organization designed to improve quality and state your rationale as to how the element could guide the intervention.
State_Metrics	State at least two performance metrics that could be measured about an organization and explain how they could be changed through a management intervention.
Steps_Challenges	State one of the steps to implementing TQM and describe challenges that may be associated with this step.

In Figure 2, each horizontal bar represents a quantitative item from the survey, with labels on the y-axis on the left side which are decoded in Table 3. The items are arranged top to bottom starting with the largest percentage of students saying answer four or five (helped learn a little or a lot). These percentages are listed on the y-axis on the right side of the figure. The percentages responding four are visualized in the bar with light grey, and the percentages saying five are visualized in very light grey. Correspondingly, on the y-axis on the left side of the figure are the percentages of respondents answering two or one (did not help learn very much or at all), and these percentages are visualized in the bar in dark grey and very dark grey, respectively. The percentages of respondents answering three (neither helped nor did not help learn) are listed in the vertical center of the figure and visualized in a neutral grey.

In Figure 2, each item corresponded to a learning objective for the unit (presented earlier). As shown in Figure 2, users of the module overwhelmingly felt that the module helped them achieve the learning objectives, with between 87% and 90% indicating that it helped them learn a little or a lot for each objective.

Figure 3 shows Likert scale results for the technical performance statements in the survey, and Table 4 decodes the labels.

Figure 3
Likert Scale Plot for Technical Performance Statements
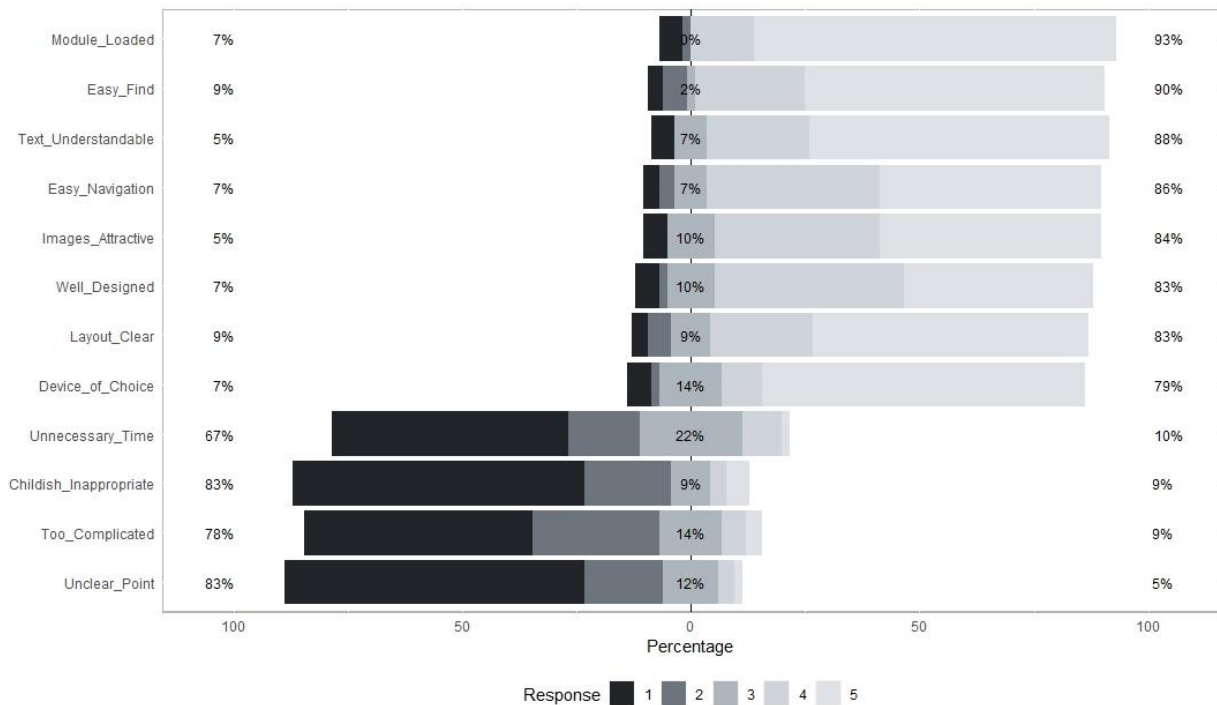
Note. Response codes: 1 = Strongly disagree, 2 = Somewhat disagree, 3 = Neither agree nor disagree, 4 = Somewhat agree, and 5 = Strongly agree. Labels, student statements, and positive or negative indicators described in Table 4 below.

Table 4

Labels and Items for Figure 3

Label	Statement	Indicates Positive Direction
Module_Loaded	Each page of the module loaded easily for me.	Agree
Easy_Find	It was easy to find what I was looking for in the online learning module.	Agree
Text_Understandable	The text used in the module was easy to read and understand.	Agree
Easy_Navigation	It was easy to navigate around the online learning module.	Agree
Images_Attractive	The images used in the module were attractive.	Agree
Well_Designed	The module was well-designed.	Agree
Layout_Clear	The layout of the module was clear.	Agree
Device_of_Choice	I could easily use the module on my device of choice (iPhone, laptop, etc.).	Agree
Unnecessary_Time	The module took extra time that was unnecessary for learning the material.	Disagree
Childish_Inappropriate	The module seemed childish and not appropriate for professionals.	Disagree
Too_Complicated	The module was too complicated.	Disagree
Unclear_Point	In the end, I did not really understand the point of the module.	Disagree

As described in Table 4, four of the twelve items were reverse coded, in that disagreement indicated a positive direction. As shown in Figure 3, between 79% and 93% responded with either somewhat or strongly agree to the statements where agreement indicated a positive direction, and between 57% and 83% responded with either somewhat or strongly disagree where disagree indicated a positive direction. No overwhelming technical issues were identified from these quantitative results. For module use for future classes, 32% recommended it be required, 64% recommended it be offered for extra credit, and 3% recommended it not be used.

Qualitative Survey Results

In the qualitative part of the survey (Appendix A), the students were asked to answer four open-ended questions addressing ways to improve the module to better meet learning objectives, any specific complaints about the module, any parts of the module that stood out as excellent, and what improvements they would suggest we make. First, this section will present evidence of the DLPs and CR that were provided in the open-ended responses from students. Next, the final coding framework with themes will be presented.

Evidence of DLPs. As described earlier, the DLPs intended to be reflected in the module were active and engaged learning, learning context and ownership, and real-world simulation. We looked for evidence of these in the responses to open-ended questions.

Many comments expressed overall appreciation for the module in a general sense, saying it helped them learn the material. For example:

> *Participant 20: I was struggling with the case study and decided to try this learning. It helped me very much. Thank you for including it.*

While it was heartening to see many positive reactions, the lack of specificity in the statements made it difficult to understand which DLPs might have been induced by the model, if any, and how these might have led to CR or improved learning. One recurring theme expressed in the open-ended questions is that students liked the ability to have the text both in written form and in audio, and expressed that they liked the interactive nature of these functions:

> *Participant 5: I loved how you can read along with the spoken words.*

> *Participant 16: All parts of the module should have the ability for the student to listen to it. I found it is more comprehensive listening to the module then just reading it. Things seem to stick if I listen to them then just reading it off the page. At least this is important to me as I study.*

We interpreted these responses reporting use of the interactive elements of the module and the desire for more interactive elements as evidence of engaged learning. It also provided evidence of learning context and ownership, in that the students were choosing which interactive items to use, and how they preferred to consume the material. Other comments suggested that the authenticity of the real-world scenario was helpful:

> *Participant 1: I like the narration of the different departments. It helped me with the understanding of executive level type meetings.*

> *Participant 14: The examples were helpful to understand how the concepts are applied.*

> *Participant 22: The simulation part was very helpful, because helped to understand each department and their points.*

> *Participant 23: The explanations from each executive's point-of-view on why they chose the specific strategy or element was most helpful.*

Evidence of CR. We also looked in the responses to open-ended questions for evidence of CR. While it was harder to assess if CR occurred, a few quotes suggested that it did:

> *Participant 5: I liked the thought section followed by what was actually said in the conversation. I think it was something we can all identify with and gave us good examples of how to rephrase our thoughts in a way that is more constructive.*

> *Participant 14: The last module was my favorite since it broke down each strategy and the steps. I really do feel like I learned a lot and better understand how to apply!*

Taken together with the feedback about the authenticity of the module, it appears that at least some students who used the module identified with the characters in the module and were able to apply CR with respect to addressing the management challenges faced by the characters.

Final coding framework. Table 5 presents a summary of the final coding framework derived from analyzing these answers.

Table 5

Final Coding Framework from Qualitative Responses

Format		Content		Other Feedback
Change Suggested	**Positive Feedback**	**Change Suggested**	**Positive Feedback**	
Use images of real people	Well-designed	Need broader incorporation of topics into module	Relatable	Some found module confusing and/or too long
Design needs improvement	Easy to navigate	British accents and higher quality audio	Liked thoughts and dialogue	Some requested modules for other topics
Add interactive features	Good module flow	Difficult tying case study to characters	Helpful details including charts and examples	Found it to be an innovative resource/would recommend
Problems with scrolling and auto-collapse		Add more audio	Background helpful	Need to be clear about assignment (grading, extra credit, deadline)
Separate resources from module		Too much background	Helped understanding of the topic	
Improve navigation		Add more video	Helped envisioning applying the theory/ roleplaying	
			Helped answering the essay question	
			Multiple uses helped understanding	

As can be seen in Table 5, the comments seemed to relate to one of three main categories: comments on actual electronic format of the module and its components, comments about the content of the module, and feedback about other areas. For the format and content, the comments fell into categories of changes requested, as well as positive feedback.

As shown in Table 5, the first main theme had to do with format. The module contained a lot of content, so to reduce the cognitive load of the user, much of the content was hidden behind collapsible accordion controls that were manually opened when the user wanted to interact with the content. This turned out to be a problem, as it made the module confusing and difficult to navigate. A different approach to this design problem needs to be used when the module is upgraded. The other main comments about format change indicated that the module should be professionalized, with professional voice actors and real photographs of individuals, not the volunteers and basic electronic tools we used to make the prototype. This would be necessary to support the real-world authenticity associated with DLPs.

The second main theme had to do with content (see Table 5). As described earlier, students reported evidence of CR and DLPs, indicating that the content helped them envision applying the theory to real management problems. They reported being able to relate to the characters and finding it helpful that the characters roleplayed not only how they thought about the situation, but what they said in the meeting. This appeared to help deepen student understanding of how to work with other managers to apply a management theory to solve a problem. Further, students reported using the various electronic resources provided, which is evidence of DLPs. Many expressed positive feedback about the inclusion of audio and video, and even requested more, though some reported the module already had too much content and was too long. The main challenge with the content was having it apply more clearly to the topic. It would have been better to get a TQM expert to advise the module, rather than having the authors design it without this subject matter expert (SME). This aspect could be incorporated as part of upgrading and professionalizing the module.

Discussion

Our quantitative and qualitative results provide evidence that higher education students who used our GBL online roleplaying module as a supplement to their management case study essay assignment experienced higher levels of learning from using the module. The students reported in engaging with various features and aspects of the module and were satisfied with the module. Students using the module provided evidence of the DLPs of active and engaged learning, learner context and ownership, and solving real-world problems. Students also reported that the module facilitated CR around the management theory described in the case study.

One implication of these findings is that with some basic tools and careful design, online learning modules can be created that increase DLPs and induce CR when trying to teach the acquisition of management soft skills—although to professionalize a module like this would probably require a dedicated development effort similar to the one used to create the roleplaying module for rural communities in Zimbabwe (Perrotton et al., 2017). Recently, there has been a call to improve academic curricula in management to better ensure workplace readiness in students in terms of soft skill acquisition (Ritter et al., 2018). Considering workplaces as external stakeholders, Ritter and colleagues (2018) contend that academic management curricula should be redesigned such that they focus on developing teamwork-related skill sets in students so that they can demonstrate these soft skills in workplaces after they graduate. Additionally, GBL roleplaying modules have been proposed specifically for teaching soft skills in management

(Acharya et al., 2018; Dias, 2017; Maratou et al., 2016; Sousa & Rocha, 2017). This suggests that use of modules such as the one tested in this study will grow in demand for use in higher education in management.

Another implication of these findings is that real-time roleplaying is not necessary to induce DLPs and CR in students. Traditionally, in F2F classrooms, case studies and management roleplaying can be done in real time. For example, Acharya et al. (2018) demonstrated in an experimental study that participating in a customized roleplaying assignment in a traditional higher education classroom was associated with not only applied learning, but greater enjoyment of the learning process. Clearly, the roleplaying approach in the traditional classroom can easily impart DLPs.

However, imparting DLPs using roleplaying by way of an online module to encourage CR is more challenging, because a design decision must be made as to whether students will be roleplaying with each other or the professor, as is done in an F2F setting, or with static characters, as was done in the prototype module tested. The disadvantage of the approach used for the module is that it lacks the social learning of the traditional classroom roleplaying scenario, which is associated with DL (Wickersham & McGee, 2008). Interestingly, the results of our study show that even though social learning was not incorporated, and students were not interacting with each other or the professor in real time, they still engaged in CR and DLPs, and received educational value from the exercises in the module. This suggests that even a roleplaying module with static characters, if designed with the proper format and content, can induce DLPs and CR in online higher education students.

Studies of online modules in higher education that increase the use of DLPs and CR are seriously lacking. As mentioned earlier, a review we conducted on studies of DLPs in higher education found that even now, traditional classrooms are studied at a higher rate than online ones, so the approaches being developed and tested cannot be deployed online (Pereira & Wahi, 2019). This may be true because it is likely more challenging to both develop as well as research an online roleplaying simulation module for higher education compared to developing and studying a roleplaying activity for deployment in a traditional classroom setting. Nevertheless, regardless of whether the module is online or F2F, the design of the module is important, because if it does not induce CR, the roleplaying aspect will have little value. As an example, Fominykh et al. (2018) created an online three-dimensional simulation environment for teaching professional counseling skills in an online higher education course. Compared to our module, theirs was much more technologically sophisticated, and appeared to have professors playing out two scenarios while electronically interacting with the students (Fominykh et al., 2018). The professors appeared to play scripted roles of a patient in an ethically challenging encounter with the student (Fominykh et al., 2018).

Because the authors collected both quantitative and qualitative data aimed at measuring "experiential learning," it was not clear from their results that students underwent CR as to what they would do when encountering a similar scenario in real-life with a patient, because CR was not the specific behavior studied. While the comments published in the article indicated that the roleplaying experience helped students prepare for a similar real experience with a patient, as we saw in our study, much of the feedback was centered around the technological aspects of the module (Fominykh et al., 2018).

It seems that in their attempt to make the module more realistic, the authors inadvertently introduced technical issues; this appears to be a tradeoff faced by online educational designers of roleplaying modules (Fominykh et al., 2018). Because these modules are so difficult to develop, it is imperative that they be improved such that they successfully induce DLPs and CR so that their educational value outweighs the effort needed to develop them.

Our study has both strengths and limitations. In terms of strengths, our module was designed based on DLPs for the goal of inducing CR, underwent rigorous field testing, and it was found that the module did encourage DLPs and the use of CR. Therefore, we were able to demonstrate not only how to make a successful online educational module like this, but how to successfully study it to receive actionable feedback. However, the study itself is limited in many ways. First, we only tested this module in two higher education classes at one college in the Northeastern US. We also found evidence of bias, in that higher performing students were more likely to volunteer to test the module. The module may perform very differently in a different student cohort and may have been successful partly because it was specifically designed for this population. Next, it is not clear that TQM was the optimal topic for a module like this, and from the feedback, it seems the use of an SME in developing module content would have improved the module. Also, before being used widely in higher education, the module format and content would need to be professionalized and upgraded.

Conclusion and Recommendations

In conclusion, we developed an online roleplaying GBL module to teach management theory to higher education students enrolled in an MBA program, and in the approximately 50% of students who chose to use it, evidence of DL and engaging in CR was reported. Feedback was given to professionalize and upgrade the module, which should involve improving the quality of the electronic resources and including an SME on the team to improve the content. More studies of online roleplaying modules for teaching soft skills that aim to increase DL and CR for applied learning in higher education, especially in management, should be conducted. This is because, with the rapid conversion of F2F classrooms to online programs currently taking place in higher education, especially in response to COVID-19, online resources that are shown to produce DL and CR in college students are currently in high demand, and few evidence-based options are available commercially.

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Appendix A

Survey

1. Please rate how much you agree that the online learning module helped you to be able to do the following learning objectives on a scale of 1 to 5, where 1 is "Strongly disagree" and 5 is "Strongly agree."
    a. It helped me be able to state at least two performance metrics that could be measured about an organization and explain how they could be changed through a management intervention.
    b. It helped me to identify a TQM element that could guide a management intervention at an organization designed to improve quality and state my rationale as to how the element could guide the intervention.
    c. It helped me to describe how two different departments in the same global organization might implement the same TQM element differently to improve quality.
    d. It helped me to be able to state one of the steps to implementing TQM and describe challenges that may be associated with this step.

2. If you have comments about how the online learning module could be improved to better meet the learning objectives, please provide them here [Open-Ended Response]

3. Please rate your agreement with the following statements about technical features of the online learning module on a scale of 1 to 5, where 1 means Strongly Disagree and 5 means Strongly Agree.
    a. It was easy to navigate within the online learning module.
    b. Each page of the module loaded easily for me.
    c. I could easily use the module on my device of choice (iPhone, laptop, etc.).
    d. It was easy to find what I was looking for in the online learning module.
    e. The layout of the module was clear.
    f. The images used in the module were attractive.
    g. The text used in the module was easy to read and understand.
    h. The module was too complicated.
    i. In the end, I did not really understand the point of the module.
    j. The module seemed childish and not appropriate for professionals.
    k. The module took extra time that was unnecessary for learning the material.
    l. The module was well-designed.

4. If you have any specific complaints about the module, please explain them here [Open-Ended Response].

5. If any parts of the module stood out to you as excellent, please comment about that here [Open-Ended Response].

6. What improvements would you recommend to the module? This question is optional. [Open-Ended Response].

7. Do you think this module should be required in addition to the essay for future classes?
Yes
No

Appendix B
Essay Scoring Guide

Essay #1: Connect two metrics to a management intervention

Domain	Component	Max. Points
Content	Stated at least two (2) metrics that could be changed through a management intervention.	2
Content	Described the management intervention and provided a clear and reasonable rationale for how the intervention should improve the stated metrics.	2
Content	Stated at least two (2) elements of TQM that relate to the proposed changes and linked them with the proposed changes.	2
Format	Less than 300 words	1
Format	Clear, cohesive writing with proper grammar.	1
Active Learn.	Appears to have integrated the concepts of applied TQM in answer.	1
Total	Essay #1 Total	9

Essay #2: Management intervention to emphasize and de-emphasize certain metrics

Domain	Component	Max. Points
Content	Stated at least one (1) TQM element to emphasize, and at least one (1) to de-emphasize.	2
Content	Clearly explained the rationale for emphasizing and de-emphasizing stated TQM elements.	2
Content	Proposed a reasonable management intervention that could improve profits based on emphasizing priority TQM element.	1
Content	Clearly stated metrics that could be used to benchmark success, and if they are benchmarks not already in the case study, clearly stated how they would be measured.	1
Format	Less than 300 words	1
Format	Clear, cohesive writing with proper grammar.	1
Active Learn.	Appears to have integrated the concepts of applied TQM in answer.	1
Total	Essay #2 Total	9

Essay #3: Strategy to keep inventory turnover high

Domain	Component	Max. Points
Content	Recommended TQM strategy and provided rationale.	2
Content	Described which TQM steps would be most impacted by choosing that strategy and provided a rationale.	2
Format	Less than 300 words	1
Format	Clear, cohesive writing with proper grammar.	1
Active Learn.	Appears to have integrated the concepts of applied TQM in answer.	1
Total	Essay #3 Total	7
Grand Total	Total points for assignment, including all essays	25

Appendix C

Examples from the Online Learning Module

Figure C1

Example Introduction Page Description of Department and Executive Leader from the Online Learning Module

Operations Department

The Operations Department deals with all the logistics involved in the organization. This involves coordinating staff and equipment (including planes) to be at the right location at the right time. It also coordinates interactions between departments, such as ensuring policies and procedures by Engineering Department staff do not collide with the activities of the Customer Service staff. The Chief of Operations is the head of the Operations Department.

CHIEF OF OPERATIONS, OPERATIONS DEPARTMENT
MS. LOGISTICS/CHIEF OF OPERATIONS

Back Story

Ms. Logistics will represent the Chief of Operations in this simulation.

- Logistics comes from a family who ran a high-end transportation service, where they catered to luxury businesspeople with limousine service. Over the course of her childhood, they expanded into the taxi service, and when she was a teenager, she became a dispatcher.

- Logistics loved being a dispatcher, and when she went off to college, worked as a dispatcher at a trucking service. It was there that she formulated in her mind her dream job – coordinating shipments of inventory for a large, international network of retail housing goods stores. Many of the truckers shipped merchandise from these stores, and not only did she love the merchandise, the truckers spoke highly of the culture of the store and how they treated their customers, contractors and employees.

Figure C2

Example Scenario Introduction from the Online Learning Module

Scenario Description

This scenario centers around an Executive Team meeting that takes place in March 2008. At the beginning of the meeting, Ms. Saver puts a slide up for everyone to see. It includes the following: 1) current data about various BA metrics, and 2) two proposed goals for changing these metrics over the next year. One goal proposed is more conservative ("low goal"), and one is more ambitious ("high goal"). See them depicted in the image below.
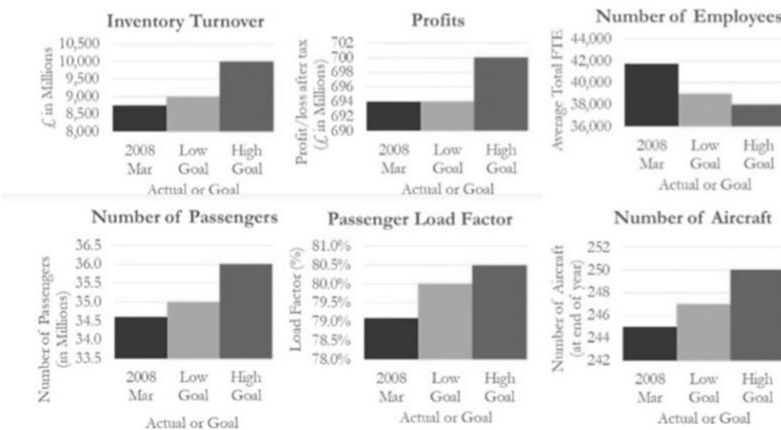
Ms. Saver wants the group to discuss the following:
1. Which of these metrics should we target improving over the next fiscal year, in 2009?
2. For those that we target, what should be the new goal, and how should we work to achieve that goal?

Ms. Saver recommends that the group review the elements of TQM to use those to help guide the group in discussion.

Figure C3

Example of Thoughts and Dialogue by a Character in a Scenario in the Online Learning Module

Operations Department

CHIEF OF OPERATIONS, OPERATIONS DEPARTMENT
MS. LOGISTICS/CHIEF OF OPERATIONS

Thoughts

Ms. Saver is so funny – she always looks at the money side of things, and overlooks the issues with inventory. Our turnover is terrible; the lower it is, it means the more we have to pay for storage of our inventory, which is costly. This is possible to correct with better planning, but it really requires system thinking, because the whole system has to adjust – the distribution of type of employees and what they do, and how planes are managed and organized – the whole thing.
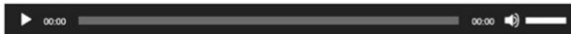
Statement in Meeting

"I'm sorry, but my eye makes a beeline straight to our turnover number, which is terrible. I think it could easily be 1 to 2 million pounds higher – in fact, I think this is the main place where we are losing money. I think we should target increasing turnover to increase profits, but if we did that, you'd all become my best friends really quickly, because we'd be meeting constantly. I'd need to work with Mr. Hari to implement personnel changes, Lady Goodflight would need to partner with me to help me figure out how to move our customer-focused inventory faster, Dr. Tinker would need to educate me more on moving our plane-related inventory faster, and Ms. Saver would need to approve all of our crazy ideas. It would be a big project, but I'm up for it if you want to do it!"
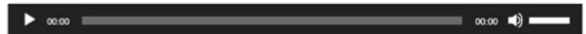
The Effects of E-Learning on Students' Motivation to Learn in Higher Education

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Abstract
The recent COVID-19 pandemic has forced educational institutions worldwide to adopt e-learning. UAE higher education institutions have implemented e-learning systems and programs to cope with this unprecedented situation. This paper measured the strength of association between key aspects of e-learning systems and programs and students' motivation to learn in Ajman University (AU). Cronbach's coefficient alpha was used to test the internal consistency reliability of key aspects of e-learning (EL-8) and students' motivation to learn (SML-16). Exploratory factor analysis was used to test the validity of, and coherence of patterns in, the data. Parametric and non-parametric methods were used to investigate the strength of association between key aspects of e-learning and students' motivation to learn in AU. The results indicated that motivation variables were more strongly correlated with both e-teaching materials and e-assessments key aspects relative to others such as e-discussion, and e-grade checking and feedback.

Keywords: internal consistency, key aspects of e-learning, motivation to learn, factor analysis

E-learning becomes an important means of knowledge and skill acquisition in higher education institutions. Students' motivation to learn contributes to knowledge acquisition and hence is of paramount importance to their success in the future. Many factors impact students' motivation to learn, and the question of how to stimulate student to learn remains the subject of much research. As concerns teachers, their role in the educational process is to create a positive environment which encourages learning and students' long-term success (Vero & Puka, 2017). Moreover, it is suggested that for students to increase their academic knowledge, they must be active in processing such knowledge. Chan et al. (2015) examined the impact of students' perceived autonomy support (explained as student perception of support received from their teacher in promoting self-learning) on learning motivation using in-lecture and after-lecture learning through the mediation of social-cognitive (defined as psychological processes that allow students to take benefits of social interaction) factors. The results indicate that perceived autonomy support plays an important role in promoting self-learning and motivation in the three samples from the U.K., China, and Pakistan.

Another factor with an immense impact on augmenting student knowledge is the use of a course learning management system. Different course management systems (CMS) have been developed and used by higher education institutions. One very popular CMS used by many higher education institutions as a complement to face-to-face learning is Moodle (Rice, 2015). These e-learning systems and programs have played an important role in improving the interaction between students and teachers.

This research focuses on four key aspects of Moodle activities, which are referred to as key aspects of e-learning: (1) e-teaching materials, (2) e-discussions, (3) e-assessments, and (4) e-grade checking and feedback.

The key aspects of e-learning inspired by the Attention Relevance Confidence Satisfaction (ARCS) model provide many meaningful benefits to the learning experience. First, they offer faculty a variety of powerful tools such as real-life case studies, short videos, social media, and invitations to guest speakers, etc. to enhance students' motivation to learn. Secondly, the tools are integrated with fun and intrinsic rewards to improve students' desire to access, attend, and actively participate in the e-learning course and cultivate the rewards of their contributions to course learning outcomes. Finally, the integration of key aspects of e-learning with ARCS model may help faculty to critically think about and accommodate students' interests and desire to learn and engage them emotionally.

Given the importance of the intensive use of information and communication technology (ICT) and its constructive impacts on the e-learning experience in higher education (Wan, Wang, & Haggerty, 2008), this study examined the use of Moodle in supporting e-learning resources in higher education. Prior research has suggested different key aspects of e-learning, such as e-moderating, e-design, e-communication, workload, and interactivity (Prosser & Trigwell, 1999). However, it is notable that the literature offers limited evidence on ARCS and key aspects of e-learning related to the use of Moodle in higher education. Hence, this study attempts to fill this gap by identifying four underlying key aspects of e-learning within Moodle.

Literature Review

Research on Online Learning

E-learning systems and programs have played an important role in improving the interaction between students and teachers. Among the prominent activities provided by learning management systems are e-teaching materials, which can be presented in different formats. E-teaching materials in the form of open educational resource (OER) textbooks are discussed by Dennen and Bagdy (2019). Their study indicated that students have given positive feedback on OER textbooks and that this type of material contributed to helping them meet course learning objectives. One recent study found that course activities aligned with learning objectives such as case studies, group assignments, problem solving, and peer-to-peer interaction have the highest impact on both student learning and engagement (Sadaf et al., 2019).

E-discussion that aims to engage students with their instructors, course content, or with each other via synchronous or asynchronous modes has been well documented in the literature. A study conducted by Truhlar et al. (2018) examined the effects of synchronous chats in an online course and found that assigning roles to students increased the proportion of student-student interaction. Prior research has also revealed that online discussion and engaging in interactive assignments stimulate students to share their opinions and develop a personal perspective (Buelow et al., 2018). Student opinion of the use of online discussion forums varies across discussion types: structured discussion forums (guided discussion with clearly identified topic) were received more positively by students than unstructured (students select the topic on mutual basis) ones (Tibi, 2018).

Asynchronous discussion in an online environment is also investigated by Mitchell (2019). The majority of students in that study indicated that the debate assignment assisted them in comprehending the course concepts and understanding them better.

Research on Online Learning, ARCS, and Motivation

Learning generally is the interaction between several components, including students, teachers, methods, technology, teaching materials, and assessment tools. Universities have examined a wide range of means to make a direct or indirect impact on improving the quality of the learning they offer, including students' knowledge, skills, and level of competency (Tokan & Imakulata, 2019). In particular, the role and value of e-learning in boosting motivation to learn has been a topic of considerable recent study. Universities have recognized student motivation to learn as an integral means of knowledge acquisition and many studies have been carried out aiming to find the relationship between effects of e-learning and on student motivation to learn.

The prominent ARCS model which is composed of four components—Attention, Relevance, Confidence, and Satisfaction—is used to inspire students' motivation to learn (Keller, 1987a). The attention component captures the interest of students and the curiosity necessary to learn. The relevance component captures the general goals of the students to inculcate good learning behaviors. The confidence component attempts to help students improve their confidence that they will succeed and are in control of their own success. The satisfaction component tries to reinforce accomplishment by means of both internal and external rewards.

Harandi (2015) investigated the strength of the relationship between e-learning and motivation among a sample of students and concluded that students' motivation is broadly impacted by e-learning. Other studies have considered the different ways in which e-learning can be delivered and assessed the role of each component in boosting motivation. Maulana et al. (2019) proposed using the three-pillar approach; social media, technology, and society (STS) to increase enthusiasm for independent learning, with results indicating that such an approach can

improve self-learning motivation. Another medium that can be used to improve students' motivation to learn is via technology, which has been proved to leverage vocational students' motivation to learn (Irawan et al., 2019). Recent developments in ICT, such as mobile phones, can also motivate students to learn. Imansari et al. (2018) indicated that e-books as a learning medium can improve such motivation in the case of studying history.

Paechter and Maier (2010) cited one of the studies addressing which aspects of e-learning courses students prefer and found that e-teaching materials are an important aspect of e-learning and contribute to motivating students to learn. E-teaching materials constitute the interface between students and an e-learning system and therefore the role of such materials in fostering motivation to learn also merits assessment. Yili and Tsai (2017) have analyzed e-learning teaching materials used by computer science students undertaking a mobile phone programming course. They found that students regarded the e-learning system teaching materials as far better than paper-based ones. These e-teaching materials contributed to students' performance and motivation to learn. In the same direction, Slater and Davies (2020) indicated that students prefer lectures, course notes, and primary literature available online, because these e-teaching materials were perceived as available and easy to engage with from outside the university campus. A study by Cundell and Sheepy (2018) found that e-teaching materials available online were highly rated by students in terms of importance in blended learning.

Asynchronous discussion, a form of e-discussion as a means of motivating students to learn, also merits study. Chan et al. (2016) explored the importance of asynchronous discussion in relation to students' self-preferences, level of engagement, and motivation. Their findings indicated that students' preferences, commitment, and participation in asynchronous discussion indirectly led to improvements in their motivation to learn.

Karagiannis and Satratzemi (2018) proposed a flexible technique in Moodle, which builds to capture both learner attitude and knowledge. Their proposed approach is based on a hybrid dynamic user model that was developed with technique based on learner knowledge and behavior. The experimental results indicated their approach affected students' motivation and performance. Researchers are engaged in ongoing study of the relationship between motivation to learn using e-learning systems and face-to-face learning. Zheng et al. (2018) assessed online self-regulated environments and learners' motivation using a structural model. Their results revealed that learners who have a motivated online learning experience tend to be more independent in the learning process and experience. Recent research (Stark, 2019) found that although the online students indicated a low level of motivation in contrast to face-to-face students, motivation variables were more strongly correlated with the course performance than learning strategies for online courses. A study of online learning conducted by Pugh (2019) revealed an association between gender and motivation, but no correlation between age and motivation.

Many psychologists and researchers have considered that students' motivation to learn is among the factors that most contribute to both face-to-face and online learning experience and academic success (Keller, 1987a; Snow, 1990; Tseng & Walsh, 2016; Kim et al., 2017). Keller (1987a, 1987b, 2008) proposed, designed, and offered the ARCS model discussed above, identifying the four basic components (i.e., Attention, Relevance, Confidence, and Satisfaction) used to stimulate students' motivation to learn. The proposed model assumes that students can be more viably and reliably motivated to learn if the motivational dynamics associated with these four factors are taken into consideration. Each component has its own motivational concern. First, attention means that students' attention to given instructions is attracted and retained.

Second, relevance requires the instructions to be connected to students' personal missions and goals. Third, a suitable level of confidence and positive expectation must be created as regards the learning process. Finally, satisfaction entails developing students' attitudes to ensure a continuing desire to participate in the learning process, with clear goals.

The ARCS model helps course designers in creating a learning experience that capture students' interest. Therefore, the ARCS model helps instructors to make specific changes in each course using ARCS components to stimulate students' motivation. Following Keller (1987b), instructors can use the four components with the objective to capture students' interest, address their needs, enhance their confidence for success, and provide them with meaningful opportunities. First, in reference to attention, instructors can present teaching materials in different formats, post challenging questions, and use real case studies. For the relevance component, instructors need to understand the students' background and experience and establish relevance via group peer-to-peer discussion or initiating in class series of guest speakers. To equip students with confidence, instructors need to establish a framework that guide students from fundamental knowledge to more specialized one that help them achieve challenging learning outcomes via giving students challenging and unfamiliar assignments. Finally, instructors must ensure that appropriate opportunities have been given to students to demonstrate their achievement of the course learning outcomes in ways other than course grading and assure that feedbacks and rewards are meaningful to them.

Chang and Lehman (2002) embedded relevance, one of the components of ARCS model, in computer-based interactive multimedia (CBIM) program used for teaching English as a foreign language to students. One of the findings of their study indicated that the performance of the students who learned from a CBIM program with an embedded relevance motivational strategy was better than students who learned from a CBIM program without an embedded relevance motivational strategy.

Prior literature showed that the ARCS model has become an integral part of academic learning activities. Hirumi et al. (2012) employed ARCS to assess two online courses, with their findings suggesting that learners' perceived levels of motivation were higher for the two online courses in which the ARCS model was used than in the conventional courses. Students' motivation to learn is considered one of the key drivers for an effective learning system in higher education (Kim et al., 2017; Guo et al., 2017). Recently, a flipped classroom design using the ARCS model to improve students' engagement and passion for learning is applied by (Songül & Polat, 2019). Findings revealed that the students' academic performance using the flipped classroom with the ARCS model was far better than in the distance education classroom model and the traditional classroom model.

The aim of this research was to measure the association between key aspects of e-learning systems and students' motivation to learn in online courses. Therefore, the following two research questions guided this research:

1. Which are the key aspects to consider in order to motivate students to learn in an e-learning environment using motivation factors within the ARCS model?
2. Is there any association between aspects of e-learning and students' motivation to learn?

Methods

To answer the research questions, the study identified the ARCS as a key reason for learning and integrated this model with the four key aspects of e-learning, namely e-teaching materials, e-discussions, e-assessments, and e-grade checking and feedback.

Setting

Ajman University (AU) was established in 1988 in the Emirate of Ajman in UAE. The QS World University Rankings (QSWUR) 2021 edition lists AU among the top 750 institutions globally by ranking it in the 701-750 band. In 2006, AU introduced Moodle as a course management system that aims to complement the face-to-face learning system. Moodle provides useful activities that help both students and educators in accomplishing a variety of tasks. The first two colleges that started implementing Moodle are College of Business Administration (CBA) and the College of Engineering and Information Technology (CEIT). All instructors are required to use varieties of Moodle activities such as uploading teaching materials, assignments, quizzes, forums, etc.

Sample

The sample was recruited from students registered in two colleges: CBA and CEIT at Ajman University. Several types of purposeful sampling strategies are used in prior research, of which criterion sampling is the most used in applied study (Palinkas et al., 2015) and has been adopted in the present study. The first criterion used for the selection of the students was based on their prior experience of using Moodle. All faculty members at the two colleges currently use Moodle as their CMS. Based on this criterion, the target participants of 160 students came from the CBA and CEIT colleges. Of the 160 students, 108 responded and completed the questionnaire, representing 68% of the target participants. The second criterion aimed at heterogeneity of study level. Only students who had finished at least one year and dealt with more than two courses that involved the use of Moodle were selected.

The selected students completed the survey form at the end of the class. In the first part of the survey, the participants provided the demographic data whose characteristics are shown in Table 1.

Table 1

Demographic Analysis of Data Sample

	Variables	Frequency	Percentage (%)
Gender	Male	50	46
	Female	58	54
Age	18 and under	2	1.9
	19–21	52	48.1
	22–24	41	38.0
	Over 24	13	12.0
Total		108	100%

Likert Scales Included in the Survey

The Likert scales and questions employed in this work are based on earlier research (Rahrouh et al., 2018; Keller, 1987a; Paechter & Maier, 2010). Additionally, to finalize the set of scales and questions a pilot was conducted with a small focus group of colleagues in the field. Respondents were asked to provide their opinion on 24 statements using a five-point Likert scale

(1 = "strongly disagree" and 5 = "strongly agree"). These statements are related to the most-used Moodle activities (EL-8) and the ARCS motivation model (SML-16). These 24 questions were divided into two subscales to maximize the outcome of the research and let the data patterns reveal new insights. The first subscale is related to e-learning key aspects and consists of eight questions defined as EL-8. The second subscale is about motivation and consists of 16 questions defined as SML-16.

The key aspects of e-learning (EL-8) are presented in Table 3. These key aspects are e-teaching materials (items 1 and 2), e-assessments (items 3 and 4), e-discussions (items 5 and 6), and e-grading and feedback (items 7 and 8). On the other hand, the items related to students' motivation to learn (SML-16) are shown in Table 4, soon after the reliability analysis.

Reliability of Instrument

The reliability of the research instrument was measured using Cronbach's alpha (Cronbach, 1951). Cortina (1993) stated that the alpha should be estimated for each dimension of a scale rather than for the entire scale. Following this argument, Table 2 presents the internal consistency reliability of both key aspects of e-learning-8 (EL-8) and student motivation to learn (SML-16). According to the coefficient alpha, the internal consistency reliability of EL-8 and SML-16 is 0.944 and 0.973, respectively. The value of Cronbach's alpha suggested that the items of the EL-8 and SML-16 were reliable.

Table 2
Summary Statistics and Cronbach's Alpha for EL-8 and SML-16

Variables/Statistics	EL-8	SML-16
Cronbach's alpha	0.944	0.973
Mean	3.77	3.62
Std. Deviation	0.894	0.911
Std. Error Mean	0.086	0.087
Skewness	-0.889	-0.665
Kurtosis	1.602	0.856

Table 2 also reports the descriptive statistics for both EL-8 and SML-16. Two important observations can be made from the summary statistics. First, the indices had a positive mean of 3.77 and 3.62, respectively. Second, the two indices are negatively skewed, and kurtosis is below the standard of 3, implying that the two variables behave linearly.

Data Analysis

To analyze the quantitative research data, IBM SPSS Version 26 was used. To assess the presence of latent factors emerging from students' answers to the Likert-scales, exploratory factor analysis (Hoban et al., 2005) was performed. Next, the parametric (Pearson *r*) and non-parametric (Spearman rank) correlation methods were employed to address research question 2, namely the assessment of the degree of association between factors.

The rationale for using the two methods is twofold. First, key aspects of e-learning and students' motivation to learn are assumed to behave linearly (parametric method); however, if variables tend to behave in a monotonic way, then it would be better to use a non-parametric method. Secondly, the parametric method is often used to assess relationships concerning an interval scale while a non-parametric method is used for ordinal variables (Lim & Park, 2011).

The parametric method is more informative than the non-parametric one in the sense that it uses information about the mean and deviation from the mean while the non-parametric method only uses the ordinal scale or spectrum of values.

Survey Findings and Results from Analyses

Table 3 and Table 4 summarize student responses using mean scores and Likert scale response percentages for key aspects of e-learning and students' motivation to learn, respectively. To address the first research question the five-point Likert scale was presented in three groupings as percentages: disagree, neutral, and agree (Ellis et al., 2009). Many conclusions can be drawn from these two tables. As documented in Table 3 and Table 4, certain issues are observed in this study and must be addressed.

Table 3

Key Aspects of E-Learning, 8 Items

Likert Scale Response: Mean and % (Disagree, Neutral, Agree)

Item/Question#		Mean	Disagree	Neutral	Agree
1	My teacher uploaded course e-teaching material and updated it on a regular basis.	4.01	7.4	14.8	77.8
4	E-assessment tools, such as assignments/projects/exams, were uploaded by my teacher.	3.93	9.4	16.8	73.8
3	E-assessment tools, such as assignments/projects/exams, are well prepared, explained, and understood by the students.	3.92	7.4	24.3	68.2
7	E-grade checking helps me to monitor my performance.	3.74	13	22.4	64.5
2	Supplementary e-teaching material such as further reading, exercises, journal articles, etc. are uploaded.	3.73	12.2	23.4	64.5
5	During the course period, my teacher discusses the importance of e-discussions for understanding the face-to-face learning experience.	3.64	14	29.0	57
6	E-discussions help me in understanding challenging topics with which I am not familiar.	3.59	14	30.8	55.1
8	E-grade checking improves communications between my teacher and me.	3.56	14.9	31.5	53.7

Table 4

SML Items

Likert Scale Response: Mean and % (Disagree, Neutral, Agree)

Item		Mean	Disagree	Neutral	Agree
24	The e-grade checking assisted me in achieving positive feelings about my success.	3.80	10.4	21.7	67.9
13	E-assessment activity such as assignments/projects/exams captured my interest and enhanced my learning experience.	3.74	8.4	30.6	61.2
22	The e-grade checking improved my feeling about responsibility for success.	3.73	9.5	31.1	59.4
21	The e-grade checking captured my interest and stimulated me to adopt an inquiring attitude.	3.69	11.3	28.3	60.4
20	The e-discussions provided me with a sense of satisfaction with the process of learning experience.	3.66	11.3	30.2	58.5
23	The e-grade checking provided me with corrective feedback and allowed me to learn from my mistakes.	3.65	8.5	23.6	62.2
14	E-assessment activity such as assignments/projects/exams helped me in meeting my personal needs.	3.65	3.7	30.6	59.2
15	E-assessment activity such as assignments/projects/exams helped me to believe that I would succeed and control my success.	3.63	6.5	29.6	57.4
19	The e-discussions helped me in building a positive expectation of success.	3.63	7.4	32.4	55.6
9	Interacting with e-teaching materials helped stimulate my curiosity to learn.	3.62	8.3	31.5	55.6
18	The e-discussions assisted in stimulating my personal engagement in the class.	3.57	7.4	31.5	55.6
16	E-assessment activity such as assignments/projects/exams helped me to acquire new knowledge and skills to solve real-world problems.	3.56	5.6	30.6	55.5
11	Interacting with e-teaching materials increased my confidence and motivated me to learn.	3.53	7.4	32.4	53.7
10	Interacting with e-teaching materials helped me in meeting my personal goals.	3.51	13.0	28.7	52.8
12	Interacting with e-teaching materials resulted in increasing my satisfaction and motivated me to learn.	3.51	12.0	31.5	50.9
17	The e-discussions contributed to sustaining my attention during my learning experience.	3.50	7.4	36.1	49

First, using the mean score, e-teaching and supplementary materials are perceived as being among the top priorities, scoring 4.01 and 3.73, respectively. In terms of the Likert scale related to e-learning key aspects, a majority of the students pointed to the importance of e-teaching and supplementary materials, with percentages of 74.8 and 64.5, respectively. This result coincides with that discussed in Paechter and Maier (2010) and Yili and Tsai (2017), who indicate that students prefer e-learning delivered in the form of PowerPoint lecture slides, videos, assignments, and chat box and forum messages with a clear goal.

Second, the mean score of the students' response to the e-assessments item suggested that the item is of high importance for their learning experience. Using a Likert scale, the majority of students indicated that e-assessments were important, with a value above 73% in relation to the key aspects of learning. Moreover, using a Likert scale, responses to item 13, 14, 15, and 16 suggested that most of the students pointed out that ARCS components were helpful with scores of 61.2 for attention, 59.2 for satisfaction, 57.4 for confidence, and 55.5 for relevance.

Finally, e-discussion and e-grade checking and feedback do not contribute to sustaining student motivation and represent a challenge in terms of improving communication between faculty and students. This result clearly emphasizes the importance of e-learning systems as a complementary teaching tool that can improve students' motivation to learn.

Factor Analysis

Exploratory factor analysis (Hoban et al., 2005) was used to assess the presence of factors. The analysis revealed three coherent factors; Factor 1: Teaching materials and assessments, Factor 2: Discussion, feedback, and intrinsic motivation, Factor 3: Extrinsic motivation. These factors were shown in Table 5 below. The three factors explained 69% of the variance with Eigenvalues of 18.03, 1.26, and 1.13, respectively. The eigenvalues of these three factors here are greater than one while all other factors evaluated in the principal component analysis (PCA) being a very small fraction indicate that along these three factors there is a lot of information as indicated in the Table 5 below.

Table 5

Factors and Standardized Loadings associate to the EL-8 and SML-16

Factors	Item	Factor Loadings
Factor 1: Teaching materials and assessments		
	Q1	0.769
	Q2	0.623
	Q3	0.719
Factor 2: Discussion, feedback, and intrinsic motivation		
	Q5	0.753
	Q6	0.816
	Q7	0.68
	Q8	0.595
	Q10	0.602
	Q11	0.678
	Q12	0.688
	Q13	0.625
	Q17	0.626
	Q18	0.728

Q19	0.745
Q20	0.685
Q21	0.561
Q22	0.567
Q23	0.565
Q24	0.712
Factor 3: Extrinsic motivation	
Q14	0.587
Q15	0.795
Q16	0.734

Note: Eigenvalue 18.03, 1.26, and 1.13, 69% variance explained.

Table 6 displays the correlation results for each factor. The results ranged from .295 for discussion and feedback to .746 for teaching material and assessments, indicating that the level of correlation ranked between low and strong.

Table 6
Summary of Non-parametric Correlation Metrics using Spearman Rank Correlation

	SML-Intrinsic Motivation		SML-Extrinsic Motivation	
	Parametric correlation (r)	Non-Parametric correlation (r)	Parametric correlation (r)	Non-Parametric correlation (r)
Teaching materials and assessments	.746**	.678**	.670**	.586**
Discussion and feedback	.343**	.349**	.299**	.295**

** Indicates 0.01 level of significance (2-tailed).

The results of this research show that both key-aspects in Table 6 and motivation variables, both intrinsic and extrinsic, were significantly and positively correlated. However, the degree of correlation varied, being stronger in regard to e-teaching materials and e-assessments (Paechter & Maier, 2010). In contrast to Zheng et al. (2018), this study found a weak correlation between motivation variables and e-discussion and e-grade checking and feedback.

Discussion

The main results show significant positive correlations between the key aspects of e-learning and students' motivation to learn in AU. This is evidence of the importance of the appropriate use of key aspects of e-learning in relation to students' motivation to learn. AU students have experience dealing with Moodle activities related to e-teaching materials and e-assessments. Since the inception of Moodle at AU, the majority of the Moodle activities used by the students are related to these two activities. Prior experience with Moodle may have also contributed to the high correlation between motivation and e-teaching materials and e-assessments. This argument is supported by other researchers (Yili & Tsai, 2017; Slater & Davies, 2020; Cundell & Sheepy, 2018). The low correlation between motivation variables and e-discussion and e-grade checking and feedback could be attributed to the absence of real-time

interaction between students and faculty in the way e-discussion and e-grade checking and feedback are implemented.

The implications of these research findings indicate, on the one hand, that AU students were intrinsically motivated toward learning via e-teaching materials and e-assessments and, on the other, that they are aiming to get good grades (extrinsic motivation) without sufficient engagement in asynchronous activities. This implies that the university needs to encourage faculty to develop strategies to further engage students with such activities to comprehend the course concepts intrinsically and extrinsically (Mitchell, 2019; Buelow et al., 2018). In addition, AU should consider developing a course that can be taken early in the student's term of study and orients them to the importance of asynchronous activities.

Conclusions

Motivating students to learn is a very important factor, and one which can contribute to improving the quality of education. In this paper, associations between key aspects of e-learning and students' motivation to learn were researched via an administered questionnaire completed by a pool of students studying at AU. The research results show a significant positive correlation between key aspects of e-learning and students' motivation to learn in AU. More specifically, the results indicate that AU students were strongly motivated in e-teaching materials and e-assessments but less so in regard to e-discussions and e-grade checking and feedback. The health crisis recently caused by the COVID-19 pandemic has increased the use of e-learning. As distance education continues to grow, more attention should be paid to how to integrate key-aspects of e-learning into motivation variables to assist AU students achieve their highest potential in a predominantly traditional system of higher education.

Limitations and Future Research

This research is limited in scope and did not include some factors such as key performance indicators and students' approaches to learning. Future research can attempt to address these limitations whilst sampling students across multiple universities in the UAE.

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Student Self-Disclosure and
Faculty Compassion in Online Classrooms

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Abstract
Compassion fatigue is well documented among professionals working in social service fields such as healthcare, emergency response, social work, and education. In higher education, there is a growing demand for faculty led student mental health support and life coaching services to support student retention and success. Students in online settings tend to disclose personally traumatic experiences and circumstances more openly in communications with faculty to seek support and extensions. In this study, we surveyed faculty to explore the relationship between student self-disclosure and faculty compassion fatigue in online classrooms. We hypothesized that student self-disclosure of personal challenges is common and may be related to faculty compassion fatigue and burnout. Results supported the hypothesis that student self-disclosure of personal challenges and trauma was common, experienced by 96% of surveyed faculty. Most faculty had low to average compassion fatigue scores; however, demographic and professional factors were associated with faculty compassion fatigue and burnout. Younger faculty, less experienced faculty, and female faculty had higher levels of compassion fatigue and burnout than older faculty, more experienced faculty, and male faculty. This study provides insight into the personal challenges and trauma students self-disclose to faculty, faculty variables that are associated with disclosure, and the impact student disclosure may have on faculty.

Keywords: Online teaching, compassion fatigue, student support, self-disclosure, faculty training

Self-disclosure is the act of sharing personal information about oneself with others, often with the goal of increasing connection, attraction, or empathy in interpersonal communication (Ryan, Kramer, & Cohn, 2016). Compassion fatigue is a psychological phenomenon defined as vicarious traumatization or secondary traumatization (Figley, 1995) that results from the emotional strain of exposure to working with those suffering from the consequences of traumatic events. It can occur in isolation following a single traumatic event or through cumulative trauma exposure (American Institute of Stress, 2017). Compassion fatigue has been extensively studied among medical professionals (see reviews in Sinclair et al., 2017; Smart et al., 2014; Sorenson et al., 2016). Physicians, nurses, psychotherapists, and emergency workers who help traumatized patients may develop their own PTSD symptoms as an indirect response to their patients' suffering (Babbel, 2012). However, other social service professionals such as police officers, social workers, and therapists can also experience compassion fatigue as a result of providing care and service to people suffering from significant emotional and physical distress (Caringi et al., 2015; Miller et al. 2018). In these social service professions, clients often self-disclose distress to their support team, leading to compassion fatigue for the social service provider (Teater & Ludgate, 2014).

Among educators, there is also evidence of compassion fatigue (Robinson, 2018). In higher education, anecdotal evidence from faculty meetings, training events, classroom observations, and conference workshops suggests students are increasingly disclosing personal information to faculty in open classroom discussions and one-on-one messages, often as rationale for absences, to request extensions, or to explain poor quality work. The increasing pressure to provide mental health support and emotional labor to students is having an impact on faculty (Gould, 2018; Ernst, 2019; Heemstra, 2019). As the culture of higher education moves towards the theoretical framework of humanizing education, faculty members are increasingly called upon to fill the role of confidant, counselor, and cheerleader. Many institutions and pedagogical experts are encouraging instructors to seek disclosure from students in order to support students (Pacansky-Brock et al., 2019). Faculty members, the majority of whom have no formal training in therapy, counseling, or psychology, and often have minimal knowledge of relevant university and community resources to appropriately counsel students who disclose significant personal struggles or issues, are taxed with knowing how to best respond to student disclosures. This can be especially challenging for adjunct, part-time, contracted faculty at online universities who typically lack the institutional knowledge and resources that other faculty (hybrid/in-person, tenured/full-time) have. If faculty members are unprepared to support student mental health needs, not only could compassion fatigue impact faculty mental health, but it may in turn, impact student success and persistence. In this paper, we present results from an online faculty survey examining compassion fatigue among online faculty members, identifying the prevalence of online faculty compassion fatigue, the prevalence of student self-disclosure, and demographic factors that might play a role in online faculty compassion fatigue.

Literature Review

The expectation for faculty members to invest emotional labor in their teaching is well documented (see reviews in Bellas, 1999; Lawless, 2018; Meier, 2005; Moore et al., 2010; Tunguz, 2016). As technology-mediated communication has increased in recent years due to social media, online/distance education, and widespread global internet access, so has researchers' understanding of the impact of technology on our tendency to self-disclose. Although findings in this area are mixed, some research (Joinson, 2001; Krasnova et al., 2010)

suggests that people tend to self-disclose more to others in an online or technology-mediated setting. Exclusively online education programs, due to their more flexible, often asynchronous nature and largely open enrollment admission requirements, tend to be tailored to students with more challenges that have an impact on their education (i.e., non-traditional/working adults, diverse student populations, low-income students, students who are less academically prepared, first-generation college attendees, single parents). The combination of students more likely to be experiencing trauma or personal distress and the technology-mediated online educational setting may result in increased student disclosure of highly personal traumatic or challenging situations and consequently, in compassion fatigue among online faculty members.

Students increasingly present college staff and faculty members with experiences of homelessness, hunger, violence, and mental health needs (Romo, 2018; Tarkan, 2018). In a survey of college counseling center directors, 95% reported that the number of students with significant psychological problems is growing on their campuses (APA, 2013). Colleges and universities, both face-to-face and online, are struggling to meet the mental and emotional health needs of students (Lederman, 2019; Thielking, 2017; Wolverton, 2019). For online faculty members specifically, online institutions may not have the same opportunity to observe in-person warning signs and may not have the same referral staff available to help students with these types of personal challenges (Barr, 2014). Given that those in medical or social services positions who are specifically trained to support trauma victims struggle with compassion fatigue, the increasing tendency to rely on untrained faculty as counselors and life coaches in online settings has the potential to result in compassion fatigue among faculty. Additionally, women faculty members are perceived as more approachable and empathetic (Bachen, 1999; Feldman, 1993). Studies have found they have higher emotional labor expectations compared to male faculty members (El-Alayli et al., 2018; Lawless, 2018, Tunguz, 2014), which suggests that sex differences are an important variable in the study of self-disclosure and compassion fatigue among faculty.

Better understanding of how student self-disclosures are perceived and handled by faculty members provides an opportunity to inform institution-level student support practices, faculty support practices, and faculty training initiatives. In this study, we sought to understand whether student self-disclosure of personal challenges and trauma is associated with faculty compassion fatigue.

Research Questions

Our study examined four research questions:
1. What is the prevalence of student self-disclosure to faculty members?
2. What is the prevalence of compassion fatigue (CF) and compassion satisfaction (CS) among faculty members?
3. What demographic factors are associated with CF and CS among faculty members?
4. Do students self-disclose equally to both male and female faculty members?

Based on the literature, we made two predictions. First, we predicted that high levels of student self-disclosure would be related to faculty CF. Second, we predicted that female faculty members may be more often subjected to self-disclosure due to perceptions that women are more approachable and empathetic.

Methods

Participants

Study participants were recruited through a combination of purposeful and snowball sampling. Invitations to participate in the study were sent via email to the authors' professional networks. Participants were directly recruited through email or social media, or were indirectly recruited through snowball sampling, receiving the survey link from other colleagues. The invitation included an informed consent statement and a link to eligibility criteria that instructors completed via self-report. Those who met the eligibility criteria and consented to participate then clicked a link to complete the online survey instrument. This study was approved by the American Public University System Institutional Review Board and follows the ethical treatment of human subjects outlined by the American Psychological Association.

The survey was available to participants between May and August 2018. A total of 238 faculty members with online teaching experience participated in the study. All participants self-reported that they met the eligibility criteria and had the option of opting out of the survey on the welcome page. Eligibility criteria required participants to hold an advanced degree in any discipline, to hold a current online position at an institution of higher learning or have held a faculty position in the past and be at least 18 years of age. Participants were asked to respond to the questions in the context of their online teaching experience(s). Therefore, in this study, participants are referred to as "online faculty."

Instrument

The survey instrument used in this study included three categories: Demographics (6 questions), Faculty Experience (3 questions), and the Professional Quality of Life Scale version 5 (ProQOL 5). The first two categories collected information about respondents' experience with online teaching and personal priorities and responsibilities, including both open- and close-ended questions.

In use since 1995, the PROQOL 5 is a widely used scale to measure the quality of life one experiences in their work in a helping career (health care, social service, education, etc.). The ProQOL measures two aspects of how one's work impacts quality of life: Compassion satisfaction (CS) and compassion fatigue (CF) (The Center for Victims of Torture, 2019). The ProQOL5 includes 30 statements related to CS and CF. Participants rate their experience with each statement as never, rarely, sometimes, often, or very often. The ProQOL is the most widely used scale to measure compassion fatigue (Circenis et al., 2013; Stamm, 2010). In its various revisions it has been used extensively in studying compassion fatigue among caregiving professionals such as nurses and health care workers (Heritage, Rees, & Hegney, 2018), substance abuse counselors (Perkins and Sprang, 2013), and governmental emergency response workers (Dang et al. 2015). Although the construct validity of the ProQOL scale has not been widely studied in the literature, the ProQOL instrument has been found to have reliability estimates for the subscales of ".87 for the compassion satisfaction scale, .72 for the burnout scale, and .80 for the compassion fatigue/secondary trauma scale" (Dang et al. Zhou, 2015, p.440).

CS refers to respondents' positive feelings about their ability to help through their work. CF refers to respondents' negative feelings about their ability to help through their work. On the ProQOL, CF is broken down into two categories: Burnout and Secondary Traumatic Stress. Burnout is a negative effect of caring, referring to the exhaustion, frustration, depression, and difficulty doing work effectively that workers in helper roles can feel. Secondary Traumatic

Stress is a negative effect of secondary exposure to trauma or traumatized people, linked with sleep difficulties or intrusive images. Burnout and Secondary Traumatic Stress are scored as separate variables in the survey and can be quantified and studied independent of one another. For this study, we examined only the Burnout component of CF, taking into consideration that Secondary Traumatic Stress typically is found in emergency workers and therapists who become vicariously traumatized through secondary exposure to extreme trauma and stress through others. For clarity, we refer to the Burnout scores as Compassion Fatigue-Burnout (CFB) to ensure the term Burnout alone would not be confused with general Burnout, unrelated to compassion fatigue.

Analysis

Using SPSSv25, we used Pearson's r correlation, t test, ANOVA, and stepwise multiple regression to examine the relationships between faculty demographics and experience data and the levels of CFB and CS they reported.

Results

Demographics

A total of 238 online faculty members completed the survey. Most identified as white non-Hispanic (83%) females (67%). Participants ranged in age (2% were 30 or under, 24% were 31-40, 41% were 41-55, and 33% were 55+). Most participants were partnered or married (75%). Fewer than half the participants shared the number of children they have ($n=122$) with only 17% of these participants being parents.

Participants had advanced degrees; most held doctoral degrees (60%). Most faculty members had 10+ years of teaching experience overall, either online or face-to-face (75%), and the majority had 5 or more years of online teaching experience (77%). Reported academic specialties ($n=234$) were varied to include liberal arts/humanities (43%), social sciences (36%), business securities/IT (5%), health (2%), math/science (6%), and other disciplines (8%).

Research Question 1: Prevalence of Student Self-Disclosure

Most faculty members reported that they experience student disclosure of personal information in class ($n=161$, 96%). Online instructors shared specific examples of personal experiences and challenges that students shared with them. These ranged from everyday challenges like family, financial, and employment issues to urgent and dangerous situations related to suicide, abuse, and addiction. Incredibly, survey responses included seven mentions of student experience with suicidal ideation, or suicide risk and attempts. Overall, student disclosures and faculty responses fell into three primary categories: emotional support, resource referral, and short-term class-based assistance as outlined in Table 1.

Table 1
Categories of Self-Disclosure

Self-disclosure Category	Example Faculty Response
Emotional support	"Sympathy. I may attempt to steer them back to the task at hand."
	"My responses are empathetic and affirming. I offer advice when possible and needed."
	"I am always sympathetic and tell the student to take care of their family and themselves first...school is second."

Resource referral	"Thank them for sharing if the sharing is related to course material and does not involve a sensitive topic such as sexual assault. In some circumstances, it may lead to an email to discuss counseling services at the school or just a suggestion to keep the conversation."
	"If they self-disclose something that requires assistance. I send them a private email telling them who or which office to contact. I also usually give that person/office a heads up which I also alert students too."
	"I listen, I let them vent, and then I advise they contact a doctor, counselor, spiritual leader, the police, whomever is the appropriate path for them."
	"If I have concerns about students' current condition, I make appropriate referrals."
Short term, class-based assistance	"I try to be sympathetic, and typically offer students relief on course deadlines."
	"I honestly let them know I will work with them. I offer them time to the best of my ability to complete assignments. I offer two chances for each assignment grade wise. I sympathize and empathize with students when they come to me with concerns."
	"I try to reassure them and make allowances accordingly."

Research Question 2: Prevalence of Compassion Satisfaction (CS) and Compassion Fatigue-Burnout (B)

We examined whether CS and CFB are prevalent among online faculty. The mean CS score was 40.3 with a range of 17-50 (n=171, SD=6.7). The mean CFB score for online faculty was 22.1 with a range of 10-39 (n=165, SD=6.3). According to Stamm's (2010) assessment of these scores, most online faculty members had an average to high level of CS (n=171, 99%) and all had low to average levels of CFB (n=165, 100%).

Research Question 3a: Demographic and Professional Factors Associated with Compassion Fatigue-Burnout (CFB)

Older faculty members had significantly lower CFB scores than younger faculty (F=7.65; p<.001). Professional background factors like graduate degree (F=1.88, p=.17) and discipline of expertise (F=.78, p=.56) were not related to CFB. Other personal factors such as marital/partner status, number of children, and race/ethnicity were not related to CFB scores.

Total number of years teaching overall were unrelated to CFB scores (F=.59, p=.55). Comparatively, more years teaching online specifically tended to have lower CFB scores (F= 1.81, p=.14) although this trend was not statistically significant.

Most faculty members reported that students self-disclose personal challenges with them during class. We examined whether this was related to faculty burnout scores. Faculty CFB scores were higher among faculty members who reported that students disclose personal information compared with faculty members who reported that students do not disclose any personal information or disclose personal information only as it relates to course topics; however, this trend was not statistically significant (F=.93, p=.39).

Research Question 3b: Demographic and Professional Factors Associated with Compassion Fatigue (CS)

Older faculty members reported significantly higher CS (F=20.54, p<.0001). Professional factors such as type of graduate degree and discipline of expertise were not related to CS. Personal factors such as marital/partner status and race were not related to CS. Interestingly, number of children was significantly related to higher CS scores (F=3.02, p<.01) and was unrelated to CFB scores (F=1.53, p=.17).

Faculty members with more years of teaching experience had significantly higher CS scores (F=4.59, p=.01). Number of years teaching online had an even more significant relationship with CS scores (F=5.85, p=.001). Length of overall teaching experience was unrelated to CFB scores (F=.59, p=.55). Length of online teaching was also unrelated to CFB scores (F=1.81, p=.14).

Research Question 4: Sex Differences in Compassion Satisfaction (CS) and Compassion Fatigue-Burnout (CFB)

We examined the relationship between sex, compassion satisfaction, and burnout among online faculty members and found a significant relationship between sex and CFB score. Females had higher CFB scores than males (F=3.34, p=.03). All faculty members ranged within the low to average CFB range identified by Stamm (2010), but females reported higher burnout scores than males, suggesting sex differences in burnout rates in online teaching. We found no significant sex difference for CS (F=.57, p=.56).

Factors Predicting Compassion Fatigue-Burnout (CFB)

We used a stepwise multiple regression to examine which demographic and employment experiences predicted CFB among online faculty (see Hunsaker et al., 2015). Based on demographic and employment experience characteristics identified as significant in our analyses, or as potentially significant from the literature, we entered six variables into a stepwise regression model. These variables were: sex, age group, discipline of expertise, number of years teaching, number of years teaching online, and student self-disclosure experience. As shown in Table 2, age group (β=-.30, p<.001) and sex (β=-.23, p<.001) significantly predicted CFB levels. Older faculty and male faculty had lower CFB scores than younger and female faculty. Sex was the most significant predictor of CFB (adjusted R^2=.12, F=22.88, p<.001).

Table 2
Summary of Multiple Regression for Predicting CFB among Online Faculty

Variable	Adjusted R^2	R^2 change	F	Standardized coefficient β	t
Age group	.12	.12	22.88	-.30	-4.08
Sex	.16	.05	16.84	-.22	-3.09

Note. n=159.

Discussion

Almost all participants reported that students disclose personal issues and challenges to them. Mental health challenges are increasing among students and many higher education institutions encourage close relationship building between students and faculty to improve student connection and belonging (see Pacansky-Brock et al., 2019; Gould, 2018; Ernst, 2019; Heemstra, 2019). Most online faculty members had an average to high level of CS, and all had low to average levels of CFB. In other words, although the prevalence of student disclosure of personal challenges and trauma was high, it did not seem to impact faculty members' level of CFB.

Using a stepwise regression model, the two biggest predictors of CFB were age and sex. Younger and female faculty members had higher CFB scores. Studies have shown that emotional labor is disproportionately expected from women and untenured faculty (El-Alayli et al., 2018; Lawless, 2018; Tunguz, 2014). Women faculty are viewed as more approachable, empathetic, and nurturing (Bachen, 1999; Feldman, 1993). These faculty may feel more pressure to engage in a counselor-like role, taking more personal responsibility with "making it right" for the student in order to support their success and progression. For untenured and women faculty this approach may help them secure future teaching opportunities (Kadowaki & Subramaniam, 2014). The disproportionate impact of emotional labor on women has been identified in other social service and helping professions as well. For example, in a study of healthcare providers, females experienced significantly higher levels of CF (Sprang et al., 2007). Our finding that female faculty members experience higher CFB scores fits with the larger body of work examining gender disparities in emotional labor among women faculty members and is worthy of additional study.

In recent years, higher education has moved from an exclusive focus on academic training for well-prepared students to a more comprehensive view of education to include remediation, life support, mentoring, and coaching more diverse, challenged learners. Our results examined predictive factors of CFB such as sex, experience, and age that may be mitigated through more or better intervention, training, and support for faculty members who fall into those categories. One potential solution could be to try and lower rates of student self-disclosure, particularly when it is directed toward younger, female faculty who are most at risk for CFB. Given that higher education is moving toward a holistic, humanized model for students in meeting their educational goals and holistically supporting their well-being, this solution is not viable. It is unlikely that student self-disclosure of emergency and trauma will decrease. However, being aware of this trend in self-disclosure, the student needs that prompt it, and the impact of student disclosure on instructors, provides institutions with an opportunity to better meet the diverse needs of students. One viable solution is to have more delineated roles between faculty as experts who teach and assess students in academic discipline content and support staff with expertise in mental health and social work who work with students on their holistic well-being. Future studies should further explore these strategies to determine what targeted supports and trainings would be beneficial for faculty and identify what larger support systems are needed outside the classroom to support student success, retention, and degree completion.

As we consider the somewhat surprising findings that, despite individual differences based on sex, age, and experience levels, faculty members did not express high levels of CFB, future studies could investigate the potential role of vicarious resilience (Hernández et al., 2010) in mitigating possible CFB among online faculty. The 2020 COVID-19 pandemic and the wide-spread disruption it has caused, particularly in education due to an immediate transition from face-to-face classrooms to online learning for most K-12 and traditional universities, has been extremely challenging. Many traditional instructors were neither prepared nor trained in online education or in working with students through trauma and life disruption, making understanding the relationship between self-disclosure, personal trauma, compassion fatigue, and online learning even more relevant. New research is already highlighting the significant negative impact emergency distance learning as a result of the pandemic is having on student and teacher mental health and inequity in education (Bozkurt et al., 2020). A future area of study could be to examine the prevalence of student self-disclosure in online classrooms compared with face-to-face classrooms, given this unprecedented shift to distance learning because of the pandemic. Of

additional interest to more completely understand the phenomenon of compassion fatigue in online educational settings would be to further explore the role that variables such as socioeconomic status (of faculty and students) and cultural competencies (of faculty and students) play in both student self-disclosure and faculty compassion fatigue and compassion satisfaction. Once the phenomenon of compassion fatigue in online educational settings is more fully understood, training faculty in trauma-informed teaching practices (see Anderson et al., 2015; Crosby et al., 2018) may have an impact on burnout and compassion fatigue among faculty.

With better understanding of the personal challenges and trauma that students disclose to faculty members, university leaders can consider how to more effectively support students who experience trauma or personal struggles. University leadership can identify ways to provide support and training to faculty members to be better prepared to help students in need. By more effectively supporting faculty in their efforts to support students, we can more effectually ensure that students persist and succeed in their academic programs.

Acknowledgements

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How Can We Improve Online Learning at Community Colleges? Voices from Online Instructors and Students

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Abstract
With the rapid growth of online learning at community colleges and the low course completion and performance associated with it, there has been increasing need to identify effective ways to address the challenges in online teaching and learning at this setting. Based on open-ended survey responses from 105 instructors and 365 students from multiple community colleges in a state, this study examined instructors' and students' perceptions of effective and ineffective instructional practices and changes needed in online coursework. By combining structural topic modelling techniques with human coding, we identified instructional practices that were perceived by both instructors and students as effective in supporting online learning as well as ineffective and needing improvement. Moreover, we identified a handful of misalignments between instructors and students in their perceptions of online teaching, including course workload and effective ways to communicate.

Keywords: online instruction, community college, instructor perception, student perception

Community colleges provide a key point of access to postsecondary education for millions of low-income and minority students. Yet, community colleges face many challenges, including limited space, faculty shortages, and large proportions of students who hold jobs while enrolled in college and therefore may find it difficult to attend on-campus courses (Carnevale et al., 2015; Ives, 2006). These circumstances provide a context in which distance learning can thrive. Indeed, almost one-third of community college students attempted at least one course online in 2016; among these "ever online students," 40% took an entirely online curriculum (Xu & Xu, 2019). Despite the high hopes for online learning to expand educational opportunities for community college students, existing studies have consistently identified high midsemester withdrawal rates and low course performance among online courses offered at community colleges (e.g., Hart et al., 2018; Xu & Jaggars, 2013). Even more concerning is the fact that students from disadvantaged backgrounds, such as minority, low-income, academically underprepared students, and student parents, are subject to greater online performance decrements (Fendler et al., 2018; Johnson & Mejia, 2014; Xu & Jaggars, 2014; Wladis et al., 2016).

A growing effort has been directed to identify effective instructional practices that can better support online learning from both instructors' and students' perspectives (e.g., Bolliger & Martin, 2018; Delen & Liew, 2016; Jackson et al., 2010; Johnson & Davies, 2014). Yet, most of these studies were conducted at four-year institutions, and the findings may not be generalized to community colleges due to the distinct populations the two sectors serve (e.g., Fike & Fike, 2008; Xu et al., 2019). Due to open-door admission policies, community colleges disproportionately serve many racial minorities, low-income students, and non-traditional students. According to the report from Fry and Cilluffo (2019), the share of underrepresented minority students in community colleges in 2016 is 43% compared to 35% at public four-year universities and 29% at private four-year universities. Nearly 50% of community college students were from families below the lower-middle income threshold compared to 35% at public four-year and 27% at private four-year universities. In addition, around 40% of the students at community colleges tended to work full-time while enrolled compared to 21% at four-year universities (Brenden, Deil-Amen, Rios-Aguilar, 2015). Community college students also tend to be less academically prepared on average compared with four-year students (Fike & Fike, 2008), and may need additional support to navigate an online course successfully. These differences in student populations imply that the specific challenges associated with online learning may differ between community college and four-year university students. Indeed, existing studies have consistently found large performance gaps between online and face-to-face courses at community colleges (e.g., Hart et al., 2018; Kozakowski, 2019; Xu & Jaggars, 2014) compared with little to no performance decrements by course modality at four-year universities (e.g., Bowen et al., 2014; Joyce et al., 2015). Accordingly, it is unclear to what extent instructional practices perceived as effective among four-year faculty and students are also perceived as effective in promoting online learning at the community college setting.

Considering the rapid growth of online coursework at community colleges and the low course completion rates associated with online learning in this setting, it is critical to understand community college instructors' and students' perceptions of online instructional practices. To achieve this goal, we developed an anonymous open-ended survey and collected information systematically on instructors' and students' perceptions of effective and ineffective instructional practices and changes needed in online coursework across multiple community colleges in the

North Carolina Community College System (NCCCS). By comparing instructors' and students' perceptions of effective and ineffective online instructional practices and how to improve online instruction, we intend to identify possible ways through which online instruction can be improved at community colleges.

This study builds on the existing literature and further contributes to it by collecting open-ended responses from both instructors and students on their perceptions regarding instructional practices in fully online courses from multiple institutions of a state community college system. Specifically, we address three research questions: what are community college instructors' and students' perceptions of (1) effective practices in online instruction, (2) ineffective practices in online instruction, and (3) critical changes necessary to improve online instruction?

Instructional Practices to Facilitate Online Learning

Several researchers have examined promising ways to support online instruction. These researchers seemed to agree that the challenges of online learning stem primarily from the increased need for self-regulation due to the absence of regular, structured, and physical class meetings (Broadbent & Poon, 2015), the greater difficulties in achieving effective interpersonal interactions (Cox, 2006; Jaggars & Xu, 2016), and the lack of easy access to student supports such as tutoring, counselling, and other services that are typically located on campus and are not available online (Destin, 2018; Schneider & Clark, 2018). Based on teaching and learning theories both in general and in the specific setting of virtual environments, researchers have recommended several online instructional principles and specific practices that have the potential to address these challenges. For instance, Johnson and Davies (2014) proposed a list of instructional strategies to help students manage, evaluate, and adjust their learning processes, such as sending regular reminders and encouraging self-assessments. Similarly, Bolliger and Martin (2018) proposed 20 instructional strategies that have the potential to improve the quality of student-to-student and student-to-instructor interactions, such as having students introduce themselves to each other and providing students with detailed feedback on their assignments.

A growing number of studies attempted to examine instructor and student experiences and perceptions regarding online teaching practices. Primarily conducted at four-year universities, these studies found that instructors and students value strategies that keep students on track, such as providing checklists each week and sending reminders for upcoming deadlines (e.g., Bolliger & Martin, 2018; Martin et al., 2018). Additionally, several studies found that both instructors and students highly rate practices that facilitate instructor-to-student and student-to-student interactions, such as offering constructive feedback on students' progress and including icebreaker activities to allow students to introduce themselves to each other (e.g., Bolliger & Martin, 2018; Bork & Rucks-Ahidiana, 2013; Martin et al., 2018; Martin et al., 2020). For instance, Martin and colleagues (2020) surveyed 115 instructors at a southeastern university about their perceptions of the effectiveness of 12 facilitation strategies in online courses. The respondents rated timely responses to questions and feedback on assignments/projects the highest. These instructors also reported group projects and synchronous sessions to be helpful when asked about other effective strategies they used in their online classes. Interviews with online students and instructors further reveal that strategies for enhancing interpersonal interactions not only allow instructors to provide more timely academic support to students and allow students to learn from each other, but also help to create a sense of community and belonging in a virtual learning environment (Kear et al., 2014; Shieh et al., 2008).

While studies conducted at four-year institutions provide important insights regarding possible strategies to better support online learning, it is unclear whether strategies perceived as effective in these studies may be applicable to the two-year setting (Fike & Fike, 2008; Xu & Xu, 2019). For instance, while intensive online collaborative activities are generally well received by students in four-year universities (Bolliger & Martin, 2018; Walker & Kelly, 2007), these activities often involve strong time commitment from the students and therefore might be more challenging for community college students who tend to be less academically prepared and are more likely to enroll part-time.

A small but growing body of research has examined the perceptions and experiences of online instructors and students at community colleges (e.g., Cunningham, 2015; Jackson et al., 2010; Stanford-Bowers, 2008). For instance, Jackson and colleagues (2010) collected survey data on student perceptions of online courses from two community colleges and found that student course satisfaction was higher in classes where instructors provided more timely responses and engaging lectures and classroom activities. Cunningham (2015) surveyed 40 community college students about specific instructional practices for enhancing social presence in online courses and found that quick email responses from the instructor and collaborative group work opportunities played an important role. Similarly, Stanford-Bowers (2008) conducted group interviews with students, administrators, and faculty at one community college and elicited opinions on barriers to student persistence in online courses. Interestingly, the study identified disagreement in perceptions between the administrators/faculty and students: while students found the lack of adequate technical support, poor course design, and limited personal contact with instructors as the most important barriers, the administrators and faculty did not report these issues as concerns.

The incongruence between instructors and students identified in Stanford-Bowers's (2008) study regarding how to improve online learning highlights the importance of collecting opinions from both instructors and students. This may not only help collect effective instructional practices more comprehensively, but also pinpoint possible discrepancies between instructors and students regarding online teaching and learning. Such misalignment often contributes to non-optimal instruction and poor learning outcomes (Cox, 2009; Karp & Bork, 2012) and may be exacerbated in online learning settings due to the lack of timely in-person communication (Bambara et al., 2009; Bork & Rucks-Ahidiana, 2013; Stanford-Bowers, 2008). In addition, all the existing studies focus only on effective instructional practices in online learning. Yet, understanding instructional practices that are perceived as ineffective and/or needing changes, especially from students' perspectives, may also provide valuable insights into specific areas that require attention and improvement.

Method

Data Collection

This study was conducted during the spring term of the 2018-2019 academic year in the North Carolina Community College System (referred to as NCCCS hereafter), the third-largest community college system in the United States. NCCCS uses mainly Moodle and Blackboard to implement its online courses. Online course enrollments have risen steadily at NCCCS: from fall 2013 to fall 2017, the percentage of students who took at least one course online increased from 43% to 66%. In a similar vein, 22% of the students who enrolled in the 2016-2017 academic year took online courses exclusively, which was up from 14% in 2012-2013. Despite the steady increase in online enrollment, there has been a persistent performance gap between online and

face-to-face courses: in fall 2015, the average course passing rate of online courses was 77%, more than 10 percentage points lower than that of face-to-face courses.

       In view of the persistent performance gaps, the NCCCS Excellence in Research and Analytics research team reached out to the official Distance Learning Administrator contacts for all the 58 North Carolina community colleges to help collect promising strategies in improving online learning experiences. These contacts were asked to further distribute a survey among faculty and students who had any online teaching and learning experiences at their individual colleges to reflect on effective and ineffective instructional practices that the respondent had experienced in online coursework and what changes were needed to improve online instruction. The detailed survey items and questions are presented in Table 1. It is important to note that the goal of this open-ended survey was not to understand how representative a particular practice had been used at NCCCS, nor to determine the views of the entire systems' students or faculty. Instead, it aimed to collect practices that are promising in improving online teaching and learning. Accordingly, most of the colleges relied on a convenience sample in collecting responses from online instructors and students.

Table 1

Survey Questions for Instructor and Students Respectively

Topic	Questions asked	
	To instructor	To student
Effective instructional practices	In your online classes, or those you manage or support, please describe any specific strategies that you have used, or helped others to use, that have produced consistent success in terms of higher course grades, course success rates, or persistence to the end of the course.	Please describe one or two things that instructors do in online courses that really help you learn, complete the courses, and get a good grade. Why do you think these things help you?
Ineffective instructional practices	In your online classes, or those you manage or support, what specific strategies have you used, or helped others to use, that have failed to produce consistent success or even reduced success in terms of lower course grades, course success rates, or persistence to the end of the course?	Please describe one or two things that instructors do or don't do in online courses that really prevent you from learning, cause you to withdraw, or get a bad grade.
Changes necessary to improve online teaching and learning	What kind of more general change do you think could significantly increase student success in online courses?	If you could change one or two things about online courses that would help you to be more successful than you are now, what would those changes be? What would the changes look like?

Twenty-seven colleges provided at least one response to either or both the faculty and the student versions of the survey, with 19 colleges providing at least one faculty response and 18 colleges providing at least one student response. Student demographic for the 27 responding colleges is fairly similar to those of the 58 community colleges in the system in terms of gender, ethnicity, and student age. A total of 105 instructors and 365 students from the 27 community colleges in NCCCS completed the survey. Compared with the demographics of students at NCCCS, the survey sample tended to have higher proportions of female students, White students, and African American students, while lower proportions of Hispanic students.[1]

Analytical Approach

We combined machine learning with human coding to identify core themes in instructor and student responses. Specifically, we first used structural topic modeling (STM) (Roberts, et al., 2014) to develop the coding scheme from the open-ended survey responses in an objective way and then conducted independent human coding of the entire sets of responses based on the key themes identified through STM. Compared with traditional human coding of qualitative data, STM does not require the researcher to establish an ex-ante coding framework, but instead allows the main themes to emerge from the large number of open-ended responses by analyzing the co-occurrence of these words and identifying words that frequently occur together. Yet, STM is limited in its ability to effectively identify themes in short texts—like the data used in this study—since the algorithm is mainly based on word co-occurrence in the data, which is limited in short texts due to data sparsity (Qiang, et al., 2017). Hand-coding the responses based on the key themes that have been identified through STM can thus help systematically examine the validity of the coding scheme developed based on STM and refine the coding scheme using human knowledge. Below, we outline the steps taken in our two-stage data analysis.

Development of coding schemes. In the first stage, we used STM to develop a coding scheme for each question and for instructor and student responses separately. The basic intuition behind STM is to group words based on the frequency of their co-occurrences in the responses. Based on the keywords in a word group identified by the algorithm, the researcher can then interpret the meaning of the words and the potential topic captured by these words. For instance, a group of words of "emails," "instructor," "communication," and "feedback" could be interpreted as a topic about "effective student-instructor communication." More specifically, the process of identifying key topics for each open-ended question involved three steps: (1) Conducting "stemming" to prepare the survey responses, which involved removing all punctuations, transforming the text to lowercase, and reducing words to their root form; (2) Setting the number of topics, where we estimated the model using a wide range of numbers of topics (e.g., from 2 to 30); and (3) Determining the optimal number of topics by balancing both the model fit and the interpretability of the results. In the third step, we first narrowed down the number of topics to a small range (e.g., from 2 to 8) based on the measures of held-out likelihood and semantic coherence. Then, two researchers coded the responses independently and determined the number of topics that made the most sense (e.g., 6 topics for instructor perceptions on effective instructional practices). After obtaining the keywords that emerged from

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[1] The majority (77.84%) of the student respondents were female, 58.8% of the students were White, 25.3% of them were African American, 6.3% of them were Hispanic, and 9.6% of them were other races or unknown. In contrast, among the students at NCCCS, 60% of them were female, 57% of them were White, 21% of them were African American, 12% of them were Hispanic, and 10% of them were other races or unknown.

STM, researchers interpreted the collection of the words and identified the key themes based on the findings in the existing literature. Appendix A provides a detailed explanation regarding the steps through which we identified the key themes based on STM and Appendix B provides the model fit results for each survey question.

Human coding based on key themes. In the second stage, two assistants independently applied the themes that emerged from the STM to review and code all the survey responses. During this process, the research assistants paid special attention to themes that were not identified as a distinct theme based on the STM but aligned well with the existing literature on online teaching and learning. We added these themes to the coding scheme to complement the results from the machine learning algorithm with human knowledge. After each round of human coding, we calculated the kappa values for the agreement between the two assistants for each code, identified areas of disagreement, discussed the new codes added, and refined the coding schemes. We repeated this process three times until satisfactory levels of kappa statistics (0.70) were obtained (Landis & Koch, 1977; McHugh, 2012).[2] The final kappa statistics for all the codes ranged from 0.70 to 0.94, with 73% of the codes having a kappa value higher than 0.8 (see Appendix C). Finally, a third researcher intervened to negotiate for a consensus where a disagreement occurred.

Results

A total of 36 themes were identified from instructors' and students' perceptions of effective and ineffective online instructional practices and required changes to improve online learning outcomes. Below we summarize the definition of these themes, sample responses for each theme, and the frequency of each theme. More detailed description of these themes and sample response is provided in Appendix D. [3]

Effective Instructional Practices
Instructor Perceptions

(i) Regular announcements and reminders. The most frequently mentioned effective instructional practice, which appeared in nearly 30% of all instructor responses, is using regular announcements and reminders to give students clear guidance about what they need to do in the upcoming week and to remind them of upcoming assignments and exams. In addition to keeping students on track, instructors perceived regular announcements and reminders as an important channel of instructor-to-student communication, which demonstrated instructor presence in the course. For example, one instructor noted: "I communicate with my students three times per week. Weekly I post the announcements of assignments due. On the assignment due date, I send

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[2] The kappa result can be interpreted as follows: values ≤ 0 as indicating no agreement and 0.01–0.20 as none to slight, 0.21–0.40 as fair, 0.41– 0.60 as moderate, 0.61–0.80 as substantial, and 0.81–1.00 as almost perfect agreement.

[3] It is important to note that a theme that was reported by only a small number of survey respondents does not necessarily mean that these practices are not important due to two reasons. First, the survey did not urge respondents to provide an extensive list of instructional practices. In addition, since this study is not intended to be a representative study, the fact that some practices that were less frequently mentioned by the survey respondents does not mean that these practices are also less important for other instructors and students in the system. Since the goals of this study is to identify any themes that are worth considering in improving online teaching and learning, we decided to retain all the themes that emerged from the data (including those with small numbers of responses). That said, in discussing the implications from these findings in the discussion section, we intentionally avoid making claims or pedagogical recommendations based on a particular theme with few responses; instead, we focus on patterns of results that are shared across multiple themes or themes mentioned by at least 10% of the respondents in our sample.

a reminder to the students who have not submitted their work for the week." In a similar vein, another instructor noted: "I periodically create video announcements with myself in them, so students get a sense of my presence in the class."

(ii) **Varied materials and diversified media in content delivery.** More than 25% of the online instructors found delivering course content using varied instructional materials and diversified media to be effective. Several instructors emphasized the use of visual presentations, particularly using lecture videos in addition to texts to enhance student learning. For example, several instructors said that they usually produced short videos that "introduce the material we will cover," "tie into the course topic," "explain more complicated concepts," or provide "'how to' videos for assignments."

(iii) **Proactive outreach with timely support.** More than 20% of the instructors reported that they reached out to students who seemed to be struggling and gave them timely encouragement and guidance on their learning. These instructors indicated that such proactive outreach would motivate students who were fulfilling the expectations of the course and provide encouragement and timely support to students who were not. For example, one instructor mentioned: "If a student does poorly on an assignment early in the semester, I reach out individually and provide suggestions on how to improve next time, such as study strategies, proofreading more carefully, and taking advantage of multiple attempts. Then I give words of encouragement, like 'Hang in there, I know you can do this!'"

(iv) **Timely response.** Around 20% of the online instructors mentioned it was critical to respond to students' emails, discussion forum posts, and text messages promptly so that students felt the instructor was approachable and responsive. One instructor said: "I also respond to student emails throughout the day every day to ensure their questions are answered promptly and they feel heard."

(v) **Quality feedback on assignments.** Around 12% of the instructors suggested that quality feedback on assignments was essential to help students improve their performance. According to these instructors, the feedback should go beyond the numeric/letter grades and include personalized compliments of what students have done and constructive criticism. One instructor noted that he/she would always "highlight the things students have done well before delving into the areas for improvement" to "enable self-efficacy" and keep "a positive atmosphere." Another instructor focused on providing "detailed feedback for any loss of points on an assignment."

(vi) **Offering discussion forum activities.** Approximately 11% of the instructors indicated that discussion forum activities that involved student interaction had the potential to enhance learning from and social interactions with peers. Some instructors mentioned that they had "a weekly open forum so that students can discuss any issues they may have had with the chapter or with the assignments," "required discussion board where students help each other complete assignments," or "a fun icebreaker activity" on the discussion board.

Student Perceptions

Six themes were identified for students' perceptions of effective instructional practices.

(i) **Varied materials and diversified media in content delivery.** Close to 30% of the students appreciated when instructors used a variety of media and varied materials to deliver course content. They also appreciated when students were provided with multiple media to receive the same information, which allowed them to choose their preferred way of accessing the information. For example, one student found it helpful when instructors provided "multiple

views of learning. For example, having videos, PowerPoint, readings etc. Not everyone learns the same way so having multiple teaching styles included helps."

(ii) Clear expectations on assignments. Around 20% of the students pointed out that it was critical for instructors to clarify their expectations on assignments. Students particularly appreciated specific guidance, clear evaluation criteria, and concrete examples that they could draw on to meet these expectations. One student mentioned: "Not all but most of my instructors give details on what they want in an assignment. Sometimes it can be misleading to students and [students] completed in a different way but not the way the instructor had wanted." Another student found "having easy to follow and descriptive instructions as well as samples greatly helps to complete assignments correctly."

(iii) Timely response. More than 15% of the students appreciated when instructors provided timely responses to their emails and discussion forum posts. Consistent with the comments from instructors, students reported that timely responses helped them get quick answers when they had questions and allowed them to move forward instead of lingering on the questions. One student noted: "When they respond to their email in a timely manner. This helps because I can get the assignment done without waiting too long."

(iv) Regular announcements and reminders. Close to 10% of the students suggested that regular announcements and reminders sent by instructors helped them stay on track. One student reported: "My biology teacher sends updates about assignments which helps me to stay on track in my class."

(v) Quality feedback on assignments. About 7% of the students indicated that they benefit from the quality feedback from instructors. Feedback on assignments early on in a term helped students understand instructors' expectations and specific ways to improve their performance in future assignments. One student noted: "the thing that helps me the most is when they comment on the work I have done. It helps me to understand what they are looking for."

(vi) Explaining course content with concrete examples. Approximately 6% students suggested that it helped them to grasp the material when instructors provided concrete examples to explain the concepts, skills, and/or processes to be learned. One student mentioned, "[The instructor] explains what we are doing and gives an example of the concept in his life. This helps me understand the concepts better."

Ineffective Instructional Practices

Instructor Perceptions

Four themes were identified from instructors' responses regarding ineffective instructional practices. Interestingly, three out of the four themes are about instructional practices that involve social interactions.

(i) Poor attendance in synchronous class meetings. Around 25% of the instructors found synchronous class meetings (e.g., video conferences and virtual office hours) ineffective due to low attendance rates. One instructor reported that most students did not attend synchronous meetings and preferred asynchronous communications: "I have attempted many attempts at synchronous meetings. We have made this a very easy process for our students, but most students do not prefer to meet synchronously. Most of our students live in an asynchronous world where they would rather text than make a phone call."

(ii) Lack of high-quality engagement in the discussion forum. More than 20% of the instructors suggested that discussion forum activities failed to achieve high-quality interactions as intended, especially student-student interactions. Instructors noted that students rarely took the initiative to respond to each other, even when responses were required. One instructor

mentioned: "If I do not require that students respond to a discussion post a day or two after posting their own response, they never go back and read the thoughts of others." Another instructor reported: "I require peer feedback on discussion boards. However, some students regularly wait until the last day to post and never respond to a peer."

(iii) Unsuccessful group projects. More than 10% of the instructors found that group projects were not successful. They pointed out that this might be partially due to the greater challenges associated with effective collaboration in an online setting. One instructor reported: "I tried a collaborative Wiki page as a weekly assignment, but about half the groups seemed to have trouble figuring out how to collaborate."

(iv) Problems surrounding deadlines. Approximately 7% of the instructors reported that students had difficulties with following deadlines, especially when the deadlines were set in an inconsistent way across assignments. Some instructors specifically indicated that allowing extensions for assignments might result in students abusing the policy and falling behind.

Student Perceptions

Four themes emerged from students' responses to ineffective instructional practices that undermined their online learning.

(i) Insufficient instructor communication and engagement. Around 25% of the students indicated that there was limited instructor communication and engagement in online courses, leading to insufficient support for students to understand the course content and complete assignments. One student complained: "The majority of the instructors are not really involved in my online classes. If I am lucky, I might hear from them once or twice during the semester to remind me to do some assignment or take a test."

(ii) Unclear expectations on course assignments. Close to 25% of the students reported that they were confused and were not able to complete assignments appropriately due to a lack of clarification of instructor expectations and clear guidance on how an assignment should be completed. One student complained that instructors "sometimes forget to give examples to help understand the concept of the assignment and what exactly the instructor is looking for."

(iii) Unreasonable workload. More than 10% of the students reported unreasonable workload from their online courses, which impeded them from optimal learning gain. For example, one student noted: "I feel sometimes online courses are so jam-packed with busy work that I focus on getting assignments done and don't really retain the information." Interestingly, some students also expected online courses to have a lighter course load than face-to-face courses and were disappointed with unreduced demand. One student explained: "Instructors do not give a fair course load. A lot of us take online classes because we're older, work full time, have families and the course load is meant for kids who don't have much going on outside of school."

(iv) Insufficient feedback on assignments and assessments. Around 10% of the students reported that sometimes instructors did not provide sufficient feedback on assignments and/or assessments, giving students limited information on how to improve their performance in future assignments and assessments. In addition, among the responses mentioned lacking sufficient feedback, more than 60% of the student respondents mentioned the need for "timely feedback," specifically. For example, one student noted that instructors may "wait to the last minute to grade assignments and don't give feedback. This causes the students to work in the dark, not knowing if the assignment they completed was correct or not before they submit another assignment." Similarly, close to 15% of the feedback-related responses mentioned the

lack of "detailed feedback". For example, one student reported that "the instructors that do not give specific explanations as to what you did wrong on an assignment are the worst."

Changes Necessary to Improve Online Teaching and Learning

Instructor Perceptions

Six themes were identified from instructors' responses about changes necessary to improve online teaching and learning.

(i) Improving instructor communication and engagement. The most common theme as reported by more than 25% of the instructors is that the instructors should make efforts to improve the level and quality of their communication with students and engagement in the course: "Instructor communication and presence in the class if the instructor doesn't attend the class why should the students?" Instructors perceived communication as fundamental to developing a positive instructor-student relationship, which in turn helps students feel connected to the course and strengthens their motivation to learn and succeed. Instructors highlighted specific ways how their communication with students could be improved, such as increasing the levels of communication (e.g., "A higher level of faculty-student communication") and humanizing instructor-student interaction (e.g., "I think it is very important to make personal contact with students" and "instructors who are open to letting their students know them as people. Instructors who are humorous).

(ii) Clarifying expectations on online learning. Nearly 20% of the instructors suggested that students tended to underestimate the workload in online courses and have insufficient skills, such as the ability to manage time wisely and to keep track of progress on course assignments that are critical to successful online learning. Thus, it is important to clarify course expectations and communicate explicitly the challenges associated with online learning early on. For example, one instructor stated that it would be helpful to clarify that "better time management skills" were needed since "students think that online classes are easier just because they don't have to be in a classroom but actually it's important that students understand the time commitment and focus needed."

(iii) Delivering content using varied materials and diversified media. Around 10% of the instructors mentioned that they would like to use more diversified media in content delivery (e.g., "I think students need to have video examples available not just a textbook") and bring in additional useful and varied materials into the instruction (e.g., "provide a variety of content and assessments"). One instructor said: "I have provided my students with multiple resources in order to make them successful. I am continuing to add anything I am made aware of in order to help my students. I am finding that a number of students take advantage."

(iv) Providing timely response. Nearly 5% of the instructors mentioned that they would like to do a better job providing timely responses to students' needs and questions. They indicated that students were more likely to actively seek help from the instructor and develop a personal connection with the instructor when they felt that the instructor was approachable and responsive. One instructor mentioned: "Respond timely to students when they have a technical problem, or questions. If it takes days to get a response, or students don't get a response at all, it defeats the learning experience, and conveys a lack of caring to students."

(v) Improving feedback on assignments and assessments. A handful of instructors (3%) reported that they would like to try to improve both the quantity (e.g., "regular feedback from instructors" and "immediate weekly feedback") and quality of the feedback provided to students (e.g., "detailed feedback on assignments"). For instance, one instructor emphasized the need to "provide instructive feedback anytime a student does not receive a perfect score."

(vi) Improving feedback on student progress. In addition to providing better feedback on assignments, several instructors (around 3%) suggested that they would like to better monitor and provide feedback on students' overall progress in a course. One instructor mentioned: "More automatic monitoring and feedback of student progress, starting early in the term with attendance and completion of early assignments."

Student Perceptions

Six themes were identified from student responses about changes necessary to improve online teaching and learning. It is worth noting that more than 20% of the students reported that no change in online instruction was needed.[4] As a result, themes identified under this question tend to receive a smaller number of mentioning by respondents.

(i) Delivering content using varied materials and diversified media. The change most frequently suggested by students (around 10%) is to use diversified content delivery media, particularly audio or videos with instructor presence, and to provide varied course materials, such as multiple examples of the implication of the course content in different scenarios. One student mentioned: "I like when teachers video themselves explaining the lessons. When the instructor gives verbal information about the subject it really helps, especially for those who are audible learners."

(ii) Setting up deadlines in more reasonable ways. Approximately 7% of the students reported that instructors should set up the due dates in a more reasonable way. Some students suggested setting up a clear schedule for assignments early in the course so that the students could plan their time. One student mentioned: "More professors to post due dates for assignments as early as possible for students who may need to work ahead for whatever reason."

(iii) Improving discussion board activities. Nearly 5% of the students reported that, while they believed discussion board activities could be beneficial, the current discussion forum activities needed to be substantially improved. On one hand, students recognized discussion forum to be a valuable way to "share information," "get in touch and assist each other," and "express concerns" and would like to "have more interactive assignments on the discussion board." On the other hand, students felt that the current discussion board activities were "just busy work" and did not generate meaningful and productive conversations. One student complained that "students are typically forced to respond to a certain amount of people which ends up not being a productive discussion. There needs to be more back and forth discussion about intriguing topics."

(iv) Sending regular announcements and reminders. About 4% of the students would like their instructors to send announcements and reminders more frequently, such as "email[ing] students regularly about due dates."

(v) Providing timely response. Around 2% of the students suggested that more timely responses to their needs and questions were needed. Some students mentioned that it would be helpful if the instructors made themselves more accessible and were able to answer emails or discussion forum posts in a timely manner. One student noted: "I need professors to respond to their emails in a timely manner. Sometimes their help is extremely needed when taking an online course."

(vi) Improving feedback on assignments and assessments. Nearly 1% of the students suggested that they would like to receive better feedback on assignments. Some students mentioned that feedback on assignments should go beyond grades to help students know why

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[4] Among the students who reported "no changes needed," most of them did not report any ineffective practices either. Others reported practices that they found ineffective but could not think of a specific way to improve it.

their answers were incorrect and how to correct them. One student complained: "When I get a question wrong, I would like a complete answer on where the answer can be found in the text and why it is wrong."

Discussion and Conclusion

Summary of Key Findings and Relevance in The Existing Literature

We identified several instructional practices that both instructors and students found to be effective in supporting online learning. These practices can be grouped into one of two categories. The first category includes practices that aim at facilitating instructor-student interaction, such as sending regular announcements and reminders and responding to students' questions in a timely manner. These practices have also been commonly cited as important ways to improve student engagement in the existing online learning literature (e.g., Bolliger & Martin, 2018; Jackson et al., 2010), as they help students to establish personal connections with the course instructor, which in turn helps students feel connected to the course and strengthens their motivation to learn and succeed (Xu et al., 2020). The second category involves practices that have the potential to improve student-content interaction, such as providing varied materials and using diversified media in content delivery. This aligns well with the research in multimedia learning that suggests multimedia help to strengthen retention of information by providing students with both verbal and visual representations of the information (Mayer & Moreno, 1998; Moreno & Mayer, 1999). Additionally, providing students with diversified media for the same content allows students to choose their preferred way of accessing the information, and is thus more responsive to the needs and interests of diverse groups of students (Martin & Bolliger, 2018). Interestingly, some of these "effective practices" are also mentioned in respondents' comments on "changes necessary to improve online teaching and learning," such as the need of varied materials and diversified media in content delivery. This implies that despite the agreement on the potential of these practices in improving online success, there may be important hurdles standing in the way of implementing these strategies in an optimal way.

Students and instructors reached less consensus on "ineffective strategies." Yet, one key theme that both instructors and students agreed on is discussion board activities. Specifically, discussion forum activity was reported as being ineffective in achieving high-quality student-student interaction by around 20% of the instructors and was on the top of the list of instructional practices that needed to be improved by both students and instructors. This result aligns with prior findings that student-student interaction was negatively associated with course completion in online courses at community colleges (e.g., Grandzol & Grandzol, 2010) and adult students in online professional development programs tended to not value interpersonal interactions with peers (Rhode, 2009). Meanwhile, this finding contrasts with previous studies conducted at four-year institutions where both instructors and students, especially undergraduates, viewed discussion board activities as effective and indispensable to facilitating interpersonal interactions in online learning (e.g., Bolliger & Martin, 2018; Walker & Kelly, 2007). Yet, this finding does not necessarily mean that student-student interactions are not as important at community colleges. Instead, it might be that it is more challenging to organize high-quality online student interaction, such as meaningful discussion forum activities in settings where a large proportion of students have other commitments outside school and are academically underprepared (Croxton, 2014).

Prior research conducted in community colleges documented misalignments between students and instructors in various perceptions, including students' responsibilities, instructor

responsiveness, and specific ways instructors should consider improving student engagement (e.g., Bork & Rucks-Ahidiana, 2013; Stanford-Bowers, 2008). Our results support this phenomenon and reveal two specific areas of misalignments. First, instructors and students diverged on what should be a reasonable workload for online students. While students expected online course to impose less coursework on students and adjust to the busy schedule of adult learners, instructors seemed to expect online students to exert equal levels of efforts, if not more. The consistent findings about the discrepancies between instructors and students in their perceptions of online learning may indicate that both instructors and students have misconceptions about the challenges of online learning and the responsibilities they need to assume when teaching/learning online (Bawa, 2016). Therefore, while a statement about the course workload required can be provided to alleviate potential misunderstanding, additional systematical professional development and online learning orientations may be needed to address the fundamental misconceptions about online learning (Bawa, 2016).

In addition, while both instructors and students valued student-instructor interactions, they differed in their preferred way of communication: while more than 25% of the instructors reported providing synchronous class meetings, students rarely took advantage of these opportunities. Instead, students generally preferred asynchronous interactions with the course instructor, such as through text messages and emails. This finding aligns with some of the existing literature that points out that students, especially adult learners, prefer asynchronous over synchronous tools as the former are more flexible to use for help-seeking, and induce less social anxiety (e.g., Li et al., 2011; Hsiao, 2012; Hollenbeck et al., 2011; Tello, 2007).

Implications

The findings from this study have several pedagogical and policy implications. First, we identified a list of instructional practices that were perceived as effective in supporting online learning by both instructors and students and can, therefore, be promoted widely among online course instructors. In spite of consistent evidence on the effectiveness of these instructional practices in the literature, our results indicate that some of these practices may not have been well implemented in online courses at community colleges. Institutions may consider promoting these practices by incorporating them into online course evaluation rubrics, as well as professional development opportunities to guide instructors to apply them to their own instruction.

Second, the findings of the ineffective practices and the misalignment between instructors and students in online course workload highlight the importance of providing additional support to both online instructors and students. Specifically, to enable instructors to design and coordinate discussion forum activities in a more engaging way, it is important that instructors receive guidance and necessary support on the importance and techniques of deploying specific tools to facilitate interpersonal interactions and build a sense of community (Baran & Correia, 2014; McKenna et al., 2019). In a similar vein, the literature on online learning has identified several ways to address misalignments between instructors and students in their perceptions of student/instructor responsibility, workload, and skills necessary for successful online learning (e.g., Bawa, 2016; Bork & Rucks-Ahidiana, 2013; Stanford-Bowers, 2008). For students, online readiness assessments and systematic course orientation that outlines the recommended study behaviors and responsibilities expected of students at the beginning of a course could help students understand the challenges of online learning, an individual's readiness to learning online, and the skills necessary for successful learning in a virtual environment. Similarly, instructors may benefit from professional development activities that provide important

information on the characteristics of students enrolled in online courses, the challenges these students typically face, and additional support that students need to succeed in online learning.

Finally, given the misalignment between instructors and students in their preferred way of communication, instructors will need to consider the strengths and weaknesses of different interaction tools and use them strategically to meet specific instructional needs. For instance, instructors may use asynchronous tools for daily communications, such as text messages to send students reminders and emails to answer students' questions. In the meantime, instructors may offer occasional synchronous meetings such as video conferences to strengthen student-instructor connection and promote social presence (Hrastinski, 2008; Moallem, 2015).

Limitations and Future Research Direction

This study has several limitations: First, it utilized a relatively small convenience sample. This is partly due to the low response rate associated with an open-ended survey, which requires greater efforts to answer the questions (Moser & Kalton, 2017). Accordingly, findings from this study may not be representative of typical opinions of online instructors and students at NCCCS. Yet, open-ended surveys allow flexible responses from participants and is an especially useful exploratory tool for identifying themes that are not pre-determined by researchers. Future research can build on the list of instructional practices identified in our study to develop close-ended questionnaires to systematically collect information from online instructors and students at a larger scale at community colleges. Additionally, our study validates the instructional practices only with student and faculty perceptions and opinions, rather than student performance outcomes. Thus, even for a practice that is deemed highly effective by both instructors and students, it is unclear whether it will indeed lead to higher student course success rates. Future studies are needed to evaluate the impacts of the perceived effective practices on student learning outcomes through rigorous research designs.

Here we present two examples of our ongoing efforts to demonstrate how findings from the current study could be used effectively to inform data collection that intends to capture instructional practices and their relationship to student outcomes in a more systematic way. First, drawing on the instructional practices nominated by online instructors and students in the current study, we developed a comprehensive close-ended survey that systematically collects information on college online instructors' use of instructional practices that are promising in engaging and supporting students in an online course. We administered the survey to online instructors at multiple community colleges and examined how reported frequencies of practices may cluster to form meaningful groups of instructors, as well as factors (e.g., instructor background characteristics) that are correlated with the implementation of these practices.

In addition, to explain how an online course could be designed to address the challenges of online learning, the second research project developed an online course quality rubric (Xu et al., 2020) to provide a systematic and descriptive benchmark for researchers and practitioners who are striving to develop a culture of high-quality college-level online courses. We used the rubric to observe one hundred online courses randomly selected from a large community college and link these observations to student course performance data to provide empirical link between specific instructional practices and student learning outcomes. Findings from the current study provide critical foundations for developing the survey instruments and the online rubric for the two ongoing quantitative projects described above.

Conclusion

This study examines instructor and student perceptions of online instruction at community colleges to identify effective online instructional practices, issues with the current online instruction, and possible strategies for future improvement. Despite the limitations and caveats mentioned above, this study sheds light on important ways to improve online instruction in community colleges by identifying specific practices that either offer promising ways to support or could potentially impede teaching and learning in a virtual environment. Our results also reveal misalignments between online students and instructors in their expectations of course workload and preferred ways of communication. Taken together, these findings highlight the importance of providing clear guidance to navigate the learning process and to improve interpersonal interactions and student engagement more intentionally and visibly in online courses. Finally, we illustrate specific ways how findings from this open-ended survey can be used to inform future development of closed-ended surveys or other data collection tools to capture the use of instructional practices and perceptions of these practices at scale.

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Appendix A

Open-ended data can provide valuable information through direct views into a respondent's thinking; yet many researchers and practitioners are reluctant to use open-ended surveys as they are more difficult to analyze than closed-surveys (Roberts et al., 2014). A major challenge with open-ended responses is that the analysis of text data requires the researchers to define the dimensions on which the data should be coded based on prior knowledge of the topic and theoretical expectations (Schuman & Presser 1996). Although originating from computer science, structural topic modeling (STM) has been increasingly used in educational research as a powerful tool to identify key themes in educational text data, such as open-ended survey responses, discussion forum posts, and reflective writings (e.g., Chen, Yu, Zhang, & Yu, 2016).

STM is applied to develop a coding scheme for each question and for instructor and student responses separately. The basic intuition behind STM is to group words based on the frequency of and their co-occurrences in the responses. Based on the keywords in a word group identified by the algorithm, the researcher can then interpret the meaning of the words and the potential topic captured by these words. More specifically, the process of identifying key topics for each open-ended question involves three steps.

(1) First, before we ran the STM, we conducted standard pre-processing called "stemming" to prepare the survey responses for each open-ended question for analysis. This involves removing all punctuations, transforming the text to lower case, and reducing words to their root form (e.g., removing tense and reducing "communicating" to "communicate").

(2) As an unsupervised method, STM requires setting the number of topics before running the model. The optimal number of topics needs to balance model fit and substantive interpretation. The recommended approach in the literature is to re-estimate the model multiple times with different pre-set numbers of topics and compare the topics that emerged from each estimation (e.g., Chen, et al., 2016). For each open-ended question, we therefore estimated the model using a wide range of numbers of topics from 2 to 30.

(3) We then compared the results of each model and determined the optimal number of topics by balancing both the model fit and the interpretability of the results.

    (a) We first narrowed down to a smaller range of numbers of topics that yielded similar and relatively better model fit based on two commonly used indicators of model fit—the held-out likelihood and the semantic coherence—of these models (more details are presented in Appendix B). For instance, for instructor perceptions of effective instructional practices, we chose to narrow down and focus on results using K equaling to 2 to 8, which yield better model fit based on the two indicators (Appendix B Figure 1).

    (b) Based on the numbers of topics chosen, STM generates several topics from the raw data and reports keywords and example responses associated with each topic. Considering that coding the topics into themes based on the word profiles requires human interpretation and decisions, two researchers coded the themes for the word profiles within each coding set independently and cross-validated our theme labels. Most of the themes were consistent regardless of the number of distinct topics pre-set by the researcher. In models with fewer topics, several of the themes identified in the more numerous coding schemes often ended with similar themes and therefore could be combined.

Appendix B

For each survey question, we analyzed the responses using STM with a wide range of numbers of topics from 2 to 30, compared model fit of the results, and chose models with better fit to narrow the space of possible solutions. For each question, the model fit of the various solutions and the process and result of solution selection is presented below.

Instructor perceptions on effective instructional practices. Results of model fit for instructor perceptions on effective instructional practices are shown in Figure B1(a). As the number of topics increased from 2 to 30, the held-out likelihood fluctuated within a small range, and the semantic coherence increased from -85 to -75 first and then decreased gradually. Therefore, we narrowed down the solutions to numbers of topics equaling 2 to 8, which yielded a relatively similar and better model fit. Two researchers coded the responses independently and determined that six themes make the most sense.

Student perceptions on effective instructional practices. Results of model fit for student perceptions on effective instructional practices are shown in Figure B1(b). As the number of topics increased from 2 to 30, the held-out likelihood fluctuated within a small range from two to seven topics then fluctuated drastically; the semantic coherence decreased substantially from two to seven topics and then fluctuated within a small range. Therefore, we narrowed down the solutions to the numbers of topics equaling 2 to 7, which and eventually led to six themes from student responses about effective instructional practices.

Instructor perceptions on ineffective instructional practices. Results of model fit for instructor perceptions on ineffective instructional practices are shown in Figure B2(a). Although large numbers of topics yield high semantic coherence (e.g., K = 25, 27, 29, and 30), the large number of topics identified are not practically valuable for summarizing the key themes from a relatively small dataset (N=105). Looking at models with small number of topics, the held-out likelihood fluctuated within a small range from two to six topics; the semantic coherence decreased substantially from -120 to -140 from two to three topics, increased from -140 to around -120 from three to four topics, and then fluctuated within a small range from four to six topics. Therefore, we chose to focus on results using two, four, five, and six topics which yield relatively better though not the best model fit. Two researchers coded the responses independently and agreed on six themes.

Student perceptions on ineffective instructional practices. Results of model selection for student perceptions on ineffective instructional practices are shown in Figure B2(b). As the number of topics increased from 2 to 30, the held-out likelihood fluctuated within a small range from two to eight topics, while the semantic coherence decreased dramatically from four to five topics. Therefore, we narrowed down the solutions to the numbers of topics equaling 2 to 4, which yield relatively better model fit, especially for semantic coherence. Two researchers agreed on four themes after human coding all the responses.

Instructor perceptions on changes necessary to improve online teaching and learning. Results of model selection for instructor perceptions on changes necessary to improve online teaching and learning are shown in Figure B3(a). As the number of topics increased from 2 to 30, the held-out likelihood fluctuated within a small range from two to six themes; the semantic coherence decreased first from two to six themes and then increased gradually. Therefore, we narrowed down the solutions to numbers of topics equaling 2 to 4, which yielded a relatively better model fit and at the same time kept the results as interpretable as possible. After human coding all the topics generated by STM, two researchers agreed on four themes and after human coding all of the responses, another two themes were added.
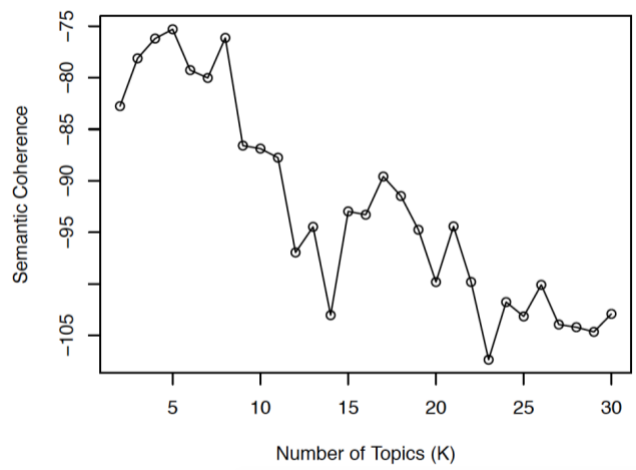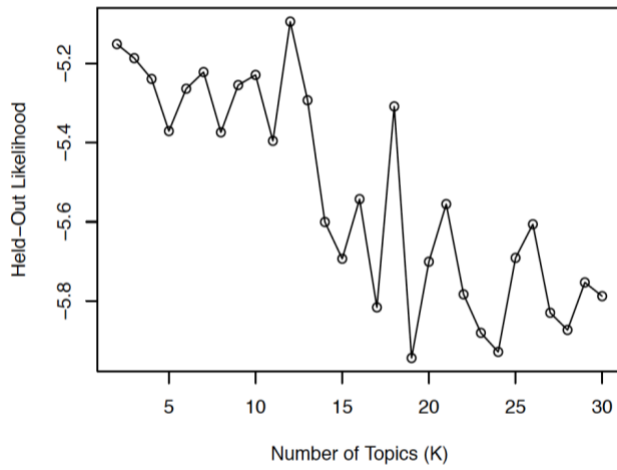
Student perceptions on changes necessary to improve online teaching and learning.
Results of model selection for student perceptions on changes necessary to improve online teaching and learning are shown in Figure B3(b). As the number of topics increased from 2 to 30, the held-out likelihood fluctuated within a small range from two to ten themes; the semantic coherence decreased first from two to four themes and then fluctuated within a small range from four to eight themes. We narrowed down the solutions to numbers of topics equaling 2 to 8, which yielded a relatively better model fit for both held-out likelihood and semantic coherences. After human coding, six themes were identified from student responses about changes necessary to improve online teaching and learning.

Figure B1

Model Selection for Instructor (a) and Student (b) on Effective Instructional Practices

(a) Instructor Perceptions
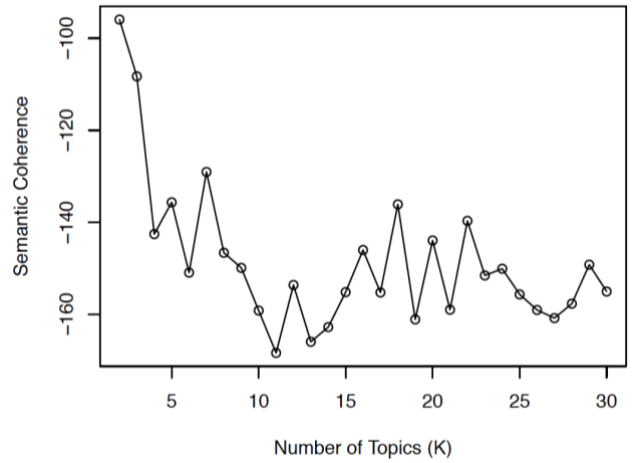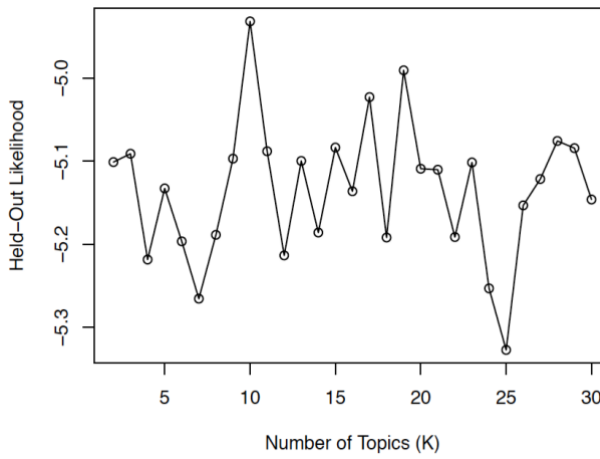
(b) Student Perceptions

Figure B2

Model Selection for Instructor (a) and Student (b) Perceptions on Ineffective Instructional Practices

(a) Instructor Perceptions

(b) Student Perceptions

Figure B3
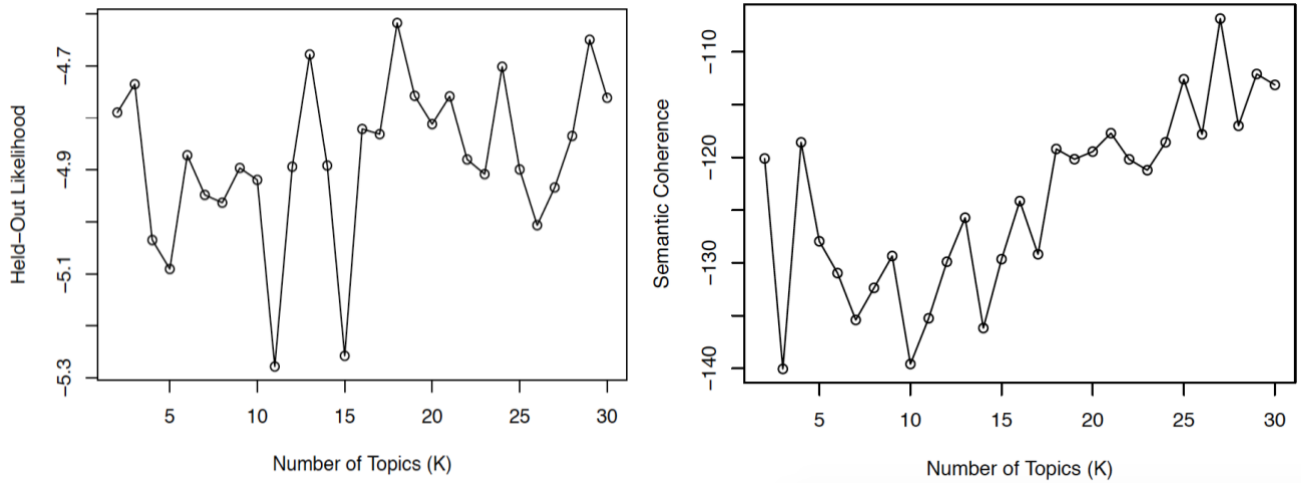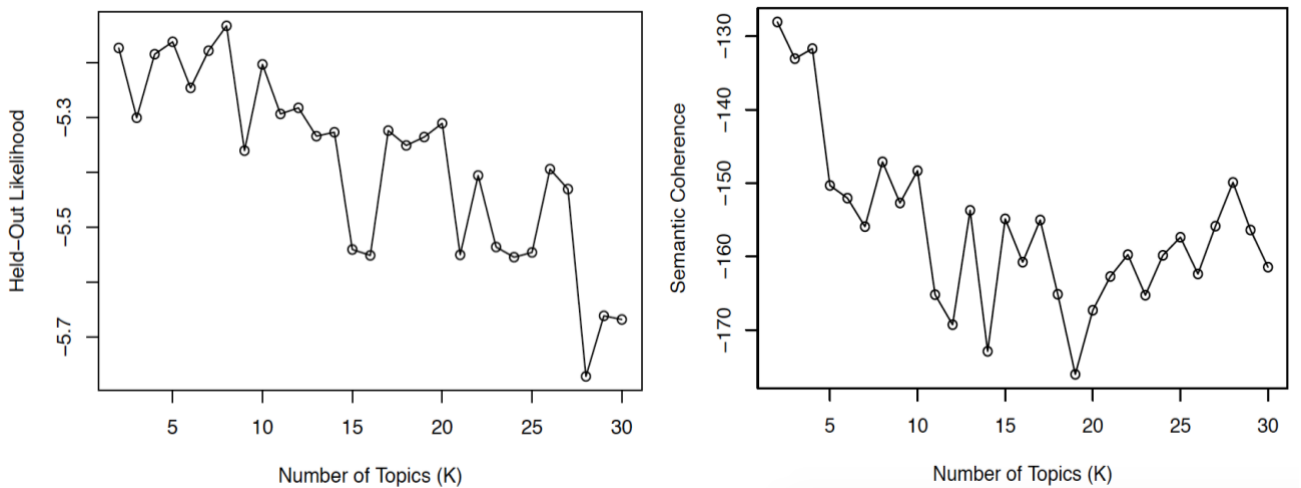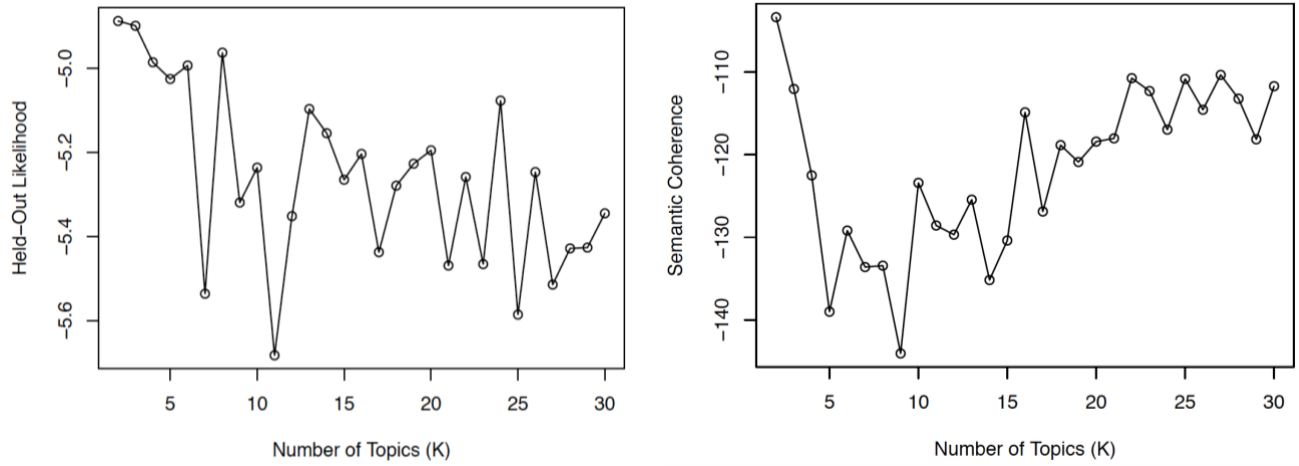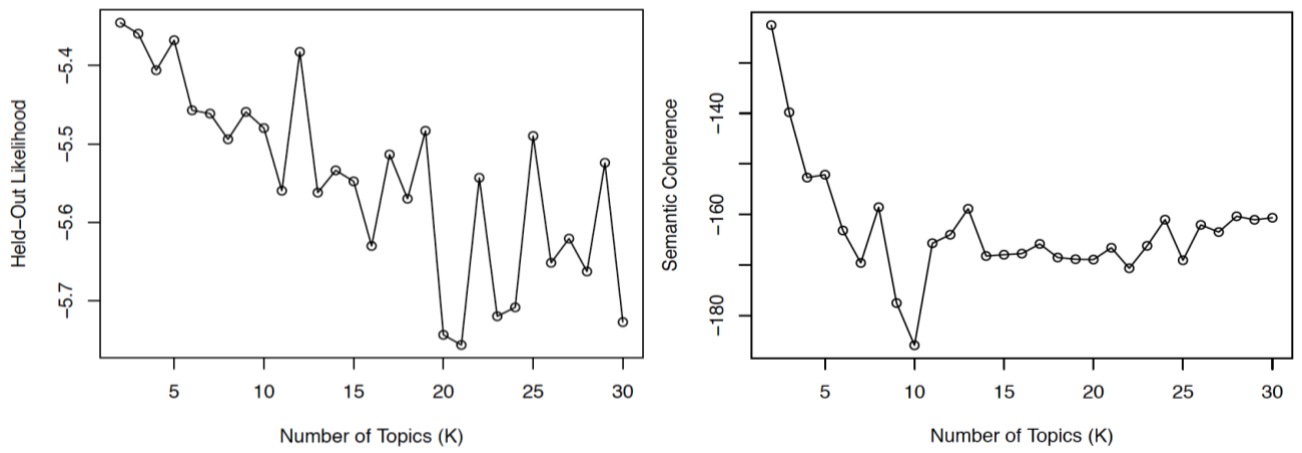
Model Selection for Instructor (a) and Student (b) Perceptions on Changes Necessary to Improve Online Teaching and Learning

(a) Instructor Perceptions

(b) Student Perceptions

Appendix C

Table C1

Kappa Statistics for All the Codes

Coding Themes			Kappa Value
Effective Instructional Practices	Instructor	• Regular announcements and reminders	0.82
		• Varied materials and diversified media in content delivery	0.82
		• Proactive outreach with timely support	0.89
		• Timely response	0.77
		• Quality feedback on assignments	0.72
		• Offering discussion forum activities	0.80
	Student	• Varied materials and diversified media in content delivery	0.70
		• Clear expectations on assignments	0.80
		• Timely responses	0.81
		• Regular announcements and reminders	0.94
		• Quality feedback on assignments	0.93
		• Explaining course content with concrete examples	0.79
Ineffective Instructional Practices	Instructor	• Poor attendance in synchronous class meetings	0.94
		• Lack of high-quality engagement in the discussion forum	0.93
		• Unsuccessful group projects	0.84
		• Problems surrounding deadlines	0.92
	Student	• Insufficient instructor communication and engagement	0.92
		• Unclear expectations on course assignments	0.70
		• Unreasonable workload	0.88
		• Insufficient feedback on assignments and assessments	0.83
Changes Necessary to Improve Online Teaching and Learning	Instructor	• Improving instructor communication and engagement	0.84
		• Clarifying expectations on online learning	0.79
		• Delivering content using varied materials and diversified media	0.83
		• Providing timely response	0.74
		• Improving feedback on assignments and assessments	0.80
		• Improving feedback on student progress	0.80
	Student	• Delivering content using varied materials and diversified media	0.72
		• Setting up deadlines in more reasonable ways	0.81
		• Improving discussion board activities	0.70
		• Sending regular announcements and reminders	0.81
		• Providing timely response	0.77
		• Improving feedback on assignments and assessments	0.75

Appendix D

Table D1

Themes of Effective Instructional Practices from Instructor Survey

Themes	Definition	Sample Responses	Frequency
Regular announcements and reminders	Instructors send weekly announcements or reminders about the due dates of assignments or upcoming exams.	"I communicate with my students three times per week. Weekly I post the announcements of assignments due. On the assignment due date, I send a reminder to the students who have not submitted their work for the week." "I periodically create video announcements with myself in them so students get a sense of my presence in the class."	33%
Varied materials and diversified media in content delivery	Instructors use multiple instructional materials to illustrate the course content	"I produce a short video to introduce the material we will cover and upload it on Monday." "I create Camtasia videos to help explain more complicated concepts." "I post instructor videos for lectures and 'how to' videos for other assignments."	26%
Proactive outreach with timely support	Instructors reach out to students (e.g., emailing students) who seem to be having problems (e.g., students who are falling behind or miss assignments) and provide timely support	"If a student does poorly on an assignment early in the semester, I reach out individually and provide suggestions on how to improve next time, such as study strategies, proofreading more carefully, and taking advantage of multiple attempts. Then I give words of encouragement, like 'Hang in there, I know you can do this!'" "I frequently send out emails when students miss assignments and encourage them to contact me with any issues. I also REACHED OUT to students who were falling behind, missed an assignment, or generally seemed to be having problems."	22%
Timely response	Instructors respond to (or answering) students' emails or posts on discussion board in a timely manner and frequently	"I also respond to student emails throughout the day every day to ensure their questions are answered promptly and they feel heard." I respond quickly to all emails and if students ask for an extension on an assignment I try to be accommodating if I can. I also let students text me or call me on my personal cell phone. Some will text or call, but most students just email me."	20%
Quality feedback on assignments	Instructors give detailed/constructive / clear feedback on assignments	"Always keeping a positive atmosphere. For example, I always highlight the things students have done well before delving into the areas for improvement. I want to enable self-efficacy." "Provide detailed feedback for any loss of points on an assignment."	12%
Offering discussion board activity	Instructors incorporate discussion board activities to encourage student-student interaction.	"…I also have a weekly open forum so that students can discuss any issues they may have had with the chapter or with the assignments." "Required discussion board where students help each other complete assignments, meant to replicate the lab environment." "…Students interact on discussion boards as well as start out the semester with a fun icebreaker activity on discussion…"	11%

Table D2

Themes of Effective Instructional Practices from Student Survey

Themes	Definition	Sample Responses	Frequency
Varied materials and diversified media in content delivery	Instructors use multiple instructional materials to illustrate the course content	"Multiple views of learning. For example, having videos, PowerPoint, readings etc. Not everyone learns the same way so having multiple teaching styles included helps." "When the teacher includes a PowerPoint with slides that contain specific examples and shows how to get the correct answer, it helps me understand not just the solution, but how to achieve it."	30%
Clear expectations on assignments	Instructors help students understand what they are expected to do for the course (e.g., clear instructions for deadline) or give examples about assignments	"Not all but most of my instructors give details on what they want in an assignment. Sometimes it can be misleading to students and [students] completed in a different way but not the way the instructor had wanted." "Having easy to follow and descriptive instructions as well as samples greatly helps to complete assignments correctly."	19%
Timely response	Instructors respond to (or answering) students' emails/posts on discussion board in a timely manner and frequently.	"When they respond to their email in a timely manner. This helps because I can get the assignment done without waiting too long." "Being very responsive to emails and questions."	17%
Regular announcements and reminders	Instructors send weekly announcements or reminders about the due dates of assignments or upcoming exams.	"My biology teacher sends updates about assignments which helps me to stay on track in my class." "The professors send plenty of notice via email or blackboard announcements to alert everyone to what is due even though we have the syllabus as reference."	10%
Quality feedback on assignments	Instructors give detailed, constructive/ clear feedback on assignments	"The thing that helps me the most is when they comment on the work I have done. It helps me to understand what they are looking for." "Most try to give you feedback on work completed. Try to help with positive feedback."	7%
Explaining the course content with concrete examples	Instructors provide good examples to help students understand the course content.	"[The instructor] explains what we are doing and gives an example of the concept in his life. This helps me understand the concepts better. "I prefer some explanation and a lot of examples of calculations."	6%

Table D3

Themes of Ineffective Instructional Practices from Instructor Survey

Themes	Definition	Sample Responses	Frequency
Poor attendance in synchronous class meetings	When instructors hold synchronous sessions (e.g., Adobe Connect), very few students attend actively.	"I have attempted many attempts at synchronous meetings. We have made this a very easy process for our students, but the majority of students do not prefer to meet synchronously. The majority of our students live in an asynchronous world where they would rather text than make a phone call." "We have tried doing a F2F training session along with a synchronous session with faculty and had low attendance with the synchronous sessions."	25%
Lack of high-quality engagement in the discussion forum	It is challenging to stimulate a high-quality discussion via the discussion board in this course.	"If I do not require that students respond to a discussion post a day or two after posting their own response, they never go back and read the thoughts of others." I require peer feedback on discussion boards. However, some students regularly wait until the last day to post and never respond to a peer." "Stimulating quality discussions has been a challenge."	21%
Unsuccessful group projects	Students' group projects and collaborative work are not successful.	"I tried a collaborative Wiki page as a weekly assignment, but about half the groups seemed to have trouble figuring out how to collaborate." "I tried creating teams to work together and turn in homework. That generated complaints as some students felt that others were not actively participating and should not receive the same grade as others who were actively involved." "Group projects have not been as successful as I would like."	12%
Problems surrounding deadlines	When the due dates are set up in a way that is not consistent or too flexible, it undermines students' learning.	"I tried providing due date extensions and the same students would regularly 'take advantage' of the opportunity. This will cause those same students to fall further and further behind and they will consistently ask for extensions. Surprisingly, I have had at least two students per semester who will not follow due dates but consistently ask for extensions." "Having inconsistent due dates caused students to miss assignments."	7%

Table D4

Themes of Ineffective Instructional Practices from Student Survey

Themes	Definition	Sample Responses	Frequency
Insufficient instructor communication and engagement	The instructors lack communication, do not engage with the students, or do not make themselves available to students.	"The majority of the instructors are not really involved in my online classes. If I am lucky I might hear from them once or twice during the semester to remind me to do some assignment or take a test." "I didn't like their lack of communication. Their lack of communication was so bad."	25%
Unclear expectations on course assignments	The instructors fail to make course assignments (e.g., deadlines) easy to find and understand and sometimes do not provide timely and correct information on course requirements.	"Sometimes forget to give examples to help understand the concept of the assignment and what exactly the instructor is looking for." "Sometimes, instructions for certain assignments are so vague that you have no idea what you are supposed to do."	23%
Unreasonable workload	The course requires unreasonable work that is sometimes unnecessary or not meaningful for learning.	"Instructors do not give a fair course load. A lot of us take online classes because we're older, work full time, have families and the course load is meant for kids who don't have much going on outside of school." "I feel sometimes online courses are so jam-packed with busy work that I focus on getting assignments done and don't really retain the information." "Give unnecessary work online when they don't give the same in seated courses."	11%
Insufficient feedback on assignments and assessments	Instructors fails to provide timely or detailed feedback on assignments or assessments	"Wait to the last minute to grade assignments and don't give feedback. This causes the students to work in the dark, not knowing if the assignment they completed was correct or not before they submit another assignment." "If the instructor takes a while to give you feedback that could impact your grade because you won't know what to improve on until you get the grade."	9%

Table D5

Themes of Changes Needed to Improve Online Instructions from Instructor Survey

Themes	Definition	Sample Responses	Frequency
Improving instructor communication and engagement	Instructors are more engaged with the course in general and improve the level and quality of communication.	"I think it is very important to make personal contact with students, especially those who are having a difficult time. It is much harder for them to drop or fail if they have a relationship with the instructor." "A high level of faculty-student communication. Greater instructor engagement with students."	22%
Clarifying expectations on online learning	Instructors coach students on the course requirement and the amount of time and the skills necessary to be successful in online learning.	"Better expectations from students entering the course as to how much time and effort the course will require." "Online students should know up front (prior to registration): the general time commitment per week to be successful in the course; the number of assignments due and when they are due; the computer requirements for course; how late assignments are handled."	18%
Delivering content using varied materials and diversified media	Instructors use multiple instructional materials to illustrate the course content.	"For me personally, I have provided my students with multiple resources in order to make them successful. I am continuing to add anything I am made aware of in order to help my students." "I think students need to have video examples available not just a textbook."	10%
Providing timely response	Instructors respond to or answer students' emails or posts on the discussion board in a timely manner and frequently.	"Respond timely to students when they have a technical problem, or questions. If it takes days to get a response, or students don't get a response at all, it defeats the learning experience, and conveys a lack of caring to students." "To be more responsive to students outside of the 8-to-5 Monday - Friday schedule."	5%
Improving feedback on assignments and assessments	Instructors give detailed/constructive/clear feedback on assignments	"Detailed and timely feedback on assignments. The instructor should provide instructive feedback anytime a student does not receive a perfect score." "Instructors should know how to set up a course in Moodle so students have immediate weekly feedback regarding assignments and their overall progress in the course."	3%
Improving feedback on student progress	Instructors monitor students' course progress and provide feedback on their course progress.	"More automatic monitoring and feedback of student progress, starting early in the term with attendance and completion of early assignments." "Instructors should know how to set up a course in Moodle so students have immediate weekly feedback regarding assignments and their overall progress in the course."	3%

Table D6

Themes of Changes Needed to Improve Online Instructions from Student Survey

Category	Definition	Sample Responses	Frequency
Delivering content using varied materials and diversified media	Instructors use multiple instructional materials to illustrate the course content.	"I like when teachers video themselves explaining the lessons. When the instructor gives verbal information about the subject it really helps, especially for those who are audible learners." "I would prefer to read text, watch lectures, and take online quizzes and tests on what I had read in the book."	10%
Setting up deadlines in more reasonable ways	Instructors set up more reasonable due dates.	"More professors to post due dates for assignments as early as possible for students who may need to work ahead for whatever reason." "Classes having due dates during the week and not on weekends. Assignments shouldn't be due on a Saturday night because the weekend is our time off from school." "I wish the due dates in assignments weren't so close together or an assignment every week. When you stack on classes keeping up with work for two different classes that is due that same week is hard."	7%
Improving discussion board activities	Instructors incorporate discussion board activities to encourage student-student interaction.	"Students are typically forced to respond to a certain amount of people which ends up not being a productive discussion. There needs to be more back and forth discussion about intriguing topics." "Meaningful discussion boards, not just busy work where others give a 'me too' response."	5%
Sending regular announcements and reminders	Instructors send weekly announcements or reminders about the due dates of assignments, upcoming exams etc.	"It would be really cool to get notifications on your phone just like a text with reminders of what's due soon!" "Set up a reminder system with students. Try Remind 101 to keep students up to date."	4%
Providing timely response	Instructors respond to or answer students' emails or posts on discussion board in a timely manner and frequently.	"To be more successful I need professors to respond to their emails in a timely matter… sometimes their help is extremely needed when taking an online course." "Having assistants to answer email questions since the professor will be busy, this way the student can quickly get a response to their question."	2%
Improving feedback on assignments and assessments	Instructors give detailed/constructive/ clear feedback on assignments	"When I get a question wrong, I would like a complete answer on where the answer can be found in the text and why it is wrong." "More feedback from the teachers. When I get a question wrong, I would like a complete answer on where the answer can be found in the text and why it is wrong."	1%
Sending regular announcements and reminders	Instructors send weekly announcements or reminders about due dates of assignments, upcoming exams etc.	"It would be really cool to get notifications on your phone just like a text with reminders of what's due soon!" "Set up a reminder system with students. Try Remind 101 to keep students up to date."	4%

A Content Analysis of Change Management Strategies Used in Technological Transitions in Higher Education Institutions from the Lens of a Strategic Alignment Framework

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Abstract
Technology innovations have the potential to significantly strengthen the ability of higher education institutions to deliver on their core educational mission with greater quality, efficiency, and effectiveness. Not surprisingly, managing technological changes is among the chief concerns for institutional leaders, and yet there is a dearth of research that provides concrete frameworks for managing this type of change in a higher education context. Using Guerra-López and Hicks's Learning and Development Strategic Alignment (LDSA) framework, this qualitative study used a directed content analysis approach to develop a contextualized framework for planning and managing technology change in higher education institutions. The findings suggest that there is a meaningful fit between specific change management strategies found in the learning management systems (LMS) transition research literature and the LDSA framework. The various strategies were synthesized and grouped around LDSA dimensions and core functions, resulting in a technological change management framework contextualized for higher education.

Keywords: Strategic Alignment, Change Management, Higher Education, Institutional Effectiveness, Learning Management System (LMS) Selection, LMS implementation, LMS transition/migration.

One of the aims of higher education institutions (HEI) is meeting the evolving needs of students, the labor market, its community, and society at large. Leveraging pedagogical developments and technological innovations can significantly strengthen higher education's ability to deliver on this promise. The challenge in fully realizing the benefits of technology innovations is wide recognition that technology is a means to an end and that purposefully aligning these innovations to strategic imperatives is the foundation for successfully managing technological change.

Implementing planned organizational change is one of the most significant challenges for leaders and those responsible for the organization's improvement and sustainability (Guerra-López & Hicks, 2017; Mishra, 2018), and in HEI managing technological changes is a key concern (Ryan et al., 2012, p. 222). In addition, Dobbin (2016) asserted that change management might be the most complicated issue to address, given the "resistance-to-change" problem when upgrading to a new technology that is common in any organization and even more evident in Higher Education. Adopting a technology, such as a new LMS, is a complex process (Straub, 2009; Englund et al., 2017) as it involves a change in the delivery approaches and content that may affect various aspects of the educational system. Moreover, failure to define clear stakeholder expectations and establish tangible alignment between the selected solutions and the institution's strategic priorities increases the risk for wasted efforts, time, and money that can lead to poor performance in the organization (Guerra-López & Hicks, 2017).

The literature consistently estimates the failure rates of organizational change initiatives to be as high as 70% (Hornstein, 2015; Al-Haddad & Kotnour, 2015; Balogun & Hailey, 2004). Technology changes in HEIs have not always been implemented with systematic consideration of the needs of a wide variety of stakeholders, including students and faculty, thereby creating a gap between the perceived gains of educational technology and tangible student outcomes (Adams Becker et al., 2017). Challenges that accompany the implementation of technological changes include high cost, insufficient resources, faculty disinclination to change, inadequate involvement of technology staff (Glenn & D'Agostino, 2008), in addition to the pressure of planning to grapple with technological obsolescence and longevity (Adams Becker et al., 2017). Just about the time faculty can adapt and master a technology, a new version is launched and marked, demanding a new cycle of implementation and adoption. For example, introduction of a new learning management system (LMS) is a significant institution-wide change that requires well-planned strategies and a sound decision-making process. Moreover, it requires involving a wide range of key stakeholders in the adoption process phases, including planning, selection, implementation, and evaluation (Boggs & Van Baalen-Wood, 2018). These technologies will be ineffective or distracting if they are not managed and integrated into the learning process in meaningful ways (Adams Becker et al., 2018)

Many studies have discussed the challenges that HEI face when changing their LMSs. These include short transition time and lack of faculty involvement (Hannon et al., 2011), resistance to change, time demands for faculty training and associated compensation (Ryan et al., 2012), extra workload from course re-design and the possibility of re-training (Smart & Meyer, 2005), besides other issues that might hinder faculty teaching and impact student learning.

Clearly, the use of effective strategies to successfully manage technological change in HEI is crucial. Nevertheless, managing technological change in higher education has not been adequately studied. Much of the research and practice has been borrowed from the corporate world and contextualized change management practices for higher education do not exist (DePaul, 2016). Despite the vast amount of research on e-learning technologies, the focus has

been on teaching and learning with technology. Consistently, Ritzhaupt and Thompson (2017) argue that there is only a modest amount of extant research literature on the planned processes involved in selecting an LMS. Other scholars have contended that change management models or frameworks that ensure successful e-learning implementation in addition to identifying critical success factors in teaching, learning, and management are needed to help academic leaders facilitate the change process (McPherson & Nunes, 2006; Pahl, 2003; Wilson, 1999). A review of the literature reveals publications on the LMS transition process and lessons learned from the implementation. Yet, there is a dearth of published efforts to help institutional leaders in higher education understand the process from the lens of an integrative theoretical framework that can systematically guide them in aligning the change initiative to the institution's objectives.

Therefore, the purpose of this qualitative study is to explore the empirical literature and identify what strategies are being used in higher education to facilitate the selection and implementation of an LMS migration from the lens of a theoretical framework for strategically planning and managing institutional change.

Theoretical Framework

In his classic book, Organizational Culture and Leadership (1985), the well-known scholar, Edgar Schein, defined culture as a pattern of shared basic assumptions learned by a group of people as it solves the problems of external adaptation and internal integration. (p.18) Schein and Schein (2016) argued that this internal integration depends on obtaining a shared understanding of the organization's mission and strategy, its goals and objectives, the means it will employ to reach them; the measurement system it will use to navigate its path, and the corrections or improvement strategies it will take to stay the course.   This is the fundamental premise underlying the definition of strategic alignment as a process of continuous adaptation to create a fit among the internal and external elements of an organization and its strategic priorities (Guerra-Lopez, 2018). Previous research had suggested that strategic alignment is vital to performance and that organizations with strong strategic alignment outperform those with weak alignment (Guerra-Lopez & Hicks, 2017; Hicks, 2015; Jin et al., 2010; Marsick & Watkins, 2003; Walter et al., 2013). Linking the activities in the organizations in a way that adds measurable value to all the internal and external stakeholders is the key to achieving success. The lack of alignment emphasis creates the risk of wasted time, efforts, and money and can lead to poor performance and demotivation among its members.

The Strategic alignment of Learning and Development framework (Figure 1) is a change management tool that can be used to clarify stakeholder expectations and validate organizational needs to ensure the best initiatives are selected and effectively implemented in any type of organizational setting. Change management models often involve three key stages for managing the implementation of organizational initiatives: communicating the change, mobilizing others to support the change, and monitoring the implementation of change. In the context of strategic alignment, the change process begins prior to communicating the change and begins with an assessment and validation of the problems to be addressed. In this sense, specific change initiatives are driven by well-defined needs and requirements. The framework is grounded on systems theory to investigate how organizational elements, factors, and dynamics work together to produce a specific result. It also relies heavily on cross-collaboration and strategic thinking to inform decision-making and direction setting (Guerra-Lopez & Hicks, 2015; 2017).

The strategic alignment framework was developed to help decision-makers understand the relationships among essential factors that impact organizational success, whether they are

internal elements such as systems, staff, skills, structure, finance, and shared values and practices, or external elements such as, government laws, environmental policies, customer needs, technology trends, economic environment, regulatory agencies, or peers or competitors.

Figure 1.
Strategic Alignment of Learning and Development model, (source: Strategic Alignment for Learning and Development by Guerra-Lopez & Hicks, 2017, p.26)

Align Expectations	Align Results	Align Solutions	Align Implementation
Understand what stakeholders want	Translate stakehlder wants into results / Identfiy critical gaps	Analize gaps for solution selection / Align solutions to gaps	Design alignment strategies
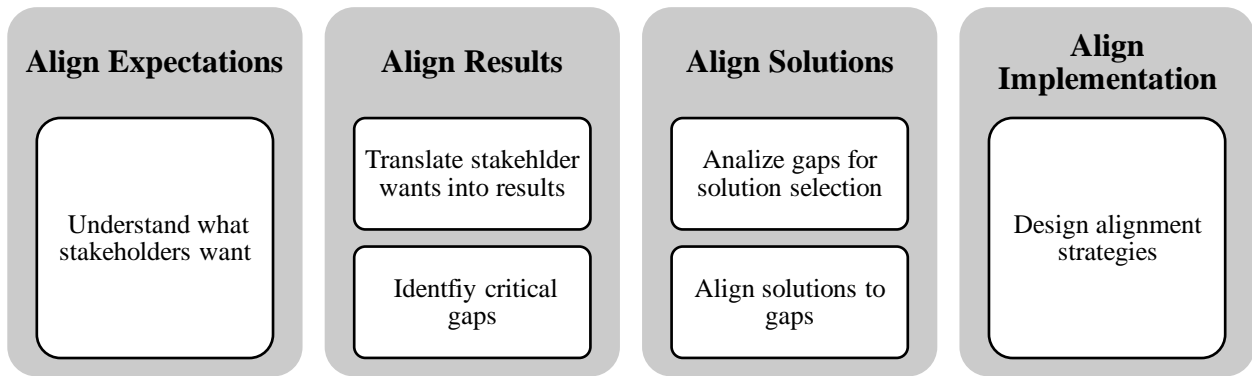
Guerra-Lopez and Hicks (2017) suggested that most failed implementations of organizational initiatives stem from either the misalignment of the perceived problem and the selected solution or the misalignment of the selected solution and the implementation context. In the former, the disconnect is in properly assessing the needs of the organization and selecting the best solution(s) for addressing those needs. In the latter, the disconnect stems from poor or non-existing strategies for purposefully implementing the solution and managing the change.

Methodology

This qualitative study took a directed approach to content analysis (Hsieh & Shannon, 2005) using the Strategic Alignment of Learning and Development (LDSA) framework to derive the primary coding categories for the analysis of text data.

This study focused on one specific type of technological change, learning management system (LMS) transitions. Piña (2018) defined an LMS as "a software system that interfaces with one or more databases and provides a secure environment to facilitate delivery, interaction, assessment, and management of online, hybrid, and web-enhanced instruction via the Internet" (p. 102). According to the 2014 EDUCAUSE Center for Analysis and Research (ECAR) report, LMS adoption reaches an extraordinary level of HEIs with more than 99% of colleges and universities reporting that they have an LMS in place and that these tend to stay in place for only eight years before institutions look to update them (Dahlstrom et al., 2014).

Thus, the researchers conducted a comprehensive bibliographic search using key terms such as "Learning Management System Selection", "Learning Management System Implementation", "Learning Management System Transition", "LMS selection", "LMS Implementation", "LMS Transition" between the period of January 1, 2012-July 17, 2019. The search efforts yielded 135 publications, including 130 journal articles, three book chapters, and two books from the Wayne State University library system.

The researchers then used additional criteria to identify the most relevant publications, which included full-text online English case study articles describing specific strategies utilized by HEIs during the LMS transition process. A snowball sampling technique was then used to identify additional empirical publications from the reference lists that also met the criteria. Two additional articles were added to the sample for a total of 11 LMS transition case studies.

Content analysis of themes was followed in which coding was used to determine the emerging themes and patterns from the studies. Change management strategies were grouped around naturally emerging themes. Based on a reiterative process of the organization, reflection and discussion, the researchers found that there was considerable fit between the emerging themes and the strategic alignment framework (though not all themes appeared in all case studies) at which times the specific strategies were organized around theoretical framework dimensions, stages, and steps, as illustrated in Table 1.
.

Findings

Below we provide a description of the contextualized strategic alignment framework based on the content analysis. The findings are presented under each of the main four phases: Align Expectations, Align Results, Align Solutions, and Align Implementation. The presentation of each phase begins with the theoretical description and is followed by the research findings.

Phase 1. Align Expectations

This phase helps higher education information technology (IT) leaders gain an understanding of the expectations, wants, and perceived performance needs from various stakeholder perspectives of the HEI. Here, the stakeholders include all those who are involved in the technological change, in this case the LMS transition, including those championing the transition as well as those who will be affected by the LMS transition, including faculty, students, staff, executive and academic leadership, center for teaching and learning (or some comparable unit), and other relevant unit representatives.

Gaining an understanding of the stakeholders' perspectives has many important functions, including helping change leaders understand how success will be evaluated across the institution, as well as what elements can help them establish strong buy-in for the process, the solution, and the ultimate results (Guerra-Lopez, 2017). In a sense, this is the beginning of creating and managing the organizational change—as people become engaged in the process, they have a shared interest in the change process and its success. It also helps build a shared understanding of the problems from various vantage points and a clearer understanding of how the various issues interact as part of one institutional system embedded within a community or societal context.   The content analysis revealed the following specific strategies for this phase:

1. *Engaging Stakeholders:* Studies emphasized involving stakeholders early in the process to gain faculty buy-in later. Representatives of all stakeholders including, students, faculty, administrators, IT staff are all invited to the conversion (Boggs, & Van Baalen-Wood, 2018; Graff, Johnson, & Means, 2013).
2. *Identify Drivers of Stakeholder's Needs and Uncover Their Expectations:* Obtaining information about students and faculty LMS usage, needs, and impressions about the current LMS as well as their desires and expectations for a new system help the change agents make a sound decision around LMS selection. This can be done through online surveys, focus groups— online or face-to-face (Boggs, & Van Baalen-Wood, 2018; Graff, Johnson, & Means, 2013; Strawser et al., 2018), and User Story (Koutropoulos,

2013) that can be used to create an inventory of needs and to evaluate potential LMS. Koutropoulos, (2013) explained that:

> a user story is a brief description, in the form of a sentence that describes what the user of a software system wants to achieve by using this system. User stories are written by users of the system, not developers, and they are meant to express the voice of the user. By using user stories for collecting requirements and evaluating the creators of the LPR process wanted to ensure that the interests of all of the campuses were preserved. (p.24).

3. *Identify Change Agents*: They can be members of the main departments at the institution that are chosen to form a *review committee.* Graff, Johnson, and Means (2013) explained,

> The selection of participants for the committee sought to achieve two goals: instructor leadership and direction of the evaluation and selection process (rather than by IT staff), and campus-wide participation (p. 56).

Phase 2. Align Results

Stakeholder wants and expectations are not always neatly articulated in terms of specific institutional objectives, and the transition team can be instrumental in clarifying links between the two. The aim of this phase is to clarify the specific results that will be achieved with the chosen initiative. These results cross over various dimensions, such as effective teaching, the learning experience, student success and institutional effectiveness among others. Clarifying expected results sheds light on relevant indicators and the data needed to document clear gaps between desired and current results. A variety of methods can be used to clarify gaps, including review of relevant institutional data, focus groups, and interviews. Perhaps not all gaps are of equal importance or share the same level of urgency; therefore, having a systematic process for identifying priorities allows the transition team to clarify the problems to be addressed, and helps focus further analysis, selection, and implementation.

For this phase, two strategies emerged from the studies:

1. *Identify Needs or Gaps:* Graff, Johnson, and Means (2013) explain that the review committee align the selection process with the institution plan and its objectives, specifically, with e-Learning system and services.

2. *Conduct Institutional (resources) Analysis:* Analyze the culture, strategic plan, and the context of the organization to determine where the LMS fits and operates (Boggs, & Van Baalen-Wood, 2018) in addition to the availability of resources and budget (Strawser et al., 2018).

Phase 3. Align Solutions

The goals of the analysis at this stage according the LDSA framework are to clarify the root causes of problems associated with the current LMS and begin to articulate the "solution requirements", which in turn provide an evidence basis for identifying LMS alternatives that will have the highest likelihood of success. It is also important to understand how other issues or dynamics in the environment may be supporting recurrent patterns that support undesired or counterproductive LMS routines. It is also essential that the process of identifying LMS alternatives be collaborative and include input from stakeholders, beginning with identifying relevant and useful criteria for selecting the options. This helps ensure that the selection process incorporates documented institutional needs, capabilities, resources, and preferences, as well as the track record of LMS options. The various solution requirements are weighed and prioritized by the stakeholders and used to evaluate each of the LMS alternatives. Six main strategies emerged from the literature within this phase:

1. ***Participatory Solution Analysis:*** Information is collected about the problem and dissatisfaction components that drove the institution to upgrade the system and the gaps to be addressed. Strawser et al., (2018) found that the age, limitations, and the maintenance cost of the old LMS system created compelling reasons for the institutional shift.
2. ***Locating Experiences of Peer Institutions:*** Locating peer institution experiences that had recently gone through LMS transition is found to be helpful (Boggs, & Van Baalen-Wood, 2018; Graff, et. al., 2013).
3. ***Request for Proposals (RFP):*** Developing RFP and locating the proposals that meet the institution's specific needs and context is necessary at this stage (Boggs, & Van Baalen-Wood, 2018; Koutropoulos, 2013).
4. ***Vendor Presentations & Review:*** Vendors are invited to present their products to faculty, students, administrators, and technical groups in on-site meetings (Graff et al., 2013; Koutropoulos, 2013; Davis & Surajballi, 2014, Boggs, & Van Baalen-Wood, 2018).
5. ***Technical Testing and Evaluation:*** After the presentation, the committee invites instructors and support staff to test the proposed systems (Graff et al., 2013; Davis & Surajballi, 2014). Technical testing, evaluation scores, and feedback are then collected.
6. ***Decision/Solution Selection:*** Final decision about the best LMS is made based on previous testing. (Boggs & Van Baalen-Wood, 2018; Graff et al., 2013). Boggs and Van Baalen-Wood (2018) recommend the rule of 80/20 and stated, "You won't be able to please everyone; aim for meeting the needs of 80% of your user base" (p.119).

Phase 4. Align Implementation

The focus of this last phase is ensuring successful execution, integration, and sustainability of the change. The implementation plan must include specific steps for integrating the new LMS in the actual environment, which includes a thoughtful communication strategy. The transition teams should consider who needs to be informed about what, when, and how as it is related to the transition. Implementation planning also includes mobilization strategies, such as defining implications for other systems, policies, processes and procedures, expectations, training, feedback, and evaluation. It may also include forming implementation support teams across various units to proactively address questions or help troubleshoot. Finally, a clear monitoring plan to track the progress and success of the LMS transition must be defined, which should include what milestones and indicators will be tracked, how frequently data will be collected, who should use it and when, and how to use the data for timely corrective or improvement actions.   The content analysis revealed four strategies under this phase:

1. ***Development of Implementation, Monitoring, and Improvement Plan:*** Having an implementation plan and an implementation team is vital to put in strategies to aid the implementation process (Davis, & Surajballi, 2014; Strawser et al., 2018).
2. ***Communication Strategies & Informational Sessions:*** Developing and maintaining robust communication strategies (Boggs, & Van Baalen-Wood, 2018; Butakov et al., 2013**;** Davis & Surajballi, 2014; Graff et al., 2013; Hannon et al., 2011; Ryan et al., 2012; Koutropoulos, 2013, Strawser et al., 2018) is essential in keeping people informed and apprised of the next steps in the transition, training, and ongoing support. Multiple informational/introductory sessions can be provided across campus and online for faculty, students, and staff to support the LMS implementation (Killewo et al., 2014; Boggs & Van Baalen-Wood, 2018; Strawser et al., 2018). Change brings about insecurity

and uncertainty. Resistance to change is considered an obstacle in the change management and is linked to its failure. Most resistance and opposition to change result from fear, uncertainty, and negative perspective of the new technology. Communication helps to address the resistance and opposition to change and facilitate effective technological change (Guerra-Lopez & Hicks, 2017; Ryan et al., 2012; Boggs & Van Baalen-Wood, 2018).

3. ***Execution of Implementing Plan with the Necessary:*** (Boggs & Van Baalen-Wood 2018; Butakov et al., 2013; Killewo et al., 2014; Judge & Murray, 2017; Sanga, 2016; Hannon et al., 2011; Ryan et al., 2012; Strawser et al., 2018)
    a. *Training:* Multifaceted training can be offered to users around content migration through workshops (basic and advanced skills workshop, foundational and targeted workshops), stand-alone sessions and series, digital training repository, and boot camp, custom workshops, sessions in users' home departments, and on-demand training. Strawser et al., (2018) argued, *"faculty must understand what the LMS can do and how it can be used in the classroom"* (p.40).
4. *Support:* Robust support from a support team that includes the vendor, IT, and instructional support personnel can be offered 24/7 through phone calls, email, online live chat, video guides, PDF guides, help page, one-on-one-appointments, or ongoing drop-in support services at individual to departmental levels.
    a. *Collaboration and Cooperation:* Judge and Murray (2017) explained that "collaboration and cooperation of the trainers and the faculty were vital to the success of the project. Collaboration consisted of scheduled meetings, structured deadlines to upload documents, and assistance for faculty and staff with individual courses." (p. 278)
    b. *Resources and Leadership:* Support and encouragement from leadership are crucial to empower stakeholders. Citing Ely (1990), Strawser et al. (2018) explained that "leadership refers to leaders who provide encouragement to consider ideas, ensure necessary training, communicate enthusiasm, and are available for consultation." (p. 42). Leadership of high quality is required to guide an effective change. Bates (2000) argued that without leadership and a strong sense of support for change in the organization, the barriers of inertia will be great.
    c. *Incentives, Rewards and Early Adopters:* Studies refer to recruiting early adopters and mentors to pilot the system and guide the content migration process as they play a vital role in the technological change process (Ryan et. al., 2012; Boggs & Van Baalen-Wood, 2018; Strawser et al., 2018). Strawser et al. (2018) recruited Moodle ambassadors to leverage the passion of first adopters and gave them incentives; they state, **"**The monetary incentive reminded faculty that their work was valuable." (p. 41)
    d. *Taking Learning Ownership:* Encourage academics to take ownership of what they do is a key. Hannon, et. al., (2011) emphasized learning by doing, scaffolding professional development, adopting project approach, and providing a creative environment.
    e. *Integrating the New LMS in other Relevant Structures and Processes* at the institution, such as with student information system.

- ***Monitoring, Change Management & Continuous Improvement Plan:*** At the completion of the transition, continual evaluation and feedback from faculty and students will be vital to determine the effectiveness of the project and to suggest plans for improvement (Judge & Murray, 2017). This can be done through a variety of methods, including surveys (Judge & Murray, 2017), or continuously via online suggestion boxes (Ryan, Toye, Charron & Park, 2012). Table 1, below, summarizes the specific strategies found in the literature, as well the supporting references.

Table 1.

A Synthesis of Technological Change Management Strategies Organized around the Four Strategic Alignment Framework Phases

Strategies	Source	Description
Align Expectations		
Engaging Stakeholders	Boggs & Van Baalen-Wood (2018); Graff et al. (2013)	Involving stakeholders early in the process to gain faculty buy-in later. Representatives of all stakeholders including, students, faculty, administrators, and IT staff are all invited to the conversion.
Identify Stakeholder Expectations	Boggs & Van Baalen-Wood (2018); Graff et al. (2013); Strawser et al. (2018); Koutropoulos (2013)	Obtaining information about students and faculty LMS usage, needs and impressions about the current LMS as well as their desires and expectations for a new system help the review committee make a sound decision around LMS selection. This can be done through: • An online survey • focus groups (online or face-to-face) • User Story
Identify Change Agents	Graff, Johnson & Means (2013); Boggs & Van Baalen-Wood (2018)	Members from the main departments at the institution are chosen to form a review committee.
Align Results		
Identify Needs or Gaps	Graff et al. (2013)	Graff, Johnson, & Means (2013) explain that the review committee aligns the selection process with the institution plan and its objectives, specifically with e-Learning system and services.
Conduct Institutional Analysis	Boggs & Van Baalen-Wood (2018); Strawser et al. (2018)	Analyzing the culture, strategic plan, and the context of the organization to determine where the LMS fits and operates. In addition to the availability of resources and budget.
Align Solutions		
Participatory Solution Analysis	Strawser et al. (2018); Graff et al (2013)	At this stage, information is collected about the components that drove the institution to upgrade the system. Further, the selection process needs to be aligned with the institution plan and its objectives.
Locate Experiences of Peer Institutions	Boggs & Van Baalen-Wood (2018); Graff et al. (2013)	Locating experiences of peer institutions that had recently gone through LMS transition.

Request for Proposals (RFP)	Boggs & Van Baalen-Wood (2018); Koutropoulos (2013)	Developing RFP and locating the proposals that meet the institution's specific needs and context.
Vendor Presentations and Review	Boggs & Van Baalen-Wood (2018); Koutropoulos (2013); Graff et al. (2013); Davis & Surajballi (2014)	Vendors are invited to present their products to faculty, students, administrators, and technical groups in on-site meetings.
Technical Testing and Evaluation	Graff et al. (2013); Davis & Surajballi (2014)	After the presentation, the committee invites instructors and support staff to test the proposed systems and then evaluates their feedback.
Decision/Solution-selection	Boggs, & Van Baalen-Wood (2018); Graff et al. (2013)	Final decision about the best LMS is made based on previous testing. (Rule of 80/20).
Align Implementation		
Development of Implementation, Monitoring, and Improvement Plan	Davis, & Surajballi (2014); Strawser et al. (2018)	Having an implementation plan and team are vital to put in strategies to aid the implementation process.
Communication Strategies and Informational Sessions	Hannon, Hirst & Riddle (2011); Ryan et al. (2012); Boggs & Van Baalen-Wood (2018); Butakov et al. (2013); Davis & Surajballi (2014); Graff et al. (2013); Koutropoulos (2013); Strawser et al. (2018)	Developing and maintaining robust communication strategies is essential in keeping people informed and apprised of the next steps in the transition, training, and ongoing support. Multiple informational/introductory sessions can be provided across campus and online for faculty, students, and staff to support the LMS implementation.

Execution of Implementation Plan with Necessary: *Training *Support * Collaboration and Cooperation * Resources & Leadership *Incentives, Rewards & Early Adopters. *Taking Learning Ownership *Integration with Other Relevant Institutional Structures and Processes	Boggs & Van Baalen-Wood (2018); Butakov et al. (2013); Killewo et al. (2014); Judge & Murray (2017); Sanga (2016); Hannon et al. (2011); Ryan et al. (2012); Strawser et al. (2018)	Multifaceted training can be offered to users around content migration through: - workshops (basic and advanced skills workshop, foundational and targeted workshops) - stand-alone sessions and series, - digital training repository - boot camp - custom workshops and sessions in users' home departments - and on-demand training. Robust support from a support team that includes the vendor, IT, and instructional support personnel, that can be offered 24/7 through: - Phone calls - email, - online, live chat - video guides - PDF guides - help page - one-on-one-appointments - or ongoing drop-in support services at individual to departmental levels. - Support and encouragement from leadership are crucial to empower stakeholders. -Recruiting early adopters and providing incentives to pilot the system and guide the migration process are vital. - Integrating the new LMS with other relevant structures and processes in the institution. -Encouraging academics to take ownership of what they do is key.
Monitoring and Continuous Improvement	Judge & Murray (2017)	At the completion of the transition, continuous evaluation and feedback from faculty and students through surveys will be vital to determine the effectiveness of the project and to suggest plans for improvement.

Discussion

It is interesting to note that many of the strategies that emerged from the literature are clustered around the final phase of the LDSA framework, "*implementation*". Given that the stakeholder buy-in process starts much sooner, during the *clarify expectations* stage, it may not be surprising that, as Dobbin (2016) asserts, change management is often faced with resistance to change. Additionally, given that other early change management phases, as outlined in the LDSA framework, allow us to identify or validate priority needs based on various sources of data and analyze various options based on solution requirements that are specific to our own institutional needs and realities, it seems logical to wonder whether this could partially explain the significant failure rate (as high as 70%) of institutional change initiatives (Al-Haddad & Kotnour, 2015; Hornstein, 2015; Balogun & Hailey, 2004).

When we talk about managing a change or initiative, people often think of implementing something, but the management of the change starts much earlier during the planning stage. There seems to be a disconnect between change planning and change implementation. Williams, et al. (2019) argue that the dedicated literature on the front-end of projects is sparse, though the front-end has been shown to be critical to the strategic success of projects.

Similarly, Guerra-Lopez and Hicks (2017) have previously argued that most failed implementations of organizational initiatives stem from either a disconnect in properly assessing the needs of the organization and selecting the best solution(s) for addressing those needs or from poor or non-existing strategies for purposefully integrating the solution and managing the change from a system view.

Figure 2 illustrates a contextualized strategic alignment framework to guide a systemic process for planning and managing change. The framework organizes specific change management strategies based on current published case studies. However, those strategies should be contextualized to best fit the unique situation for each institution, and further may not flow neatly in the same order as suggested. Reality, particularly in institutional settings, is complex and does not always fit perfectly into models, diagrams, and flowcharts.

Conclusion

Effectively implementing planned organizational change is one of the most significant challenges for leaders in HEIs and managing technological changes is a key concern (Ryan et al., 2012). This study sought to propose an integrated framework for helping leaders manage technological change in HEIs. One of the limitations of this study is the modest number of case studies included in the analysis. While the researchers could have increased the sample size by expanding the inclusion criteria to a wider variety of empirical articles, we wanted to maintain focus on providing HEI leaders an applied framework that reflected strategies that had been applied in similar contexts. Further research is needed to identify a broader set of strategies and their level of effectiveness when applied as part of a systematic and integrated approach.

Figure 2.
A Synthesis of Technological Change Management Strategies in Higher Education by Strategic Alignment for Learning and Development Phases (Adapted from Guerra-Lopez & Hicks's framework, 2017).

Align Expectations: Understand what stakeholders want

- Engage stakeholders
- Clarify stakehold erexpectations
- Identify change agents

Align Results: Translate stakehlder wants into results; Identfiy critical gaps

- Identfiy gaps and needs
- Conduct institutianl (resources) analysis

Align Solutions: Analize gaps for solution selection; Align solutions to gaps

- Conduct participatory solution analysis
- Locate experiences of peer institutions
- Review requests for proposals
- Facilitate vendor presentations and review
- Conduct technical testing and evaluation
- Decision/solution selection

Align Implementation: Design alignment strategies

- Develop implementation, monitoring, and improvement plan
- Define communication strategies and facilitate information sessions
- Execute implementation plan with necessary support (e.g. training, collaboration, leadership, tools/resources, incentives and rewards, institutional structures and processes, etc)
- Develop and execute monitoring, change management, and continuous improvement plan

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Parents' Use of Digital Literacies
to Support their Children with Disabilities
in Online Learning Environments

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Abstract
An emerging research base has highlighted various roles and responsibilities that parents of students with disabilities accept when they enroll their children in online schools. Since finding and using online texts and using various programs and applications that require search and evaluation skills to do work are typical for online learning, it follows that part of parent responsibilities in many families might involve using basic technological literacies or even more advanced digital ones. To focus on the range of technological literacies that parents employ, researchers gathered self-report data from parents about how they engage with online education technologies while working with their children with disabilities. Interviews with (n = 32) parents across six states in the West, Midwest, and Southern United States revealed that parents employ various skills with a specific set of purposes in mind. Literacies were used to (a) perform basic technological computing tasks, (b) evaluate information to supplement existing instructional materials, and (c) communicate with the school about children's needs. Reported purposes for using these skills emerged as (a) instructing, (b) monitoring, (c) advocating, and (d) learning school expectations. Implications of this study include the potential for literacy-based approaches to parent preparation for supporting vulnerable children in online settings.

Keywords: virtual schools, parent roles in virtual school, K-12 online learning, students with disabilities, technology skills, digital literacies, technological literacies

K-12 student enrollment in fully online learning schools, programs, and courses enjoyed a steady 6% annual growth since 2009 (Digital Learning Collaborative, 2019). For students with disabilities, pre-pandemic state prevalence estimates ranged from 6% to 25% (East et al., 2016). In fact, the number of children who were being educated in online environments and who qualified for special education services under the Individuals with Disabilities in Education Act (IDEA 2004) has been steadily increasing alongside the general education population (Molnar et al., 2015). Additional increases in student enrollment in online environments, including enrollments for students with disabilities, may continue to occur while traditional public schools make adjustments to scheduling and delivery modes associated with the COVID-19 pandemic. Also, some families that became familiar with learning online during the pandemic might decide to become full-time or part-time online school students, even after school buildings fully re-open.

Once children are enrolled in fully online schools, parents typically assume extensive responsibilities for helping children move through their coursework (Alcena, 2014; Black, 2009; Borup, 2016; Borup et. al 2013; Borup et al., 2015). However, previous research has documented that the parents of students with disabilities are given and expect to accept even greater demands on their time and skills to support their children in online schools (Rice & Carter, 2015, Rice, et. al., 2019). Further, previous research has documented the uneven access parents have to support for their roles as on-site mentors within online schools (Ingersoll et al., 2017; Ortiz et al., 2017). None of this research has specifically addressed these roles with reference to the technological knowledge and skills that parents have or need. Instead, discourse has focused on parents as not providing enough help or providing too much (Black, 2009; Rice et al., 2017). The result is that schools and parents are vulnerable to being confused about what they can and should do for children versus what the schools should provide in terms of support (Rice & Deschaine, 2021). This is especially important where students with disabilities are concerned because they have rights to services in the United States and many other countries (IDEA, 2004; Márton et al., 2013). Many of these skills are grounded in practices associated with various types of literacies that are becoming part of everyday life in a digital world (e.g., using and producing digital texts, finding and evaluating information, navigating applications) (Martzoukou & Abdi, 2017). These literacies serve larger goals of acquiring and using cultural capital (Bourdieu, 1986). Rethinking these efforts as technological, even digital literacies might help educators in online environments to conceptualize equitable support for parents in mentoring their children because they offer an alternative to deficit conversations where parents are incapable or do not want to help.

Research Questions
1. What technological and/or digital literacies do parents report using while supporting online schooling for their children with disabilities?
2. What purposes to do parents cite for using these literacies in relationship to their roles in supporting their children?

Theoretical Framing for Technological Skills as Digital Literacies
Literate activity is situated in social goals and values (Street, 1984). These goals and values are associated with the desirable habits and are reflected as cultural capital (Bourdieu, 1986). In fact, literacies have been described as the means by which individuals, communities, and societies gather, preserve, and express their capital (Gee, Hull, & Lanskshear, 1997; Luke, 2003). To this point, Kellner (2000) offered the following definition:

> *'Literacy' in my conception comprises gaining competencies involved in effectively using socially constructed forms of communication and representation. Learning literacies involves attaining competencies in practices in contexts that are governed by rules and conventions. Literacies are socially constructed in educational, governmental, and cultural practices involved in various institutional discourses and practices. Literacies evolve and shift in response to social and cultural change and the interests of elites who control hegemonic institutions. (p. 197)*

In the digital context, literacies have undergone a transformation from habits and practices associated with typing and attaching files to more sophisticated integration of finding, sorting, evaluating, designing, and critiquing (Martzoukou & Abdi, 2017). These so-called higher order skills are necessary because they more efficiently do the work of aggregating and maintaining capital necessary to retain group viability.

To further the conception of technological skills as literacies, this study drew on Martin and Grudziecki's (2006) work to classify digital literacies. These scholars argued that digital literacies could be distinguished as (1) computer information technology literacies, (2) technological literacies, (3) information literacies, and (4) communication literacies. These definitions have some overlap in meaning but provide a foundation for thinking about how technological skills have been previously articulated in scholarship as types of literacies.

Computer information technology literacy is concerned with basic computing tasks, such as typing and organizing files. Keywords for this conception include access, manage, integrate, and evaluate information, construct new knowledge, and communicate with others to participate effectively (van Jooligan, 2003; Dakers, 2006).

Technological literacies is an open term with two opposite approaches. The first focuses on skills-based vocational skills for computing. The second focuses on critical, constructivist perspectives that highlight the social and political consequences of technology use (Dakers, 2006; Kress, 2003).

Information literacies acknowledges that the internet has vast amounts of information that users must evaluate and use to make meaning. Primary skills to make sense of this information include recognizing a need for information, identifying what information will help fill the need, locating the information, comparing and evaluating information, organizing and communicating information, and finally synthesizing information, even producing more information as a contribution (Cook, 2018; Martin & Rader, 2003; Webber & Johnston, 2017).

Communications literacies. While communication has always been important, technologies have enabled increased digitally supported communication. However, the advent of digital systems that offer instant communication to one or many, requires users to be more aware of the nature and implications what they communicate and how they do it.

Reviewing Literature on Parent Involvement

Parent involvement in children's education has been theorized in research for in-person settings, online settings, and with various populations, including students with disabilities. A brief review of key ideas from these research areas appears below. While there have been some efforts to understand parent work in the context of capital (Bourdieu, 1986) for traditional in-person schooling, strong connections to capital and concomitant linkages to literacies in parent work in online schooling have not yet been made.

Traditional Parent Involvement in Education

Parent involvement for fully in-person educational settings has considered the perspectives of individual parents' beliefs and motivations, the values and goals of the community, and the mission and desires of the school. Where parent involvement has been theorized, the dominant theory has been that schools operate to assist in the transmission of cultural capital as a set of desired aesthetics, traits, knowledge, and habits to future generations (Bourdieu, 1986; Yamauchi et al, 2017). In various models of parent involvement, the goal is to leverage the cultural capital of parents who are regarded to possess it and share the capital with parents who are not. Children can acquire the capital from school, usually to the end goal of functioning as human capital, or workers (Anyon, 1980). Parents from working class backgrounds, who represent racial, ethnic, gender, or linguistic diversity, or who have different physical, emotional, and neurological abilities are not usually the parents regarded to possess cultural capital (Auerbach, 2011). In these capital-focused models, parent contributions to education are supposed to support the goals and aims of the school and what counts as involvement is often distilled to a narrow range of activities that the school closely monitors (e.g., parent-teacher conference attendance) (Epstein, 2011; Hoover-Dempsey & Sandler, 1995, 2005).

The problem with centering the educational experience on school and the capital it supposedly provides is that it fails to acknowledge important activities that children could do outside of school that are economically important and critical to the identities of families and their members (Moll et al., 1992). Centering school also sets up a power structure where learning must be attained in school settings in a school-ish way (e.g., taking notes) (Anyon, 1980). Even where schools have acknowledged that some families have strong networks, skills, habits, and literacies, the more usual approach has been for schools to determine that some families have the desired traits and some do not (Baquedano-Lopez et al., 2013).

In online educational settings, instructional materials and assignments are provided by schools, but students engage in learning away from the locus of power (e.g., the school building). This arrangement had potential for such power balances to be disrupted. However, there was also the potential that school could impinge on home life to a greater degree. This greater encroachment could come as family life becomes swallowed up in doing schoolwork. Under such circumstances, *any time*, *any place* learning leads to doing school assignments *all the time*, *every place*. Such disruptions of family life were the basis of some parent complaints about remote online learning during the COVID-19 pandemic-related school building closures (Dong et al., 2020). Parents felt that they were spending large amounts of time advancing the schools' agenda and they were unsure of what the benefits were to the children.

Parent Involvement in Online Learning

Parent work in online learning and the home-school balance while participating in online school opportunities was identified more than 20 years ago as an issue that needed attention (Litke, 1998; Black et al., 2008; Black, 2009). In these early studies, it was noted that parents were assuming roles that would traditionally belong to teachers, such as making sure that students turned in assignments.

Litke (1998) argued that increased direct parent involvement in education must be a positive development, but Black (2009) found that parents who were very involved in children's work did not have children who were performing better. There are a number of possibilities for why this might be the case. One possibility might have been that parents who have children who are doing well do not need to intervene and therefore, they do not. Only parents with children

who are struggling, notice the struggle and attempt to help. Heavy parent involvement might also send a message to children that their parents do not have confidence in them, which may lessen their motivation. Heavily involved parents might also be doing some of the work for the child on some assignments and leaving children to do other ones, resulting in uneven performance. Another possibility is that parents who are inclined to intervene are unable to leverage digital literacies and learning skills in ways that translate to school success.

Previous research on parent work in online learning has yielded important findings implying that parents use what are recognizable as digital literacies to help their children. Sorensen (2012) identified organizing learning as a major parental responsibility, which suggested literacy skills associated with calendaring, file sorting, and workflow that probably extended online. Such skills are also recognizable as forms of capital required to attain and retain employment opportunities (Bourdieu, 1986; McLennan, 1967). In another interview study with 10 parents tracking parent involvement, Borup et al., (2015) found parents engaged in five major types of job activities to support their children that all mirror job responsibilities: (1) facilitating interaction with school officials (here, operating as supervisors), (2) advising and mentoring children (here, operating as subordinates), (3) organizing the learning as a multi-step project, (4) monitoring and motivating engagement with the child subordinates, and (5) instructing the children as subordinates. Many of these activities that are essential for clerical positions might have common threads with some responsibilities of parenthood in general, but they take on new meaning or intensify in online schools. For example, teaching children how to fix a wagon or a set a table for a family dinner, or even providing instruction for homework might be typical in many households. However, just because a parent might know how to assist children with tasks, that does not mean they have the stamina to supervise formal learning online during many hours during the day for most of the days of the week. Also, just because parents may have certain job skills for their job, that does not mean they have the time, interest, or ability to automatically translate them into support for their children's learning.

Prior to the COVID-19 pandemic, Borup (2016) used teacher surveys and interviews to learn about teacher perceptions of parent involvement in virtual charter schools. In the 2016 study, teachers reported similar findings to what parents had reported in 2015 (Borup et al., 2015). While teachers expressed gratitude for some of these types of support, they also perceived that some parents were overly engaged in certain types of learning activities, meaning that they were providing too much assistance. Teachers were most complimentary of parents' efforts to monitor assignment completion and communicate teacher expectations to children, reflective of a middle management role where the teachers are the higher-level supervisors. When students were asked about their interactions with parents and their perception of the support they received from parents, students reported appreciation for parent efforts to assist them by providing explanations as the job-related tasks of monitoring and scheduling (Borup et al., 2013).

To learn more about how schools constructed parent roles in online schools, Rice (2015) analyzed testimonials from online schools directed at parents as potential customers. These testimonials characterized parents as instigators of online school enrollment, as well as organizers of schedules and providers of time and space to work online. The major plotline in these testimonials focused on being in a fallen state regarding the child's education. Finding fully online learning alleviated the tension and subdued all anxiety about the child's learning.

Other than organizing, the testimonials did not feature other aspects of parent work highlighted in previous research. Further, the testimonials did not explicitly highlight digital literacies, but instead suggested that the learning would come right to the child and parent interactions with children around schooling would be idyllic and pleasant.

Parent Involvement in Online Schooling When Children Have Disabilities

There has also been research on parent work in online learning that is specific to students with disabilities. Findings from these studies have highlighted how parents of children with disabilities are also expected to enact job tasks as a demonstration of capital. For example, Rice & Carter (2015) studied online educators and found that teachers and administrators engaged in extensive monitoring of students with disabilities to make sure they were submitting work. Further, fully online educators desired parent assistance in monitoring and in making sure that students contacted them regularly. Again, this monitoring was implicitly technologically-related in its requirement to use a learning management system, but not explicit about the digital literacies parents would need (Ortiz et al., 2017).

Researchers at the Center on Online Learning and Students with Disabilities (COLSD) also conducted several additional studies of parent work (Basham et al., 2015). Studies of parent work within this center focused on parental role construction, disability service transition, and social and emotional support for parents and students with disabilities when they moved online. These researchers found that parents described their roles as educators, medical aides, reward managers, and executive function directors for students. These findings centered on executive function where parents narrated the need for digital literacies in organizing student work (Rice et al., 2017).

Researchers have also found that parents felt pressure to assume these roles because transition services for students' Individualized Educational Programs (IEPs) were inconsistent in their quality (Smith et al., 2017). Some parents did have positive experiences, but other parents reported that their children lost access to many of their special education services, and that fully online schools refused to provide supplementary services and support guaranteed per U.S. law (IDEA, 2004). Even when parents reported receiving some support and believed they had positive relationships with school officials, they seemed to be misinformed about the services they were receiving. For example, when researchers inquired about access to assistive technologies, parents would affirm they had these. When asked to name the assistive technologies they had received, parents were unable to say anything specific. Moreover, they did not know where to go—online or offline to find information about assistive technologies.

More recently, Rice et al. (2019) documented the difficulties of a foster parents working to support a child with multiple disabilities in a virtual school. The foster mother in this study was in her 60s and two children with disabilities in her home. The parent reported extensive efforts to contact school officials and communicate her child's needs to them. When those queries were unmet, she resorted to doing most of the instruction for her foster son on her own. As part of this work, she described using specific information literacies, such as finding YouTube videos for her son and using online spreadsheets to make daily schedules. She did not receive instruction on how to do these from the online school. Instead, she seemed to be drawing on skills she brought with her to the situation through work and her university education.

Although there are negative reports made by parents about working with their children online, many parents of students with disabilities continue to affirm their desire to be at an online school rather than a traditional one. In Beck, et al.,'s (2014) study, parents of students with disabilities were more positive than parents of children without disabilities. Also, (Rice et al.,

2017) found this to be the case among parents they interviewed across multiple states. These parents believed that if their children could not succeed in a fully online school, they may not find success anywhere, since traditional schooling experiences had been poor also. Importantly, these parents also believed that their children with disabilities had educational and personal needs that others cannot understand or do not want to, and they enjoyed the opportunity to work with their children out of the immediate presence of school officials (Rice et al., 2017; Rice et al., 2019). Other researchers have had similar findings (Tonks et al., 2021). Drawing on a study of parents of children with disabilities who enrolled the children in a virtual school in California, Schultz (2019) wrote:

> *[P]arents of students with disabilities chose a full-time virtual charter school for their children due to push factors related to their previous school. Parents seemed most interested in being able to individualize education for their child, have a flexible schedule, and be able to instill their values in their children by educating them in the household. (p. 75)*

Thus, it seems that parents are willing to use a variety of literacies and subordinate to school expectations if it means they can remain in an online school with some autonomy and be successful.

As the COVID-19 pandemic set in, researchers were questioning the level to which students with disabilities were truly included in online learning environments and whether typical practices for supporting parents of children with disabilities in online learning were sufficient (Rice & Deschaine, 2021; Rice & Ortiz, 2020). Early research findings from studies and district-sponsored questionnaires conducted during the COVID-19 pandemic showed varying responses to supporting remote online education. Parents in Dong, et al.'s study, (2020) reported spending large amounts of time supporting their children, but they could not tell what their children had learned. In district surveys from the U.S., parents were generally positive. However, some parents voiced concerns that were grounded in literacies, such as keeping track of different websites and digital tools, managing timing for video conferences with multiple children, and helping their children keep pace with what was perceived as a higher workload than before the pandemic (Gwinnet County Public Schools, 2020; Parsippany-Troy Township Schools, 2020). These challenges were more acute for parents of children with disabilities.

What we do not yet know is what digital literacies parents believe they have for providing support in these domains from previous research (facilitating interaction with school officials, advising and mentoring, organizing, monitoring and motivating student engagement, and instructing). We also do not know parents' purposes for using these literacies to work with their children. To gain additional understanding on these topics, we engaged in the current study.

Methodology

In this study interviews were collected, and the content was analyzed to uncover themes (Boeije, 2010; Birks & Mills, 2015; Trainor, 2013). These interviews occurred with 32 parents of children with disabilities in online schools.

Participating Parents

Parents from nine different programs in six states participated in this study (California, Colorado, Georgia, North Carolina, Utah, Wisconsin). Each of these states has multiple online school providers. Parents in this study were invited to the study in two ways. The first way was

through invitation from a national parent advocacy network for children with disabilities. From this invitation, 19 parents agreed to an interview.

The second way was through an invitation at the end of a survey designed at a technical service center and distributed to parents directly through online charter schools. Thirteen parents who responded to this survey agreed to participate in an interview. Parents had a range of experience in virtual schools (from one semester to three years). The average experience level was 2 years. Most of the parents identified as biological mothers of the children (n = 28), which a few grandmothers in parenting roles (n = 3) and one foster parent (mother). Parent/grandparents reported ages ranged from 28 to 70, with a mean age of 36. Reported household income ranged from $28,000/year to $120,000/year. However, most parents reported a household income between $40,000 to $65,000. Table 1 summarizes demographic information.

Table 1
Participant Information

Category	Types	N
Age	Under 30	2
	30–40	25
	40–50	4
	+50	1
Children's primary disability**	Autism Spectrum Disorder	11
	Attentional Disorder	10
	Emotional/Behavioral Disorder	2
	Other Health Impairment	6
	Specific Learning Disability	4
	Speech Language Disorder	3
Experience with online schooling	<one year	4
	1 year	10
	2 years	14
	3 years	3
	3 or more years	1
Household income*	$20,000–$30,000/year	5
	$30,000–$40,000/year	4
	$40,000–$50,000/year	6
	$50,000–$60,000/year	8
	$60,000–$70,000/year	4
	+70,000/year	1
Race/Ethnicity*	White, non-Hispanic	25
	Black, non-Hispanic	2
	Black, Hispanic	1
	Mixed Race	3
Role	Mother	28
	Grandmother	3
	Foster mother	1
State of residence	California	4
	Colorado	2
	Georgia	5
	North Carolina	8
	Utah	3
	Wisconsin	10

**Note: Some parents had more than 1 child with a disability, resulting in n > 32.
*Note: Some participants declined to answer some questions resulting in n < 32.

In addition, while 10 parents reported having bachelor's degrees and one had a master's degree, the rest had some college without a degree or none at all. Paid employment for participating parents in the study included educators (n = 2), health care workers (n = 3), business owners (n = 3), and customer service representatives (n = 4). However, most were not currently working for pay (n = 20). Permission from a university ethics board was obtained for conducting this research and privacy and confidentiality was preserved in accordance with directives from the ethics board.

Data Collection

Two researchers conducted interviews with parents. These interviews were semi-structured; questions were asked using a protocol, but interviewers solicited elaboration when it was relevant to contextualizing a response or further illuminating research questions (Brinkman & Kvale, 2018). The interview protocol was based on previous research conducted with parents of students with disabilities by the Center on Online Learning and Students with Disabilities but was modified to include more information about digital literacies (Basham et al., 2015). The interview protocol included several questions related to demographics. These were followed by questions about the children's disabilities and how the disability affected learning, as well as the support and services they were receiving. Next, interviewers and parents discussed labor roles, current daily routines, and resources accessed apart from the school. After establishing this context, we asked them about the technologies they used and had them refer to previous responses to make connections. The interview protocol appears as Table 2.

Table 2

Topics and Questions for Interviews

Topic	Questions
Demographics	What is your age?
	What are your children's ages?
	How do you and your family identify socially (race, ethnicity, gender)?
	What are the educational attainments of the adults in the household?
	What types of work for pay do adults in this household do?
	Can you give an estimate of your yearly household income?
	What are your children's ages?
Disability information	For the children who have disabilities, what are the disabilities?
	How was this disability identified?
	What services and supports does the child receive?
Labor roles	How do the various adults in your household or social circle provide support to the children who are learning online?
Routines	Can you describe a typical day learning online in your household?
	Can you describe an exceptionally challenging day?
	How did you meet the challenges you experienced?
Technologies	How would you rate your skill level with using technologies to support your child's learning?
	Can you describe the technological skills that you use most often?
	For what purposes have you used technological skills to support your children's learning?
	How is what you do with technologies for your children related to what you have done in a job situation or that you think you might do?
	Do you think that your literacies or fluencies with technologies helps you support your child? Can you give an example?

The set of questions was designed to provide multiple opportunities for parents to describe literacies they used and purposes although questions about support began and general ones and became increasingly more targeted to literacies. This was done to make parents feel more confident. Interviewers thought asking about literacies immediately would be intimidating, confusing, or may even sound like shaming to some parents.

Interviews were conducted and recorded using web conferencing applications. The applications generated automatic transcriptions. Interviews lasted between one and two hours. The variation in time was due to the number of children in the family, the extent to which the parents deigned to share information, the length of time parents had spent as on-site mentors in online learning, and potentially their overall level of comfort with being interviewed.

Data Analysis

To learn from the interviews, the researchers who conducted the interviews coded them in three phases: open coding, axial coding, and selective coding (Boeije, 2010; Birks & Mills, 2015). During the open coding phase, researchers read the data, highlighted meaningful information, and created initial codes. The meaningful information was targeted based on the research questions about parents' use of digital literacies and the purposes behind their uses.

During axial coding, the relationships between the codes were developed into a hierarchical structure. Instead of calculating inter-rater reliability, the researchers shared their codes and negotiated them (Garrison et al., 2006). In addition to open and axial coding, researchers sought to make connections between codes to analyze the content (Krippendorff, 2018). In considering connections, core themes not only appear frequently; they are also connected to other codes (Boeije, 2010). This was particularly important since we found that parents descriptions of their uses of digital literacies were often directly tied to their rationales. This was also true because our interview methodology focused on connection-making. It was not possible, then, to report the answers to the research questions sequentially (RQ1 report followed by RQ2 report). Instead, the connections researchers made by mapping codes and subcodes yielded themes where use and purpose were linked. The mapping was done by researchers through drawing codes and drawing connections and then checking back with the data. The coding scheme yielded three major themes around technological literacies (basic, informational, and communication) with 3–4 subthemes for each.

Findings

Parents reported using basic computing skills to support their children. They also reported using information literacies to learn on the internet and various communications tools. Each of these themes and their accompanying rationales is discussed below.

Basic Computer Information Technology Literacies

All parents in this study (n = 32) reported a need for basic computer information technology skills to support their children with disabilities. These skills were used for organizing learning, troubleshooting, and advocacy efforts, particularly advocacy that enhanced accessibility to the curriculum.

Organizing learning. These skills came in the form of using basic technological applications and doing rote tasks like turning logging onto the internet. The parents often paired their discussion of technical literacies with efforts to organize the learning of their children. A parent of a 14-year-old boy with sensory processing disorder offered the following explanation.

> *In the brick-and-mortar, you keep your locker clean, right? Now in online learning we work on keeping his desk area clean, having a daily agenda, and using the Google calendar [application]. For his live learning classes, I have him log in 5 minutes ahead and help him to check his email.*

This is a parent who has a high school diploma and no further education. High school is the experience from which she can draw. The parent wove traditional organization skills together with basic computing skills (keeping a calendar, opening and responding to email) as part of a plan to help the child learn routines and stay current with his work. Using these technological skills is key to staying organized. The parent reported, based on her own experience, that being organized was the integral to school success and she often made analogies (i.e., the locker) to explain her thinking. It also represents a belief transmitted by schooling the organization, even of something such as the locker is the pathway to success. Logging in early and checking email represent additional attempts to affirm the habits of the school as a workplace for both of them.

Troubleshooting. While being organized and going online early for tasks like email provided a sense of calm for many of the parents, of course, some of the technological skills went toward troubleshooting when technologies failed. Only one parent did not report troubleshooting, in fact. The high-school educated parent of a 12-year-old with autism described one such circumstance and their workaround.

> *There's a good amount of technical difficulty at times. Whether it's an internet connection or whatever system they use to do the live lessons. I believe it was an Adobe program and sometimes the teacher would get kicked out of the room during the middle of the lesson. It would just go quiet all of a sudden. That happened kind of frequently, which is a little frustrating. After a while we didn't attend the live sessions anymore. We watched the recordings, especially because with math you could pause it and go over it to make sure he understands and then resume. In the live lesson, in real time you couldn't do that.*

To account for the technical issues that the parent deemed was beyond her control, she simply stopped attending the synchronous lessons. However, making this decision required the parent to use basic computing skills in accessing the videos, playing them, and then leveraging their affordances to support the teaching she was doing. Keeping the children online and deciding how to use asynchronous materials were critical ways that parents used to keep kids working.

Advocacy. Close to two-thirds of the parents (n = 20) were engaging with a more extensive repertoire of technological devices, which required different skills. For example, a parent of a 10-year-old with a rare form of brittle diabetes had to research, purchase, and learn to use a bevy of technological equipment.

> *Parent: We had to purchase him an enlarged, high-contrast keyboard. The virtual school didn't do it. We had to purchase him extra speakers so that he could hear things better. The school didn't do it. We had to purchase colored overlays for his computer, the school wouldn't do it. They are really refusing assistive technology that has been identified that would help him.*

Interviewer: Those technologies were identified with outside testing?
Parent: Yes. And some of it was identified in the brick-and-mortar school as well. He had an FM transmitter, which showed he needed better speakers. He needed high contrast paper and in brick-and-mortar they would Xerox things on colored paper.
Interviewer: The FM system or the contrasting paper, was that in his IEP?
Parent: Yeah.
Interviewer: And the virtual school would not provide it?
Parent: No.

This parent was doing this work of acquiring various technologies and learning to use them alongside a computer required for virtual learning as a measure of advocacy. The family had the financial resources and a sense of the importance of these assistive technologies, and they went out and found them. These purchases were made so the child could do his work more efficiently. Instead of asking for these from the school, the parent did not feel they were able to advocate with the school; they found it easier to avoid making a plea for supplies and bought their own. This acquisition of one's own work supplies formulated advocacy as something the parent does for the child to make sure they look competent to the school.

Information Literacies

The parent referenced above did not only have to develop and use skills for coordinating different types of technologies. She also had to go onto the internet, research about these assistive devices and how they worked with computers, conduct price audits, and make arrangements for the items online. More than two-thirds of parents (n = 25) reported using informational literacies, such as locating, evaluating, and sharing content found on the internet to work with their children in virtual schools. These information literacies were used to find the virtual school in the first place, and then because parents felt they needed to provide instruction for their children.

School searching. About 25 percent of parents (n = 8) were referred to online schools by word of mouth. For example, one participant was referred to a fully online school by the waitstaff at IHOP. A few parents found their way to virtual school because friends, colleagues, or brick-and-mortar school staff referred them. However, most parents (n = 24) went through an information search and evaluation process to find the virtual school. One parent described changing from a brick-and-mortar rural school to a rural virtual school because she knew her child was not keeping up with peers.

My son is not very academic, and he wasn't off the average pace of students in the public school. [The school was] giving him a lot of accommodations, and there were people working with him, but I still felt like that he wasn't going to be able to work to his full potential because in a classroom you have to stick to a certain pace. I felt like if we were able to work at home we could work at his pace, and he wouldn't be missing things because they had to move on to the next thing. I specifically looked for a school where he could work at a slower pace.

The parent was able to take her search criteria "a school with a slower pace" and search through various programs. She then identified the online school, contacted a representative, and began moving through the process of enrollment. Besides their criteria, parents needed to find schools that would accept their children. Most parents who described a search process were rejected

outright from at least one virtual school. One parent who was accepted right away had six children. They were all admitted as students without disabilities, but three of the children were later tested and identified as having speech-related disabilities. Parents with children with severe disabilities were especially vulnerable to being denied enrollment. One parent reported that school officials would ask her to make detailed descriptions of the nature of the child's disability before they would invite her to enroll, citing resource difficulties. Because of difficulties like these, parents' efforts to seek information about online schools were often compromised. Again, the important element is the parent working to make the child look acceptable to the school—to appear that they have the capital and resources necessary, instead of being able to take an orientation where the school assessed their strengths and needs and served them.

Instruction. Parents were much more successful in their use of information seeking literacies after enrollment as they accepted additional responsibilities to provide instruction directly to children apart from what the school was providing. Of 32 parents, only 2 indicated that they did no teaching during their work to support their child. The parent of a 14-year-old with a specific learning disability described her use of information literacies to supplement science curriculum from the virtual school.

> *Being his teacher, it's all on me if he doesn't learn the things he needs to learn. It would be all my fault. I have to make sure that I prepare his subjects the night before. I look over them to see what we're going to be learning the next day or even that following week, because we have projects. Science projects, for example. I have to find extra videos and stuff to help him learn.*

For parents who did consider themselves as having teaching responsibilities, all of them reported searching for additional information on the internet to help them explain concepts or finding additional videos, websites, and so forth that they perceived would be more engaging for the child. Sometimes this engagement was sustained by sounds, lights, games, animation and so forth. Other times, the more engaging resources that parents located were merely texts that were at a lower reading level for a student with low reading skills. Parents did not seem to mind gathering additional resources and making decisions about whether, when, and how to share them with their children. In fact, they often reported feeling success when they did this. Even so, parents felt pressed for time to do this regularly or felt it as acute pressure to ensure their children's learning without support from the school. For them, searching for resources, evaluating them, and deciding what to use added to the burdens they felt in providing instruction. In these conversations, there was no sense that school might provide these resources. Besides, in a model where the child is the worker and the parent is middle management and the teacher is the higher-level supervisor, these parents do what takes to please the supervisor.

Communication Literacies

The final commonly reported skill for parents were communications tools (n = 19). These tools were used to support their children in communicating with peers, for monitoring student progress, and for learning the school's expectations of them.

Peer-to-peer communication. Even in cases where parents are not regraded to have capital, facilitating communication with peers was a reason that 18 of the parents cited for using these technologies. This was actually a more popular reason than communicating with teachers. In fact, older students had regular access to their teacher though messaging systems and they used apart from their parents or they did not engage with teachers at all.

The parent of an 8-year-old boy with intellectual disabilities and a hearing impairment described her use of communications tools to help her child engage with his teacher and his peers. This parent seemed to be the most advantaged by far in terms of understanding what could and should be done to support students with disabilities because she was also the director of special education at a virtual school.

We kept all the accommodation domains from the original IEP and then shifted those goals for the home setting. We are looking at basic communication—greeting people when someone comes to the home, for example. In addition, my son uses an eye gaze talking device to communicate with people who visit or online. We were able to develop social skills goals as well that included assisting him in interacting with peers through the chat box. We also use emoji. I made sure there are social skills mini lessons where we revisit with the chat box (some students use chat to text features they can use as extensions on a regular chrome book or touch screen chrome book). Parents can also use a touchscreen chrome book for communicating.

This parent was able to name many technology-enhanced strategies for helping her son communicate with his class. Unlike the other parents, this parent had the school provide the technologies and resources. Because that parent understands the school system and is used to having people work for her (not the other way around), she can get what she needs and is under little to no pressure to make her child look acceptable to the school. Because she is regarded as having the acceptable capital, the school has to provide the resources that are acceptable to her and her son.

Progress monitoring. The technologies the parent articulates in the example above were more extensive than those that other students in our study were receiving. Most parents reported that they used the communication tools outside of the child's presence to learn about student progress. Typically, this was done with message systems inside the learning management system, with applications like remind.com. or voice over internet protocols and video conferencing programs. In the following example, a parent of a 17-year-old with an emotional disorder and attention deficit disorder shared how she uses the learning management information often to communicate with teachers and monitor her daughter's progress.

She is in a jigsaw application, which is linked to her teachers separate from me. I just look at the learning management system. I see assignments that are coming due on the gradebook. I work a lot of hours as a nurse. I tell my daughter that she got a bad grade, and she needs to re-do it. The dashboard also shows me how much time she has spent working on the class. I know when she is goofing off and when she is not. It is a great feature to have. The more I hover over her, the more she stresses, so it is good to have a way to look at her progress that is not confrontational with her.

The parent uses the tools to try to avoid over-involvement in her daughter's instruction. This is for two reasons—first, she worked many hours on a rotating schedule as a nurse and cannot be around when her daughter is doing her schoolwork during the day. Second, tension and agitation resulted when the mother asked questions. Communication tools help maintain family harmony since now the mother only has to get involved if there is a serious breach in a steady work pattern.

School expectations. Finally, parents used communications tools to learn the school's expectations for them. A parent of a 13-year-old with writing and spelling disabilities described the online parent information the received via webinar.

> *They had an in person or online orientation where you were taught everything about the school, the expectations, the online format, the curriculum and how to use it.*

While almost half of the parents in the study reported some form of parent training, usually delivered online, the purpose was often for the school to communicate the information that they wanted the parents to have. There were not as many reciprocal efforts made for the parents to communicate with the school. In fact, in the example above where the parent communication came exclusively through the learning management system, this was suggested by a teacher. That teacher told the mother to stop monitoring of her daughter because the teacher believed it would be better for the daughter, given her emotional challenges. However, this also set up a system where the mother is more likely to receive communication from the school than send it. This incident is also a good illustration of how parents become comfortable with their roles as middle management—where they have a lot of autonomy until the higher-level supervisor (the teacher) gives them a directive. At this point, the parent is supposed to obey, which they often did.

Discussion

Previous research in virtual school learning has highlighted specific roles for parents. These included (1) facilitating interaction with school officials, (2) advising and mentoring, (3) organizing, (4) monitoring and motivating engagement, and (5) instructing (Borup et al., 2015). In this study, parents' use of technology maps onto these roles very well, probably because they match the capital needed for obtaining and retaining many types of jobs (Ayon, 1980; Bourdieu, 1986). These responsibilities that parents in this study accepted positioned them as middle management supervisors of their children's learning, rather than parents. What made it worth the effort for parents was their purposes in making their children look acceptable to school to support their well-being. With the exception of the highly educated parent, they all accepted the school's expectations as being legitimate; their job was to do what it took to make their children successful in the eyes of the school, even if it meant large amounts of work for them.

These management/supervisor position might be a valued role for some parents, but a burden for others. Particularly during remote learning associated with the COVID-19 pandemic, parents who suddenly became remote online schooling parents, but then lost their jobs might have felt glad to enact work roles at home for the sake of routine. Conversely, they might be resentful at having act like they were at work without being at work and getting paid. Some parents who have jobs where they rank higher than many other employees might also resent a subordinate role.

Parents in this study exhibited a wide range of literacies in helping their children with disabilities access and engaged with the instructional materials provided by the school. Generally, the parents were able to use the tools and applications that were recommended by the school or that they knew to use from other parts of their lives, such as work or family life (e.g., Google calendar) (Dakers, 2006; Martzoukou & Abdi, 2017). Parents drew on applications and tools that were already included in their capital (Bourdieu, 1986) many of which came from jobs

they had or used to have (McLennan, 1967). In cases of limited formal post-higher school education, the high school experience provided capital upon which they could draw.

Implications for Practice

Parents reported searching for resources and evaluate them. To do this, they used their personal knowledge of their own children and their sense of what would be helpful them. This is much closer to models of parent involvement that assume all parents have strengths (Auerbach, 2011; Moll et al., 1992). Moreover, parents can be regarded as having digital literacies even when they are not always able to support their children in the ways that schools might prefer (McDougall et al., 2018).

In this study, parents used the learning management systems to communicate (Cook, 2018; Martine & Rader, 2003; Webber & Johnston, 2017). However, this communication was usually in one direction—from the school to the parent. This is consistent with previous theorization of schools as being centered on their pursuit of capital distribution and cultural reproduction (Auerbach, 2011; Baquendano-Lopez et al., 2013). The unidirectionality was also present in the parents' descriptions of webinars and other information that some parents in this study were provided. Parents could benefit from more opportunities to communicate with the school, but more importantly, they need more opportunities to share their digital literacies with schools (Baquedano-Lopez, 2013). Specifically, there might be opportunities for parents to self-select activities to acquire or practice more literacies during interactive opportunities sponsored by the schools.

For parents of students with disabilities, parents used their digital literacies to accommodate, modify, and even compensate for the inadequacy of the instructional materials in needing the child's needs. Moreover, parents' major purpose in engaging with digital literacies was for teaching. This finding is in line with previous research on parents of children with disabilities that has found parents take on roles as instructors because they think other people either *cannot* or *will not* meet their children's needs (Rice et al., 2017; Rice et al., 2019). Knowing that parents see themselves and their children in these ways, schools should provide guidance for helping them choose materials and technologies that help parents address issues that matter the most to them. It would also be helpful if schools broke away from their expectation that parents were supposed to advance the schools' agenda as middle management workers. Instead, schools and parents should collaborate to set and meet mutual goals for children's learning.

Implications for Research

Future research projects should aim to make more detailed descriptions of how parents obtain and use digital literacies for their children's online education. It is also important to take a more critical approach to the expectations laid on parents. Conceptualizing the expectations for them as job skills that are also require certain digital literacies could lead to many studies that carefully examine how these expectations are established, which parents with which job histories and skills accept/reject these responsibilities and under what circumstances, and how parents and schools establish healthy expectational boundaries for one another. Understanding how parents use the technologies they have and gain access to new ones through school and other outlets seems important for ensuring that extant gaps in educational experiences do not grow larger. It also seems important to understand what role literacies play in accessing infrastructure such as high-speed internet and high-quality internet-ready devices, as well as high quality digital instructional materials. The literacies required to access such resources might play important roles in children's online learning success.

Additional research might also describe how attempts at collaborative projects focused on learning with and from parents about digital literacies can support student achievement and other indicators of high quality experiences. It might also be helpful to learn more about how and whether parents explicitly share these literacies with their children during online learning. Importantly, efforts to support students merely by providing parents more "training" on what the school wants them to do might not be the best approach for trust-building between parents and schools and the long-term success of children.

Limitations

This study did not use probabilistic sampling or other procedures associated with the positivist paradigm. Therefore, it is not generalizable. What is important about the work is that it offers a basis for learning more about parents' digital literacies when supporting their children with disabilities that could lead to research tools like survey instruments and the development of additional support programs. Also, these findings might inform tools of practice as they highlight the need to learn more about what parents know and are able to do with the technologies that they have access to while supporting their children with disabilities in online schools. These findings are also important for developing initial policy conversations about how to involve parents meaningfully in the education of children with disabilities per IDEA (2004) and how to include thinking about their digital literacies in such conversations.

Conclusion

This study described the digital literacies that parents (n = 32) used in supporting their children with disabilities in virtual schools. This research is valuable to improving the educational experiences of children with disabilities who voluntarily come to these schools as well as children who are directed to online learning in some ratio or form because of the pandemic. Parents with a range of demographic characteristics and experiences were able to use basic technological literacies, information literacies, and communication tools. What needs to be improved for these families is acknowledgement of the literacies that they bring, as well as access to interactive, collaborative, preparation for their roles, even personalized parent preparation based on self-selected familiarity with technologies, e-learning, or some other factor.

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Student Initiative Empowers Engagement for Learning Online

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Abstract

Assessing the degree to which students engage and learn from their online courses will be important as online courses are becoming more ubiquitous. This study sought to capture student perceptions of their independence as learners, their level of engagement, their effort exerted, and the amount of information they learned in online courses. The study was conducted over three years with 455 students who completed a self-assessment at the end of an intensive summer online course. Results showed an equal number of students agreeing and disagreeing that online courses help students learn the same amount of information encountered in a face-to-face course. The majority of students reported they were more independent (84.4%), were more engaged (54.5%) and exerted more effort (57.4%), in their online course than a typical face-to-face class. Recommendations are made for faculty creating online courses who have the opportunity to coach students on how to succeed in the online learning environment.

Keywords: Distance education, pedagogical issues, adult learning, teaching/learning strategies

Online learning is growing in popularity among students (Bednar, 2018) and is predicted to be a growing market for academic institutions for the foreseeable future (Technavio Research, 2019). A 2018 study reported that distance education enrollments increased for the fourteenth consecutive year, with the most recent years seeing the most significant increase, even as overall college enrollment was declining (Seaman et al., 2018). Then, in the spring of 2020, many colleges were forced to create online courses or components of courses in response to the social distancing requirements during the COVID-19 pandemic. Many faculty members responded to this need by creating online learning experiences for students. Teachers continue using technology to build online courses where students are engaged and learning, which generally asynchronous interactions make especially challenging. The asynchronous nature of online learning in particular highlights how important student motivation is to student engagement (Al Tawil, 2019; Choi, 2016). Some students struggle to engage with material when attendance is not tied to a specific time, but online learning is also challenging considering the reputation among some students that computer-assisted learning is inferior to, or less rigorous than, face-to-face (F2F) learning (Allen et al., 2016). Some students still approach online learning with this assumption, reasoning that because no face-to-face sessions happen, the course will be less demanding on time, it will be less difficult academically, and it will require less effort (Bawa, 2016). These perceptions may be based on past experiences of poorly designed courses, or based on assumptions tied to the online method of instruction. But if perception of their experiences is the reality for students, then what they perceive about their online courses matters, and evidence suggests there is room for continued improvement in the student experience with online learning (Sarraf et al., 2019). The current study sought to capture student perceptions of their online learning experience in several categories.

Review of Literature

Students' perceptions of their learning experiences are important to gather, especially beliefs about a course's value and how interesting it is (Yang et al., 2011). Course assessment is a vital tool that helps students succeed in online education and can improve the quality of future courses (Yarbrough, 2018). The current study emerged from the desire to glean those perceptions of students' own independence, engagement, effort, and learning in online courses in order to evaluate the efficacy of these online courses. Considering this, the following literature review focuses on three areas: independence as a hallmark of adult learning, student engagement, and course design.

Independence and Adult Learning

Online courses are, by their very nature, constructed in ways that depend on students to be responsible and access information in isolation, independent of other learners (Yarbrough, 2018). Within this isolation students find their own initiative, or motivation, for consistently engaging the course. They must be "self-regulated…developing agency and be responsible for their own learning" (Cohen & Jackson-Haub, 2019, p. 1). Students who understand their own independence grasp an important component of learning that helps them be successful (Buelow et al., 2018). In other words, the best recipe for student engagement is for students to view online courses as "instructor facilitated and student owned" (Schroeder-Moreno 2010, p. 28) as students take initiative and responsibility for their learning.

Adult learning theory acknowledges the importance of student initiative and independence. It does this by distinguishing between pedagogy (learning by children and adolescents) and andragogy (learning by adults). Adult learners differ from children in six

important ways (Knowles et al., 2005). Specifically, 1) adults need to understand why they need to learn something, 2) adults have a self-concept of being responsible for their learning, 3) adults approach learning with a wealth of experience, 4) adults are ready to learn applicable content, 5) adults are life-centered (or problem-centered) in their orientation to learning, and 6) adults are motivated intrinsically to pursue learning. Adults have tools at their disposal to be successful in learning that some younger learners do not have. These are primarily experience, study habits that work for them, and the initiative to pursue learning. Of all these, motivation seems to be the characteristic that fuels their resilience to succeed in courses.

Motivation is essential to adult education because adult learners want to know that an investment in learning is relevant to their lives and valuable in helping them accomplish goals. They want learning to connect with their own experiences and they want to feel respected as competent learners with agency in the process. Students are more likely to feel motivated and engage in learning when these standards are met (Smith, 2017).

Online research not focused on adult learning has identified tools successful learners have that happen to be some of the hallmarks of adult learning. For example, online courses require students to have skills in time management, self-motivation (Bednar, 2018), self-imposed academic discipline, self-directed learning, and initiative (Bawa, 2016). These comprise characteristics of successful adult learners. Similarly, Lehman and Conceição's persistence model for online student retention identifies five student qualities for successful learning: self-awareness, self-efficacy, goals, means to achieve those goals, and rewards along the way (2014). Adult learners motivated to achieve learning frequently possess these characteristics.

The strongest predictors of course achievement in one study included "self-regulated learning, particularly regular study in accordance with the course schedule, the timely completion of assigned tasks, frequent accessing of course materials, and the reading of important course information" (You, 2016, p. 27). In online course environments, procrastination and the inability to take initiative for learning often result in less engagement and less learning. In short, time management is essential for student success (Lehman & Conceição, 2014).

Student Engagement and Effort

The educational value of engagement has led some to claim it is one of the most important variables for student learning (Kucuk & Richardson, 2019), while Shulman (2002) has declared that student learning begins with engagement. Said another way, engaged students are more likely to learn (Cohen & Jackson-Haub, 2019). This awareness of the vital role of engagement has inspired the annual National Study of Student Engagement in an effort to assess how, and how well, students are learning (Indiana University School of Education, 2019). Engagement matters because it often signals student effort, or grit (Fosnacht et al., 2017). In addition, disengaged students in online classes put themselves at risk of lower grades and less learning. Disengaged students also put faculty at risk of lower course evaluations (Stott, 2016).

While online student engagement is vital to learning, a single, universally accepted definition for engagement does not exist (Halverson, 2019), and online engagement may not be the same as in-person class engagement. Evidence suggests that online courses may work well to elicit certain types of student engagement like individual learning strategies and quantitative reasoning while not eliciting other types of engagement to the same degree, such as interactions with faculty and others with diverse perspectives (Dumford & Miller, 2016). "Student disposition" variables such as expectations for participation as well as "motivational, affective, social, and/or cultural" variables also influence student engagement (Chen et al., 2018, p. 28). These include the quality of the learning experiences in the course. Ultimately, student

perceptions of online courses are important because students who feel unsupported or discouraged may not persist within a course (Stevenson, 2013). How students interact with the content of a course by engaging the material provided remains an area of research to be explored (Xiao, 2017).

Course Design for Learning

One of the ways to inspire student learning is to design a quality course that requires students to consistently connect with each other, with the instructor, and with the content of the course (Everett, 2015; Groccia, 2018; Buelow et al., 2018). These are, even in F2F classes, "the three parties to the conversation: the teacher, the students, and the subject itself" (Palmer, 1993, p. 98). And yet, one of the challenges of online courses is "the creation of a community of support…in a virtual space without the personal relationships often formed in face-to-face meetings" (Stevenson, 2013, p. 24). Because a lack of personal relationships can lead students to feel isolated, course design should take this into account and provide various methods of connection with the content, with peers, and interactions with the instructor (Collins et al., 2019). Students seek connection, which is achieved through engagement (Buelow, 2018). "Student engagement takes many forms" and includes cognitive, affective, and behavioral aspects of interaction with the course (Groccia, 2018, p. 18), but again, it is facilitated by quality course design.

Students are more likely to thrive when teachers communicate manageable expectations, explain clear directions, and set due dates. Conversely, overwhelming tasks and unclear instructions dampen student independence, and subsequently, negatively impact student learning (Buelow, 2018). For this reason, it is not in the students' best interests for faculty members to simply transfer a F2F course into an online course without careful consideration of the student experience in taking that course. Online courses are "different animals" (Jackson, 2019, p. 13) that require instructional designers to build them through the lens of the student experience to promote collaboration with other students and learning (Bawa, 2016). To achieve this goal, it is important to incorporate diverse student-centered strategies for learning such as faculty lectures, projects, assignments, and quizzes (Sato et al., 2019). It is also important to have a diversity of learning experiences, including cooperative learning (discussions and group projects), simulations and gaming (progression toward a goal with achievements), and multimedia tools such as videos (Davis et al., 2018). These diverse activities should take learning theories into account (Shrivastava & Shrivastava, 2017), flow directly from course outcomes, and be designed to engage students (Stone & Springer, 2019). Online courses that use a diversity of teaching and learning strategies (such as video lectures, case studies, multimedia resources, and challenging activities) contribute to higher student engagement (Bolton & Gregory, 2015).

Online discussion forums are a staple feature of many courses. They assist students, not only with encountering course content, but also with encountering diverse others taking the course. Students benefit from engaging in reflexivity and awareness of themselves while interacting with fellow students in the online context (Kahn et al., 2017). As students take courses in social and geographic contexts around the world, they inform course discussions with important perspectives that need to be heard (Deschaine & Whale, 2017). But online education also presents challenges. For example, in 2018 the National Study of Student Engagement surveyed over 3,500 undergraduate students to investigate the quality of online education (Sarraf et al., 2019). Researchers observed that students do not use all the possible engagement strategies they could for successful learning, such as asking questions (self-quizzing) and seeking answers from course readings (note taking), exchanging ideas with fellow students (discussions), and

communicating with instructors. And yet, these are the behaviors online courses are intended to inspire in students through tools like quizzes, discussions, opportunities for note-taking, and emailing or asking questions of instructors. Course design can facilitate and enable learner engagement but whether students engage or not is driven by other forces of motivation within them.

Current Study

This study sought to capture the perspectives of students as they consider the differences that exist between their behaviors in F2F and online courses. This is not to make the two types of courses the same, but rather to propose practices intended to increase student engagement and success in online learning contexts. Other studies have also sought to capture student perceptions of various parts of the online experience, including student learning, student engagement (Martin et al., 2018), levels of self-regulated learning, and the amount of content learned (Ng & Baharom, 2018). These studies focused on the influence of faculty communication and leadership and adult learners respectively. Students' perceptions of their agency in online learning continues to be an important research area (Xiao, 2017; Khan et al., 2017).

This paper is a response to the need for continued assessment of students' perceptions as they are learning. Specifically, this research reports on student perceptions of their own independence, engagement, and effort in their online courses. The research also gave students the opportunity to comment on the amount of their learning in online courses. The primary questions guiding the research were:

1. How do students perceive their own degree of independence, level of engagement, intensity of effort, and amount of learning in online courses?

2. Do students who have taken more online courses demonstrate increased levels of independence, more frequent engagement, higher intensity of effort, and more learning?

3. What are the online learning experiences that students perceive to be most helpful to their education?

Methods

Participants

The students in this study attended Abilene Christian University in Abilene, Texas, where Institutional Review Board approval was acquired to conduct this research. The researchers used a convenience sample of 455 students enrolled in an online summer course called BIBT 342 Christianity in Culture. The students were surveyed over three years from 2017 to 2019. Students in 22 different sections of the course participated in the study with class sizes between 19 and 22 students in each online section. Table 1 reports student demographic characteristics. Nearly 60% of the students who participated were female and just over 40% were male. The majority of students (81.3%) were seniors when taking the course. Juniors made up 17.4% of students and 1.3% were sophomores. This course was the first online course ever taken for 9.7% of students, the second online course for 17.6% of students, the third for 20.7% of students, and the fourth online course for 22.0% of students. A significant number of students (30.1%) had already taken 5 or more online courses.

Table 1

Participant Characteristics

Variable	Respondents (%)
Sex	
Female	59.3%
Male	40.7%
Classification	
First-year	0%
Sophomore	1.3%
Junior	17.4%
Senior	81.3%
Number of Online Courses Taken	
1	9.7%
2	17.6%
3	20.7%
4	22.0%
5	11.4%
5+	18.7%

This asynchronous course required student completion of various tasks each day in order to progress to the successive assignments throughout the course. The required readings included three books, five articles, and several web pages. Short instructor videos guided students through content as they progressed through the course. Students submitted papers, wrote learning journals, took quizzes, and posted in online discussions. Student participation in discussions required them to make one initial post and respond to two other students' posts within the conversation. A personal learning evaluation at the end of the course served as the instrument for this study.

Instrument

The survey instrument used was distributed as a final course personal learning evaluation worth 2% of students' final grades. Each student received full credit (2%) after the completion of the personal learning evaluation, regardless of their answers. This served as an incentive for students to participate (Gall et al., 1996).

The instructions for the survey were as follows: "This 'quiz' serves primarily as a reflection for you about your learning and it also provides feedback to your faculty member about ways to help improve the student experience in this course in the future. Your grade will not be impacted by how you answer these questions. This is a completion grade. We want your honest feedback."

The personal learning evaluation instrument was assessed for validity by six faculty members who served as a panel of experts prior to its implementation (Leedy & Ormrod, 2001). Reliability of the instrument was determined by comparing the three survey years and noting no significant differences in answer patterns across the samples. The survey instrument was standardized by being administered consistently in each section through a Canvas Learning Management System end-of-course survey. The choice to use a self-report assessment was made in order to glean students' individual perceptions of their engagement and learning in online

courses. The survey contained 5 Likert-type questions, four multiple choice demographic questions, two open-ended questions, and one rank order question. The specific questions on the instrument were:

1. During which hours of the day did you complete most of the work for this course? (Choose one) 12am-6am, 6am-9am, 9am-12pm, 12pm-3pm, 3pm-6pm, 6pm-9pm, 9pm-12am

2. From which city and state did you take this course?

3. How many hours a day did you spend working on this course? (Choose one) <30 min., .5-1.0hrs., 1.0-1.5hrs., 1.5-2.0hrs., 2.0-2.5hrs., 2.5-3.0hrs., 3.0-3.5hrs., 3.5-4.0hrs., 4+

4. Rank in order the following assignments according to how much they helped you learn (1 was the most helpful for your learning and 6 was the least helpful for your learning): Instructor Videos, Course Content, Discussions, Quizzes, Textbooks, Papers

5. What is your classification in school? Senior, Junior, Sophomore

6. How many total online courses have you taken in college? (Choose one) 1, 2, 3, 4, 5, 5+

7. In this course I was more engaged as a learner than I usually am in a face-to-face class. 1 (*disagree strongly*), 2 (*disagree*), 3 (*unsure*), 4 (*agree*), 5 (*agree strongly*)

8. This course required me to be more proactive and independent as a learner than a face-to-face class. 1 (*disagree strongly*), 2 (*disagree*), 3 (*unsure*), 4 (*agree*), 5 (*agree strongly*)

9. I exerted more effort to learn in this course than I typically do in a face-to-face class. 1 (*disagree strongly*), 2 (*disagree*), 3 (*unsure*), 4 (*agree*), 5 (*agree strongly*)

10. My instructor did a good job facilitating this course. 1 (*disagree strongly*), 2 (*disagree*), 3 (*unsure*), 4 (*agree*), 5 (*agree strongly*)

11. When you think about the amount of information learned in this course, was it equivalent to what you usually learn in a face-to-face class or was it less? 1 (*significantly less*), 2 (*less*), 3 (*about the same*), 4 (*more*), 5 (*significantly more*)

12. What is your gender?

Data Analysis

The data were gathered from students through Canvas, then exported into Excel for analysis, and identifying student information was removed once exported. To answer the first research question, the researchers calculated percentages for student responses to Likert-type questions related to students' feelings of independence, engagement, effort, and amount of

learning. Bivariate correlations using Pearson's r between all of the variables were used to investigate how independence, engagement, effort, and learning are related (Table 4). The correlation matrix also served to answer the second research question by comparing the total number of students' online courses with the four variables considered. Finally, to answer the third research question, the researchers averaged the rank-order responses to determine student perceptions of course variables most helpful to their learning.

Results

Table 2 provides the hours of the day that students reported working on the course along with the amount of time spent on the course each day. Students reported working on the course mostly in the evenings: 30.3% completed most of the work between 6pm and 9pm, and 30.5% completed most of the work between 9 pm and midnight. The median amount of time that students spent on course work each day was 2 to 2.5 hours each day.

Table 2

Time Spent on the Course

Variable	Respondents (%)
Hours Worked on Course	
12 am to 6 am	0.9%
6 am to 9 am	1.1%
9 am to 12 pm	11.9%
12 pm to 6 pm	25.3%
6 pm to 9 pm	30.3%
9 pm to midnight	30.5%
Amount of Time Spent on Course	
Less than 30 minutes a day	0.2%
30 minutes to 1 hour a day	5.1%
1 to 1.5 hours a day	12.5%
1.5 to 2 hours a day	23.7%
2 to 2.5 hours a day	18.0%
2.5 to 3 hours a day	17.1%
3 to 3.5 hours a day	9.7%
3.5 to 4 hours a day	8.1%
4+ hours a day	5.5%

In addition to asking questions about student demographics and the amount of time spent working on their course, students were also asked how strongly they agreed or disagreed with the following statements: "This course required me to be more proactive and independent as a learner than a face-to-face class," "In this course I was more engaged as a learner than I usually am in a face-to-face class," and "I exerted more effort to learn in this course than I typically do in a face-to-face class." Students were also asked to respond to the following question: "When you think about the amount of information you learned in this course, was it equivalent to what you usually learn in a face-to-face class or was it less?" Table 3 shows the distribution of student responses to these questions.

Table 3

Independence, Engagement, Effort, and Learning in the Course

Variable	Respondents (%)
This course required me to be more proactive and independent as a learner than a face-to-face class.	
Strongly Agree	35.2%
Agree	49.2%
Unsure	10.1%
Disagree	4.6%
Strongly Disagree	0.9%
I was more engaged as a learner than I usually am in a face-to-face class.	
Strongly Agree	13.8%
Agree	40.7%
Unsure	24.6%
Disagree	15.4%
Strongly Disagree	5.5%
I exerted more effort to learn in this course than I typically do in a face-to-face class.	
Strongly Agree	17.6%
Agree	39.8%
Unsure	22.2%
Disagree	17.4%
Strongly Disagree	3.1%
When you think about the amount of information you learned in this course, was it equivalent to what you usually learn in a face-to-face class or was it less?	
Significantly More	7.3%
More	24.0%
About the Same	46.2%
Less	19.8%
Significantly Less	2.9%

Independence

Most students (84.4%) agreed or strongly agreed that this course required them to be more independent and proactive as learners. Those students who reported that the course required them to be more independent as learners spent more time each day on the course, they reported exerting more effort, they said the amount of content learned was equivalent to a typical face-to-face course and were most likely to say their instructor did a good job facilitating the course.

While it is interesting to get a snapshot of student attitudes and behaviors, the survey also allowed us to look for trends and correlations in the data. Table 4 displays a correlation matrix for all variables and several significant correlations are noteworthy. Women report spending more time working on the course each day than men. Seniors spend less time per day, report exerting less effort as compared to a face-to-face class, and report getting less information as compared to face-to-face classes than juniors and sophomores. The number of online courses that a student has taken is positively correlated with both engagement and with perceptions of the amount of information learned, meaning that students with more experience with online learning engage more and feel that they get more information out of the course than students who have taken fewer online courses.

Students who spent more time each day on the course have significantly higher agreement that they had to be more proactive in the online course than in an average F2F class and they also report exerting more effort in the course. As anticipated, student perceptions of how proactive and independent they had to be, their engagement, the effort they felt was required, and the amount of information learned in this online class as compared to a typical face-to-face course are all highly positively correlated.

Table 4

Correlation Matrix for All Variables

|	1	2	3	4	5	6	7
(1) Sex (1 = Male)	1						
(2) Classification	0.104*	1					
(3) Total Courses	-0.055	0.036	1				
(4) Time on Course	-0.128**	-0.104*	-0.014	1			
(5) Engagement	-0.036	-0.032	0.188**	0.081	1		
(6) Independence	-0.034	-0.055	0.013	0.122**	0.361**	1	
(7) Effort	-0.051	-0.111*	0.029	0.228**	0.343**	0.371**	1
(8) Information Learned	-0.039	-0.102*	0.098*	0.078	0.430**	0.267**	0.427**

* Significant at the 0.05 level (2-tailed)
** Significant at the 0.01 level (2-tailed)

Engagement

Over half of students (54.5%) agreed or strongly agreed that they were more engaged as a learner in this online class than they were in a typical face-to-face class. And those students who had taken more online courses were more likely to report being more engaged. While the definition and interpretation of engagement is often subjective and elusive (Deschaine & Whale, 2017), it can be defined as a student's individual effort exerted in a class (Stone & Springer, 2019). This seemed to be the case for these students and is illustrated in Figure 1, which shows the strong similarities between responses about their effort exerted and their level of engagement.

Figure 1

Engagement and Effort
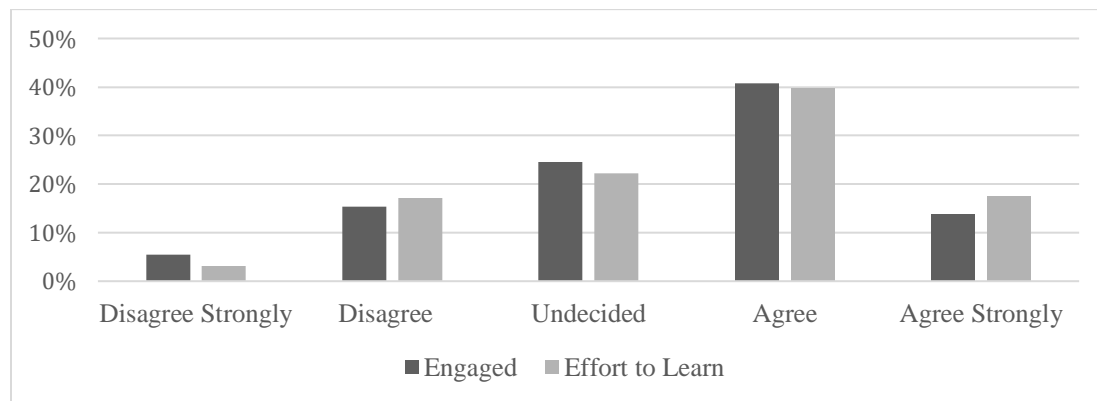
Effort

In terms of perceived effort, over half of students (57.4%) said that they put more effort into the course than the typical face-to-face course. These students were more likely to say they spent more time on coursework each day and that they learned the same amount or more than in a F2F class. While it is difficult to compare all online courses and all F2F courses, this study sought to capture student perceptions of the comparison based on their own experiences. It is worthwhile to note again that the responses to this question about effort and the question about engagement are very similar.

Learning

Additionally, just over three quarters (77.5%) of students said they learned the same amount or more in their online course when compared with a typical F2F class. Just under half said that they learned about the same amount (46.2%) in this class while a small minority said they learned significantly less (2.9%) or significantly more (7.3%). These responses plot a bell-like curve depicting the reactions of students to the amount of course content learned. While this may say more about the composition and design of the course than the students' effort, any course is an opportunity for inquiry and deep learning for those inspired by that course to propel students to additional learning.

Table 5 lists the number of graded course assignments along with their grade weights. These assignments included taking quizzes with LockDown Browser (over readings and course content provided through video lectures), written assignments, participating in discussions, traditional papers submitted through Turnitin, and finally, learning journals. Only the personal learning evaluation at the end of the course was a completion grade as students received full credit for any answers given.

Table 5

Summary of Graded Assignments in Course

Number of Assignments	Type of Assignments	% of Grade
12	Quizzes	39%
6	Written Assignments	23%
5	Discussion Forums	15%
3	Papers	12%
3	Learning Journals	09%
1	Personal Learning Evaluation	02%

To learn students' perceptions of course tasks, students were asked to rate the various assignments of the course in order from 1 to 6 according to how much the assignment helped them learn (with 1 being most helpful and 6 being least helpful to learning). Table 6 provides the average rating of each of the components of the course. On average, students rated the textbooks and course articles as the most helpful with the content videos being rated as least helpful, although overall a narrow distribution among the averages was evident.

Table 6
Average Rating of Course Components for Learning

Course Components for Learning	Average Rating
Textbooks and course articles	2.73
Group discussions	3.13
Quizzes	3.17
Daily instructor feedback video	3.32
Papers / assignments	3.53
Course content videos	3.57

The students surveyed ranked discussions as the second most effective educational tool overall to impact their learning. The value students place on sharing ideas with other students is confirmed in another study of online students who ranked their discussions as first in a list of other learning tools, followed by interactive assignments, specific topics, media/videos, and assignments (Buelow et al., 2018). While many students value sharing ideas in discussions, the similarity in average ranking results in this study for each aspect of the course communicates the diversity of answers to this question. These results align with research suggesting one silver bullet to facilitate student engagement may not exist. Instead, using a diversity of online engagement tasks for students may be best for helping them learn (Dixson, 2010). While textbook (readings) and quizzes were ranked higher in this study as two of the three most helpful tools for their learning, students in other studies have ranked readings and quizzes as the least helpful learning methodologies they encountered in a course (Cundell & Sheepy, 2018).

Discussion

Independence

It is possible that the hidden curriculum of online courses includes lessons in adult learning skills such as being proactive, which is a distinguishing characteristic of adult learning (Knowles et al., 2005). Online courses teach students to be proactive because the methodology of instruction and delivery depends heavily on the initiative of the student to pursue learning. The majority of students in this study perceived that they were required to take more responsibility for their learning than in a typical F2F class. For example, they decided what time of day they would engage in coursework and navigated the expectations of the syllabus while often completing other responsibilities during the course like jobs and home life commitments.

Students who had taken more online courses were more likely to report being more engaged. This may indicate that by taking online courses students are being assimilated into the culture of online learning through adapting to the modality and acquiring the skills to be successful in that context. These students seem to be the ones who understand their roles as assertive participants rather than passive observers to the course. They take responsibility for their learning and appear to receive the most benefit from the course. This aligns with the positive relationship that has been observed between the self-efficacy of students and their overall learning (Landrum, 2020). Teaching students the value of their own initiative and equipping them with online learning strategies is vital to their confidence and success as students.

While adult learners and students who have taken more online classes are generally more self-directed than younger learners, this is not always true of all adults because people approach learning with diverse motivations and maturity (Chen et al., 2018). For this reason, all types of

students may need coaching on what it means to be self-directed and what they can do to take initiative for their learning (Cox, 2015). This coaching, to be more proactive, should happen early in online courses to give students the greatest chance of success, and it should also continue throughout the course as necessary. Coaching reminds students of their agency in learning in areas such as time management and communication (Martin et al., 2020). But faculty encouragement of student participation should be done in ways that are interpreted by students as positive nudges rather than punitive nagging (Lawrence et al., 2019). Students value instructors who set clear expectations at the beginning of a course, then are responsive and supportive throughout it (Martin & Bolliger, 2018).

Engagement and Effort

While a single definition of student engagement remains elusive (Redmond et al., 2018), the student responses to questions about their engagement in this study align very closely with responses to how much effort the students exerted. This was not the case when students were asked about their independence and proactivity as learners compared to a F2F class. Many more students reported that the course required them to be independent (84.4%) than said they were engaged (54.5%). One possible explanation for this is that students equate effort with engagement in ways that are distinct from being proactive and independent as learners. This is understandable because being proactive and independent as a learner is something that online courses require them to do (You, 2016), while their effort and engagement are things that students choose in any given course.

An important application of this research, then, includes the need to teach students how to be successful in online courses where independence, engagement, and effort positively influence potential learning in the course. Ideally, educators want students to progress from reluctant to assertive engagement. This difference is not always distinguishable by the engagement, but rather by the attitude of the learner approaching the course. This aligns with the sentiment that student engagement requires attentive nurturing and should be constantly assessed (Khan et al., 2017).

This research also has specific applications for faculty members creating online courses to craft opportunities for students to exert effort through engagement and understand their independence (or initiative) in their learning. Instructors can highlight the importance of initiative through communication with students, and inspire initiative through a diverse number of educational experiences for students within the course design (Sato et al., 2019; Stone & Springer, 2019; Davis et al., 2018). Students' preferences of course strategies for learning in this study were very closely ranked. It is possible that different students had preferences for different learning strategies. The case could be made, then, for the inclusion of multiple learning strategies in online courses to connect with many different students. There may not be one "best" learning strategy. Instead, utilizing an array of methodologies that facilitate interaction may be what helps students learn the best (Nortvig et al., 2018).

Learning

Just over three quarters (77.5%) of students said they learned the same amount or more when compared with a typical F2F class. These results challenge any claims that online courses by default result in less learning for students. Those students who recognized the independence, engagement, and effort required to succeed in the course are the students who enjoyed the most learning. This is not necessarily the case in all online courses because all online courses are not all the same. Nor are all students. This is evident in our results showing greater effort exerted by women in online courses than men, which is counter to results in other studies showing men exert greater effort in online courses (Yang et al., 2011).

Limitations and Future Research

One limitation of this research is that it depended on students' own perceptions of their independence, engagement, effort, and learning in online courses. Gathering student perspectives is an important part of educational research (Xiao, 2017; Khan et al., 2017), but it is possible that personal bias led students to claim greater engagement than they exhibited. Future studies could use course analytics to compare student self-reports with the amount of time online to capture a more complete image of their effort in the course. This research also investigated only one online course, albeit across multiple sections and across several years. Future research could compare and contrast courses across disciplines and contrast online and F2F classes with similar outcomes to discern any differences in students' reports of engagement and learning with different course designs. Finally, because the study did not require students to define engagement or identify what led them to feel engaged in the course beyond asking for their ranked preference of learning activities, future research is needed to capture how students define engagement and factors that contribute to feelings of isolation versus engagement.

Finally, the COVID-19 global pandemic of 2020 influenced teaching and learning with technology. While we do not yet know all the ways the world will continue changing, we can surmise that online education is only going to become more common. This research may have been conducted in the last summer when so few students had taken so few online courses. For 10% of our students, this was their first online course, and for another 28%, it was their second. In the immediate future, students will continue taking multiple online courses, which is why it is vital to continue improving this method of education.

Conclusion

This research contributes to the field of student engagement in online education in several ways. First, students equate engagement with effort exerted in online classes, and more specifically, they equate engagement with time devoted to their coursework. Second, it is possible to create online courses for students that they perceive to be significant learning experiences where they learn just as much as in a face-to-face course. Teachers accomplish this by incorporating diverse learning activities that are challenging, relevant, and help accomplish course goals. Third, the hidden curriculum of online courses may be the proactivity and independence required to succeed that prepares students to be more successful as adult learners. Instructors can coach students on these expectations through consistent and clear communication so that students do not feel isolated, which leads to discouragement as they become immobilized, but rather feel ownership and independence, which leads to confidence as they take initiative. Finally, it has been said that learning begins with engagement (Shulman, 2002), but it might also be said that learning begins with initiative, which in turn empowers student engagement.

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Catching lightning in a bottle: Surveying plagiarism futures

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Abstract

The digitization of higher education is evolving academic misconduct, posing both new challenges to and opportunities for academic integrity and its research. The digital evidence inherent to online-based academic misconduct produces new avenues of replicable, aggregate, and data-driven (RAD) research not previously available. In a digital mutation of the misuse of unoriginal material, students are increasingly leveraging online learning platforms like CourseHero.com to exchange completed coursework. This study leverages a novel dataset recorded by the upload of academic materials on CourseHero.com to measure how at-risk sample courses are to potential academic misconduct. This study's survey of exchanged coursework reveals that students are sharing a significant amount of academic material online that poses a direct danger to their courses' academic integrity. This study's approach to observing what academic material students are sharing online demonstrates a novel means of leveraging digitized academic misconduct to develop valuable insights for planning the mitigation of academic dishonesty and maintaining course academic integrity.

Keywords: academic misconduct, digitization, distance education

As the internet came to gain an increasing role in higher education, some feared a corresponding rise in plagiarism and other forms of academic misconduct. The internet and its affordances seemed to make academically unethical behavior simply too easy for students to resist (Scanlon, 2003). While the more recent scholarship on the frequency and prevalence of plagiarism continues to affirm academic misconduct like plagiarism as a common, important issue in higher education, that research also shows plagiarism is not clearly made worse as a result of the internet (Hart & Morgan, 2010; Ison, 2014, 2015; Kidwell & Kent, 2008; Peterson, 2019; Stuber-McEwen et al., 2009).

Nevertheless, the internet and digitization of higher education do sustain academic misconduct and have enabled new waves of ethically troubling behaviors that challenge academic integrity. Beyond the threat of instant and unacknowledged replication, the internet now supports international contract cheating (Lancaster & Clarke, 2016), peer-to-peer trading of coursework (Rogerson & Basanta, 2016), and the automated production of entire assignments (Shahid et al., 2017). The intersections of higher education and the internet are also opening new methodological opportunities for the analysis of academic misconduct in higher education. The online exchange of academic material, for example, creates new opportunities for research in the digital traces and data that can be used to analyze how, what, and to what degree students share their work. This study leveraged metadata generated from coursework being shared online to develop a novel approach for observing the prevalence of academically dishonest behavior online.

By surveying the kind of materials being shared on CourseHero.com from a sampling of undergraduate courses, this study created a cross-section of how compromised the courses are for academic misconduct. Recognizing the complexities associated with measuring "plagiarism" or "academic dishonesty," this study focused on observing the exchange of unoriginal work as a fundamental condition for those nuanced concepts: the exchange of unoriginal work. Instead of staking out definitive claims about specific student academic misconduct behaviors like plagiarism, this study tried to catch the lightning of what coursework students are exchanging online in a digital bottle as a means of determining how vulnerable courses are to those behaviors. Observing a cross-section of the academic material students shared online served to gauge the propensity or likelihood of academic misconduct by exposing what, and to what degree, formal assignments circulate among students. Such a cross-section provided valuable insights for planning the mitigation of academic dishonesty and of maintaining course academic integrity.

Prevalence of Plagiarism and Academic Dishonesty

Self-reported research on the prevalence of academic misconduct like plagiarism reflects mixed perceptions of its degree of severity but demonstrates frequent or common issues. For example, Hart and Morgan's (2010) survey of online and residential nursing courses reported "very low levels of cheating and very high standards of academic integrity" (p. 501). Wilkinson's (2009) survey of cheating frequency similarly found "less than half of both staff and students thought that cheating in assessment tasks was common" (p. 100). Yet more than a decade ago Scanlon and Neumann (2002) found, "24.5% of . . . students reported plagiarizing online" (p. 381). A more recent self-reported study on cheating behaviors in an Australian university found 15.3% of respondents reported "buying, trading, or selling notes;" 27.2% reported "providing completed assignments to other students;" 5.78% of respondents reporting they had engaged in "one or

more of the five behaviors classified as 'contract cheating'" (Bretag et al., 2019, p. 6). Some research has also suggested academic instructors underestimate the frequency of academic misconduct (Brimble & Stevenson-Clarke, 2005).

However, contrary to early reports of plagiarism's rise in correlation to the internet (Scanlon, 2003; Scanlon & Neumann, 2002), more recent work has shown online respondents do not report more frequent cheating behaviors (Hart & Morgan, 2010; Stuber-McEwen et al. 2009; Kidwell & Kent, 2008). Respondents in Stuber-McEwen et al.'s (2009) survey comparing residential and distance course students even reported students in traditional classroom environments as more likely to cheat than those online. A large-scale survey of residential and distance students measuring the self-reported occurrence of 17 "cheating behaviors" found distance students reported "Considerably less cheating" than their residential counterparts (Kidwell & Kent, 2008, p. S14). Watson and Sottie's (2010) survey of more than 600 undergraduate and graduate students found nearly identical levels of self-reported cheating or academically dishonest behavior between online and residential classes. The same study also found "for almost every individual survey statement, more students admitted to inappropriate behavior in face-to-face classes than in online courses" (Watson & Sottie, 2010, p. 5). More empirical measures of plagiarism's frequency, typified by the use of text-matching or "similarity detection" software like Turnitin or SafeAssign, paint a more detailed, but still varied image. The application of text similarity analysis on student coursework generally demonstrates the widespread occurrence of problematically similar or even exact, unattributed text in student writing which is a common benchmark for plagiarism across higher education (Table 1).

Table 1

Results of Similarity Detection Plagiarism and Their Methods of Measure

Study citation	% of samples demonstrating "plagiarism"	Analysis tool/method (qualification threshold)
Waker (2010)	26.2%	Turnitin "similarity index" and custom analysis (not specified)
Martin et al. (2011)	61%	Turnitin similarity index (3%)
Gilmore et al. (2010)	42.6%	SafeAssign index (not specified)
Chao et al. (2009)	39%	Turnitin similarity index (at least 1%)
Ison & Szathmary (2016)	39.6%	SafeAssign index (15%)
Ison (2012)	72%	Turnitin "similarity index" (10%)
Martin et al. (2009)	61%	Turnitin "similarity index" (3%)
Batane (2010)	66.1%	Turnitin "similarity index" and custom analysis (1-34%)

Ison (2018)	25.1%	Turnitin "similarity index" (not specified)
Holmberg & McCullough (2006)	63.2%	Custom analysis
Ison (2015)	77% (pre-internet), 52.8% (post-internet)	Turnitin "similarity index" (at least 11%)

Ison's (2012) study of dissertations from a distance Ph.D. program found 72% of samples had "at least one case of improper paraphrasing and citation" and 46% of samples had "verbatim text without citation" (p. 233). On aggregate, 46% of sampled dissertations "were classified as having a low level of plagiarism," 11% with a "medium level," and 3% with a "high level" (Ison, 2012, p. 233). In another similar detection study, 40% of sample "capstone assignments" from a cohort of graduate student capstone courses exceeded a SafeAssign index threshold of 15% (Ison & Szathmary, 2016). Measuring the Turnitin "similarity" index score of dissertations from various global regions showed the improper use and/or attribution of unoriginal material is a common issue, with samples demonstrating a mean similarity index of 25.1% (Ison, 2018); this means, on average, a quarter of the writing from sampled dissertations was flagged as problematically similar to unattributed sources. The same study also found little statistically significant variance between global regions defying "the assumptions of rampant plagiarism and other forms of academic misconduct in specific countries and regions" (p. 302). Walker (2010) found the unattributed use of unoriginal material to be a relatively frequent occurrence, with more than a quarter (26.2%) of sampled student work demonstrating "some sort" (p. 48) of plagiarism. In those samples, unattributed paraphrasing was the most common manifestation of plagiarism (15.7%) and the substantial or entire submission of unoriginal work was the least common (1%) (Walker, 2010). Similarly, although Ison's (2015) findings show a majority of pre- and post-internet dissertations contain problematic text, the plagiarism was generally "low level" with a "similarity index range" of 11 to 24%.

The use of similarity detection analysis further erodes the correlation between distance education, the internet, and plagiarism's prevalence. Peterson's (2019) review of research on the differences in academic dishonesty between online and residential classes shows "little evidence that cheating is more prevalent in online courses" (p. 33). Ison's (2014) comparison of Turnitin "similarity indexes" on dissertations from residential and online institutions found "no statistically significant difference in the level of plagiarism" (p. 278) between types of institutions. Comparing dissertations submitted before the widespread use of the internet in academia (1991–993) against more current dissertations (2010–2014) even showed pre-internet work to have higher mean Turnitin "similarity index" scores, thus contradicting the notion that the digital environment has increased the misuse of others' work (Ison, 2015).

Plagiarism Futures

Still, the internet clearly supports academically dishonest behavior, and that digitized behavior is happening in new spaces and manifesting in new ways. Academically dishonest behavior is evolving in digital marketplaces that facilitate contract cheating (Lancaster & Clarke, 2016), peer-to-peer (Rogerson & Basanta 2016) or crowd-sourced sharing of coursework (Dixon

& Whealan George, 2020), and even terrifyingly futuristic spun manuscripts (authored entirely by machine learning or artificial intelligence software) that evade detection by normal text-matching software (Shahid et al., 2017). Contract cheating is facilitated by worldwide digital markets that connect students to for-purchase, original, third-party coursework that is extremely difficult to catch and good enough to pass assessment (Medway et al., 2018; Malesky et al., 2016). Online contract cheating markets are reflective of an increasingly transactional approach to education where students view it "as a product to be bought, sold or traded rather than an intrinsically motivated, effortful and potentially transformative individual process" (Bretag et al., 2019, p. 2). This transactional view of education is sustained by web platforms explicitly designed for the exchange of academic coursework. An increasing number of web platforms like Chegg, Coursehero, Quizlet, and Study.com offer students the infrastructure to exchange coursework in peer-to-peer (Rogerson & Basanta, 2016) or crowd-sourced (Dixon & Whealan George, 2020) fashion. Coursework exchange web platforms capitalize on nuances of authorship and ownership and blur the line between scholarly collaboration and academic dishonesty by facilitating the "strong temptation for students to reuse or repurpose downloaded content for personal gain and academic advantage" (Rogerson & Basanta, 2016, p. 265) without proper attribution. As Rogerson and Basanta (2016) further argued,

> *There is a big difference between sharing knowledge based on the principles of academic integrity versus information uploading and downloading under the guise of supporting others, which ultimately conceals or obscures original authorship and potentially distorts content and meaning. (p. 265)*

The online environment facilitates complex forms of information exchange and reproduction that are difficult to define, detect, or even observe. Coursework exchange platforms and the academic behavior they support are obscured by logins, passwords, proprietary user-agreements, and obstructive community standards (Dixon & Whealan George, 2020). Even though these digital evolutions of academic dishonesty challenge higher education to reflect on "the ways in which the sharing economy is shaping students' approaches to life and learning" (Bretag et al., 2019, p. 22), there has been little evidence of or investigation into how these coursework exchange platforms are used by students.

Despite the challenges that online academically dishonest behavior may pose to higher education, however, digitalization may also offer a methodological boon to academic misconduct researchers. The exchange of coursework—arguably a cornerstone of academically dishonest behaviors usually considered plagiarism—now comes with digital traces. Whereas exchanging coursework once depended on largely private and hidden interactions, that exchange is now recorded with digital evidence. For example, coursework uploaded to exchange platforms include background metadata describing document characteristics like when it was uploaded, which user uploaded it, and what its primary content is about. Digital evidence like document metadata opens new avenues of replicable, aggregate, and data-driven (RAD) research not hitherto available for academic misconduct research. Haswell (2005) defines RAD research as "a best effort inquiry" that is "explicitly enough systematized in sampling, execution, and analysis to be replicated; exactly enough circumscribed to be extended; and factually enough supported to be verified" (p. 201). RAD research describes a quantitative, usually computer-enabled methodological approach to research topics normally that are typically analyzed from a qualitative perspective.

The digitization of academic misconduct and the potential for RAD academic integrity research is analogous to that of writing and composition in higher education more generally, shortly after the turn of the millennia. As student writing increasingly took place in digital formats rather than pen and paper, their work compiled into corpuses of data. Instead of stacks of physical papers, students increasingly generated bytes of data. Digital corpuses enabled Composition Studies researchers to apply computer-assisted analysis methods like concordance software, which can measure word frequencies and patterns, among other aspects to re-test pedagogy and assessment research with more RAD methodologies. The digital migration of student writing made possible research that would otherwise be difficult or even unworkable (Fishman, 2012; Haswell, 2012; Dixon & Moxley, 2013). Since digital writing corpuses represent more stable, finite, shareable data, analysis of that data is more exact, systematic, replicable, and verifiable. As Dixon & Moxley (2013) note of their study of more than 100,000 instructor comments on student writing, digitization of the corpus and analysis enabled "in a few keystrokes what once took years" (Dixon & Moxley, 2013, p. 243). By enabling more RAD methodologies, the digitization of composition facilitated an "increased sensitivity to the local contexts, rhetoric, and characteristics of writing" (Dixon & Moxley, 2013, p. 252). Such sensitivities contribute to research that meaningfully captures the subjects, purposes, and meanings of writing (Dixon & Moxley, 2013). The migration of plagiarism and academic misconduct into online spheres is creating similar digitized research opportunities. The academically dishonest exchange of coursework and other academic materials is now recorded in timestamps, texts, emails, IP addresses, uploads, downloads, and metadata. Plagiarism and academic integrity or misconduct research now have datasets primed for more RAD research.

One such dataset is the academic material and coursework being shared on CourseHero.com. CourseHero.com is an online learning platform offering course-specific study materials from over "40 million course materials" (2019a, para. 1). In addition to a catalogue of tutoring and Q&A services, textbook resources, and other study materials, CourseHero.com hosts the exchange of syllabi, questions, instructor notes, homework solutions, complete essays, completed tests, and other coursework produced by students. Students either pay for access to CoureHero's database or can upload 10 documents to "unlock" 5 downloads (CourseHero.com, 2019b). While the corpus of student work hosted by CourseHero.com alone does not clearly constitute academic misconduct, it does embody a broad transition zone between social learning and academic dishonesty. CourseHero.com's vast trove—collected with the intent of exchange by students—establishes the ideal conditions for academic dishonesty through the use and submission of unattributed, unoriginal academic material as students' own. In this way, CourseHero's digital corpus of academic materials represents a kind of plagiarism futures trading. Futures trading essentially contracts another party to pay for an asset today, with delivery at a future date, at a predetermined price. To relate this to the plagiarism, students' participation in CourseHero.com essentially entails agreeing to pay for an asset via download, at a future time by the student, for a predetermined price for a set number of uploads.

Methods

Research Design

This study focused on the academic materials shared on CourseHero.com from a sampling of courses to develop an image of one university's plagiarism futures. This study used a descriptive research design to survey what and how much coursework is being shared by students online. This study's research design did not begin with a hypothesis, but sought a measure of how compromised, or how at-risk for compromise, a course is as a result of its assignments and assessments being available to potential misuse.

Setting

The sample university was a mid-sized private institution (30,000 students), supporting undergraduate and graduate degree programs across two residential campuses, and a distance education campus. Researchers selected a group of eight undergraduate courses from the distance campus catalogue that were frequently taught. Multiple sections of the selected courses are offered every term and are typically full to enrollment capacity. The selection of undergraduate courses ensures almost all of the University's student are likely take one of the sampled courses, thus assuring a thorough sample population of students. This study did not require IRB approval because it gathered data that was publicly available, did not require the researchers to observe, interact, or intervene with individuals to gather the data, nor did any of its analysis, results, or conclusions utilize any personal identification data. This study monitored the coursework being shared on CourseHero.com from the sample university's following course prefixes: HUMN330 Values and Ethics; WEAX201 Meteorology I; ENGL123 English Composition; ECON211Macroeconomics; RSCH202 Introduction to Research Methods; MATH11 College Math for Aviation; UNIV101 College Success; PHYS102 Explorations in Physics. This selection of courses ensured a variety of sample disciplines and a constant stream of active students taking the courses during the Spring 2020 term to best simulate the normal changes in artifacts found on the website.

Data Collection

Data collection was facilitated by a custom application titled Course Villain. Course Villain is an original, web-based desktop application developed by a faculty and student research team at the sample university. Course Villain was designed with the explicit purpose of monitoring the uploading of university content on CourseHero.com by performing automatic, custom searches, aggregating results matching search terms, and engaging CourseHero.com's "Copyright Infringement" workflow to remove content matching query terms. Course Villain used a webserver that performed scans and ran a database of results, and a desktop application for the user interface that displayed results with a browser that allowed for automation. The Course Villain software was experimental in design, ongoing in development, and has not been subjected to rigorous reliability or usability testing.

Course Villain users, which at the time were faculty and student researchers, start by downloading the desktop application for either Mac or Windows, and then create an account. Once users have an account, they define search queries for specific courses that they want to monitor. Query parameters filter results to search for the course name, ensured all document types were shown, and constrain results to the sample university's content on CourseHero.com. Scans for new documents uploaded to CourseHero.com for all courses were performed twice per day by the software. New query matches were recorded to a database for users to view and were also sent to users through email reports. Users can view documents matching query terms through a page in the desktop application. Users can choose to either ignore documents if they are irrelevant or have the application automatically populate the CourseHero.com "Copyright Infringement" form with information about the researcher, the document, and the course the

document belongs to. Populating the "Copyright Infringement" form must be performed on the user's computer instead of a website because the CourseHero.com "Copyright Infringement" form contains a Google reCAPTCHA that requires a user to complete a task proving they are not a robot in order for the form to be submitted. Documents that have been marked as irrelevant or have already been reported are labeled as such in the database, are hidden from the interface. If a document that has been reported is taken down from CourseHero.com, the reporting user will receive an email correspondence from them.

Course Villain scans are run on the webserver using a headless, or invisible, browser window. For all course queries created by users, CourseHero.com opens new tabs and searches for documents belonging to this course. Course Villain's search windows are generated and controlled using Puppeteer, which is automation software created by Google to control browsers using code. Search pages are filtered to show only content from the sample university. All documents on search pages are scanned and each document title or name is compared against the search query terms to ensure relevancy. Information about each document matching query terms is taken directly from the search page and saved to the database. Document names, IDs, upload dates, and document types are all recorded by Course Villain. If a document is already recorded in the database, it will be skipped. To minimize false-positive matches, the course title or name metadata of each document is compared against the query terms by the software. A document is only recorded with exact matches. Document course name and query term comparison also improves scan accuracy by locating artifacts whose other metadata may not accurately match query terms or criteria The first time a query is scanned, the search is organized by relevance according to most recently uploaded to CourseHero.com, and all documents with matching course names are recorded for each page until there are no documents on a page. Initial scan results are organized by recency and all pages are scanned until the last page is reached. This routine maximizes the number of documents recorded during the scans. Subsequent query searches only the artifact first page, using the recency filter to control for newly uploaded documents.

Course Villain uses the Node.js runtime environment. Node.js was created in 2009 and has been trusted and implemented by many major technology companies since then (Brewster, 2020). Course Villain's functional reliability over time depends mostly on revisions to the CourseHero.com application program interface (API). From Course Villain's initial development in 2018 to its most recent update in 2020, the CourseHero.com website changed multiple aspects of its design, including both the search result pages and the "Copyright Infringement Notification" form. These revisions to CourseHero.com made the Course Villain application unusable and required coding changes to function. Whenever CourseHero.com changes, Course Villain's code must be revised accordingly.

For this study, search queries for the aforementioned course prefixes were run for one academic term (one nine-week academic term at the sample university). Course Villain collected materials already uploaded on CourseHero.com prior to the beginning of the scan, as well as newly uploaded material during the test period. To evaluate the artifacts collected from CourseHero.com, the researchers manually categorized the artifacts into low, medium, and high value categories. The categorization of artifacts was based on the researchers' interpretation of how an artifact might jeopardize or endanger a course's assessments if publicly available. The researcher's categorization was based on an artifact's point value or weight in terms of their course's assessments or grades and on a subjective qualification of how severe an impact the misuse of a given artifact would have on the course's academic rigor and integrity. For example,

the degree to which a student's personal notes about a lecture would compromise the integrity or rigor of a course is much different than a final exam's answer set. The categories created were as follows:

    Low: notes, syllabus, PowerPoint presentations
    Medium: homework, discussion questions, problem sets
    High: quizzes, tests, papers, case studies
    Other: artifacts that are not related to course

Researchers then calculated a "compromise metric" using the categorized data. The compromise metric is equal to the sum of medium and high value assignments, divided by the total number of artifacts recovered from a given course. A compromise metric near or greater than 50% was considered alarming, whereby a course could be considered significantly compromised. For example, if an instructor planning for an upcoming term was presented with the information that half of the course deliverables were already available on the internet, that instructor would likely implement significant revisions to the course's assignments. The compromise metric intentionally underweights the percentage of a course that is compromised because the low category like notes, syllabus, and PowerPoint presentations are typically not included in students' final grades.

Data Analysis

Data analysis was completed using a simple spreadsheet software. The faculty researchers manually opened each document flagged by Course Villain and visually reviewed the artifacts. Faculty researchers then categorized the artifact into the appropriate predetermined categories of low, medium, high, and other. In many cases, it was unnecessary to manually open the artifact because the title assigned to the document uploaded by students was evident to which category they should be tabulated within. For example, titles like Final Paper, Final Exam, Module 3 Discussion Questions, or Module 5 Problem Set allow quick assignment without the more time-consuming task of opening the artifact and viewing the submission. Once all collected artifacts were categorized, the researcher calculated the percentage of assignments collected in each category and calculated the compromise metric for each course in the sample.

Limitations

The specific results of the study offer little external validity. Instead, this study's design is intended to produce detailed, internally valid results that render an image of the sample university's specific contexts. Without purposefully and accurately capturing the context of other Universities or institutions, this study's results do not and cannot provide meaningful, specific conclusions about academic misconduct or plagiarism writ large. Instead, this study's results provide the sample university with detailed evidence about its courses' potential for academic misconduct. Future research is planned to use this software for external validity and application on how online coursework sharing might be studied.

Another limitation inherent to this study's design is the dependence on descriptive statistics. Without robust inferential statistics, this study's results cannot offer valid conclusions about patterns or predictions of online coursework sharing, even in the specific context of the sample university. Instead, this study's results offer only a general description of a novel dataset captured from a complex practice.

This study's final significant limitations stemmed from the absence of reliability testing and subjective coding in analysis. As noted above, the Course Villain application's scan results were inherently subject to a measure of reliability error. Course Villain's results were subject to user error in query term design, incorrect matches due to metadata misidentification, and

unaddressed changes to CourseHero.com's API. Through continuing development and maintenance, the research team has worked to mitigate errors, particularly as detailed in the Methods section. False-positives and other kinds of result errors were also screened out in analysis. However, Course Villain has not been subject to rigorous reliability testing. Additionally, this study's results hinged on the researcher's subjective coding of Course Villain's results. The application facilitated scanning, collecting, and organizing the coursework artifacts available to students on CourseHero.com, but analysis required manual classification of the artifacts. The study's results, therefore, were influenced by the researchers' subjective interpretation of sampled documents' value and no inter-rater reliability measures were undertaken during this study. Whenever possible, artifacts were judged according to file names, document titles, or other obvious metadata recorded by Course Villain. When a document was titled "Final Test" or "Final Paper," it was fairly easy to characterize that as a high value artifact. When simple artifact identifiers could not be used for evaluation, researchers reviewed what was available through Coursehero.com's document preview.

Results

The test period was successful in scanning for and collecting artifacts in seven of the eight courses. Over the nine-week academic term, Course Villain produced 92 reports from across the sample courses, capturing 1,890 artifacts. One of the courses, ECON 211, was misidentified in query terms and did not return any results. However, with 13 reports capturing 260 artifacts for each course, more than enough data were collected for the remainder of the courses to adequately survey the types of artifacts present on CourseHero.com, as well as a calculation of the compromise metric (see Table 2).

Table 2

Compromise Metric Results in Terms of Value and Types of Artifacts Collected

Course	Compromise Metric	Low Value	Medium Value	High Value
HUMN 330	100%		Discussion Questions (60%)	Tests, Papers (40%)
WEAX 201	44%	Notes (56%)	Homework, Discussion Questions (44%)	
ENGL 123	31%	Notes, study documents (69%)	Discussion Questions (30%)	Papers (1%)
ECON 211	n/a	n/a	n/a	n/a
RSCH 202	56%	Notes (38%)	Homework, Discussion Questions (41%)	Quizzes, Papers (15%)

MATH 111	71%	Misc. Documents (33)	Homework, Discussion Questions (50%)	Quizzes, Papers (17%)
UNIV 101	0%	Notes (100%)		
PHYS 102	46%	Misc. Documents (54%)	Homework, Discussion Questions (46%)	

Overall, half of the courses in this study demonstrated compromise metrics of nearly 50% (49.7% actual mean value), meaning that almost half of all artifacts collected represent graded deliverables vital to the academic rigor of the courses. All of the course materials shared from HUMN330, Value and Ethics, represented significant threats to its academic rigor or integrity. Of HUMN330's shared materials, 60% were discussion question responses or other kinds of homework exercises, and 40% were completed test answers or whole essay assignments. At the other end of the observed spectrum, none of the material shared from UNIV101 (College Success), posed a meaningful threat to its rigor or integrity. All of the observed materials being shared from UNIV101 were some kind of student notation and did not represent actual, assessed coursework. MATH111 (College Math for Aviation) and RSCH202 (Introduction to Research) both scored high compromise metrics of 71% and 56%, respectively. MATH111 and RSCH202's compromised materials were also both spread across all kinds of assessments. A generally random collection of non-assessed artifacts comprised 33% of MATH111's shared materials, while 41% were homework answer sets or discussion question responses, with 17% being completed quizzes or major paper assignments.

Similarly, 38% of RSCH202's shared materials were student notes, 41% were completed homework assignments or discussion question responses, and 15% were completed quizzes or major paper assignments. PHYS102 (Explorations in Physics) also recorded a high compromise metric of 46%, though that metric was composed primarily of low- and medium-value assessments. Student notes accounted for 54% of PHYS102's shared materials and completed homework assignments or discussion question responses accounted for 46%. ENGL123 (English Composition) recorded a 30% "compromise metric" with student notes accounting for 69%, discussion question responses accounting for 30%, and major papers or essays accounting for 1% of the materials being shared. WEAX201 (Meteorology 1) recorded an overall compromise metric of 44%, with 56% of shared materials representing student notes, and 44% representing discussion question responses or other kinds of homework exercises.

Discussion

Given the relatively limited duration and scope of this study's design and the many nuances inherent in defining and measuring academic misconduct like plagiarism, external and valid conclusions are not appropriate. Within the context of the sample university, however, this study's results demonstrate that surveyed courses are worryingly compromised by the exchange of coursework on CourseHero.com. An aggregate mean compromise metric of 49.7% among the sampled courses shows nearly half of materials shared by students on CourseHero.com was identified as either medium or high value to course integrity. Such exchange likely endangers the value and integrity of those course assessments, and this study's results give strong testimony for

urgent course revision. With all but one of the surveyed courses demonstrating a compromise metric of greater than 30%, it is additionally clear that students from the sample university are exposing a significant degree of coursework that poses a meaningful danger to the academic integrity of those courses.

This study's results show that problematic coursework exchange is slightly more prevalent among sampled STEM subjects than others. Even with Value and Ethics' (HUMN330) 100% compromise metric, sampled non-stem subject courses shared a mean of 43.6%. College Success (UNIV101), a general education course that introduces students to fundamental aspects of being a student in higher education, was the only course to score a zero-compromise metric. The four STEM subject matter courses recorded a mean compromise metric of 54.25%, signaling that more than half of all the coursework shared from the courses by students represents a meaningful danger to the courses' academic integrity. College Math for Aviation (MATH111) scored a 71% compromise metric, showing that most of its exchanged coursework is dangerous to its integrity. Introduction to Research (RSCH202) also recorded a notably high compromise metric of 56% which was a level the researchers considered a direct threat to the course's integrity. The notable difference between the compromise metric of STEM and non-STEM signals a potentially notable finding worth further testing.

The observed coursework exchanged among sampled STEM courses is particularly worrisome because their subject matter content is arguably more objective or finite, and less flexible in how their basic materials might be appropriately used by students than the non-STEM sample. By example, the catalogue of coursework being exchanged from MATH111 is less open to subjective interpretation, reuse, and alteration than that of HUMN330. Arriving at the results of an algebraic equation by virtue of downloading the assignment is more clearly an act of academic dishonesty than downloading another student's current events blog to inspire one's own writing process. In this way, HUMN330's 100% compromise metric is startling and more careful analysis of how those shared materials were used by students is necessary to draw meaningful conclusions about the connection between that exchange and academic misconduct. The 71% of medium- and high-value coursework shared from MATH111 is more problematic because there are fewer conditions in which sharing completed quiz and test question and answer sets is appropriate. These results suggest students at the sample university are not only sharing a meaningful degree of coursework that poses a danger to those courses' academic integrity, but also the coursework being exchanged seems likely or directly connected to academic misconduct.

Though this study's results do not provide a clear or direct measurement of plagiarism, they may still be informative to compare against those from self-reported and similarity-detection studies of plagiarism. A mean compromise metric of 41.3% among the sampled courses may indicate that academic misconduct is slightly more prevalent than reported by survey-based plagiarism research methodologies, but towards the lower end reported by similarity detection methodologies. With detailed self-reported data showing roughly a quarter of students admitting to various kinds of academically dishonest behavior (Bretag et al., 2019), this study's findings exceeded that measure with a mean 41% of the coursework being shared from sampled courses. This study indicated a meaningful threat to the academic integrity of the courses as a higher level of questionable academic behavior is taking place than previous research suggests. The margin between this study's findings and those of self-reported academic misconduct research may be explainable by students' observed lack of understanding about what constitutes academic misconduct (Gullifer & Tyson, 2010; Ramzan, 2012; Hu & Lei, 2015), and

the gaps between student and instructor perspectives about misconduct (Watkinson, 2009; Brimble & Stevenson-Clarke, 2005). If students do not fully understand what academic misconduct is, or what their instructors and institution's expectations about it are, they are not likely to accurately report misconduct behaviors.

With medium- and high-value course artifacts accounting for 31 percent to 100 percent of the coursework being exchanged by students in sampled courses, this study seems to generally reflect the findings of similarity detection methodology research (see Table 1). The rate at which important coursework is being shared supports similarity detection-based findings that plagiarism is, while not an overwhelmingly frequent behavior, nevertheless common and serious. However, these results are likely less congruent than might appear. This study's observations do not completely capture the breadth or depth of plagiarism behaviors since illicitly exchanging coursework online is only one of many other possible means of plagiarizing. This study's results, therefore, likely underrepresent the improper use and attribution of unoriginal material in coursework. This study's observations also cannot account for what students actually do with exchanged coursework, and therefore likely overrepresent the academically dishonest or unethical behavior under scrutiny. It is unreasonable to assume that all of the coursework being exchanged in these spaces is being used in nefarious ways.

The widespread exchange of compromising coursework observed in this study suggests that crowd-sourced plagiarism represents a meaningful issue for the sample university, and perhaps also for similar distance education campuses. While this study's limited design and analysis do not directly contribute to scholarship about the prevalence of academic misconduct in distance education, it does signal the prevalence of ideal conditions for academic misconduct online. In the same way that seasonality makes parts of the equatorial Atlantic Ocean likely to sustain the development of tropical cyclones, the exchange of coursework on CourseHero.com appears to be promoting prime conditions for academic misconduct. Students are clearly exchanging a significant degree of problematic coursework online. For the sample university's campus whose courses were sampled, the increasingly favorable conditions observed here signal potential storms on the horizons of its courses' academic integrity.

Conclusion

True to any forecasting, perfect foresight into the nature and severity of academic integrity's coming storms is impossible. This, however, does not render proactive action against academic misconduct like plagiarism impossible. As Sutherland-Smith (2016) concluded, effectively mitigating academic misconduct requires a pluralized approach, necessitating diverse angles of "dialogic processes, academic research, collegial action, effective policy and reflexive teaching" (p. 40). Rather than cure-alls, the most actionable approaches to combat academic misconduct are found in the careful details of how and what disciplines, institutions, and instructors need and want to help students accomplish.

This study's most important contribution to academic misconduct research is to demonstrate a novel approach to monitoring academic misconduct behaviors. As noted above, the students' exchange of coursework online should not be considered equivalent with academically inappropriate behavior. Rather, keeping scholarly tabs on how much and what coursework students are actually exchanging with one another online is a promising and relevant means of better understanding the practice of students intentionally submitting the work of others as their own which is a keystone of plagiarism and other kinds of misconduct. In addition to self-

reported student and instructor perspectives, and similarity detection software, monitoring the online exchange of coursework offers another vector by which to triangulate academic misconduct.

In addition to self-reporting methodologies, digitized coursework exchange monitoring offers a more RAD approach to academic misconduct, grounded in new data and analysis techniques not previously available. Even somewhat rudimentary programming like the kind used in this study's data collection taps into plagiarism futures' digital records in more aggregate and replicable ways than survey-based approaches. Digitized coursework exchange monitoring also compliments similarity detection approaches to defining and measuring academic misconduct by more explicitly maintaining researchers' vital contexts. Similarity detection ultimately hinges on black-boxed algorithms and proprietary corporate products outside of the researcher's control. Digitized coursework exchange monitoring, rather, depends on academic misconduct researchers to define their own terms of observation and measurement, making clearer their cultural, disciplinary, and pedagogical frames that dictate their perspectives on academic misconduct. Without such context, observations of digitized coursework exchange will lack relevancy, rigor, and application.

Observing the exchange of coursework online also welcomes a valuable measure of currency to both more established approaches to studying academic misconduct. Both survey and similarity detection approaches to academic misconduct research capture problematic behavior after the fact. Capturing and researching academic misconduct after it has been perpetrated contributes to a largely reactive stance. Monitoring what coursework is being exchanged in closer to real-time conditions gives researchers, instructors, and administrators a kind of foresight on which courses are or may be becoming vulnerable to academic misconduct; putting them in a position to be more proactive. This sort of foresight is particularly relevant and valuable in distance education contexts that rely heavily on instructional design. Assessment design and management plays a vital role in mitigating the danger posed by peer-to-peer sharing to academic integrity (Rogerson & Basanta, 2016). However, whereas residential instructors can adjust their curricula to notable classroom trends somewhat quickly, as needed, distance instructors frequently face more lag-time. Asynchronous online courses built around course-shells, for example, may have a refresh or redesign timeline of academic years instead of lectures or weeks. Monitoring the digital exchange of coursework in distance education contexts gives higher education stakeholders a more current means of anticipating which courses, or even particular assignments should take precedence in the queue of revision. In either residential or distance education contexts, digital coursework exchange monitoring provides a more current, proactive means of engaging a holistic academic integrity culture.

Ultimately, careful triangulation is the best approach to addressing academic misconduct in higher education. The work here demonstrates the potential for new prong of academic misconduct research, focused on a new mutation of a classic issue with equally novel methods. Self-reported methodologies give academic misconduct research the means to reveal and decipher faculty and student perspectives. Similarity detection lends academic misconduct research a measure of objectiveness which helps codify and parse misconduct behaviors. Monitoring the digital exchange of coursework offers higher education's researchers, administrators, and instructors an additional, particularly current, and data-driven means of triangulating academic misconduct in their own vital contexts.

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Supporting Student-Initiated
Mobile Device Use in Online Learning

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Abstract
Understanding the experiences of students who self-initiate mobile device use for online courses or course-related activities provides institutions with valuable insights. In this study, we report how students enrolled in online courses in higher education voluntarily used mobile devices for their coursework and course-related activities, the challenges in using these devices, and how they managed those challenges. We surveyed 103 college students enrolled in one or more fully online courses regarding their habits in using mobile devices for online learning. Findings reveal most participants use mobile devices for convenience, portability, and overall ease of use. The way the devices are used for course-related activities varies, however, with reasons ranging from taking notes and reading course materials, to downloading those materials, communicating, socializing, and other purposes. Challenges when using these devices often relate to access issues and overall limitations of the technology. Yet, despite these limitations, some reported that, depending on the task, even though using a mobile device often took longer compared to a laptop or PC, the convenience of using it was a greater benefit. Participants were surveyed about their experiences prior to the COVID-19 pandemic, providing additional perspectives for possible future research focused on emergency circumstances to remote teaching or alternative forms of instruction. Additionally, this study provides a foundation of how and why students choose to use mobile devices for coursework and in what ways they may need support from their institutions related to their use.

The number of students voluntarily using devices other than PCs and laptops for their online coursework continues to rise (Magda & Aslanian, 2018). With over 96% of Americans owning a cell phone of some kind (Pew Research Center, 2019), it is not surprising that mobile devices are becoming a popular, often preferred mode for engaging in online courses and course-related activities (Clinefelter et al., 2019; Magda et al., 2020). Understanding the experiences of students who use mobile devices while taking an online course or courses, particularly those who self-initiate their use, provides institutions valuable insights. When the students self-initiate mobile device use for their online courses, there are a myriad of potential, negative impacts on their experiences. This is particularly notable when students engage in online courses not specifically designed for mobile learning on their devices. These issues include areas such as inability to consistently access (Perrin, 2019; Sadeque, 2020) or read (So, 2016; White, 2017) content, distractions when using devices (Cross et al., 2019; Pedro et al., 2018), and limitations when engaging in the course (Krull & Duart, 2019), among others. For these and other reasons, as institutions continue to seek ways to support students regarding technology and online learning, mobile device users should not be ignored.

Purposes of this Study

The purpose of this qualitative study was to explore how students enrolled in online courses in higher education voluntarily use mobile devices for their coursework and course-related activities. In addition, we were interested in understanding the challenges they encountered with respect to using these devices and how they overcame or attempted to overcome them. This study provides a foundation of how and why students choose to use a mobile device for coursework and in what ways they may need support from their institutions related to these areas.

As Martin et al. (2020) noted: "Online learning is no longer an innovation but has become the norm in [the] majority of the universities in the U.S. institutions" (p. 45). As such, institutions cannot assume that all students use only PCs or laptops for their online coursework. As institutions continue to seek ways to support students regarding technology and online learning, mobile device users should not be ignored, nor the challenges they may face due to factors such as device design and access limitations. The guiding Research Questions were:
1. Why do students who self-initiate mobile device use in their online course or course-related activities choose to use the device?
2. How do students who self-initiate mobile device use in their online course or course-related activities use the device?
3. What challenges do students who self-initiate mobile device use in their online course or course-related activities face, and how did they overcome those challenges?

Review of Literature

Mobile Device Defined

As new technologies and tools emerge, the definition and scope of the term "mobile device" continues to evolve. A review of earlier research references mobile devices as Personal Digital Assistants used for course activities such as reading and note-taking (Kukulska-Hulme, 2002). In 2004, Anderson and Blackwood described mobile devices as "mobile (or cellular) phones and also a range of information processing devices ranging from Personal Digital Assistants (PDAs) to more media-orientated gadgets that play video and MP3 music files" (p. 3). Along these same lines, Cain (2003) examined the issues and possibilities of the PDA, with a

focus on research and access to library sites and databases. At the time, the author called on professionals "to be agile enough to either adapt themselves or be adapted with minimal effort" (p. 47). This ability for students to quickly adapt, and for technology to adapt with them, remains true today.

Presently, mobile devices can be described as a mobile personal computer; users can use them in many of the same ways they would a computer, albeit with the limitations of a smaller screen size (PC Magazine, 2020). The term "mobile device," as defined for this study, refers to a smartphone or tablet device. However, survey respondents were also asked to identify if they used another type of device they would identify as a mobile device. No other types of mobile devices were identified, either through the review of recent literature or responses from participants. This definition aligns with descriptions found in other recent studies as well (e.g., Ally & Wark, 2018; Gallegos et al., 2019).

Mobile Device Use in Online Learning

According to a recent report, over 56% of online college students surveyed used a mobile device for at least some of their course-related activities (Clinefelter et al., 2019). Within the research, this voluntary use of mobile devices for learning has been referred to as "student-initiated mobile learning" (Vasudeva et al., 2017). This is an important distinction from the umbrella term "mobile learning" (M-learning), which may include any or all elements of a course that are delivered via mobile technologies. These might include, for example, game-based learning, applications (Chuchu & Ndoro, 2019; Troussas et al., 2020) or augmented reality (Radosavljevic et al., 2020) among many others. This distinction is vital to this study, as it is focused only on those who self-initiate mobile device use in their courses, not students in courses or activities specifically designed as M-learning.

Students highly value mobile devices as collaboration tools (Dabbagh et al., 2019; Heflin et al., 2017; Tang & Bradshaw, 2016), allowing them to engage with coursework and communicate with instructors or peers at any given time or place (Ahmad, 2020; Anshari et al., 2017; Clinefelter et al., 2019; Cross et al., 2019; Fraga & Flores, 2018). Text messaging or other applications support continuous contact and communication (McKinney & Sen, 2016; So, 2016; Tang & Bradshaw, 2016), letting group members efficiently work together on projects while in different locations (McKinney & Sen, 2016; Vasudeva et al., 2017). This social aspect of mobile device use in course-related collaboration may have added value to the student experience and learning as well (Jiang & Zhang, 2020), critical to cultivating relationships and providing opportunities for expansion of social networks (Dahya & Dryden-Peterson, 2016; Sun et al., 2017).

More recently, during the COVID-19 pandemic (the "pandemic"), the use of mobile phones, in general, increased across all age groups, leading the use of laptops or desktop computers (Branscombe, 2020). As a response to the pandemic, many institutions shifted to emergency remote instruction in varying alternative models (e.g., online or hybrid formats) (Govindarajan & Srivastava, 2020). This rapid shift prompted higher education institutions and researchers to re-evaluate and consider delivery of content, with attention to those students who used their mobile devices to access their courses (Naciri et al., 2020; Sandars et al., 2020). However, a global pandemic that impacted daily routines, finances, and technology access may impact learners in unexpected ways, far outside the typical student experience. As such, there is a lot to be gleaned from those who were self-initiating mobile device use for online courses before the pandemic; participants in this study offer these insights.

Challenges of Mobile Device Use in Online Learning
Access Issues

According to a recent report, 29% of adults with annual household incomes below $30,000 do not own a smartphone; more than 44% do not have home broadband services or a traditional computer, with lower-income Americans not owning a tablet device (Anderson & Kumar, 2019). This issue was at the forefront during the COVID-19 pandemic, with emergency transitions to online learning prompting some institutions to distribute mobile devices to help ensure student access to classes (Marinoni et al., 2020). For some students, not having affordable and easy access to a mobile device or reliable internet services may impede their desire or ability to use one for learning purposes or might hinder engagement with certain learning content due to limited data (Krull & Duart, 2019). In the United States, there is still a significant digital divide, as many rural families may have little cell phone service and no internet, or slower internet speeds (Perrin, 2019). Similarly, as noted by Rideout and Katz (2016), many U.S. families experience interruptions in service due to missed payments or broken devices.

On a global scale, there are an estimated 3.6 billion individuals who do not have any internet access, mostly in developing countries (Sadeque, 2020); this is an important consideration for institutions with global student bodies (Al-Emran et al., 2016). As noted by Ahmad (2020), some countries face "significant infrastructural, institutional, socio-economic and financial resource constraints" (p. 26). For example, in a recent study focused on using mobile devices to improve access to online learning within multiple locations across Indonesia, connectivity was the primary limitation indicated by participants (Padmo et al., 2019), highlighting impediments created by poor infrastructure. Other environmental circumstances may also impact access or interrupt service, such as national crises, disasters, or frequent power outages (Chaka & Govender, 2017; Holzweiss et al., 2020; Kaliisa et al., 2017). Beyond service issues, access to recent versions of devices may be an issue in many nations as well (Narayan & Sharma, 2017).

When examining the challenges faced by students living in different countries, perspectives toward mobile device use in online learning varied. For example, students in Australia identified factors such as device features and social media distractions as primary challenges related to mobile device use in learning (Kaliisa et al., 2017). Conversely, students in Nigeria (Oyelere et al., 2016) and Egypt (Sobaih et al., 2016) identified poor infrastructure, resulting in limited or no internet access, as a primary challenge. Students living in certain areas where theft is a concern may also face increased possibilities of losing their mobile devices, and therefore their course access (Le Roux, 2016). These types of experiences indicate that country of residence is an important factor when considering the student experience, overall, with regards to mobile device use for learning (Kaliisa et al., 2017).

User Experience

Students who engage in self-initiated mobile device use for online courses must first have a positive perception of using a device for academic purposes (Fagan, 2019; Vasudeva, 2017). Limitations of a mobile device may influence how a student uses it. Students who self-initiate mobile device use for online courses or activities that were not designed for mobile learning (M-learning) may be particularly at risk for a poor user experience. M-learning design considers the limitations of mobile devices in design technique, engagement, and usability (Eschenbrenner & Nah, 2019; Kumar & Goudnar, 2019; Suartama et al., 2019). Students should not expect these same considerations if they are engaging in an online course or course activities that were not specifically designed for mobile device users.

The physical and technological characteristics of a mobile device can impact a student's ability to use it effectively and efficiently as a tool for academic work. The smaller screen and keyboard size may make it challenging to use the device for common tasks such as submitting assignments, reading materials, or writing content (Ahmad, 2020; Pimmer et al., 2016; So, 2016; Vrana, 2015). Small screen size can increase time spent reading (Al Ghamdi et al., 2016) or contribute to students only feeling comfortable using mobile devices for low-stakes tasks (Hu et al., 2016). Readability issues related to screen size may make it difficult to see more robust displays of content and images (So, 2016; White, 2017), which may influence learning outcomes, overall. Similarly, a learner's level of understanding of the functionality of their device, particularly for learning, may be a challenge (El-Sofany & El-Haggar, 2020; Figueras-Maz et al., 2017).

Distractions

Outside of the inherent technical issues faced by students using a mobile device, a personal mobile device also opens the door to more distractions—with social media, web browsing (Cross et al., 2019), and endless apps and games only a quick tap away. This easy access, combined with push notifications from many apps, results in a constant competition for students' attention (Pedro et al., 2018). Multitasking with social media or answering text messages via a mobile device while engaging in a learning activity can negatively impact academic performance (Junco, 2012). In the traditional classroom, an instructor can help to mitigate the distractions by having students put away devices, but online students must regulate their own behavior (Cross et al., 2019). Some online students may struggle with easy access to other online platforms and be distracted from academic work, which may limit any potential positive impact of mobile device use.

Methods

Design

A basic qualitative research design was used to uncover student experiences related to self-initiated mobile device use in online courses or course-related activities (Creswell & Creswell, 2017; Merriam, 2002; Merriam & Tisdell, 2015). Before collecting any data, the researchers obtained Institutional Review Board approval from their institution. An anonymous, online survey was developed and posted on the website SurveyCircle, a platform where researchers around the world can participate in research or recruit participants. The survey was also posted within the online participant pool at the researchers' institution, a global online for-profit institution based in the U.S. Also, the researchers posted the survey link on LinkedIn and other social media sites to maximize recruitment strategy (Benfield & Szlemko, 2006), including the social media page for SurveyCircle. This sharable survey link allowed for snowball sampling, as participants were invited to share it with their acquaintances to support increased sample size (Sharma, 2017; Taherdoost, 2016).

Instrument

The researchers developed an anonymous, online survey that began with two screening questions designed to verify that participants met the inclusion criteria. To qualify, participants needed to (a) be enrolled in a fully online course at the time of participation or have taken such a course within the last 6 months and (b) voluntarily used a mobile device for coursework or course-related activities. The screening questions were followed by five demographic questions designed to provide a descriptive summary of the participants. The remaining section of the

survey consisted of five short answer questions and three multiple-choice questions designed to provide data to answer the research questions. These questions explored participant experiences using a mobile device for online coursework or course-related activities. These questions centered around topics relevant to what devices are used, for what reasons they are used, what challenges are experienced, and what strategies are used to overcome challenges. The full survey instrument is provided in the Appendix.

Participants

Out of 144 responses, 103 participants met the two screening criteria and completed the full survey. Of those who took the full survey, two questions asked participants about mobile device use to better understand general user habits, including: (a) frequency of use compared to a laptop or computer and (b) the average number of times per week the device was used. Sixty-two participants (66%) reported they use a mobile device less often compared to a laptop or computer, 28% (26 out of 94) more often, and 6% (6 out of 94) use only a mobile device for their online coursework (9 participants did not respond). Forty-one participants (43%) reported they use their mobile device 3–5 times per week, on average. Twenty-five participants (26%) use their mobile device 0–2 times per week, and 19 (20%) use their device 6–10 times per week. Over 10% of participants use their mobile device more than 10 times per week for course or course-related activities (8 participants did not respond). An overview of the frequency of mobile device use is provided in Table 1. Additional participant demographics are reported in Table 2.

Table 1
Frequency of Mobile Device Use

		Frequency	Percentage
Mobile device use compared to a laptop or computer	Use a mobile device less often	62	66%
	Use a mobile device more often	26	28%
	Only use a mobile device	6	6%
Weekly mobile device use	3 to 5 times per week	41	43%
	0 to 2 times per week	25	26%
	6 to 10 times per week	19	20%
	More than 10 times per week	10	11%

Table 2
Participant Demographics

		Frequency	Percentage
Age	18–29	58	56%
	30–49	36	35%
	50–64	9	9%
Gender	Female	71	69%
	Male	31	30%
	Prefer Not to Respond	1	1%
Ethnic/Racial Background	White	72	70%
	Asian/Pacific Islander	12	12%
	African American/Black	11	11%
	Prefer Not to Answer	3	3%
	Other/Not Listed	3	3%
	Hispanic/Latino	2	2%

Level of Program	Bachelor's	43	42%
	Master's	26	25%
	Doctoral	22	21%
	Other	8	8%
	Post-graduate certificate	4	4%
Field of Study	Psychology & Counseling	41	43%
	Business & Management	20	21%
	Education	11	12%
	Other	9	9%
	Public Health & Health Sciences	6	6%
	Social Work & Human Services	3	3%
	Criminal Justice	2	2%
	Public Policy & Administration	2	2%
	Communication	1	1.0%

Data analysis of each short answer question was guided by Braun and Clark's (2006) six-phase guide for qualitative analysis. Data was hand-coded through an inductive process. The process started with reading and re-reading the participant responses, listing each of the responses per question, and color-coding the responses that were alike. Next, the color-coded data was counted for frequencies and categorized to look for patterns and to derive themes. For qualitative credibility purposes, the raw color-coded data was shared with the other two authors for a quality check before developing main themes.

Findings

Self-Initiated Mobile Device Use
Theme 1: Choosing a Mobile Device for Convenience and Portability

Results of the survey reveal that students who self-initiate mobile device use for online courses or course-related activities often choose to do so because of convenience and portability. Several participants described that their mobile device is especially useful when they commute to work or do not have a laptop available. Furthermore, some indicated that because their mobile device is readily available, they can participate in their course discussions and interactive lectures and access email no matter where they are. One participant stated, "I use my mobile device for convenience when I am not at home so that I can still participate in the discussion and email." One participant noted that their mobile device is "always on hand," while another shared, "I always have it so if I realize I have to turn something in right away and I don't have my laptop I can just use my phone."

Participants noted that they like the comfort of their mobile devices, as they are less bulky or heavy compared to a laptop, textbook, and notebook. Along these lines, participants described that with their mobile device, they do not have to be at a standstill, as they can do their coursework or research work on their mobile device in their spare time and can multitask. One participant shared, "it's easier to not have to be tied down to an actual computer, the ability to move about the house while working makes it easier to get the work needed done."

Theme 2: Using a Mobile Device for its Practicality and Efficiency

While the "on the go" nature of the mobile device is an important consideration in why participants use mobile devices for their online courses, it was not the only reason they choose to use a mobile device. Multiple students highlighted the practical application of using a mobile

device. The functionality of a mobile device prompts one participant to listen to readings, sharing that they access the "text to speech function to listen to readings that I downloaded." One participant noted they use their mobile device for "Googling things I don't know as I encounter them," while another participant shared, "rather than be confined to the computer, I download the pdf [sic] and read on Kindle or iPad." This efficiency was described by several as the primary reason they choose to use their mobile device, noting their preference for using a mobile device for quick tasks, such as checking in on their courses and jotting down notes. Furthermore, participants responded that their mobile devices simplify their planning and organization, allowing them to keep up with the pace of the course. One participant stated they "work many hours, and the smartphone simplifies my planning and organization," while another participant noted are "able to quickly respond when traveling."

Primary Uses of Mobile Devices
Theme 1: Engaging with the Course Content

How participants use mobile devices varies. Many described they use their mobile device primarily for accessing the Learning Management System (LMS) and course-related materials. The reasons for accessing the LMS varied, including activities such as reading announcements, checking grades, submitting assignments, and taking online quizzes. Also, nearly half of participants indicated they engage with some or all course content via their mobile device to read course materials (e.g., articles and e-books), watch or listen to lectures, and access other content related to their courses. Several reported using their mobile devices for researching information on different topics, searching for course resources, and reviewing notes while not at their computer.

Theme 2: Communicating with the Learning Community

In addition to accessing the LMS or engaging with the course content, nearly half of participants use the mobile device as a communication tool, mainly to email instructors or connect with classmates. The modes for doing so varied, however, including chatting, messaging, and texting classmates to clarify assignments, scheduling and attending meetings via Slack, Zoom, Skype, and Google, and participating in classroom discussion forums and social media groups. Direct communication with faculty was limited to email and phone calls, but participants connect with peers in several ways using their mobile devices. For example, participants noted they used a mobile device for a "scheduled phone meeting with Professor." However, other participants shared they use their mobile device for "Facebook messaging group members," to "text classmates to clarify assignments, use "group chat with classmates, and use "WhatsApp for group work."

Student Challenges with Mobile Device Use
Theme 1: Experiencing Compatibility Issues

The types of challenges participants described relevant to self-initiated mobile device use varied, with nearly half noting device compatibility with the course or course materials as a primary barrier. More specifically, these included issues relevant to accessing the LMS and other applications, typing and formatting papers, and accessing attachments and media resources. One participant shared, "as I have advanced in my studies the need to write and edit has become a cornerstone of my work and the device I use does not support this activity." Another participant shared, "not all media resources provided by lecturers is compatible with mobile devices," while another participant noted that "my biggest issue with using my mobile device is that I do not have Grammarly or Word to spell check."

Related, participants also described software or device limitations as a challenge in using them for their online coursework. These are described as pages not loading correctly, applications working inconsistently, issues with the touchscreen, and trouble accessing some functions and links. One participant shared that:

> when trying to access some of the online pages which are clearly set up more for PC use, it can be frustrating to try and click on the relevant part of the screen as it doesn't recognize me touching the screen when using my smart phone, or the screen touch is too responsive so it will open and close a screen without me actually wanting to do so.

Along these lines, another participant shared that "sometimes if my phone doesn't have the most current updates, it affects the Blackboard app and I can't use certain functions."

Theme 2: Encountering Challenges Due to Device Design

Device design presents challenges as well, with readability issues, and slow connectivity identified by over one-quarter of participants as a challenge. Small screen size, visibility restrictions, small font size, and screen formatting problems creates a poor student experience. One participant shared, "the biggest challenge is not being able to enlarge the font and maintain the ability to view the whole page like you can when reading an e-book, for example," while another participant shared that the "limited view on screen" was a challenge. Another participant shared that "getting articles to display properly and making them large enough to read comfortably" was a challenge. Compounding these issues were slow connections, signal interruptions, privacy concerns, and issues loading websites, documents and files were frequently described as barriers to using a mobile device. One participant shared, "use to extended road travel—there are points where signals are limited—hence interactions with classmates may be interrupted," while another shared that they experienced "slow load time."

Resolving Mobile Device Challenges

Theme 1: Attempting to Self-Resolve

Many participants described attempts to self-resolve challenges in using their mobile devices, with nearly half reporting that they switched to a computer or hardcopy (i.e., moving to paper) as a solution. One participant shared, "I was unable to resolve my issues, so I used a regular computer to complete written assignments," while another shared "I was not able to resolve the problem and completed the task later on my laptop." If the problem was an issue with formatting or readability, several noted that they enlarge the text or look for webpages compatible with mobile devices. One participant shared that "devices have 'desktop view,' but this is often only marginally better," while another shared, "I was able to figure out how to enlarge the text. The only downside to enlarging the test is that the page numbers become off." Connection challenges were also often reported as being self-resolved; many participants responded they would reset the device, update an app, or move to a location with better Wi-Fi.

Not all reported challenges with mobile device use were resolved. Several reported that "patience" and "caution" were important in addressing the challenge, with one participant noting, "I have to carefully click what I need and therefore be a bit more slower than I would usually be," while another shared "waiting patiently" is how they address the challenge. Those instances in which challenges went unresolved, led to frustration. One participant shared, "I was not able to resolve it, I had to deal with frustration." Another shared, "I just used it, it was never resolved."

Theme 2: Seeking Outside Support

Nearly one-quarter of participants shared that others, such as technical support or classmates were a source of help. One participant noted, "I honestly will ask my students for

help. I am a high school teacher," while another participated shared that "calling tech support may provide answers." During communication interruptions, one participant shared, "I make my classmates aware. They usually take a break at point of lost contact and give me the opportunity to reconnect."

Suggested Resolutions

Theme 1: Considering Content Design

Over half of participants suggested more mobile-friendly design of content as a potential resolution to their issues. Many indicated that applications used for online courses education should be configured for mobile devices. One participant shared, "I feel that the apps for my coursework could be better formatted for mobile devices," while another wrote they could resolve challenges "if the website pages were designed with phone/tablets in mind rather than being really just set up for PC use." Another participant shared, "I think they could make a spell check, and grammar check like Grammarly for mobile device keyboards."

Theme 2: Preparing for Technology Challenges

Over a quarter of participants indicated they should be better prepared for the possibility of issues with technology. Many described their desire to be more adept with how to operate their mobile devices to understand ways to resolve problems. One participant noted they could have "more patience or learning about potential solutions," while another shared that they could "learn how to operate additional functions on the phone." Several indicated that administrative teams should be available to resolve the issue, rather than relying on the student.

Theme 3: Choosing an Alternative Device

Some acknowledged that sometimes the mobile device is not the best choice for academic work at all, due to device size or limitations. For example, one participant shared, "I probably should have gotten a note phone or a tablet so I would have a bigger screen," while another shared the challenges could have been resolved by "using a laptop instead." Participants noted they should have chosen or used a different, larger device.

Discussion

Importance of Flexibility

How and when participants use their mobile device highlights the desire of students to be able to maintain access to their academic work and materials while traveling, commuting, and working. Participants valued being able to connect even when on-the-go, which aligns with previous research illustrating the desire of online learners to have a flexible learning experience (Cross et al., 2019). While most participants reported they use a computer or laptop more frequently than a mobile device, students still frequently rely on a mobile device multiple times per week to engage in quick tasks related to their coursework. As noted in previous studies, participants often switch between devices to support their efficiency (Krull & Duart, 2019). Despite challenges when using their mobile devices for academic purposes, many continued to rely on the mobile device, perhaps because of the portability and convenience of being able to quickly communicate with others, find information, or engage with course-related content. This pattern suggests that even when challenges exist, students may find the convenience and efficiency possibilities of connecting on-the-go as a top priority.

Research shows that student preferences for using a mobile device for learning is increasing, with students interested in online programs being more likely to use a mobile device (Magda et al., 2020). Given the increasing number of students who are voluntarily using mobile devices for their learning, institutions should not ignore this growing group. It is worth noting

that participants in this study were split among the bachelor's (42%), master's (25%), and doctoral (21%) levels. Yet, findings did not indicate any particular use patterns when comparing the preferences, habits, or challenges faced by these groups. Similarly, participants from different age groups showed no distinct differences, suggesting that adult learners and those from the younger generations experience similar benefits and challenges when choosing to use a mobile device for online courses, and choose to use a mobile device at similar rates and in similar ways. Interestingly, these generational similarities contradict other findings showing that learners 45 years and older are less likely to use mobile devices for learning activities (Clinefelter et al., 2019). While there is not enough data to draw any defined conclusions, this does indicate the need to consider further research in this area.

Mobile-Friendly Course Design

It is important to note that research exploring student habits regarding why they use mobile devices for learning often uses the term M-learning as a generic term. This may create an imprecise understanding of the research and student experience. When limitations of mobile learning are discussed, it is often unclear if the course setting was specifically designed for this modality (Bateman & Palilingan, 2017), making it difficult to ascertain the true experience of learners and reasons for any challenges they may have faced.

What is clear from this study and others (Clinefelter et al., 2019; Magda et al., 2020) is that students continue to use mobile devices for their online courses or course-related activities, even if those courses are not designed for M-learning. Institutions must remain mindful of this group of students, as participants noted the challenges they experienced when trying to access courses and course-related content from their mobile device. While many institutions are focused on adapting existing courses to align with M-learning principles, students in this study indicated the need for broader mobile-friendly considerations beyond the classroom itself. For example, websites, documents, and additional resources must also be designed in a mobile-friendly way to increase the accessibility and user experience of self-initiated mobile device learners. Considering the accessibility of these items on a mobile device is essential, given the desire of students to complete readings on a mobile device, and the possibility of an increased reliance on such devices for class communications and coursework (Magda et al., 2020). This comparison between M-learning experiences and challenges versus the experiences of those students who self-initiate mobile device use may glean insights into the student experience from these unique groups of learners. This distinction also highlights the need for a more precise approach to mobile learning research by focusing on characteristics of the learning environment and how those features can support student goals (Grant, 2019).

The emergency transition to remote instruction during the pandemic revealed the differences between emergency remote teaching and online learning (Hodges et al., 2020). While some research refers to this sudden use of mobile devices for learning in higher education as mobile learning (Biswas et al., 2020), the distinction from self-directed mobile device use is critical. Online learning is designed as online being the primary mode of instruction, prepared over time, with proper training of staff and other considerations (Shisley, 2020). These considerations should also extend to mobile learners through mobile-friendly course design. Knowing how students are accessing a course, and deliberately designing for PC, laptop, and mobile learners, will support a positive student experience. While some participants suggested they should not have used a mobile device at all, this is not necessarily ideal for those who do not

have access to another tool or face other limitations. Nor does it consider those who prefer their mobile device for its convenience. Institutions must consider a balance between those who (a) prefer mobile devices to computers, (b) use them because they do not have access to another device, or (c) use the device because it offers features that are not as easy to use on a computer (i.e., listening to a podcast of a lecture).

Technical Support

From an institution standpoint, mobile device use creates a challenge for the design and implementation of resources for a variety of reasons. Because students do not all use the same types of devices, the institution cannot limit support to a single type or style of device. Students will seek out support that is device specific (Gikas & Grant, 2013) and may experience frustration when they are unable to resolve challenges with their device (Regalado & Smale, 2019). Given the wide variety of device models and platforms, it seems likely that students using mobile devices will face challenges in getting institution-level technological support, and that some users will face barriers in the access and use of some content. In this study, multiple participants noted the need for them to become more familiar with the features of their mobile devices to overcome challenges.

The need to better understand the functionality of mobile devices may extend beyond specific technical issues, however, and could determine if mobile devices support or hinder student learning. For example, Hartley and Bendixen (2019) noted the need for students to understand how installed applications could help them by sending reminders or, conversely, distract them by sending constant notifications. As technology changes, institutions cannot feasibly create support materials for every single mobile device or application. They could, however, curate resources from major mobile device companies so students can quickly locate external help and support. These resources might inform students, for example, about general mobile device features, such as how popular apps use notifications. Even though mobile devices are widely used by students (Magda et al., 2020), what is clear is that institutions should not assume that all learners understand how to effectively use such tools or overcome challenges when engaging in course-related activities.

For those institutions who provide mobile devices to ensure access to online courses, as some did during the pandemic (Marinoni et al., 2020), those institutions should consider offering technical support for those specific devices. As findings of this study revealed, several participants' challenges went unresolved. In these situations, it is unclear if this negatively affected or hindered the students' experiences or progress. However, other researchers have noted that some students may become frustrated when technology does not work properly (Olt & Teman, 2018), which may influence student success, overall (Kakada et al., 2019). Additionally, consistent with other studies (Gikas & Grant, 2013), many participants in the current study noted they switched to a different device when faced with mobile device challenges. Being able to switch to another device may not be an option for all learners, however, as some students may not have access to other devices, or their devices may not be suitable for given tasks (Brown & Haupt, 2018). This behavior is particularly interesting in the context of the pandemic, when some institutions provided devices to learners who may not have secondary devices at home. These student patterns and challenges are important considerations if institutions are focused on creating mobile-friendly courses or other resources. Even with such focus and careful design, there are some students who may still face barriers when it comes to using a mobile device for such purposes.

Limitations and Future Research

There were several limitations to this study. While there are benefits to using snowball sampling to recruit participants, there are also limitations. As Geddes et al. (2018) described, snowball sampling can often falter, prompting the researchers to seek alternative ways to recruit participants. In this study, the method created a loss of control over the sample. To address this concern, questions related to institutional profile and available supports would have added additional context regarding participant responses. Along these lines, this study did not take into consideration the cultural backgrounds of participants. Yet, due to the variety of recruitment strategies, participants could come from diverse locations, programs, and backgrounds from around the world. While this was not the focus of the research, it should not be ignored, as there are global implications related to device use, infrastructure, and other areas that could factor into the findings.

In addition, it is important to note that data collection for this study was completed before the COVID-19 pandemic that impacted many students and institutions on a global scale. As many more institutions moved to online delivery in response, users experienced issues related to interrupted internet access and overwhelmed servers. These perspectives and experiences were not captured in data collection. Therefore, the results of this study are reflective of a more typical student experience not impacted by these circumstances. This creates, however, an opportunity for future research. Further exploration of the experiences of this same population of students would provide further insights into the student experience after an unexpected transition to online learning.

The survey instrument did not ask participants specifically about access to a device or multiple devices. Yet, as several participants in this study indicated, they switched between several devices when they face challenges with their mobile device. However, this is not an option every student has. As many students are only using a mobile device for their coursework, further research is needed to understand challenges faced specifically by those students who only have access to a mobile device for online coursework. Future research should consider gathering this information to gain a clearer understanding of this area.

This study confirms the themes revealed in the review of current literature relevant to student-initiated mobile device use in online learning. It also illuminates the gap in research focused specifically on this group of learners. As the term M-learning becomes more common, there must be an explicit distinction between the terms *mobile-learning* and *mobile-friendly design*. With this distinction, understanding the experiences of students who self-initiate mobile device uses in online learning compared to courses or activities designed specifically for M-learning will become more apparent.

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Appendix

Mobile Device Use Survey

Screening Questions
- Are you currently enrolled in a fully online course, or have you taken a fully online course at a higher education institution in the past 6 months? (Y/N)
- Do you <u>voluntarily</u> use a mobile device (i.e., tablet or smartphone) for your coursework and/or course-related activities? (In this case, voluntarily means that device use is not required, but you choose to use one for some or all course activities). (Y/N)

If individual answered "Yes" to both questions, they proceeded to the survey. If they answer "No" to either question, they received the following message:
- Thank you for your interest in participating in this study. However, in order to participate you must satisfy both screening criteria to proceed. Because you answered "No" to one or both questions, you did not pass the screening questions. Thank you for your time.

Survey Questions
Instructions: For the first set of questions, please select the box that corresponds to your answer.

What type of program are you currently enrolled in?
- Bachelor's
- Master's
- Doctoral
- Post-graduate certificate
- Other

What is your area of study?
- Business and Management
- Public Health and Health Sciences
- Information Technology
- Psychology and Counseling
- Social Work and Human Services
- Education
- Criminal Justice
- Public Policy and Administration
- Nursing
- Communication
- Other (Please describe)

What is your age?
- 18–29
- 30–49
- 50–64
- 65 and over

What is your ethnic/racial background?
- African American/Black
- Asian/Pacific Islander
- Hispanic/Latino
- Native American/American Indian
- White
- Not Listed (Please describe)
- Prefer not to respond

What is your gender?
- Female
- Male
- Neither male or female
- If you chose "neither male or female" how do you identity yourself? (short answer)
- Prefer not to respond

Reflecting on your mobile device use for your online course(s) or course-related activities in the past 6 months, what type of mobile device do you use for your coursework and/or course-related activities? (check all that apply)
- Tablet
- Smartphone
- Other [please describe]

Instructions: The next five (5) questions are short-answer, typed responses that relate to your mobile device use in your online course(s). Prior to responding, reflect on your mobile device use for your online course(s) or course-related activities over the past 6 months.

1. In a few words, describe the primary reasons **why** you chose to use a mobile device for your coursework and/or course-related activities. For example, one reason why you may use a mobile device might be for convenience.
2. Please provide an example or examples of how you used a mobile device for your coursework and/or course-related activities. For example, one way you may use a mobile device for your courses is for e-mail with your classmates.
3. Describe a challenge you encountered when using a mobile device for your coursework and/or course-related activities. Be as specific as possible. If you never encountered a challenge, please indicate that you have never encountered a challenge.
4. With regards to the challenge described in question 3, how did you resolve (or attempt to resolve) the problem? If you were unable to resolve the problem, explain that as well.
5. With regards to the resolution (or attempted resolution) to the challenge you described in your response to question 3, in what other ways do you feel the issue could have been (or could be) resolved, if any?

Instructions: For the last set of questions, please select the box that corresponds to your answer. Prior to responding, reflect on your mobile device use for your online course(s) or course-related activities in the past 6 months.

Which of the following best describes how much you used a mobile device compared to a laptop or personal computer?
- I only use a mobile device and <u>never use</u> a laptop or personal computer for my online course(s) or course-related activities.
- I use a mobile device <u>more often than</u> a laptop or personal computer for my online course(s) or course-related activities.
- I use a mobile device <u>less often than</u> a laptop or personal computer for my online course(s) or course-related activities.

How many times per week, on average, during your online course(s) do you use a mobile device for your coursework and/or course-related activities? In this instance, one "time" means when you pick up your device and use it for your course(s), even if you are using it for multiple activities.
- 0–2 times per week
- 3–5 times per week
- 6–10 times per week
- More than 10 times per week

Hybrid Flexible Instruction:
Exploring Faculty Preparedness

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Abstract
The aim of this investigation was to survey faculty members on their perceived level of preparedness to design and implement hybrid flexible (HyFlex) instruction. Participants included 121 full- and part-time faculty. Using an electronic survey, faculty members: a) rated their preparedness to engage on different HyFlex instruction competencies, b) shared which pedagogical strategies they felt prepared to use in this instructional modality, and c) listed the resources and support that they felt were needed to successfully implement their course. The results indicated that faculty members felt prepared to successfully engage in competencies related to HyFlex instruction that were significantly similar to competencies required for in-person instruction. However, they admitted to feeling less prepared to manage the intricacies that are unique to the HyFlex modality. Also, instructors believe a variety of pedagogical strategies can be integrated into HyFlex instruction; however, for those unfamiliar with this instructional modality, significant support and resources are needed before designing and implementing a course.

Keywords: HyFlex, online learning, instructional modality, faculty, higher education

Hybrid Flexible instruction (HyFlex) refers to a combination of both online and face-to-face instruction. It allows students who are unable to physically attend class sessions to be virtual attendees with real-time or asynchronous interactions with the instructor and their in-person classmates. As Irvine (2020) noted, "the specific characteristic here is that the learners have full control of their modality (face-to-face, online synchronous, or online asynchronous)." Traditionally, learners who want to continue their education but are unable to attend an in-person course choose to pursue online education. However, research shows that the design of online instruction does have some faults; many online students endure some degree of loneliness without social interactions with other students (Chakraborty & Victor, 2004). Various investigations report that online students also miss the engagement with professors through immediate feedback and one-on-one interactions, which traditional in-person courses typically have (Chakraborty & Victor, 2004; Stewart et al., 2011; Park & Bonk 2007).

Some institutions have started to explore the implementation of HyFlex instruction, in which students who are able to attend synchronous class sessions can participate virtually (Rogers et. al., 2003). HyFlex classrooms implement different educational technologies in which distance learners can interact with in-person students and communicate with the instructor in real time (Roseth et al., 2013) as well as in fully online, asynchronous formats. The implementation of HyFlex instruction was initially driven by universities with limited physical space that wished to accommodate more learners, and by institutions wanting to give access to learners with educational needs who are unable to relocate or physically attend a classroom. More recently, the desire to implement HyFlex instruction has been driven by the social distancing guidelines that educational institutions must follow to diminish the spread of the SARS-CoV-2 virus while ensuring continuity of education during this pandemic.

It is important to note that HyFlex instruction is novel and experimental. Yet, a similar instructional modality with different technological configurations has been used in the past. In the 1990s, The Georgia State Academic and Medical System (GSAMS) was used by the University System of Georgia to allow live, interactive, two-way video conferencing between as many as 16 sites during individual conferences (Gruenhagen et al., 1999). The distance education system GSAMS served to connect a teacher preparation program to student teachers in rural areas. While many lessons can be learned from these early distance education efforts, the GSAMS multiway television broadcast courses and HyFlex instruction are not the exact same modality. Therefore, researchers today need to continue to investigate how universities can prepare faculty members if they decide to design, develop, and implement HyFlex instruction. While many researchers have studied the implementation of this type of instruction (Bell et al., 2014; Chakraborty & Victor, 2004; Moore et al., 2017; Park & Bonk, 2007; Popov, 2009; Roseth et al., 2013; Ryu & Boggs, 2016; Stewart et al., 2011; Szeto, 2015), little research exists examining faculty preparedness regarding HyFlex teaching and learning.

The aim of this study was to survey full- and part-time faculty at an institution of higher education on their preparedness for the implementation of HyFlex instruction. The results support an understanding of faculty readiness for this mode of instruction, the pedagogical strategies they believe are best suited for this instructional format, and the support and resources needed to successfully implement this type of learning experience.

Purpose Statement and Research Questions

The aim of this investigation was to survey faculty members about their level of preparedness to use HyFlex instruction. It is critical to investigate how faculty members perceive HyFlex instruction, what pedagogical strategies they feel are best suited for this instructional format, and what support and resources are needed, from their standpoint, to successfully implement this instructional format. Data for this investigation were collected prior to the COVID-19 pandemic. When the World Health Organization declared COVID-19 a pandemic, educational institutions had to pivot into emergency remote instruction and then make plans for instructional continuity. The results of this investigation are critical because many of these instructional continuity plans now involve the implementation of HyFlex. The research questions that guided this investigation are the following:

RQ1: What are faculty perceptions of their preparedness towards teaching using HyFlex learning experiences?

RQ2: What pedagogical strategies do faculty members feel are best suited for HyFlex learning experiences?

RQ3: What resources and support do faculty members feel are needed to successfully implement HyFlex learning experiences?

Literature Review

Educational institutions have aimed to implement pedagogy and technology to best adapt to the current world and equip learners with 21st-century skills. Additionally, educational institutions are working toward providing learners with access to learning experiences regardless of their geographical location. This access to education has taken place in the form of various online, hybrid, and blended learning instructional formats (Irvine, 2020). As previously mentioned, one type of online distance education format that institutions are starting to explore and implement is HyFlex instruction. Our review of the literature identifies some of the most recent research efforts that address a) HyFlex instruction and b) blended synchronous learning with HyFlex elements embedded.

Stewart et al. (2011) investigated the implementation of HyFlex instruction with 18 graduate college students working towards a doctorate in education. Fourteen students physically attended the classes while the four others virtually joined through a video conferencing program from an external site. The researchers observed the classes and provided open-ended surveys over a two-year period. Through survey responses, the learners did not report a change in participation levels but did note an increased difficulty with non-verbal communication in class. Wang et al. (2017) also studied the gradual implementation of a blended synchronous learning environment with the capability of supporting online and in-person students simultaneously. The researchers surveyed graduate students after each of the four rounds of implementation of blended synchronous learning. The surveys demonstrated that the graduate students responded positively to the blended synchronous learning environment; however, several design principles had to be considered, including the design of activities to be more inclusive of the remote learners, a partnership strategy to increase attention and communication between the instructor and all the learners, pre-training on the learning environment to reduce technical difficulties, and clear video communication (Wang et al., 2017).

The results of other investigations also raised awareness of issues related to communication between the instructor and the students when implementing HyFlex instruction. Moore et al. (2017) implemented a four-course professional development series for pre-service teachers on blended classrooms and underwent evaluation cycles: pre-course, pilot course, and the ongoing actual course. Results of the evaluation showed that the communication and interactions among all students were rated with the highest satisfaction whereas the instructor's evaluation and support were rated with the lowest satisfaction scores. Rogers et al. (2003) also focused on better understanding the instructors' and students' experiences after transitioning to blended synchronous classrooms. Like Moore et al. (2017), the results indicated that instructors faced challenges with the adaptation to instructions for distance students. Distance students felt alienated due to technical difficulties where they missed comments made in the in-person classroom without the ability to playback. In a case study by Park and Bonk (2007) on synchronous multi-media, researchers emphasized how learning was promoted with the mediated interaction among online learners, in-person learners, and the instructor. Despite technical difficulties, students reported many effective components, including team-teaching capabilities, multiple multimedia tools, and new experiences. Another case study was conducted by Romero-Hall and Vicentini (2017) in which three graduate students in an instructional design and technology program participated as online learners in HyFlex instruction during two consecutives semesters while in their master level program. The results of that case revealed that lack of adequate technological infrastructure led to challenges related to interactions and communications with in-person classmates and feelings of inequality in the course (i.e., during group project distance learners did not feel treated equally by in-person classmates). However, the case study also highlighted the importance of instructor proactive actions to maintain open communication channels with all learners, make material available prior to instruction, and ensure equity in class activities and assessments.

According to several research findings, the acceptance of HyFlex modality in terms of effective design and implementation for instruction varies greatly. Popov (2009) investigated several negative points of view towards HyFlex instruction, expressed by the participants (graduate students and lecturers in a master level program). According to Popov (2009), the graduate students and lecturers emphasized many challenging aspects, including poor communication among students and teachers, distracting technology, lack of structure for assignments, and assessment differences that benefitted online learners over in-person learners. Overall, the graduate students and lecturers who participated in this study did not find HyFlex instruction effective. Similarly, Chakraborty and Victor (2004) conducted a case study related to HyFlex instruction that included face-to-face and remote learners. The researchers discovered that the main issues were technical difficulties which made the course more difficult for remote learners (Chakraborty & Victor, 2004). Bourdeau et al., (2018) compared in-person, online, and HyFlex learning with a focus on academic success rates, concluding that in-person learning had fewer failures than online learning, which had fewer failures than HyFlex learning.

Some research has emphasized how HyFlex instruction relies on the context of the situations and setting. For example, Bell et al. (2014) aimed to find the most efficient integration between technology and instruction in multiple locations using different formats such as linked classes, shared portals, personal portals, and small groups. The researchers concluded that the effectiveness in one setting during a specific semester could not predict the effectiveness in other settings in a different semester because the conditions called for customization using different formats (i.e., linked classes, shared portals, personal portals, and small groups).

Szeto (2015) focused on the instructional effects of the community of inquiry (teaching, social, and cognitive presence) in blended synchronous teaching and learning with first-year engineering students. Szeto (2015) concluded that teaching presence had more effect than social and cognitive presence in this particular context, as teaching presence made a bigger impact on the assessment scores of the learner. Additionally, the researcher noted that teaching presence varied during class sessions. For example, during discussions, moments of confusion arose due to the novel challenge of connecting with the online students via a screen. The results indicated that social presence thrived in instances where students had to rely more on visual and audio cues to communicate with their virtual peers. Finally, Angelone et al. (2020) used a case study approach to determine the technological design of a blended synchronous environment for a graduate level course designed as here or there (HoT). The aim was to explore how the technological design of blended synchronous learning environments influenced the learner experience. Using an iterative and contextual process, the study revealed that, the integration of only the technology deemed necessary to support pedagogy and create co-presence between and among learners was critical to create more seamless experiences. Angelone, et al. (2020) also determined that co-presence can be enhanced using visual and physical connections and inclusive language.

Methods

Participants

Permission was obtained from the Office of Institutional Research to email all full- and part-time faculty members teaching at a university in Southeastern United States. A total of 1,002 faculty members were invited to participate in the survey via a formal email sent by the principal investigator. The email specified the name and contact information of the principal investigator, the purpose of the research project, confidentiality information, and details of participation. Faculty members were asked to provide consent before proceeding with the electronic survey. Representing a response rate of 12.07%, 121 individuals consented to participate in this investigation. Participants were 18 years and older.

Demographics. The results for the demographic information of the participants' gender showed that the majority self-identified as females (see Fig. 1).

Figure 1
Percentage of Participants Per Self-Reported Gender

	Female	Male	Prefer not to disclose
■ Percentage	61%	37%	2%
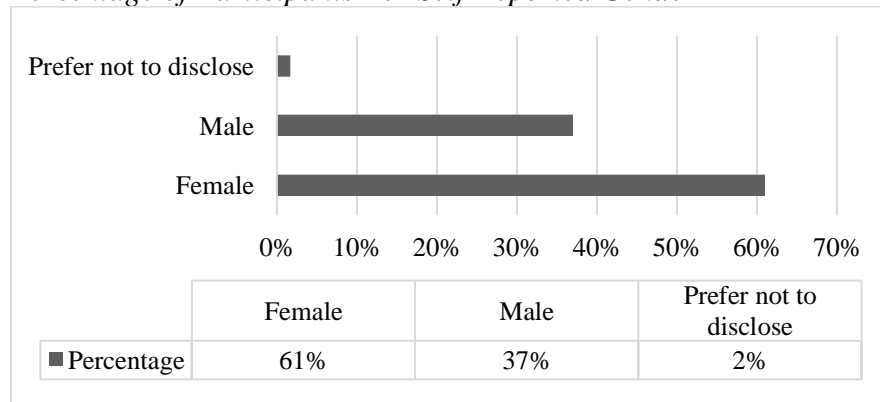
However, some participants self-identified as males and only a small percentage of participants preferred not to disclose their gender. Also, most participants identified as non-tenure track, but tenured and tenure track faculty members also consented to participate (see Fig. 2).

Figure 2
Percentage of Participants per Self-Reported Academic Rank

	Tenure-Track	Tenured	Non-Tenure Track
■ Percentage	19.80%	28.10%	52.10%
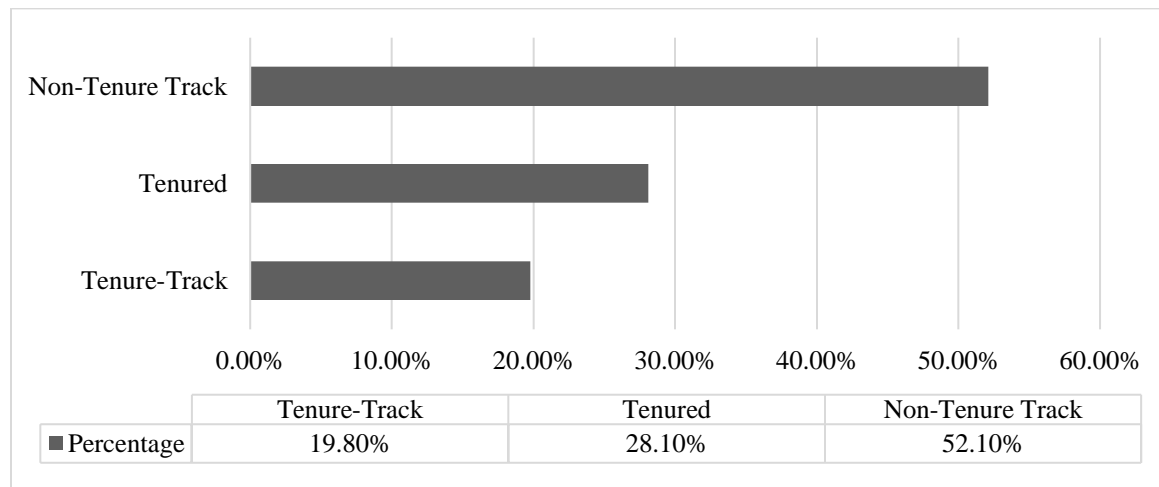
Participants were also asked to self-report their total a) years of teaching experience, b) years of teaching experience in an online environment, and c) years of teaching experience in a HyFlex environment. A cross-tabulation analysis based on the participants' self-reported college affiliation within the institution and years of teaching experience in different instructional formats is shown in Table 1.

Table 1
Cross-Tabulation Analysis based on the Participants' Self-Reported College Affiliation Within the Institution and Years of Teaching Experience in Different Instructional Formats

		College Affiliation at the Institution			
		College of Arts and Letters	College of Health and Natural Sciences	College of Social Science, Mathematics, and Education	College of Business
Years of teaching experience	0 to less than 1 year	2.8%	0.0%	0.0%	0.0%
	1 to 5 years	8.3%	30.8%	25.8%	7.1%
	11 to 15 years	22.2%	23.1%	9.7%	14.3%
	6 to 10 years	27.8%	15.4%	16.1%	32.1%
	More than 15 years	38.9%	23.1%	45.2%	46.4%
	0 to less than 1 year	41.7%	30.8%	58.1%	46.4%

Years of teaching in an online format	1 to 5 years	33.3%	50.0%	22.6%	39.3%
	11 to 15 years	2.8%	0.0%	0.0%	0.0%
	6 to 10 years	16.7%	11.5%	12.9%	10.7%
	More than 15 years	5.6%	0.0%	3.2%	3.6%
Years of teaching in a HyFlex format	0 to less than 1 year	63.9%	65.4%	77.4%	67.9%
	1 to 5 years	25.0%	23.1%	19.4%	25.0%
	11 to 15 years	0.0%	0.0%	0.0%	0.0%
	6 to 10 years	8.3%	3.8%	0.0%	7.1%
	More than 15 years	2.8%	0.0%	0.0%	0.0%

The demographic results illustrate the participants' self-reported exposure to training related to distance learning (see Fig. 3).

Figure 3
Participants' Self-reported Exposure to Training Related to Distance Learning
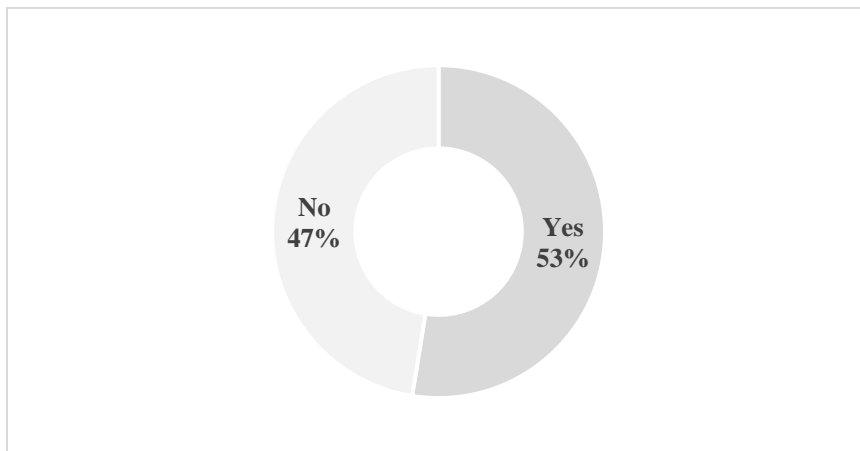
Electronic Survey

Data were collected via an electronic survey with closed and open-ended questions using Qualtrics. The questionnaire included inquiries related to the participants': a) demographic, b) preparedness for HyFlex instruction, c) pedagogical strategies that they feel are best suited for HyFlex instruction, and d) support and resources needed at their institution to successfully implement this type of learning experiences. The electronic survey was adapted from the validated instrument Faculty Readiness to Teach Online (FRTO) developed by Martin, Budhrani & Wang (2020). Certain items related to course design, course communication, time management, and technical competence that related to HyFlex instruction were adapted and used as part of the electronic survey for this investigation (see Appendix A).

Data Analysis

For RQ1, descriptive statistics are reported at the item level. For RQ2 and RQ3, the researchers employed a qualitative, iterative, and process-oriented team coding approach. Two researchers conducted open coding focused on identifying patterns and clusters across the responses provided by the participants (Creswell, 2009). Specifically, the analysis of RQ2 and RQ3 used the coding process approach by Tesch (1990) which was as follows:

1. All responses that addressed the research questions were read.
2. An initial coding of the first 35 responses were clustered into similar topics (these topics were formed into columns in a spreadsheet with major topics, unique topics, and leftovers).
3. The researchers engaged in discussion and peer checking and came to agreement.
4. The research went back to the data, abbreviated topics into codes, and wrote codes next to the appropriate segment responses provided by the participants.
5. A recoding of the initial 35 responses was conducted.
6. The researchers again engaged in discussion to reduce the total list of categories by grouping topics that related to each other and final decisions on the codes were made.
7. Already coded data was recoded, and remaining data were coded.

To further enhance the rigor of the study and analysis, the researchers actively engaged in a reflective process in which we constantly located ourselves and our analysis in relation to our own lived experience, positionality, and epistemology.

Results

Although 121 individuals consented to participate in this investigation, the results are based on *n*=107 completed surveys. Surveys with fewer than 80 percent of the items completed were dismissed from the analysis for the following research questions.

RQ1. What are faculty perceptions of their preparedness towards teaching using HyFlex learning experiences?

Participants were asked to assess their preparedness toward teaching using HyFlex learning experiences by reflecting and evaluating 11 competency statements presented in the survey. The rating used to evaluate their level of preparedness was the following: "I can do it very well," "I can do it," or "I cannot do it."

The results of the survey indicated that faculty members felt they were very well prepared to communicate course goals and outcomes at the beginning of the course, for both in-person and online students (*n* =73); communicate as needed with in-person and online students about course progress and changes via email, course announcements, and others (*n*=69); encourage a safe, inviting, and mutually respectful HyFlex environment by communicating with students in a positive tone and by promoting Netiquette guidelines (*n*=62); establish a presence, for both in-person and online students, on a regular basis via course announcements, assignments, emails, online office hours, and various other methods (*n*=61); and respond to in-person and online students' inquiries via email or phone within 12 - 24 hours to guide students towards a positive learning outcome (*n*=55).

Additionally, faculty members felt moderately prepared to attend to the unique challenges of distance learning where learners are separated by time and geographic proximity (*n*=56); attend to learning needs and situations of both traditional age and adult learners and provide a HyFlex educational experience that is appropriate for both (*n*=55); achieve mastery of the teaching and learning in a HyFlex environment by becoming familiar with all materials, tools,

and organization of the course environment (*n*=55); demonstrate sensitivity to disabilities and diversities throughout the synchronous online course, including aspects of cultural, cognitive, emotional, and physical differences (*n*=54); and monitor and manage in-person and online student progress by using course statistics or reports to identify students who are not accessing course materials or participating in learning activities and reach out to encourage engagement (*n*=49).

Overall, participants did not overwhelmingly respond "I cannot do it" to any of the competency statements regarding their preparedness towards teaching using HyFlex learning (as shown in Table 2). For all the competency statements, the "I cannot do it" ratings were less than 14.95 percent.

Table 2
Faculty Preparedness Towards Teaching Using HyFlex Learning Experiences

Survey Items	Responses		
	I cannot do it	I can do it	I can do it very well
Attend to the unique challenges of distance learning where learners are separated by time and geographic proximity.	11.21% n=12	52.34% n=56	36.45% n=39
Attend to learning needs and situations of both traditional age and adult learners, providing a synchronous online educational experience that is appropriate for both.	14.95% n=16	51.40% n=55	33.64% n=36
Achieve mastery of the teaching and learning in a synchronous online environment by becoming familiar with all materials, tools, and organization of the course environment.	14.02% n=15	51.40% n=55	34.58% n=37
Respond to in-person and online students' inquiries via email or phone within 12 - 24 hours to guide students towards a positive learning outcome.	8.41% n=9	40.19% n=43	51.40% n=55
Provide detailed feedback on assignments and exams, in synchronous online format, through facilitation, guidance, directed learning, and progress assessment.	11.21% n=12	40.19% n=43	48.60% n=52
Communicate as needed with in-person and online students about course progress and changes via email, course announcements, etc.	2.80% n=3	32.71% n=35	64.49% n=69
Encourage a safe, inviting, and mutually respectful synchronous online environment by communicating with students in a positive tone and by promoting Netiquette guidelines.	3.74% n=4	38.32% n=41	57.94% n=62

Monitor and manage in-person and online student progress by using course statistics or reports to identify students who are not accessing course materials or participating in learning activities and reach out to encourage engagement.	11.21% n=12	45.79% n=49	42.99% n=46
Communicate course goals and outcomes using the syllabus and course announcements at the beginning of the course, for both in-person and online students.	5.61% n=6	26.17% n=28	68.22% n=73
Establish my presence, for both in-person and online students, on a regular basis via course announcements, assignments, emails, online office hours, and various other methods.	5.61% n=6	37.38% n=40	57.01% n=61
Throughout the synchronous online course, demonstrate sensitivity to disabilities and diversities, including aspects of cultural, cognitive, emotional, and physical differences.	13.08% n=14	50.47% n=54	36.45% n=39

A cross-tabulation analysis was also conducted to gain a sense of how faculty members rated their preparedness towards teaching using HyFlex learning experiences, while also understanding whether they have prior formal training related to the design, development, and/or implementation of Internet-based distance education (see Table 3). The results indicate that, overall, faculty members who felt well prepared to address the various HyFlex competencies had had some sort of formal training on Internet-based distance education. The results indicate the exact opposite for those who felt unprepared to implement these HyFlex competencies. A high percentage of participants who felt unprepared to implement these HyFlex competencies reported that they have not received training on Internet-based distance education.

Table 3
Crosstabulation of Faculty Preparedness Towards Teaching Using HyFlex Based on Prior Formal Training on Internet-based Distance Education

Statements	Level of Preparedness	Have you received any formal training related to the designing, developing, and/or implementing Internet-based distance education?		
		Total	No	Yes
Attend to the unique challenges of distance learning where learners are separated by time and geographic proximity.	I can do it very well	33.1%	14.3%	50.0%
	I can do it	47.5%	55.4%	40.3%
	I cannot do it	10.2%	17.9%	3.2%
Attend to learning needs and situations of both traditional age and adult learners, providing a synchronous online educational experience that is appropriate for both.	I can do it very well	30.5%	12.5%	46.8%
	I can do it	46.6%	58.9%	35.5%
	I cannot do it	13.6%	16.1%	11.3%
	I can do it very well	31.4%	17.9%	43.5%

Achieve mastery of the teaching and learning in a synchronous online environment by becoming familiar with all materials, tools, and organization of the course environment.	I can do it	46.6%	55.4%	38.7%
	I cannot do it	12.7%	14.3%	11.3%
Respond to in-person and online student's inquiries via email or phone within 12 - 24 hours to guide students towards a positive learning outcome.	I can do it very well	46.6%	37.5%	54.8%
	I can do it	36.4%	39.3%	33.9%
	I cannot do it	7.6%	10.7%	4.8%
Provide detailed feedback on assignments and exams, in synchronous online format, through facilitation, guidance, directed learning, and progress assessment.	I can do it very well	44.1%	25.0%	61.3%
	I can do it	36.4%	50.0%	24.2%
	I cannot do it	10.2%	12.5%	8.1%
Communicate as needed with in-person and online students about course progress and changes via email, course announcements, etc.	I can do it very well	58.5%	44.6%	71.0%
	I can do it	29.7%	39.3%	21.0%
	I cannot do it	2.5%	3.6%	1.6%
Encourage a safe, inviting, and mutually respectful synchronous online environment by communicating with students in a positive tone and by promoting Netiquette guidelines.	I can do it very well	52.5%	39.3%	64.5%
	I can do it	34.7%	44.6%	25.8%
	I cannot do it	3.4%	3.6%	3.2%
Monitor and manage in-person and online student progress by using course statistics or reports to identify students who are not accessing course materials or participating in learning activities and reach out to encourage engagement.	I can do it very well	39.0%	30.4%	46.8%
	I can do it	41.5%	41.1%	41.9%
	I cannot do it	10.2%	16.1%	4.8%
Communicate course goals and outcomes using the syllabus and course announcements at the beginning of the course, for both in-person and online students).	I can do it very well	61.9%	41.1%	80.6%
	I can do it	23.7%	37.5%	11.3%
	I cannot do it	5.1%	8.9%	1.6%
Establish my presence, for both in-person and online students, on a regular basis via course announcements, assignments, emails, online office hours, and various other methods.	I can do it very well	51.7%	39.3%	62.9%
	I can do it	33.9%	39.3%	29.0%
	I cannot do it	5.1%	8.9%	1.6%
Throughout the synchronous online course, demonstrate sensitivity to disabilities and diversities, including aspects of cultural, cognitive, emotional, and physical differences.	I can do it very well	33.1%	25.0%	40.3%
	I can do it	45.8%	48.2%	43.5%
	I cannot do it	11.9%	14.3%	9.7%

RQ2. What pedagogical strategies do faculty feel are best suited for HyFlex learning experiences?

Using an open-ended question, participants were asked to share which pedagogical strategies they felt were best suited for HyFlex learning at their institution (see Table 4). Many responses ($n=21$) to this open-ended question specified that faculty members were unsure of pedagogical strategies that could be implemented because they were unfamiliar with HyFlex teaching and learning. Those who were familiar with HyFlex learning stated that if given the option to teach in this format, they would integrate various pedagogical strategies such as

synchronous video sessions (*n*=17), online discussion boards (*n*=15), interactive activities (*n*=14) with students (i.e., breakout rooms), learner-centered strategies (*n*=11) such as adult learning theories, inquiry-based approaches (*n*=9) such as case studies, pre-recorded videos and lectures (*n*=9), and content sharing via the learning management system (*n*=9).

Table 4

HyFlex Pedagogical Strategies, Percentages of Contributed Statements, and Representative Comments by Faculty Members

Pedagogical Strategies	Percentage	Example Statements
Unsure of Specific Pedagogical Strategies	30.77%	"I believe that this is my central lacking competency, as I do not have any formal training re leveraging/utilizing available synchronous strategies/technologies." "I realize that this is the way of the future and I want to learn from it." I'm really not at all familiar with how synchronous online teaching is done so I don't want to assume I know much about it."
Synchronous Video Sessions	26.15%	"During the synchronous sessions I invite students to participate by typing in the chat box or filling in surveys or other activities in the room. I allow them to ask a question whenever they want in the chat window, and I make sure to acknowledge each question immediately. I also suggest topics of discussion so they can create conversations in the chat box."
Discussion Boards	23.08%	"In the past, I have used Blackboard for my online courses. I have been able to record lectures and had them available to students on Blackboard, conduct discussion boards, and a variety of assignments." "The use of discussion boards, online videos, and audio files to assist students."
Interactive Activities with Students	21.54%	"During the synchronous sessions I invite students to participate by typing in the chat box or filling in surveys or other activities in the room. I allow them to ask a question whenever they want in the chat window, and I make sure to acknowledge each question immediately. I also suggest topics of discussion so they can create conversations in the chat box."
Learner-Center Strategies	16.92%	"More familiar with adult learning strategies which focus on the concept of learner: self-directedness, the learners' experience should be used, readiness to learn depends on need, and orientation is life-or problem centered."
Inquiry-Based Approaches	13.85%	"I like the question-based approach coupled with iterative learning spaced over time to include retrieval exercises and feedback."

Online Videos	13.85%	"Video-based apps and formats that encourage a different way to respond and engage in dialogue." "Record lecture and hold virtual office hours."
Content Sharing via the Learning Management System	13.85%	"Proficiency with LMS and various tools that allow for small group and whole group instruction, breakout sessions, and I find that real time whiteboards and collaborative writing tools are useful for online teaching."
Live Collaboration	9.23%	"I use a good deal of social constructivism in my classes to engagement my learners and it with synchronous online teaching encouraging the use of webinar rooms, live spreadsheets, and documents."
Nurturing and Mentoring of Students' Growth	9.23%	"Once a student has identified as ready for synchronous learning, I gear up to meet the individuals' motivations. The intrinsic motivation is present, my strategy is to nurture and encourage the student to remain motivated."
Email Communication	7.69%	"These [math] problems will be 'turned in' via email." "I try to respond to email as much as possible."
Asynchronous Online Strategies	6.15%	"I employ multiple strategies that incorporate synchronous, asynchronous and conventional online pedagogy that engages students on multiple platforms."
Virtual Testing	6.15%	I will be using my math lab as a homework tool to allow student to handle more complex problems by themselves. I am going to use recorded lecture with an 'in class' practice portion. These problems will be turned in via email. I plan to use proctoring software for the security of tests. I also am planning virtual office hours."
Backwards Design Approach	3.08%	"Starting with the end in mind and working backward, using deliberate activities and exercises that introduce and reinforce learning objectives."
Teacher-Focused Strategies	1.54%	"Teacher-centered, content-focused, and participatory."

Participants mentioned other pedagogical approaches but with less frequency. These pedagogical approaches include the use of live collaboration (*n*=6) to work on documents or spreadsheets, the nurturing or mentoring of students' growth (*n*=6) at a more individual level, increased email communication (*n*=5), using asynchronous online strategies (*n*=4), virtual testing (*n*=4), backward design (*n*=2), and teacher-focused strategies (*n*=1).

RQ3. What resources and support do faculty feel are needed to successfully implement HyFlex learning experiences?

Using an open-ended question, faculty members were asked to state which resources they felt were needed to successfully implement HyFlex learning opportunities at their institution. Analysis of responses (*n*=69) to this open-ended question revealed that an array of resources were deemed necessary. Some of the most often mentioned resources include synchronous and asynchronous software (*n*=19), video equipment in the in-person classrooms (*n*=16), reliable equipment for faculty and students (*n*=15), and technical support (*n*=9).

Other resources that were mentioned less frequently included classroom microphones (*n*=7), training (*n*=7), good discussion board platforms (*n*=7), reliable Internet connection (*n*=4), a consistent institutional pedagogical approach (*n*=3), open educational resources (*n*=3), and teaching assistants (*n*=2). Results of the responses to this open-ended question also drew attention to the fact that many participants lack knowledge of HyFlex learning and could not narrow down resources (*n*=17). For example, some participants stated the following when asked which resources they felt were needed to successfully implement HyFlex learning opportunities at their institution: "I don't know what I would need as my experience is limited" and "don't know enough about it to answer." A few faculty members (*n*=2) felt that they did not need any additional resources to successfully implement HyFlex learning opportunities at their institution. One faculty member responded: "None beyond what I already have." Table 5 shows various resource categories, the percentages of responses for each category, and example statements from survey participants.

Table 5
HyFlex Resources Categories, Percentages of Contributed Statements, and Representative Comments by Faculty Member

Resources	Percentage	Example Statements
Synchronous and Asynchronous Software	27.54%	"Access to video conferencing for individual/classroom use and a good Webinar software platform (I cannot recommend a particular tool for [institution], as I have not done adequate research, nor do I have adequate familiarity with the needs of other faculty). A good video capture software application would also be very helpful (to support non-synchronous preparatory work, class review, and/or make up sessions for students who have an excused absence). In addition, an online support tool (to support virtual office hours as email/telephone can become onerous (especially just prior to a due date) and is often an inadequate way to respond to questions (especially if such questions require problem mechanics or diagramming a flowchart or similar). On that, a synchronous "e-white-board" would be exceptionally helpful."
Lack of Knowledge/Cannot Narrow Down Resources	24.64%	"Not familiar with the resources required."
Video Equipment in Classroom	23.19%	"It would help to have video equipment in classrooms to allow online viewers to experience learning more as those in the classroom do."
Reliable Equipment for Faculty and Students	21.74%	"I'm more concerned about the quality of technology on the students' end. Sometime the students have old devices or unstable Internet connections, so their experience suffers greatly compared to the others. Perhaps if all

		enrolled students were given a standard machine to ensure a baseline of quality across the classroom."
Technical Support for Faculty and Students	13.40%	"A 24/7 help desk for students and faculty."
Classroom Microphones	10.14%	"Video-recording of the lectures. Or a microphone that could pick up my voice as I walk around."
Training	10.14%	"Paid training and rehearsals with knowledgeable others would be optimal."
Good Discussion Board Platforms	10.14%	"I find the most important tools necessary are great discussion board platforms and high levels of functionality. Definitely not Blackboard."
Reliable Internet Connection	5.80%	"Reliable connections to Internet"
Consistent Institutional Approaches	4.35%	"A consistent approach/use/layout of the platform by all faculty would help students adapt and become familiar in its use...at least some sort of standardization within each college."
Open Educational Resources	4.35%	"Accessing free resources to augment the online instructional experience."
Teaching Assistants	4.35%	"Teaching assistants or student leads, depending on the class size, to help meet student expectations."
No Additional Resources Needed	2.90%	"None beyond what I already have."

Participants were also invited, using an open-ended question, to share the types of support that they felt were needed to successfully implement HyFlex learning opportunities at their institution. Analysis of responses to this open-ended question ($n=76$) revealed some overlap between the *support* and *resources* mentioned by participants. For example, direct instruction ($n=39$) using training, workshops, seminars, online tutorials, or webinars were welcome opportunities to support faculty wanting to implement HyFlex learning. Direct instruction in the form of *training* was also mentioned as a *resource* needed by faculty.

Other forms of support mentioned often included access to various educational technology software tools ($n=18$) and a team of professionals ($n=16$) which could include educational technologies, curriculum developers, instructional designers, and information technologists. Some participants also expressed interest in receiving support to implement HyFlex learning opportunities through a graduate student assistant ($n=14$) or an experienced peer ($n=6$). A few participants mentioned that they did not need any additional support ($n=5$) or that they would need a course context to provide suggestions ($n=3$). Table 6 shows the various support categories, the percentages of responses for each category, and example statements from survey participants.

Table 6

HyFlex Support Categories, Percentages of Contributed Statements, and Representative Comments for Faculty Members

Support	Percentage	Example Statements
Training, Workshops, Seminars, Webinars	59.22%	"Courses, workdays, and seminars on teaching online courses and pedagogical tools on how to teach online and how to address specific areas, such as culture, diversity, special needs, experiential learning activities through online platform, etc."
Various Educational Technology Tools	23.68%	"Use of a more fluid LMS. I find Blackboard to be bulky and non-user friendly for students comparatively with other platforms."
Educational Technologist/Course Developer/Instructional Designer/Tech Support Team	21.05%	"Need a dedicated staff/department for online support. This is very common at other universities where I taught courses completely online. The dedicated online staff is mandatory for teaching online - otherwise, UT should not offer online courses."
One-On-One Support/Graduate Student Assistance	18.42%	"Course development assistance, Graduate assistants, Curricular development assistance, and training to ensure quality online is not different from quality in the classroom."
Experienced Professor's Perspective	7.89%	"Someone that is familiar with Instructional design. I'm a content expert, not an on-line delivery expert."
Do Not Need Additional Support	6.58%	"To be honest I feel ready (I'm trained in instructional technology). I have not taught online here at UT so I am not aware of anything that can help us here at UT."
Support Based on Course Context	3.95%	"It all depends on what courses at what level (UG/GRAD)."

Discussion

This investigation provides insight about how faculty members teaching at institutions who do not currently use HyFlex instruction feel about the potential of integrating this type of online hybrid modality. Unlike other investigations on HyFlex instruction (Bell et al., 2014; Chakraborty & Victor, 2004; Moore et al., 2017; Park & Bonk, 2007; Popov, 2009; Roseth, Akcaoglu, & Zellner, 2013; Ryu & Boggs, 2016; Stewart et al., 2011; Szeto, 2015), this paper focuses on faculty preparedness prior to implementation.

The results indicate that faculty members feel prepared to engage in HyFlex instruction competencies that are similar to competencies required for other instructional formats such as in-person instruction. For example, instructors are prepared to communicate course goals and progress, make sure the learners feel comfortable in the instructional environment, and establish a presence. However, they admitted to feeling less prepared to manage the intricacies unique to the HyFlex modality. These intricacies involve equally managing students in two settings (in-person and online) during the same class period. Faculty seem less prepared to synchronously share content and their attention with the learners in the two different settings.

In addition, faculty members report feeling moderately prepared to tackle critical aspects related to diversity, inclusion, and accessibility in the HyFlex instructional format. These results are on par with prior findings from previous literature. Several researchers have shared issues related to the attention and communication between instructor and students in the online environment in a HyFlex setting (Popov, 2009; Moore et al., 2017; Rogers et al., 2003). In this investigation, faculty members pro-actively shared that their preparedness for these competencies of HyFlex instruction is average, which can be a barrier for effective implementation but can also potentially encourage them to better prepare or seek additional professional development. These professional development opportunities could help create healthy design habits that are more inclusive of all learners (synchronous or asynchronous learners) such as pre-training learning activities and videos, instructor-learner pro-active communication before and after blended synchronous sessions, and equity of in class activities and assessments (Authors, 2017; Wang, Quek, & Hu, 2017).

The results of the investigation highlight the variety of pedagogical approaches that instructors consider as they imagine their HyFlex classroom. Some faculty members thought about traditional asynchronous ways to engage with students in an online format such as the use of the Learning Management System (LMS), but others considered unique ways that would allow for synchronous collaboration, communication, and active learning using inquiry-based approaches, virtual surveys, and video sessions. These are similar to approaches shared in the existing literature (Roseth et al., 2013; Bell et al., 2014). It can also be deduced, based on the pedagogical approaches shared, that faculty members thought about strategies to engage learners outside a specified class session in an asynchronous format using discussion boards and pre-recorded videos. Some of these pedagogical approaches were covered in the literature and implemented by faculty members who have previously designed and employed HyFlex instruction and aimed to a) create a balance of didactic approaches and b) make learners in both settings feel included (Wang et al., 2017).

In terms of resources and support, faculty members were very insightful and identified many assets, materials, supplies, measures, and staff that could aid them as they considered how to implement HyFlex instruction in their specific contexts. Many of the resources and support mentioned would intentionally address some of the major issues that, in the past, have prevented adequate implementation of the instruction: non-verbal communication in class (Stewart et al., 2011), poor communication among students and teachers (Popov, 2009; Moore et al., 2017), and inequalities that benefit online learners over in-person learners or vice-versa (Popov, 2009; Moore et al., 2017). The resources and support listed would also serve to provide feedback and ensure the highest quality of instruction given the limited knowledge of the HyFlex modality by the participants in this investigation.

Significance of This Work

The design of a HyFlex course requires that the instructor consider the structure, content, and activities for students in-person and online settings (Beatty, 2019). Giving careful attention to the design process will help ensure the course is well prepared to address the learning needs of HyFlex learners. The significance of this specific investigation is that it considers faculty preparedness before a decision to design a HyFlex course is even contemplated. Understanding their preparedness gives faculty ample time to explore opportunities for professional growth and development that they perhaps did not know were needed.

This investigation is also significant because it provides organizational considerations related to infrastructure, resources, and support needed before implementation of HyFlex course offerings. It is critical that institutional leaders understand how various instructional modalities may require different or similar resources and support. In particular, institutional leaders need to assess the opportunities (benefits) and challenges (cost) of HyFlex. Many have stated that HyFlex can increase course offerings, provide flexibility to serve more students, increase enrollment, and build faculty capacity (Beatty, 2019). Yet, institutional leaders must also appreciate certain complexities and factors that can be costly prior to implementation, such as design support teams, classroom technology, and professional development resources. In addition to cost, many policies and procedures should be assessed to ensure adequate and positive learning experiences for both learners and faculty.

Research on HyFlex instruction is increasingly significant today as we consider alternative modalities that can provide access to learning experiences around the world and at different educational levels. The COVID-19 pandemic has fueled conversations about instructional modality as educational institutions and governments seek options to accommodate learners while maintaining safety. As Kelly (2020) stated in a blog post regarding hybrid-flexible course design during the pandemic, "the world (re)discovered HyFlex." However, given the newness of the HyFlex approach, administrators, faculty members, and learners face many questions about this instructional modality: what does the effective HyFlex design look like? Does it provide equal learning opportunities for all learners? Are students adequately prepared to learn in a HyFlex format? Have faculty members received sufficient professional development to truly embrace, design, and implement HyFlex instruction? Do adequate institutional resources and infrastructure exist to implement HyFlex?

The reality is this:

HyFlex does not have that extensive body of support research, but hundreds of institutions of all types are using HyFlex, and many of these institutions have been conducting initial studies of their own to test and revise their approaches and documenting the achievement of their unique set of HyFlex goals (Beatty, 2020).

It is critical to research HyFlex instruction, as it serves to inform educational needs while we continue to deal with learning experiences at all educational levels during the COVID-19 pandemic.

Limitations

The findings of this study must be seen considering certain limitations. First, the considerations for implementation of HyFlex are evolving rapidly due to increased demand and necessities for application of this modality, especially during this COVID-19 pandemic. As researchers, we plan to re-survey the same faculty members to gather data on whether they have implemented HyFlex instruction since the COVID-19 pandemic started. It is very likely that some of the faculty members that participated in this investigation have since implemented HyFlex courses during the COVID-19 pandemic.

Another major limitation of this investigation is that all the participants belong to a specific educational institution. It is possible that the level of preparedness, pedagogical strategies, and resources and support needed are very different for faculty at other institutions of higher education depending on their enrollment, classification, administration, geographical location, and other factors.

An additional constraint of this investigation and its findings is that the survey was distributed to all faculty members at this institution; however, not all faculty members have the same adeptness and inclination for online instruction. Conducting the same investigation with faculty who have a fondness and predisposition towards online teaching and learning could yield different results. Finally, this investigation was not focused on discipline-specific analysis of faculty preparedness for HyFlex instruction; instead, it aimed to provide an analysis of all faculty at a specific institution. Future research could concentrate on a more discipline-specific inquiry related to the implementation of HyFlex instruction.

Conclusion

The aim of this investigation was to survey faculty members on their perceived level of preparedness for teaching employing HyFlex instruction. Using an electronic survey, faculty members a) rated how prepared they were to engage on different competencies related to HyFlex instruction, b) shared which pedagogical strategies they felt prepared to use if given the opportunity to engage in HyFlex teaching, and c) listed the resources and support that they felt were needed to successfully implement this type of instructional format.

The HyFlex modality is an instructional format that researchers are starting to explore and better understand. Therefore, it is critical that we also investigate the level of faculty preparedness for HyFlex instruction. The results of this investigation highlight that, even with many years of experience teaching, the HyFlex instructional format is very new to faculty members. Overall, instructors feel prepared to teach in a HyFlex format, but certain competencies require further adjustment and improvement. Also, instructors believe a variety of pedagogical strategies can be integrated into HyFlex instruction. For those who are not familiar with this instructional format, however, significant support and resources are needed before designing and implementing a course.

Acknowledgement

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Appendix A

Faculty Preparedness for HyFlex Instruction

Please specify your gender.
- Male
- Female
- Non-binary
- Prefer not to disclose

Which college at this institution are you primarily associated with?
- College of Arts and Letters
- College of Business
- College of Health and Natural Sciences
- College of Social Science, Mathematics, and Education

What is your highest degree?
- Doctoral degree
- Master's degree
- Bachelor's degree

What is your current academic rank at this institution?
- Tenured
- Tenure-Track
- Non-Tenure Track

Years of teaching experience?
- 0 to less than 1 year
- 1 to 5 years
- 6 to 10 years
- 11 to 15 years
- More than 15 years

Years of teaching in an online format?
- 0 to less than 1 year
- 1 to 5 years
- 6 to 10 years
- 11 to 15 years
- More than 15 years

Years of teaching in a synchronous online format?
- 0 to less than 1 year
- 1 to 5 years
- 6 to 10 years
- 11 to 15 years
- More than 15 years

Have you received any formal training related to the designing, developing, and/or implementing Internet-based distance education?
- Yes
- No

The following statements will allow you to evaluate and reflect upon your competencies in key areas of synchronous online teaching. For each statement, please select the response that best represents you.

	I can do it very well	I can do it	I cannot do it
Attend to the unique challenges of distance learning where learners are separated by time and geographic proximity.			
Attend to learning needs and situations of both traditional age and adult learners, providing a synchronous online educational experience that is appropriate for both.			
Achieve mastery of the teaching and learning in a synchronous online environment by becoming familiar with all materials, tools, and organization of the course environment.			
Respond to in-person and online student's inquiries via email or phone within 12 - 24 hours to guide students towards a positive learning outcome.			
Provide detailed feedback on assignments and exams, in synchronous online format, through facilitation, guidance, directed learning, and progress assessment.			
Communicate as needed with in-person and online students about course progress and changes via email, course announcements, etc.			
Encourage a safe, inviting, and mutually respectful synchronous online environment by communicating with students in a positive tone and by promoting Netiquette guidelines.			
Monitor and manage in-person and online student progress by using course statistics or reports to identify students who are not accessing course materials or participating in learning activities and reach out to encourage engagement.			
Communicate course goals and outcomes using the syllabus and course announcements at the beginning of the course, for both in-person and online students			
Establish my presence, for both in-person and online students, on a regular basis via course announcements, assignments, emails, online office hours, and various other methods.			
Throughout the synchronous online course, demonstrate sensitivity to disabilities and diversities, including aspects of cultural, cognitive, emotional, and physical differences.			

Open-Ended Response Questions

What pedagogical strategies are you familiar with and feel prepared to use for synchronous online teaching?

What additional support do you feel would help enhance your readiness to design and deliver synchronous online teaching experiences?

What additional resources (i.e., software, hardware, classroom facilities, etc.) would help your readiness to successfully implement synchronous online teaching experiences?

Developing Peer Review of Instruction in an Online Master Course Model

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Abstract

In this study we looked at how participation in a peer-review process for online Statistics courses utilizing a master course model at a major research university affects instructor innovation and instructor presence. We used online, anonymous surveys to collect data from instructors who participated in the peer-review process, and we used descriptive statistics and qualitative analysis to analyze the data. Our findings indicate that space for personal pedagogical agency and innovation is perceived as limited because of the master course model. However, responses indicate that participating in the process was overall appreciated for the sense of community it helped to build. Results of the study highlight the blurred line between formative and summative assessment when using peer review of instruction, and they also suggest that innovation and presence are difficult to assess through short term observation and through a modified version of a tool (i.e., the Quality Matters rubric) intended for the evaluation of an online *course* rather than the *instruction* of that course. The findings also suggest that we may be on the cusp of a second stage for peer review in an online master course model, whether in-person or online. Our findings also affirm the need for creating a sense of community online for the online teaching faculty. The experiences of our faculty suggest that peer review can serve as an integral part of fostering a departmental culture that leads to a host of intangible benefits including trust, reciprocity, belonging, and, indeed, respect.

Keywords: Peer review, online teaching, teaching evaluation, master course model, statistics education, instructor presence

Peer review has a long history in academia, originating in the professional societies of the early Enlightenment. The practice first arose to address the need for an evaluation/evaluative metric of the quality of research in an era replete with amateur scientists. In this same context, peer review also functioned as a foundation for establishing collective expertise that was not dependent on the approval of an external body, whether political fiat or divine consecration. The present study examines one way in which this long-standing practice of peer review has evolved to embrace new professional modes (i.e., teaching), new modalities of instruction (i.e., online), and new roles for instructors within the current context of higher education.

Literature Review

Peer review had long been the gold standard for academic research, but it was not until the learning-centered revolution, begun in the 1970s, that the practice found application in education. At first, peer review was confined largely to volunteers who were experimenting with pedagogical changes stemming from recent developments in learning science research. As one leading scholar writes, there was "a general sense…that teaching would benefit from the kinds of collegial exchange and collaboration that faculty seek out as researchers" (Hutchings, 1996). Further, contrary to the conservative bias often attributed to the peer review of research (Roy & Ashburn, 2001), peer review of teaching (PRT) has increasingly proven to foster both personal empowerment and teaching transformation (Chism, 2005; Hutchings, 1996; Lomas & Nicholls, 2005; Smith, 2014; Trautman, 2009). As one set of scholars state, "the value of formative peer assessment is promoted in the exhortative literature…justified in the theoretical literature…and supported by reports of experimental and qualitative research" (Kell & Annetts. 2009; Hyland et al., 2018; Thomas et al., 2014).

Those early experiments led to dramatic breakthroughs in evidence-based practice in teaching and learning and, by extension, changes in how these activities are evaluated. Since the early 2000s, universities have responded to a growing imperative to assess teaching effectiveness, both as a means of evaluating work performance and as a way of demonstrating collective accountability for the student learning experience. An increasing number of studies have linked effective instruction to desired institutional outcomes, including recruitment, persistence, and graduation rates, upon the latter of which many funding models rest. Because the drive towards accountability is fueled by student interests, it is perhaps not surprising that the most common strategy for evaluating teaching are student evaluations of instruction (SETs). At a typical U.S. university today, students are asked to complete an electronic survey at the end of each semester comprised of a series of scaled survey items along with a handful of open-ended questions.

Over the years, the use of SETs as a measure of teaching effectiveness has been both affirmed and disputed (Seldin, 1993). The reliability of the practice has been strengthened through increasing sophistication of both the design of the questions and the analysis of the results. At the same time, however, it has also been questioned as the basis of personnel decisions (Nilson, 2012; Nilson, 2013).

Although not definitively proven, there is a persistent perception that SETs are biased, particularly in the case of faculty members from under-represented populations, including those for whom English is a second language and, in some disciplines, women (Calsamiglia & Loviglio, 2019; Zipser & Mincieli, 2019). Other scholars have called the validity of the results into question, suggesting that students are not always capable of assessing their own learning accurately or appropriately, leading to claims that SETs are more likely to measure popularity

rather than effectiveness (Schneider, 2013; Uttl et al., 2017). Perhaps the only safe and definitive conclusion to draw is that the implications of the practice are complex and contested.

Higher education institutions have navigated these stormy waters in multiple ways, most by encouraging the use of multiple forms of measurement for teaching effectiveness, often in the form of a portfolio, or similar collection tool (Chism, 1999; Seldin et al., 2010). This practice is supported by the research literature, which aligns the practice with the multi-faceted nature of teaching as well as the importance of direct (e.g., not self-reported) measures of student learning. To potentially counterbalance the limitations of SETs, practitioners have suggested the use of PRT, which places disciplinary experts, rather than amateur students, in the driver's seat. In this evaluative mode, PRT typically takes the form of either peer review of instructional materials and/or peer observation of teaching.

While PRT may appear to be a neat solution to a pervasive issue, the practice had previously been used largely for formative purposes on a voluntary basis. The transition to compulsory (or strongly encouraged) evaluative practice has proven to be fraught with dangers, both philosophical and practical (Blackmore, 2005; Edström 2019; Keig, 2006; McManus, 2002). Practically speaking, the PRT process requires a considerable investment of time, energy, and attention, not only to conducting the reviews but also to developing shared standards and practices. Philosophically, several scholars have predicted that several of the primary benefits of PRT as a developmental tool might suffer when transposed into a summative context (Cavanagh, 1996; Gosling, 2002; Kell & Annetts, 2002; Morley, 2003; Peel, 2005). It has proven to be difficult to substantiate these fears, however, as one of the downsides of utilizing summative assessment is the challenges it presents to research.

The PRT problem is confounded by the rise of new modes of instruction, especially online and hybrid modalities (Bennett & Barp, 2008; Jones & Gallen, 2016). Since its inception, online education has carried with it a burden of accountability that traditional in-person instruction has not, and the onus rests with online instructors to prove that the virtual learning experience is of comparable quality to other modalities (Esfijani, 2018: Shelton, 2011). This has, in turn, led to the development and refinement of shared quality standards for online courses (notably, the Quality Matters (QM) rubric), the application and evaluation of which often rely on the collective expertise of other online instructors, i.e., pedagogical (rather than disciplinary) peers (Shattuck et al., 2014). The QM peer-review process, for example, designates two reviewer roles, a subject matter expert and online pedagogy practitioner, the latter of whom undergoes a QM-administered certification process.

The proliferation of online courses, however, has been accompanied by design and implementation changes. Because it takes time and sustained engagement to master the techniques and approaches needed to meet the quality standards for online courses, the role of the instructional designer (ID) as expert in these areas has become increasingly commonplace. A typical role for an ID might be to collaborate closely with faculty members to design and develop online courses that effectively deliver content in a manner that meets (or exceeds) quality standards. Once created, it is certainly possible for the same course to be taught by multiple faculty members.

In a typical ID-faculty scenario, the faculty member often has considerable input on the design as it evolves and provides primary instruction, but peer review of instruction is complicated both by the medium and the role of the third party (the ID) (Drysdale, 2019). For example, the observation protocols developed for the classroom may not apply to a virtual space, at least not to the same degree, and a review of instructional strategies, as reflected in artifacts

such as the syllabus, may be the product of both the ID and/or the faculty member. It is perhaps for these reasons that peer review of online instruction has tended to focus on the course rather than the instructor. The Quality Matters rubric, for example, emphasizes attributes of course design rather than teaching effectiveness. Yet, the need for evaluative measures of instruction and instructor persists, perhaps even more so as trends point to a growing number of adjunct faculty teaching online courses for whom such measures can provide both accountability and professional development. (Barnett, 2019; Taylor, 2017).

The challenge is further compounded by the emergence of instructional standards and/or competencies for online (or hybrid) courses that are distinctive to the virtual environment, both in form and context (Baran et al., 2011). The popular community of inquiry model, for example, differentiates between cognitive presence (content and layout), social presence (engagement), and teaching presence in online courses; all are facets of instruction that are less emphasized in in-person instruction. These insights have led to the development of several exemplary protocols specifically intended for reviewing online instruction (McGahan et al., 2015; Tobin et al., 2015). Each of these tools are firmly grounded in an extensive body of evidence-based practice for online teaching, but still, the handful of studies that have been conducted on the PRT process itself have tended to be limited to case studies and/or action research (Barnard et al., 2015; Swinglehurst et al., 2014; Sharma & Ling, 2018; Wood & Friedel, 2009). As one researcher put it, it is simply "difficult to find quantitative evidence due to its nature and context" (Bell, 2002; Peel, 2002).

The challenge of peer review of teaching is even further complicated by the increasing use of the master course model (Hanbing & Mingzhuo, 2012; Knowles & Kalata, 2007). For courses in which stakes are higher and student populations larger, such as gateway or barrier courses, an institution may choose to adopt a master course model in which an already designed course is provided to all instructors, thereby ensuring a consistent experience for all students (Parscal & Riemer, 2010). In this scenario, instructors have little to no control over the content, design, and, in many cases, delivery of the course, all of which serve as major components of most peer review of instruction models, whether for online or in-person courses. However, even within a master course model, instruction varies and opportunities remain to provide both formative (for individual improvement) and summative (for performance evaluation) feedback. Yet, the question of how to evaluate teaching within these boundaries is a subject that has received less attention in both research and practice. Our study explores the implementation of a peer review of teaching process for an online statistics program that uses master courses at a large, public, research-intensive university.

Methods

Context

The Pennsylvania State University is a public research university located in the northeastern part of the United States. The statistics program offers 24 online courses, with approximately 1500 enrollments per semester, including those for its online graduate program and two undergraduate service courses. Statistics courses have been identified as barrier courses at many institutions, including this one. Therefore, the program at The Pennsylvania State University bears the responsibility for high standards of instructions that contribute to student success, especially persistence.

Each of the program's 24 courses is based on a master template of objectives, content, and assessments. The courses are delivered through two primary systems, the learning management system (LMS) and the content management system (CMS). Each section has its own unique LMS space for each iteration of the course. Students and instructors use the LMS for announcements, communication/email, assessments, grading, discussion and any other assignments or interactions. The lesson content for each course is delivered through a CMS, which in this case has a public website whose content is classified as open educational resources under a creative commons license. The CMS is unique to the course and is not personalized or changed from semester to semester. Similarly, the lesson content, developed and written by program faculty members, does not change from semester to semester, aside from minor fixes and/or planned revisions.

Instructor agency in the LMS context varies depending on the course taught, how long the instructor has taught it, and how many sections are offered in that semester. Instructors who are teaching a course that has only one section have more agency to change appearance and interactions within the LMS than instructors who are teaching a course with multiple sections. In this statistics department, only one section of most of the online graduate courses is offered per semester, while more than one section of undergraduate courses is typically offered. The largest of these undergraduate courses is a high enrollment, general education requirement course that runs 10-12 sections per semester. Courses with multiple sections use the same CMS as well as the same master template in the LMS to maintain consistency in the student experience. Therefore, in a single section course the instructor could modify the design of their course space within the LMS by choosing their home page, setting the navigation, and organizing the modules while still delivering the content and objectives as defined by the department for that course. Such modifications are less likely to occur in multi-section courses. The following table highlights the level of agency possessed by the instructor in both the CMS and LMS according to the varied teaching contexts in this department.

Table 1
Levels of Instructor Agency in Various Course Types Offered

If the instructor teaches...	Content Management System (CMS)	Learning Management System (LMS)
Undergraduate, single section	Low	High
Graduate, single section	Low	High
Undergraduate, multiple sections	Low	Low
Graduate, multiple sections	Low	Low

During the fall 2019 semester, the faculty members in the department who teach online courses were comprised of full-time teaching professors (n=13), tenure-track professors (n=6), and adjuncts (n=10). Peer review of instruction has been practiced since the onset of the program. In its current iteration, the process takes place annually over an approximately three-week period in the fall semester. The primary purpose of the peer-review process is to offer formative feedback to the instructors, but the results are shared with the assistant program director and faculty members are permitted (though not required) to submit the results as part of their reappointment, promotion, and tenure dossiers. For the fall 2019 semester, 27 of the 29 (93%) faculty members participated in the peer-review process.

Peer Review of Instruction Model

In the fall of 2018, the instructional designer for these statistics courses piloted a new peer-review rubric, which is a modification of the well-known Quality Matters Higher Ed rubric. In this modification, 21 out of 42 review standards were determined to be applicable to the instructors in the master course context. The rubric serves as the centerpiece of a two-part process, in keeping with identified best practices (Edkey, & Roehrich, 2013). First, the faculty member completes a pre-observation survey and the reviewer, who is added to the course as an instructor, evaluates the course according to each of the twenty-one standards in the rubric. The observation is followed by a virtual, synchronous meeting with the peer-review partner. Faculty members are paired across various teaching ranks and course levels, and the pairings are rotated from year to year. Both the observation and the peer meeting are guided by materials created by the instructional designer, who provides both the instructor intake form and two guiding questions for discussion.

In keeping with evidence-based practice for online instruction, the first discussion prompt addresses how the faculty establish social, cognitive, and teaching presence within their course. Along with the prompt, definitions and examples of each type of presence are provided to the instructor.

Discussion prompt 1 in the online statistics program peer-review guide:

***Prompt #1**: Share with your peer how you establish these three types of presence in your course.*
Notes: How does your peer establish these three types of presence in their course?

The second prompt provides an opportunity for the instructors to share changes or innovations they have implemented within the past year.

Discussion prompt 2 in the online statistics program peer-review guide:

***Prompt #2**: Share with your peer if you are trying anything new this semester (or year)?*
If yes, share your innovation or change you've made this semester (or year).
- *Has the innovation or change been successful?*
- *What challenges have you had to work through?*
- *How could others benefit from what you've learned?*
- *What advice would you share with a colleague who is interested in trying this or something similar?*
Notes: What has your peer done this semester (or year) that is innovative or new for them?

The process seeks to evaluate and promote not only quality standards through the rubric, but also collegial discussion around innovation, risk-taking, and instructor presence.

Study Design

The IRB-approved study was originally intended to be a mixed methods study, in which input from participating instructors, collected in the form of a survey, would be supplemented with an analysis of the peer-review artifacts, especially the instructor intake form and the peer-review rubric (which includes the 2 discussion prompts). The instructors provided mixed responses to the requests for use of their identifiable artifacts, which limits their inclusion in the study, but the majority did choose to participate in the anonymous survey (14 out of 27, 54%) which was administered in the Fall semester of 2019. The online survey, sent to instructors by a member of the research team not associated with the statistics department, consisted of 11 questions, comprised of 1 check all that apply, 8 five-point Likert scale, 1 yes/no, and 3 open-ended questions.

Results

Quantitative Results

With the small sample size (n=13) we are limited to basic descriptive statistics to analyze the results of the Likert questions. The most infrequently chosen category on the Likert scale of this survey was "neither agree nor disagree" (n=10), while "somewhat agree" (n=37) was the most frequently chosen. In looking at the responses to specific prompts, we note that the statement with the highest score was *The steps of the peer-review process were clear*. For this statement, 13/13 responded with somewhat agree or strongly agree (mode = "strongly agree"). Consistent with our qualitative findings, the next highest scoring statement was *The peer-review process was collegial*, where 12/13 responded with somewhat agree or strongly agree and one responded as neither agree nor disagree (mode = "strongly agree"). The statement *The peer-review process was beneficial to my teaching* received the third highest rating with 10/13 respondents saying that they somewhat agree (n=7) or strongly agree (n=3) (mode = "somewhat agree").

We do want to note that consistent with best survey design practice, one of the statements was purposely designed as a negative statement: *The peer-review process was not worth the time spent on doing it*. For this prompt, 8/13 responded with strongly disagree or somewhat disagree, while 3/13 somewhat agreed with that statement and 2 chose neither agree nor disagree (mode = "strongly disagree").

Qualitative Results

The findings suggest that the participants operated under several constraints. When asked how they assess student learning in the intake form, for example, the majority indicated that the assessments are part of the master class and largely outside of their control, e.g. *All… sections have weekly graded discussion forums (might not be the same question), same HWs and same exams. All instructors contribute for exams and HWs. Assessment of learning outcomes mainly occur through these.* This was evident both in the content and tone of their responses, with passive voice predominating, e.g., *quiz and exam questions are linked to lesson learning objectives.* The presence of constraint also came to the fore in the survey questions about changes; for those who did make changes (6/11), these largely took the form of micro-innovations (e.g., *so far just little things, small modifications*), tweaks primarily focused either on course policies (e.g., *new late policy*); enhancing instructor presence (e.g., *try new introductions*; *I am using announcements more proactively*) or fostering community (e.g., *increasing discussion board posts*, *add netiquette statement*).

Space for personal pedagogical agency and innovation is perceived as limited because of the master course model employed in this context. This sentiment is evidenced by the tone of the survey responses related to assessments, and as just discussed. On the other hand, the instructor intake form shows that instructors can innovate and experiment with those course components that can be characterized broadly as relating to instructor presence, particularly regarding communication in the course. There is a marked shift in the tone of response when asked, for example, *Please describe the nature and purpose of the communications between students and instructors in this course.* Responses to this question show agency and active involvement on the part of the instructor in this aspect of the course:

> *I post announcements regularly and am in constant communication with the class. The discussion forums have a fair bit of chatter and I have replied with video and images as well there with positive feedback.*

> *I respond very quickly to student correspondence. I use the course announcements feature very often and check Canvas multiple times a day.*

> *I would like to promote the use of the Discussion Boards more, but students still do not use those as much as I would like them to.*

In this last example, we see that the instructor is forward looking and discusses changes that he or she would like to make even in the future. The data suggest that instructors are trying to make space for their own unique contribution to the course and for more personalized choices in their interactions with students. They are also eager to get feedback from their peers on practices that fall into this space of agency:

> *I would appreciate any feedback on my use of course announcements. Do you feel that they are appropriate in both content, frequency, and timing?*

Our findings indicate that many of these instructors are operating within the constraints of a master course model, as discussed earlier, and they are most enthusiastic in their responses and innovative in their teaching when they can identify areas over which they can exert some degree of control in the course design and delivery process.

As evidenced in the quantitative findings previously discussed, these qualitative findings also tell us that instructors who participated in the survey appreciate the collegiality of the process. Their open-ended responses indicate an appreciation of the collegiality and connection, the informal learning, that the peer-review process afforded them. For example, one instructor comments, "I have enjoyed the opportunity to discuss teaching ideas and strategies with other online faculty. As a remote faculty member, I particularly value that interaction." Responses primarily indicate that participating in the process was overall appreciated for the sense of community it helped to build. What we see emerge is another space—a space where instructors can negotiate together the limitations for innovation that exist in this sequence of Statistics courses, and where they can also share experiences. As one participant comments, *The direct communication with the peer is great for sharing positive and negative experiences with different courses.* As we see in our findings, faculty members clearly find value in the process, regardless of the product. This insight suggests the presence of a lesser known third model, distinct from

either formative or evaluative formats, called collaborative PRT (Gosling, 2002; Keig & Waggoner, 1995). In collaborative PRT, the end goal is to capture the benefits of turning teaching from a public to a more collaborative activity (Hutchings, 1996).

Discussion

Our findings should not be overstated. This study was conducted for a single program at a single university over the course of one semester; as such, the results may or may not be replicable elsewhere. Replication may also be hindered by the challenges inherent in studying peer review as a process. Because the results of peer review in this case may be used for summative or evaluative purposes, any evidence generated is considered part of a personnel file and, as such, subject to higher degrees of oversight in the ethical review process. The ethical review board at The Pennsylvania State University, for example, did not classify this study as exempt research, but rather put the proposal through full (rather than expedited or exempt) board review, and has required additional accountability measures. And the evaluative nature of those documents also contributed to low faculty participation (n=3) in the first stage of our study, where we asked to include copies of their peer-review documents (an intake form, review rubric, and meeting notes). There is a reason why there are comparatively few studies on peer review as a process.

In the case of the statistics program, the primary rationale for establishing a peer review of teaching process was intended to be formative assessment, i.e., providing feedback to instructors so that they might improve the teaching and learning in online statistics courses. In practice, however, the boundaries between formative and summative assessment blurred. While instructors were not required or compelled to disclose the results of their peer review, many did choose to include comments and/or ratings in their formal appointment portfolios, especially when the only other evidence of teaching effectiveness (a primary criterion) available are student evaluations of instruction (SETs). At The Pennsylvania State University, SETs are structured so that students provide feedback on both the instructor and the course, at times separately and, at other times, together. In a master course model, however, instructors have limited control over many components of the course, making the results of student evaluations challenging to parse out and potentially misleading if treated nominally or comparatively.

The distinction between formative and evaluative assessment is not the only blurred line that arose from this study. In this case, peer review of *instruction* was accomplished with a modified version of a tool (the QM rubric) intended to be used for the evaluation of an online *course*. The modification of the QM rubric took the form of removing questions or sections pertaining to course components deemed to be outside the control of the master course instructors. In addition to the modified QM rubric, two supplemental items—open-ended questions—were added to the review process. These items focused on presence and innovation, which are difficult to assess through short-term observation. Our results suggest that this strategy has led to partial success, i.e., the majority (10/13) of faculty members who responded to our survey strongly or somewhat agreed that the process was beneficial, but its impact on teaching practice has been limited. This may be partially a result of the limited scope of the study (one academic year) which may or may not be an appropriate time frame for capturing changes to teaching practice, but it may also stem from limitations in the current iteration of the peer-review process itself.

If we look back over the history of peer review of instruction for online courses, a pattern emerges in which first, an existing tool, developed for a different purpose or context, is importuned and adapted into a new environment. This occurred, for example, when peer evaluation tools designed for in-person courses were adapted to suit online courses. In the next stage, the adaption process reveals limitations of the existing tool which, in turn, spur the development of new instruments or processes that are specifically designed for the context in which they are being used. The creation of the QM Rubric is a clear example of this latter step.

The findings of our study suggest that we may be on the cusp of this second stage for peer review of teaching in online master courses, which constitutes a quite different teaching environment than other types of courses, whether in-person or online. In the case of master courses, there is a distinctive division of labor where, primarily, instructional designers work with authors to develop courses, course leads manage content, and instructors serve as the primary point of contact with students. It may be time to develop a new rubric (or similar tool) that takes this increasingly popular configuration more into consideration.

Adoption of the master course model is fueled by the need for both efficiency and consistency in the student learning experience, and both experience and research suggest that it has been effective in serving these goals. That being said, like all models, it also has its limitations. Our study suggests that one of those tradeoffs may be that the model constricts both the space for and the drivers of change. Without being able to make changes to the master course itself, the faculty in our study tried to find ways to make small changes, i.e., micro-improvements in those areas over which they held agency. Larger or more long-term changes, on the other hand, would need to come from instructional designers and program managers, who may be one or even two steps removed from the direct student experience. Although instructors frequently make suggestions for course improvements, large changes to courses are not frequently implemented. In other words, the division of labor needed to support the master course model also divides agency, and the challenge remains to find systematic ways to re-integrate that agency in the service of continuous improvement.

The limitations on faculty agency inherent in the master course model have led some institutions to further devalue the role, substituting faculty-led courses for lower-paid, lesser recognized, and more easily inter-changeable instructor roles (Barnett, 2019). Such a path would be at odds with the culture of The Pennsylvania State University, but it does suggest the need for faculty development, i.e., for finding ways to support and treat even part-time instructors as valued and recognized members of the community of teaching and learning, even in conditions where they may not be able to meet in person. It could be said that our findings affirm both the need for creating a sense of community online both inside and outside of the courses, for faculty members who teach them. The experiences of our faculty members suggest that peer review can be an integral part of departmental culture that supports faculty peer to peer engagement, leading to a host of intangible benefits including trust, reciprocity, belonging, and, indeed, respect.

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Appendix A

Anonymous Survey Questions

Likert Questions [1-8]

Answer Options
Strongly disagree

Somewhat disagree

Neither agree nor disagree

Somewhat agree

Strongly agree

1. The peer-review process was beneficial to my teaching.
2. The peer-review process was beneficial to my career development.
3. The peer-review process was not worth the time spent on doing it.
4. The peer-review process was collegial.
5. The peer-review process provided me with new insight into my teaching practice.
6. The peer-review process inspired me to try new things related to my teaching.
7. The steps of the peer-review process were clear.
8. I have little to no prior experience with peer review of online teaching.

Open-ended Questions [9-11]

9. Did you make (or do you plan to make) changes to your instruction based on your participation in this peer-review process (e.g. feedback you received, conversations with your peers, rubrics, etc...)?   Y/N

    a. If Y, please describe the change(s) you plan to make to your instruction based on the feedback you received through the peer-review process.

10. Please describe at least two insights gained from your participation in the peer-review process.

11. What changes, if any, would you suggest should be made to enhance the benefits of the peer-review process?

Appendix B
Instructor Intake Form Questions

Your information

1. What is your name?

2. What is your e-mail address?

3. Who is your assigned peer reviewer?

Your Online Course

4. What is your course name, number & section (e.g., STAT 500 001)?

5. What is the title of your course (e.g., Applied Statistics)?

6. What is the Canvas link to your course?

7. What is the link to the online notes in your course?

Context

8. How many semesters have you taught this course? Choose: (0-3) (4-6) (6 or more)

9. Does your course have multiple sections?

10. If yes, are all sections based on a single master (or another instructor's) course?

11. If yes, roughly what percentage of the course do you change or personalize from the master?

12. How do you know if students are meeting the learning outcomes of your course?

13. Is there a specific part of the course content or design for which you would like the reviewer to provide feedback?

14. Please describe the nature and purpose of the communications between students and instructors in this course.

15. Are you trying anything new this semester based on prior student or peer feedback, professional development, or your own experiences?

16. If yes, please explain.

Canvas Communication

17. Please identify **other communications among students and instructors** about which the Reviewer should be aware, but which are not available for review at the sites listed above.

18. Does the course require any **synchronous activities** (same time, same place)?

  ___Yes   ___No

19. If yes, please describe:_____

20. Is there any other information you would like to share with your peer before they review your course?