Introduction to Special Issue: National Research Center for Distance Education and Technological Advancements (DETA)

Tanya Joosten
Director of Digital Learning Research and Development,
Co-Director, National Research Center for Distance Education and Technological Advancements
University of Wisconsin-Milwaukee

This issue of *OLJ* includes four articles from a submission process resulting from invitations to participants in research supported by the National Research Center for Distance Education and Technological Advancements (DETA). These projects were funded under Grant #84.116Q, P116Q140006, from the U.S. Department of Education's Fund for the Improvement of Postsecondary Education. The objective of the DETA Research Center is to promote student access and success through evidence-based online learning practices and learning technologies. Specifically, DETA identifies and evaluates instructional and institutional practices, with particular attention to underrepresented individuals (i.e., Pell Grant eligible, first-generation college, minorities, and students with disabilities), through rigorous research.

These articles discuss a broad range of interests relating to distance education, including blended and online learning, and competency-based education. These studies address academic and social interactions, instructional characteristics or design elements of courses (including student-created content), and their relationships to student success. They also evaluate the efficacy of competency-based education.

The first of our articles is "Perceptions of the Persistent: Engagement and Learning Community in Underrepresented Populations" by Wendy Athens of Utah Valley State. A key area of focus for online learning research seeks to identify social and academic interactions that can increase student success. This interest includes understanding the relationship between engagement and student outcomes. In this paper, the author explores engagement and learning community to establish a baseline to which future instructional design and retention efforts can be compared. The paper investigates how online student success (as measured by grades) is related to student perceptions of engagement and learning community. Instrumentation for engagement and learning community were gathered using reliable measures from the DETA Research Toolkit (http://www.uwm.edu/deta). Also, the investigation examines variation across subpopulations. The author concludes that engagement and learning community are positively related to student success for the entire population and the subpopulation. Other findings are discussed, including additional subpopulation analyses. This study provides insights related to academic and social interactions and student success, which could lead to identifying ways to better engage learners in online courses. The author concludes that online course activities that enhance engagement and learning community may positively influence student success.

The second of our articles is "Do Student-Produced Videos Enhance Engagement and Learning in the Online Environment" by Denise Stanley and Jenny Zhang from California State University-Fullerton. Again, engagement strategies are deemed important in online courses. In this paper, the authors explore the engagement strategy of using student-produced activities. The paper investigates how student-generated videos increase student engagement and improve learning outcomes. Also, it investigates differences between groups of students with varied demographic backgrounds. The authors conclude that student-produced activities, such as student podcasting and video production, improve engagement and learning. Better class performance and learning gains are reported in the treatment section compared with the control section. This study provides insights into the impact of student-created content, especially in regard to the increase in mastery of specific concepts related to that content. The authors find that courses incorporating student-created content, such as videos, may increase engagement and learning. Details of the student-produced video activity are included.

The third of our articles is "Exploring Best Practices for Online STEM Courses: Active Learning, Interaction & Assessment Design" by Baiyun Chen, Kathleen Bastedo, and Wendy Howard Mail of the University of Central Florida. Online education in science, technology, engineering, and mathematics (STEM) is quickly evolving, and instructional staff are identifying how to best design STEM online courses. In this paper, the authors explore course design elements of active learning, interactivity, and assessment. The paper investigates the frequency of the presence of these design elements and their relationship to student outcomes of learning and satisfaction. The authors conclude that courses should be designed to engage students with real-life problems and active learning experiences, with a variety of additional instructional resources and student collaboration opportunities to ensure clarity of instruction, and with considerations for accessibility. This study provides insights that will inform designers and instructors how to design effective online STEM courses.

The final article in this special edition is "An Evaluation of Critical Thinking in Competency-Based and Traditional Online Learning Environments" by Matthew Mayeshiba, Kay Jansen, and Lisa Mihlbauer. New approaches to developing online courses and programs are evolving to better meet the needs of students in completing their degrees. Competency-based education (CBE) that is offered online and is designed as a nonterm, direct assessment program is one of those approaches. Researchers are identifying ways to determine the efficacy of these new programs. In this paper, the authors compare students' critical thinking between a traditional online program and a nonterm, direct assessment CBE program. The paper investigates whether CBE students demonstrate critical thinking at levels similar to those demonstrated by students enrolled in the traditional online environment. Assessments were scored using the Valid Assessment of Learning in Undergraduate Education (VALUE). The authors conclude that the two environments demonstrated student critical thinking at comparable levels. This study provides insight to the efficacy of nonterm, direct assessment CBE program.

Student-Produced Videos Can Enhance Engagement and Learning in the Online Environment

Denise Stanley and Yi Zhang
Mihaylo College of Business and Economics, California State University, Fullerton

Abstract
Student engagement in online learning remains a challenge for the design of effective coursework. Additionally, few analyses have focused on student-produced activities in the online mode or upon how such class activity affects student subgroups differently. We conducted a randomized design experiment with student video production at a large public university. Student background and behavior factors were measured in two online surveys, which were combined with course assessment data. Because of the small sample size, we observed few significant differences in learning outcomes across the experimental treatment and control sections, except with regard to a value-added measure. We suggest that student learning was likely most concentrated on concepts around which students produced the videos. And when students were divided by incoming language proficiency, non-native English speakers had higher perceived learning; but when grouped by incoming GPA, those with higher previous grades actually achieved higher test scores and pass rates.

Keywords: student-generated videos, peer learning, demographic factors, random design

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Student-Produced Videos Can Enhance Engagement and Learning in the Online Environment

Online education offers opportunities to enhance student success particularly when it (1) allows universities to increase class offerings if space constrains the number of classroom sections, (2) brings education access to students who cannot come to campus to take classes, and (3) enhances the performance of subgroups of student learners who engage better in a digital environment (Betts, Hartman, & Oxholm, 2009; Clark, 2009; Lorenzo & Moore, 2002). Although learning outcomes usually exhibit no statistical difference across modes, research and observations in cross-disciplinary venues (i.e., *The Chronicle of Higher Education*, *The American Journal of Distance Education*) mention the higher dropout rates of students taking an online version of coursework compared to a traditional lecture section. One reason for this could be lower student engagement in online-classes compared to face-to-face classes. Another possible issue is how students with different demographic backgrounds react to an online class.

Designing effective pedagogies within online coursework, thus, must involve enhancing student engagement and satisfaction. For example, collaborative learning and enhanced social presence (joint participation in interactions) build community in asynchronous learning networks and, as a result, increase student engagement in online classes (Rovai, 2000). Chang and Smith (2008) find higher levels of student–student interaction (through chat sessions, discussion boards, and other projects) to be a significant predictor of satisfaction; Dixson (2010) links these interaction factors to student course engagement. Activities in which students make presentations and teach each other are effective practices highlighted in the National Survey of Student Engagement (NSEE, 2010).

Personal and demographic characteristics may affect students' learning in the online environment. The impact of student computer self-efficacy, prior online experience, and feelings regarding online course delivery appears mixed (Puzziferro, 2008; Jan, 2015). Bolliger, Supanakorn, and Boggs (2010) suggest that background factors (e.g., gender and online experience) affect student motivation, preferences, and ultimately satisfaction with pedagogies such as podcasts; Hargittai (2010) uses regression analysis to find that gender and race are significant predictors of higher levels of Web-use skills and the access necessary to succeed in an online class. Zhang (2015) finds that students of higher socioeconomic status are more likely to utilize some learning technologies (e.g., Khan Academy). There is not much research examining how demographic background impacts different stages of online learning, such as preparedness, class behavior, learning outcome, and satisfaction.

Multimedia design components generally involve an audio or video file of content placed online for course material delivery. Faculty- or professionally-generated multimedia components are common for online or hybrid course design. Most research on faculty-generated multimedia components in online courses shows that it leads to positive results in actual and perceived student learning (see Kay, 2012, for a review). An exception is Dupange, Millette, and Grinfeder (2009), who found that a (nonrandomly selected) group of students viewing videos did worse than nonviewers in a communication studies course; additionally, the viewing levels were lower for nonwhite students and higher for those expressing positive attitudes toward online education and computer literacy. A Dupuis, Coutu, and Laneuville (2013) study finds that lower GPA students demonstrated the largest gains in test scores after watching the videos and that the learning gains were concentrated around particular exams/concepts.

The innovation of student-generated course material represents a novel recent addition to online courses (Guertin, 2010; Bolliger et al., 2010; Kay, 2012). In general, this effort builds upon the use of student discussion forum activities in the online class mode to enhance interaction and cognitive engagement (see for example Zhu, 2006). Multimedia moves the interaction to a more visual and auditory presentation of the discipline concepts. Students producing podcasts gain not only subject knowledge but also professional presentation skills, while the broader group gains peer learning through these student-generated videos.

The literature has documented student-generated multimedia activities primarily in the science and business disciplines. Surveys show different positive impacts (teamwork, communication, satisfaction) of podcasting in engineering (Alpay & Gulati, 2010), information technology (Bolliger & Armier, 2013), and geography (Anderson, 2013). Student responses indicate increased perceived learning in a variety of business disciplines (Armstrong, Tucker, & Massad, 2009; Alon & Herath, 2014; Orus et al., 2016). And nursing students exhibit greater development of core competencies in sections with self- and peer-recorded videos, compared to traditional lecture classes (Pereria, Echeazarra, Santamaria, & Gutierrez, 2014).

Moryl (2013) summarized an assignment in which viewing of professionally produced podcasts increased perceptions of economic understanding. Later, Moryl (2016) documented how student groups created their own YouTube videos of economic concept presentations. Our project differs from Moryl (2013, 2016) in that we focus on upper division economics coursework and individual efforts. We include a somewhat larger random sample and analyze the effects of student video production on both satisfaction, motivation and actual quantitative learning achievement.

Our particular strategy represents an example of active learning and student peer provision of learner support and feedback, which could influence student success directly and/or indirectly through its contribution to student course engagement and satisfaction. Yet it is a component that requires some technical skills, fluency in English, and comfort with public presentations. So analysis of student background characteristics and their possible interplay with the component can shed light on the observed actual learning outcomes. In the analysis below, we focus on differences in preparation, behavior, and outcomes not only by treatment status but also by previous academic performance (GPA), gender, underrepresented status (e.g., Hispanic), Pell Grant status, whether English is the student's first language, and mother's educational attainment.

We examined whether differences exist among students along demographic background and whether these differences correlate to differences in terms of their readiness for online education, behavior in the class, and performance. We discuss a student-generated video project to increase student learning and retention in online education. Ideally, it could promote student engagement with course content, and provide supplemental learning materials for the class, which could benefit particular groups of students desiring more visual tools. The following were our two research questions:

1. Does the student-generated video component increase student engagement with the class and improve learning outcomes?
2. Are there any differences among groups of students with varied demographic backgrounds in terms of online education readiness, engagement in the online environment, and/or learning outcomes and satisfaction in online classes?

To answer these questions, we implemented a random experimental design in spring 2016 with two online class sections of the same course, with one using the self-generated video component and the other not using it.

Methods

Participants

This study used an experimental design based on the random assignment of 113 ever-enrolled students across two online sections of a managerial economics class. Randomization occurred 72 hours before the first day of the spring 2016 semester. This course is required for all students who want to get a BA in Business Administration. Students enrolled in the class are either at the junior or senior level. The random design reduced possible biases from the correlation between unobservable factors, student behavior, and the outcome variables by providing exogenous variation in treatment. Sample selection bias could occur if, when students chose to participate in a class with oral presentations, hidden characteristics behind their likelihood to participate also affected test scores. Students were assigned to each class section using an Excel random number generator, with verification of the comparability of the samples based upon their incoming academic qualifications (see Appendix A). Some students dropped the class (with three late adds) during the first two weeks of the class before the video activity began. Ultimately, 97 students remained enrolled in the class and received surveys; 87 took the final exam. The first survey had 84 respondents (an 87% response rate) and the second survey 78 respondents (an 80% response rate) across both sections. Response rates were encouraged by extra credit incentives.

Student Background

In general, data from the first survey suggests students were somewhat older (average 25 years, *SD* = 4.91) and worked more than 24 hours/week (*SD* = 16.60). There were slightly more women (41% men, *SD* = 0.50). Most of the students had lower income levels (71% Pell Grant eligible, *SD* = 0.46) and definite past experience (average 5.05 courses, *SD* = 3.84) in online education. They had diverse ethnic backgrounds (33% Hispanic, the rest reported as non-Hispanic and primarily as Asian or Caucasian) and moderate incoming grades (mean incoming GPA = 2.91, *SD* = 0.40). Almost half of the students' mothers did not complete college (*SD* = 0.50). Seventy-nine percent of the students also reported English as their primary language (*SD* = 0.41). These characteristics were similar across class sections, except that survey results showed that students in the treatment sections could be coming in with somewhat better English skills, while those in the control group were more likely to self-identify as Hispanic. There were no significant differences across the treatment/control groups with regard to work hours or previous online experience, although students with Pell Grants (financial aid) tended to have fewer work hours than those without the grants. There was some overlap between the students in our six background categories; for instance, there was a significant positive correlation between male gender and Hispanic ethnicity and between English being the native language and a mother's completing college. Very few physical or otherwise disabled students enrolled in the classes, with no differences across sections.

Measures

In this study, we included measures on demographics, students' perception of their preparation for online classes, their perception of the class, and actual performance data. Demographic information was collected through the Office of Institutional Research, and students' perceptions were measured through Likert-scale survey questions drawn from the *DETA Research Toolkit 1.0* (Joosten & Reddy, 2015). Actual performance was measured through students' grades on various online activities (on the Moodle and McGraw-Hill Connect websites). Variable definitions are provided in Appendix B. Characteristics of survey items were developed after consultation with experts, a literature review of key instruments, and expert-developed classifications to group items (see Joosten & Reddy, 2015). The first survey included 22 variables from the *Toolkit* related to background personal and academic characteristics as well as six variables linked to student preparedness and readiness for the course. Among the demographic/academic background variables, incoming GPA and native English language ability could give students an advantage in class performance, as would the reality of fewer work hours and greater previous online course completion. In the analysis below, we focus on six binary dimensions by which the student population can be characterized: low versus high incoming GPA, gender, Hispanic versus non-Hispanic, Pell Grant status, native English language, and mother's college completion versus noncompletion. Within each dimension, the population is divided into two subgroups.

The first survey included the preparedness and readiness questions (measures of experience in distance education, access to technology, online skills proficiency, technology familiarity, online learning efficacy, and self-directedness). These factors could be relevant to how the class activity affects the outcomes of each student. For instance, a student with greater computer self-efficacy could produce a better quality video more efficiently, thereby impacting their own and peer outcomes.

The second survey focused on student behavior and perceptions at the end of the course. Students were asked about their perceived course activity challenge, course interactivity, and active learning behaviors in the course, as well as their perceptions of the course social presence and engagement. The second survey also included questions on student outcomes, including scalar and open-ended queries regarding how student performance, learning, satisfaction, and success were impacted by the course.

Among the measures in the questionnaires, we found that the following six variables (Table 1) were most relevant to this study and provided the most internal consistency as measured through Cronbach's alpha.

Table 1.

Initial Survey Background Response-Item Consistency

Variable group	Cronbach's alpha statistic	Items
PRESKILLS (1-7) Online Skill Proficiency	.972	7
PRESE (1-6) Online Learning Efficacy	.861	6
PRESD (1-4) Self-directedness	.914	4
ENGAGE (4-8, 10, 12-15) Engagement	.965	10
LEARN (1, 3-8) Perception of Learning	.973	6
PERFORM (1-5) Perception of Performance	.868	5

Since these questions were on a Likert scale (1 = *strongly disagree*, 2 = *disagree*, 3 = *neutral*, 4 = *agree*, 5 = *strongly agree*), a higher number represents a more favorable response. For the purposes of this research, where we want to look at differences among subgroups, we first calculated a total score for each student for each variable area in Table 1. We then determined an average score (between 1 and 5) for each student. The questions (listed in Appendix B) meant that a higher number on the Likert scale implied a student felt they had a greater degree of online skill proficiency, efficacy, or self-directedness. At the end of the class, a student choosing agree or strongly agree would be indicating more engagement and a higher perception of learning and performance in the class.

Other variables measured by the instructor included student performance on module online homework and quiz activities, as well as treatment student scores on the video activity and ratings for each module. The online textbook–homework bundle provided access to a class-specific website for the graded problem sets and the optional Learn Smart concept mastery exercises. (This publisher's website also tracks student engagement through time, frequency, and success of activities.) The final exam provided the primary learning assessment measures (correct multiple-choice question numbers and points, worked problem scores) and the value- added score. This score included 10 questions administered as a pretest (before students opened the content website) and as a posttest, with those same questions incorporated within the final exam. The content of the 10 questions included key concepts from across the coursework: marginal analysis, the value of a firm, linear demand function interpretation, own-price elasticity, cost measures, principal-agent concerns, market structure measures, monopoly profit maximization, oligopoly game-theory analysis, and second-degree price discrimination.

Procedures

Both the treatment and control student groups had unique Moodle websites with common study activities (online lecture content and quizzes), and common exams were administered online or on campus at separate locations. The two groups were also placed in two separate McGraw-Hill homework websites. The same final exam for both sections was 30% of the class grade. The online student-generated problem-solving video project comprised 10% of the grade in the treatment sections, with the other activities (quizzes, homework) scaled for comparability (i.e., in the treatment group, each homework earned up to 10 points and each quiz up to 5 points; in the control group, each homework earned up to 15 points and each quiz up to 7.5 points, so the points in the treatment were multiplied by 1.5).

Each student in the treatment section was asked to produce a narrated video showing the steps to solve a typical exam multiple-choice problem. Students were given a window in which to choose the topic; after that, the instructor assigned problems randomly. Students were provided a guideline sheet outlining the options (a narrated PowerPoint slideshow, a YouTube video, etc.) and examples created by the instructor and the publisher. Sample topics presented in the student videos included (a) the steps to calculate full economic price under a price ceiling, (b) the steps to calculate own-price elasticity from a linear demand function, and (c) the steps to calculate the optimal two-part pricing scheme for a firm with market power. Each student created a video and posted it in a discussion forum link by Thursday of the relevant module. Other students viewed it and provided ratings and comments in the forum. Each student earned up to 25 points (5% of the class grade) for the video produced and up to 5 points for each of five ratings of other students' videos (viewing of additional videos was encouraged and open throughout the semester). Assignment grading was based upon a rubric providing 60% of the weight for video content, 20% for how other students rated the video, and 20% for the video's technical quality to encourage serious efforts at peer teaching.

Data Analysis

In the outcomes below, we employ a mixed methods approach to data analysis. We use quantitative tools (cross-tabulations, *t*-tests, *F*-tests, and ANOVA) to analyze the data trends in survey and instructional data across the treatment and control groups, as well as within demographic subgroups. We also include qualitative comments to provide context to the trends observed. All calculations were undertaken in SPSS-24.

Results

Differences in Students' Perception of Their Online Readiness

First, we examine the subgroup differences in terms of students' perceptions of their skills and readiness for the online class. Table 2 shows the overall section average values for each of the response question areas with standard deviations in parentheses. In no case was the summary index significantly different across the randomly sorted treatment and control sections. Most students felt they possessed strong skills and self-directedness for online coursework. Yet very few believed strongly in the efficacy of online coursework. Most students answered *strongly agree* or *agree* on the Likert-scale questions (4, 5) on the preparedness and readiness questions included in the first survey. A few significant variations appear across the focus subgroups with regard to the average responses on specific frequency-based questions (PREPSE). (See Appendix B for specific question wording.) Table 2 shows that women (particularly in the treatment section) and non–Pell Grant students had significantly stronger beliefs about the efficacy of online courses (differences in bold). Nearly all students had taken several online courses in the past.

Table 2.

Selected Student-Learner Readiness Characteristics From First Survey

Section	Online skill proficiency index PREPSKILLS_A1-A7 (average across 5-level scale on each question)	Online learning efficacy index PREPSE1-6 (average across 5-level scale on each question)	Self-directedness index PREPSD1-4 (average across 5-level scale on each question)	Previous online courses
Total class	4.26 (0.98)	3.35 (0.72)	3.86 (0.74)	5.04 (3.84)
Treatment section	4.24 (1.03)	3.38 (0.80)	3.84 (0.74)	5.07 (4.41)
Control section	4.28 (0.94)	3.31 (0.62)	3.88 (0.76)	5 (3.26)
Focus divisions				
Incoming GPA				
2.5 and above	4.23 (1.04)	3.32 (0.71)	3.38 (0.75)	5.08 (4.00)
Below 2.5 range	4.43 (0.57)	3.51 (0.78)	4 (0.75)	4.77 (2.86)
Gender				
Female	4.27 (0.96)	**3.48 (0.71)***	3.87 (0.68)	4.71 (2.67)
Male	4.24 (1.04)	**3.16 (0.70)**	3.85 (0.835)	5.53 (5.12)
Self-identified Hispanic				
No	4.14 (1.10)	3.34 (0.63)	3.83 (0.69)	4.88 (3.37)
Yes	4.47 (0.65)	3.34 (0.89)	3.91 (0.85)	5.54 (4.62)
Pell Grant eligible				
No	4.34 (0.88)	**3.63 (0.81)***	4.04 (0.60)	5.35 (3.80)
Yes	4.24 (1.03)	**3.29 (0.66)**	3.83 (0.83)	4.88 (3.52)
Native English speaker				
No	4.10 (0.97)	3.31 (0.71)	3.67 (0.69)	3.82 (3.71)
Yes	4.29 (1)	3.36 (0.73)	3.91 (0.76)	5.27 (3.82)
Mother college education				
No	4.32 (0.78)	3.35 (0.76)	3.78 (0.83)	5.11 (4.18)
Yes	4.18 (1.23)	3.35 (0.69)	3.97 (0.55)	5 (3.55)

Note: Means and standard deviations reported.
* $p < .10$. ** $p < .05$ using a two-sided *t*-test with equal variances not assumed.

Table 3.

Selected Differences in Course Behaviors and Qualitative Outcomes

	McGraw-Hill Engagement Index*** (0-10)	Survey Engagement Index (ENGAGE 4-8, 10, 12-15, reverse items corrected; average across 10)	Student Perception of Learning Index (LEARN 1, 3-8, reverse corrected; average of 6 items, 5 points each)	Student Perception Performance Index (PERFORM 1-5, reverse corrected; average across three items)	Student's expected grade in the course: % expecting B or better
Total class	5.38 (1.59)	3.29 (0.85)	3.58 (0.81)	3.53 (0.76)	36 ≥ B or better
Treatment section	**5.49 (4.68)****	3.34 (0.73)	3.63 (0.80)	3.52 (0.79)	43
Control section	**4.68 (1.92)**	3.24 (0.96)	3.53 (0.82)	3.52 (0.79)	29
Focus divisions					
Incoming GPA					
2.50 and above	5.16 (1.84)	3.31 (7.77)	**3.68 (0.66)****	3.58 (0.69)	38
Below 2.50	4.69 (1.77)	3.21 (1.16)	**3.14 (1.22)**	3.27 (0.98)	29
Gender					
Female	5.42 (1.54)	3.39 (0.73)	3.66 (0.77)	3.54 (0.66)	33
Male	5.34 (1.74)	3.13 (1.00)	3.42 (0.86)	3.49 (0.89)	45
Self-identified Hispanic					
No	5.32 (1.59)	**3.13 (0.74)****	3.54 (0.78)	3.51 (0.71)	**42****
Yes	5.43 (1.64)	**3.59 (1.04)**	3.59 (0.91)	3.57 (0.89)	**26**
Pell Grant eligible					
No	5.19 (1.15)	**3.69 (0.63)***	3.76 (0.76)	3.39 (0.70)	33
Yes	5.25 (1.63)	**3.24 (0.90)**	3.51 (0.85)	3.53 (0.78)	40
Native English speaker					
No	5.25 (1.65)	3.39 (0.68)	**3.78 (0.46)***	3.53 (0.70)	44
Yes	5.48 (1.60)	3.27 (0.91)	**3.49 (0.89)**	3.52 (0.80)	38
Mother college educated					
No	5.26 (1.48)	3.18 (0.94)	3.53 (0.90)	3.62 (0.82)	32
Yes	5.47 (1.66)	3.38 (0.76)	3.59 (0.71)	3.37 (0.68)	43

Note: Means and standard deviations reported.
* $p < .10$. **$p < .05$ using a two-sided t-test with equal variances not assumed (for all columns except far right) or a Pearson χ^2 test (for far right column).
***external engagement measure based on time and success on activities

Student Behavior and Perception Differences

We were able to observe student behavior through class activities, websites, and survey items. Points earned on the module quizzes and Connect homework were virtually the same across treatment and control sections. We brought in additional data from the McGraw-Hill website, including the ungraded practice Learn Smart exercises and an overall engagement score; in both cases students in the treatment section took more advantage of the publisher homework website.

This external source shows a significantly higher degree of engagement recorded in the treatment section (5.49 points vs. 4.68 points, $p = 0.03$).

In Table 3 no significant differences appear in the behavior survey questions between the treatment and control sections (ENGAGE, LEARN, PERFORM). However, there are different behavior and perception differences across subgroups of students. Students coming into the class with higher grades tended to use the publisher website to a greater degree (as measured by the McGraw-Hill Engagement Index). The index was higher overall and for this subgroup in the treatment section ($p = 0.08$), for native English speakers ($p = 0.07$), as well as for Hispanics in the treatment section (vs. the control; $p = 0.03$). The survey engagement question shows a somewhat different trend. The group without Pell Grants was more likely to express agreement with the survey engagement questions. When the students were grouped by ethnicity, Hispanic students were more likely to express agreement with the survey engagement questions. In a separate ANOVA analysis, we found a significant positive interaction effect between treatment and Hispanic ethnicity on the ENGAGE average index ($F = 2.74$, $p = 0.10$). Question items mattered; for instance, to the engagement question "I was absorbed in the experience," 35% of the students chose the 4–5 (*agree* or *strongly agree*) on the Likert scale, with the highest positive responses by Hispanic students (43%, compared to 28% for non-Hispanics, $\chi^2(1) = 8.63$).

Table 3 also shows that those for whom English was not their first language expressed higher perceived learning. Almost 69% of the non-native English speakers answered *agree* or *strongly agree* on nearly all of the items (compared to 43.3% of the native speakers). The video presentations may have helped language learners since they could watch the media as many times as they wanted. However, when the students were considered along a different dimension (incoming GPA), those with lower grades tended to have lower perceived learning from the class and lower grade expectations. And non-Hispanics had higher grade expectations, since they more frequently stated their grades would be at the top end of the seven categories (A, A-/B+, B, B-/C+, C, C-/D+, D). This differential for this subgroup was particularly strong in the treatment section, where 52% of the students expected a B or better, while only 29% expected this in the control section.

Additionally, open-ended questions were included in the second survey. The first question asked students in the treatment section to "describe if and how the learning activity (class video presentations) changed your engagement in this class." Most responses favored the activity, highlighted engagement/learning aspects of the activity, and confirmed the effect of peer learning. Some examples include the following:

> "The class video presentation exercise changed my engagement in the class in a positive way it gave myself and other students accountability to interact by giving our personal feedback and explaining our problems."
>
> "It was useful to better understand problems I couldn't solve on my own."
>
> "The video presentations were pretty helpful in increasing engagement within the class. Creating the video really made you learn the subject, while watching others' videos made sure that I would keep tuning in every week."

However, there were still a few negative comments (five of the 48 participants). These negative comments could help design the activity better in the future:

> "I personally do not think it helps but only creates busy work in class and only is there to get points for participation."

> "The videos did not fully change my engagement in class. Comments on the videos stimulated discussion but it was mostly surface level and one sided. I think most students posted their one comment for a grade rather than in-depth discussion. From all the assignments in this course, it was the one I thought about the least."

Students in the treatment section answered a second open-ended question: "Describe if and how the learning activity (class video presentations) changed your learning experience." Again, most responses were positive, with comments such as the following:

> "The video presentation exercise changed my learning experience in this class in a positive way because before creating my video, I ensured I fully understood the concept so it was teachable and presented clear enough when it came to making my personal presentation."

> "It changed my learning experience because online classes can be pretty limiting in participation, but this presentation was a great way to participate as well as learn from."

Quantitative Student Learning Outcomes

Table 4.

Actual Learning (Quantitative Outcomes)

Students taking final	Treatment (n = 44)	Control (n = 43)	p-value
Class GPA	2.55 (0.82)	2.31 (0.78)	.95
Total class points (% of 500)	74.10 (19.37)	72.43 (19.70)	.675
Pass rate (0,1; 1 if C or better)	72.9%	67.3%	.55
Final exam word problems points (0-30)	25.59 (4.04)	25.43 (3.43)	.842
Final exam multiple-choice points (0-120)	65.97 (14.59)	61.28 (13.69)	.124
Pretest average (0-10)	3.34 (1.60)	3.60 (1.84)	.69
Posttest average (0–10)*	**5.59 (2.11)**	**4.78 (1.90)**	.067
Value-added (post-pre)* (range -10 to +10)	**2.25 (2.44)**	**1.27 (2.72)**	0.083

Note: Means and standard deviations reported.
* $p < .10$. ** $p < .05$ using a two-sided t-test with equal variances not assumed (for all columns except far right) or a Pearson χ^2 test (third row)

Table 4 provides data on the learning assessment from class grades and scores on the cumulative final exam. Students in the treatment section tended to earn more class points overall, receive a slightly higher grade, and passed the class more frequently, although the differences were not significant. However, students in the treatment section did perform significantly better on certain final exam multiple-choice items. Their learning on the key concepts (especially market equilibrium, elasticity, and market structure) included on the pretest and posttest did improve. This is to be expected since the student video work demonstrated how to solve such multiple-choice-type problems. There was a significant 1-point increase on the value-added scores of students in the treatment section.

We next turn to how different subgroups of students performed on the learning measures. Table 5 suggests that background factors matter on the student's final exam performance. When students were grouped along their previous grades, those with higher incoming GPAs were more likely to pass the class and earn a better grade. All final exam measures were higher for them. We also observed that students with higher GPAs tended to have higher learning gains than students with lower incoming GPAs. Hispanic students tended to earn lower grades and do somewhat worse on the final exam multiple-choice items. Being a native English language speaker provided a significant boost only on the written part of the final exam. In addition, when the students were divided by whether or not their mother completed college, we found that those without college-educated mothers tended to earn lower overall grades and perform worse on the multiple-choice items of the final exam. We also looked at learning gain through the difference between pre- and postquiz questions. Students who are not first generation scored 1.5 points higher on the value-added questions, particularly in the treatment section (p = .07).

Table 5.

Performance Outcomes by Subgroup

	Pass rate	Class grade GPA	Final word problems	Final multiple choice	Pre versus post value-added
Total class	70%	2.43 (0.80)	25.51 (3.73)	63.65 (14.20)	1.78 (2.61)
Focus divisions					
Incoming GPA					
2.5 and above	**74%****	**2.52 (0.78)****	25.72 (3.53)	64.25 (14.71)	**1.89 (2.57)***
Below 2.5	**50%**	**1.96 (0.80)**	24.43 (4.63)	60.54 (11.06)	**1.21 (2.83)**
Gender					
Female	71%	2.44 (0.72)	25.59 (3.29)	63.85 (13.84)	1.73 (2.73)
Male	78%	2.46 (0.90)	25.74 (1.54)	64.50 (15.56)	1.91 (2.59)
Hispanic					
No	80%*	**2.56** (0.84)**	25.76 (3.73)	**65.98* (14.54)**	2.02 (2.79)
Yes	62%	**2.15 (0.61)**	25.27 (3.5)	**60.39 (2.54)**	1.20 (2.26)
Pell Grant					
No	66%	2.41 (0.58)	**23.92** (3.7)**	60.69 (14.57)	1.82 (2.24)
Yes	76%	2.50 (0.83)	**26.18 (1.44)**	65.47 (13.64)	1.60 (2.76)
Native English					
No	78%	2.42 (0.65)	**24.09** (3.8)**	64.84 (14.80)	1.00 (2.48)
Yes	73%	2.47 (0.84)	**25.95 (3.7)**	64.08 (14.50)	2.1 (2.66)
Mother College Education					
0 = no	68%	**2.30* (0.79)**	25.18 (3.82)	62.36 (13.39)	**1.00** (2.66)**
1 = yes	78%	**2.60 (0.79)**	25.66 (3.49)	66.57 (15.10)	**2.73 (2.44)**

Note: Means and standard deviations reported.
$^*p < .10$. $^{**}p < .05$ using a two-sided t-test with equal variances not assumed (for all columns except far right) or a Pearson χ^2 test (for far left column).

The question remains whether the video production activity could have changed how these background factors related to the actual learning outcomes. In separate subsample mean tests, a few significant differences appeared for the value-added learning outcome of the students of that group in the treatment section compared to the students of that group in the control section. For instance, students with higher incoming GPAs and non-Hispanic students did better in the treatment section than they did in the control group. In the univariate analysis of variance of Appendix C (Test of Between-Subjects Effects), there were no significant interaction effects between the treatment intervention and each specific subgroup characteristic. However, the treatment alone did explain a large part of the variation in student value-added scores across English language groups; their mean value-added scores were over 1 point higher in the treatment section (compared to the control) in both cases (p = .08 and p = .09, respectively).

Discussion

Summary of Results and Connection to the Literature

Student podcasting and video production can improve engagement and learning in online coursework. Here, we implemented a randomized experiment with upper division students enrolled in the same class, in sections with and without video production. By looking at class performance, we observed better class performance and learning gains in the treatment section when compared with the control section. This observation provides some support for our assumption that student-generated videos will increase engagement and learning.

Video production could have been a challenging activity for some groups. Those without technical skills or English as primary language could feel less prepared at the beginning of the semester; however, over time we observed that actual language-based learning gaps were reduced. Student academic preparation for the class (incoming GPA, meeting the prerequisites, etc.) remained crucial. But interestingly, on item-response questions, most students surveyed did not feel less prepared or lacking the necessary skills for the online course experience.

The main findings of this study are summarized below:

1. The students had diverse demographic and behavioral characteristics, particularly regarding their incoming GPA levels, gender, ethnicity, first-generation learner, Pell Grant status, and command of the English language. All subgroups of students participated in the treatment activity nearly equally. But each of these subgroups had somewhat similar self-expressed beliefs in their online skill proficiency and self-directedness, as well as the efficacy of online learning. Like the student body analyzed in Hargittai (2010), we observed that better-off students (i.e., without Pell Grants) had completed more online coursework and possessed higher perceived online skills. (And non-English native language students were concerned about their skills and had taken the smallest number of online courses.) We note that women expressed the greatest belief in the efficacy of (and enthusiasm for) online coursework, while those with college-educated mothers scored higher on the index of self-directedness.
2. Three engagement trends were examined: student work on the McGraw-Hill Connect website, student performance/effort on other class activities, and student responses to specific survey questions. Only in the first case did students in the treatment section demonstrate higher levels of engagement. Students in the treatment group did not behave

significantly differently regarding participation in various class activities or on the survey-based questions. Qualitative comments suggest students generally enjoyed the activity, with some split over the value of viewing and rating other students' work. This does not follow some other studies of student podcasting (Anderson, 2013; Armstrong, Tucker, & Massad, 2009; Moryl, 2016) in which very high student enthusiasm was noted. Our results are more similar to those of Bolliger and Armier (2013), with a strong majority of participants noting increased perceived learning. Among the other inherent background factors, better-off students expressed the highest level of engagement with the overall course on the survey response measures; and the study here follows the trend noted in Zhang (2015) in which Hispanic students had higher agreement responses to particular questions around attention focus in the course.

3. Although there were few perceived differences in the performance and learning response questions, survey results show non-Hispanic and higher GPA students expecting to do well in the class. Qualitative comments implied that the experimental treatment students perceived that their learning had increased. In actuality, final grade assignment and actual learning were not much higher across treatment groups or subgroups. A small but significant treatment versus control difference was detected in the final posttest questions and value-added measures, particularly for higher GPA and/or non-Hispanic students. These gains are lower than those observed for the student podcasting work in marketing (Orus et al., 2016) and contrast the improvements for lower GPA students noted in Dupuis et al. (2013) for molecular biology. For our sample, the students' mothers' college education was most associated with actual learning achievements. There were no interaction effects between treatment group and student background factors.

Taken together, these findings suggest inherent background factors affect a student's trajectory through online learning preparation, specific assignments, processes, and outcomes. Our students with low incoming GPAs had taken fewer online courses previously, were less engaged in the course, had lower grade expectations in both sections, and ultimately achieved lower actual learning outcomes. A similar path was observed for the group of students whose mothers had not completed college. On the other hand, students with English as a native language expressed higher online experience but lower perceived learning than those without an English background; however, the native English speakers did better on some of the actual learning measures. These paths appeared across both class sections (with and without video production).

It is worth recalling that the student video production activity represented a small part of the overall grade and was done alongside other learning activities (whose effectiveness is not discussed here). We posit that the precise learning improvement from the activity comes down to enhanced mastery of specific concepts in the class, rather than overall learning of the material. To verify this, we further explored possible specialized learning from video production. The final exam included several word problems and 48 multiple-choice questions, with subgroups related to each learning module of the class. There were four questions for each of the modules related to early content (overview, supply and demand, elasticity, production and cost, incentives, and market structure measures), and eight questions per module for the new areas not covered on the earlier midterms (perfect competition/monopoly, oligopoly, and advanced pricing strategies). The module/chapter for which each student produced a video was identified, without those module-specific questions removed from the "overall learning" group. So, for instance, students who produced a problem-solving video on the Chapter 3 material would have their scores on the total four questions related to Chapter 3 compared to the remaining questions (44 possible questions). We compared the proportion of each student's correct "material-related" questions to the overall question material. Generally, 62% of the students did better on the questions related to their activity content, compared to the overall questions included on the final exam (average 52% correct) (t = 1.88; p = .16). Yet this pattern was clearest on the review material earlier in the semester, compared to the more advanced sections later in the semester.

Limitations

The research design focused on the incremental (marginal) impact of a new activity, with all other aspects of the course design in place. The comparison courses were designed to provide moderate incentives for participating in the new video activity while maintaining the integrity of the other course components and exam assessment measures across both the control and treatment sections. Very small (marginal) impacts were determined. If the student-generated assignment had represented a larger part of the class (e.g., each student producing three videos for 30% of the grade), we would expect to have seen larger learning gains.

And the analysis is based on a small sample size and only on included multiple-choice-type items for problem-solving skills. An exercise in which a larger number of students produced videos to address case study or essay-type questions may provide different results. Finally, the experiment took place in the context of students' (and the instructor's) learning curve on the assignment and video production process. If students participated in the same activity in a subsequent course (such as a major capstone), different learning gains could perhaps be observed.

Future Research Directions

Here we explored the association between the video intervention activity in the class and student learning outcomes. We discussed how this association could vary across different student subgroup variations, which could serve as both controls and drivers in the process. Future research should explore the direct and indirect causation between student background factors, class interventions, and learning outcomes. That is, a path analysis approach could link student background factors (indirectly) to exam scores and performance through the measures of engagement and perceived learning/performance. Additionally, two-stage regression analysis would treat the processes sequentially.

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Appendix A: Background Institutional Data

Beginning of semester background characteristics of treatment-control groups, spring 2016		
	Treatment (*n* = 56)	Control (*n* = 57)
Enrolled credits	13.80 (3.30)	12.62 (3.07)
Incoming GPA	2.59 (0.59)	2.66 (0.59)
Low incoming GPA (= 1 if below median 2.50)	54%	41%
Grade points ECON 201	2.75 (0.69)	2.83 (0.77)
Grade points Math 135	2.63 (0.93)	2.69 (1.02)
Met prerequisites (1 = yes)	0.88 (0.33)	0.83 (0.38)
Note. Means and standard deviations reported		

Appendix B: Variables Definitions

Variable ID	Definition	Item	Coding
Gender	Student-reported gender	With which gender do you identify?	1 = Male 0 = Female (recoded) 99 = Unknown
Age of student	Student self-reported years of age	How old are you?	Continuous in years
Ethnicity	Student-reported ethnicity	Do you identify as Hispanic?	0 = Non-Hispanic 1 = Hispanic 99 = Unknown
First generation	Student report of mother's highest level of education achieved	What was the highest school completed by your mother or parent 1?	1 = Middle school/jr. high 2 = High school 3 = College or beyond 99 = Other/unknown
	Student report of father's highest level of education achieved	What was the highest school completed by your father or parent 2?	1 = Middle school/jr. high 2 = High school 3 = College or beyond 99 = Other/unknown
Pell Grant eligible	Student's report of eligibility	Are you eligible or have you received a Pell Grant?	Yes = 1 No = 0 (recoded) Unknown = 99
Time commitment	Self-reported paid hours worked/week	How many hours do you work per week on average?	Continuous (hours worked last week), don't know, or none
	Self-reported number of credit hours in past	How many credits did you take last semester?	Continuous (number of credits enrolled last semester) or don't know
Native English speaker	Self-reported as English as student's first language	Is English your first language?	1 = Yes 0 = No (recoded)
Preparedness and readiness	Student's self-reported experience in distance education	How many previous online courses have you taken?	Continuous (number courses)

	Student's self- reported preparedness or readiness for distance education based on one's beliefs about their skills proficiency, comfort with technology	I am able to easily access the Internet as needed for my studies; I am comfortable communicating electronically; I am willing to actively communicate with my classmates and instructors electronically; I feel that my background and experience will be beneficial to my studies; I am comfortable with written communication; I possess sufficient computer keyboarding skills for doing online work; I feel comfortable composing text on a computer in an online learning environment	• 7 items used (of 16) • 5-point Likert scale • *Strongly disagree* = 0 to *strongly agree* = 5; collapsed to *strongly disagree/disagree* = 1; *neutral* = 2; *agree/strongly agree* = 3 • 0 reverse coded
	Student's self- reported beliefs about online learning	I am motivated by the material in online activities; Learning is the same in class and at home online; I feel that I can improve my listening skills the same working online as in an-person class; I believe that learning online is more motivating than a traditional in-person course; I believe a complete course can be given online without difficulty; I could pass a course online without any teacher assistance	• 6 items (of 7) • 5-point Likert scale • *Strongly disagree* = 0 to *strongly agree* = 5; collapsed to *strongly disagree/disagree* = 1; *neutral* = 2; *agree/strongly agree* = 3 • 0 reverse coded
	Student's self- reported belief about their initiative and ability to be self- directed	When it comes to learning and studying I am a self-directed, take charge kind of person; In my studies I am self-disciplined and find it easy to set aside reading and homework time I am able to manage my study time effectively and easily complete assignments on time; In my studies, I set goals and have	• 4 items used (of 15) • 5-point Likert scale • *Strongly disagree* to *strongly agree* • 0 reverse coded

Engagement	Self-reported engagement with academic challenges, active/collaborative activities, and course community	I was captivated; I felt wrapped up in the experience; I was absorbed in the experience; I was attracted to the learning activities; The class was an enriching experience; Class was fun and exciting; The class kept me totally absorbed in the activity; The class held my attention; The class excited my curiosity; The class aroused my imagination	• 10 items used (of 21) • 5-point Likert scale • *Strongly disagree* to *strongly agree* • None reverse coded
Learning	Student's self- reported perceptions of learning	The class allowed me to better understand concepts; The class helped me understand the course material; The class made it easy to connect ideas together; The class helped me think more deeply about course material; The class did not help my learning; The class did not make it easier for me to understand the course material; I was not able to better understand course concepts	• 6 items used (of 10) • 5-point Likert scale • *Strongly disagree* to *strongly agree* • Some reverse coded
Performance	Student's self- reported perceptions of performance on assessments and overall in course	The class activities helped me get a better grade; My experience in the course helped me do better on my exams and other assignments; The class activities did not help me score higher on the exams; I got higher scores on my assignments because of my experience in the course; The class activities did not improve my assignment grades	• 5 items • 5-point Likert scale • *Strongly disagree* to *strongly agree* • Some reverse coded
Beliefs	Student's self- reported belief of their grade earned	What final grade do you expect to receive in this class?	1 = A; 2 = A-/B+; 3 = B; 4 = B-/C+; 5 = C; 6 = C-/D =; 7 = D; 8 = D-/F+; 9 = F 99 = Don't know

Video engage	Treatment student response	Describe if and how the learning activity (class video presentation) changed your engagement.	Open-ended question
Video learn	Treatment student response	Describe if and how the learning activity (class video presentation) changed your learning experience.	Open-ended question
Final exam score	Total points on final exam	Instructor data	Numeric continuous on scale of 100 or 150 points per class
Multiple-choice questions	Total correct multiple-choice questions in class	Instructor data	Numeric continuous on a scale of 48–50 per class
Posttest questions correct	Total correct answers on selected 10 pre- and posttest questions	Instructor data	Numeric continuous on a 0–10 scale
Value-added difference pre- and posttest questions	Difference between number of correct questions when same questions done in pretest and in posttest	Instructor data	Numeric continuous on a scale of -10 to 10

Appendix C: Significance and Interaction of Treatment and Subgroup Characteristics on Value-Added Scores From Pretest and (Final) Posttest Questions

Variable/group	Type III SOS	Degrees of freedom	*F*-statistic	*p*-value
Low incoming GPA				
Treatment	19.09	1	11.09	.19
Low GPA	13.48	1	7.83	.22
Interaction	1.72	1	0.26	.61
Gender				
Treatment	18.45	1	29.90	.12
Gender	0.72	1	1.17	.48
Interaction	0.62	1	0.09	.77
Hispanic				
Treatment	11.07	1	2.85	.34
Hispanic	7.63	1	1.97	.40
Interaction	3.88	1	0.57	.45
Pell Grant eligible (PGE)				
Treatment	8.24	1	16.13	.16
PGE	0.39	1	0.77	.54
Interaction	0.51	1	0.07	.79
Mother's education				
Treatment	3.24	1	0.70	.41
Mother's education	49.92	2	9.73	.09
Interaction	5.13	2	0.39	.68
Native English speaker				
Treatment	7.81	1	905.46	.02
English	12.63	1	1464.80	.02
Interaction	0.01	1	0.001	.97

Perceptions of the Persistent: Engagement and Learning Community in Underrepresented Populations

Wendy Athens
Utah Valley University

Abstract
In an effort to characterize perceptions of learning community and engagement in relation to success for underrepresented populations of online learners at a public institution in southeastern United States, a survey was conducted in Spring 2016. The results of the survey were paired with institutional data to create a baseline engagement and learning community profile for the online student population, which comprised 22% of total enrollments. The subpopulations of interest were: Age, gender, race/ethnicity, disability, Pell grant eligibility, first-generation, and orphan. For all students, a very strong positive relationship was observed between student perceptions of engagement and learning community and student outcomes (grades). This strong and positive relationship was confirmed across the subpopulations, but there were a few noteworthy exceptions: Hispanic and Black students were more engaged than Whites but earned lower grades. Younger students and students with disabilities were less engaged than their counterparts, but earned equivalent grades. These patterns corresponded to withdrawal statistics, which revealed a higher percentage of young minority males withdrawing from online courses.

Keywords: Attrition, diversity, engagement, first-generation, gender, learning community, online, orphan, race, retention, social presence

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Perceptions of the Persistent: Engagement and Learning Community in Underrepresented Populations

Through a FIPSE grant, the U.S. Department of Education funded the National Research Center for Distance Education and Technological Advancements (DETA) at the University of Wisconsin-Milwaukee to conduct cross-institutional data collection with 2-year and 4-year institutions of higher education. The objective of the DETA Research Center was to promote student access and success through evidence-based online learning practices and technologies. The local study aligned most closely with DETA's Study #3 research question, "*Which social and academic interactions can increase underrepresented student success in an online course?*"

Challenged to find ways to better engage online learners and improve retention, a study was designed to characterize student perceptions of engagement and learning community in relation to success (grades). Demographic, success, and withdrawal data were paired with the survey data to generate a holistic view of the online population. The subpopulations of interest were characterized by gender, age, race/ethnicity, disability, first-generation in college, Pell Grant eligibility, and orphan. The purpose of the study was to establish a baseline from which future instructional design and retention efforts could be compared.

Review of Related Literature

Engagement

Engagement is a broadly researched topic in education due to its impact on academic success and its malleability (Carini, Kuh, & Klein, 2006; Fredricks, Blumenfeld, & Paris, 2004). Csikszentmihalyi's "flow" theory (1990) describes the ultimate engagement as a state of "flow" in which students are so intensely involved in an activity that nothing else seems to matter. At the other end of the spectrum, withdrawal from the academic institution exemplifies the ultimate disengagement. Academic engagement has a long history of research support in terms of thinking deeply and staying focused, as Chickering and Gamson (1987) so succinctly stated, "Time plus effort equals learning." The social aspects of engagement became integrated with academic aspects through the work of Astin (1984) and Tinto (1997) among others. Drawing from the K-12 literature, engagement has been deemed a multidimensional construct including behaviors, emotions, and cognitions (Appleton, Christenson, & Furlong, 2008; Fredricks, et. al., 2004, 2016; Wang & Holcombe, 2010). *Behavioral engagemen*t includes participation, effort, persistence, and attention. *Emotional engagement* includes a sense of belonging, positive or negative feelings about the instructor, peers, the course, or the institution. The need to belong is a fundamental human motivation. "Key self-esteem processes, such as relatedness, are hypothesized to have energetic functions; they are considered catalysts for engagement or disaffection. Engagement is a key construct in motivational models because it is considered a primary pathway… to learning" (Furrer & Skinner, 2003, p. 149). *Cognitive engagement* includes self-regulated learning, deep learning strategies, and exerting oneself to grasp complex ideas.

One of the most recognized measures of engagement in higher education is the National Survey of Student Engagement (NSSE, Kuh, 2001). The NSSE instrument assesses five key educational practices that support engagement, including

- Academic challenge
- Active and collaborative learning
- Student interactions with faculty
- Enriching educational experiences
- Supportive campus environments

As summarized by Kuh (2008, p. 542), "Student engagement represents both the time and energy students invest in educationally purposeful activities and the effort institutions devote to using effective educational practices." Thus, engagement can be viewed from both institutional and course-level perspectives.

Considering course-level engagement, Joosten (2015) adopted a systems perspective to characterize the impact of several input variables on engagement, learning community, and other social and communication processes in the classroom. Students attributed the key input variables to be instructional design (42%), instructional support (22%), and assessment and evaluation (15%). Regarding learning community, students identified assessment as most significant (27%). "It is clear that assessment and evaluation... may be greatly overlooked as having significant impact on predicting course communication, specifically media richness, social presence, and learning community" (Joosten, 2015, p. 52). Both engagement and learning community contributed to students' perception of learning. Joosten's descriptive model is depicted in Figure 1 (Joosten, 2015, p. 69).

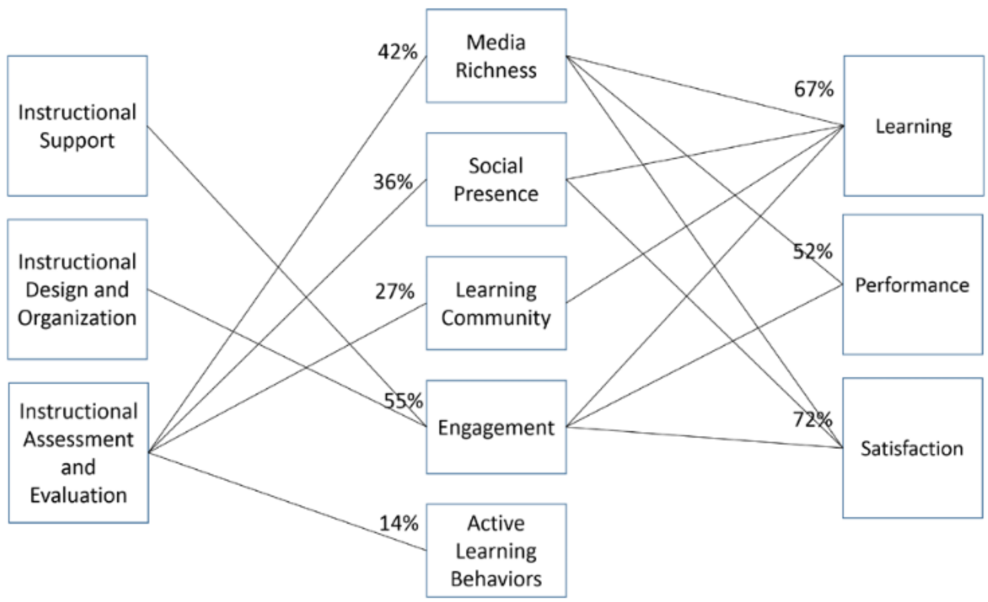

Figure 1. Systematic view of classroom academic and social processes

Learning Community

Tinto (1997) and Rovai (2002) emphasized the importance of community in reducing attrition through feelings of connectedness and shared learning, which motivated learners to persist. "The broader process of academic and social integration can be understood as emerging from student involvement with faculty and peers in the communities of the classrooms" (Tinto, 1997, p. 617). Whereas Tinto's work focused on the face-to-face community college classroom, Rovai focused on the possibilities of establishing effective virtual learning communities. To this end, Rovai (2002) described seven factors that affected the development of a virtual learning community: Dialogue versus instructor-controlled conversation, social presence (defined as "...a measure of the feeling of community that a learner experiences in an online environment" (Tu & McIsaac, 2002)), social equality (everyone has a voice), small group activities, group facilitation by the instructor, learner-centered teaching, and optimal community size (20-30 students in a class with active discussions).

Angelino, Williams, and Natvig (2007) and Liu, Gomez, and Yen (2009) recommended beginning courses with "icebreaker" activities to stimulate conversation, incorporating introduction discussion posts, and using group projects to develop a sense of community. They posited that once social connections were formed, learning could occur. "Clearly the path to student engagement… is not about the type of activity/assignment but about multiple ways of creating meaningful communication between students and with their instructor - it's all about connections," said Dixson (2010). Johnson (2011) and Arbaugh (2002) found gender differences in online course communication patterns (females communicated more than males and formed more social networks), but performance was gender neutral. Tsai, Liang, Hou, & Tsai (2015) found females adapted better to online discussions than males, whereas males participated more actively than females in face-to-face classroom discussions.

Garrison, Anderson, and Archer developed the Community of Inquiry model in 2001. "An interactive community of learners is generally considered the *sine qua non* of higher education," (Garrison & Cleveland-Innes, 2005, p. 135). The three domains of the Community of Inquiry are cognitive presence, social presence, and teaching presence. From the student perspective, these can be viewed as interaction with content, interaction with peers, and interaction with the instructor (Garrison, Anderson, & Archer, 2001; Moore, 1989).

Retention

Models of Retention. Tinto (1993, 1997, 2006) described the "complex web of events" that impact student retention and the uphill challenge institutions faced to improve this metric in light of diminishing resources. Tinto's initial work described only the traditional, four-year, residential situation, but his later work developed the complex web to include cultural, economic, social, and institutional forces segmented by institution type (2-year, 4-year, residential, non-residential). First year involvement was deemed critical, yet it was unclear how best to operationalize engagement, although research supported the development of learning communities and emphasized the importance of faculty involvement in the process (Tinto, 2006). Full implementation of effective programs included faculty ownership of student retention and assignment of more experienced faculty to the critical freshmen courses.

Bean and Metzner (1985) created a theoretical model to explain the forces impacting the nontraditional student's decision to drop out. The nontraditional student was defined as *not* 18-24 years of age, *not* residential, and *not* full time. These forces included low grades, psychological factors (e.g. goals, stress, satisfaction), background factors (e.g. past academic performance, demographics), and environmental factors (e.g. hours of employment, finances, family responsibilities, ability to transfer). "The chief difference between the attrition process of traditional and nontraditional students is that nontraditional students are more affected by the external environment than by the social integration variables affecting traditional student attrition" (p. 485).

Rovai (2003) synthesized the persistence models of Tinto (1993) and Bean and Metzner (1985) to incorporate the unique needs of online learning students, resulting in a composite persistence model. The unique needs of online students included (1) remote access to institutional policies, procedures, and course catalogs, (2) self-confidence to handle the learning management system and workload, (3) integration into the college and learning community, and (4) remote access to support services including bookstores, library, financial aid, and advising. Rovai (2003) concluded that no simple formula could ensure student persistence, but institutions should strengthen orientation programs and support services for online students, while course design must encourage the building of learning community.

In Braxton, Hirschy, and McClendon (2004), Tinto's persistence model was empirically tested and differentiated between traditional four-year residential and commuter institutions. For commuter institutions, only two of Tinto's thirteen propositions were validated: 1) Student entry characteristics affected the initial level of commitment of the institution, which 2) then affected the subsequent institutional commitment. Braxton, et al. (2004) searched, identified, and advocated nine exemplary retention programs, including a student-led Campus Retention Committee, a college process review, minority outreach programs, a proactive Decision Tree survey to ascertain students' intentions to stay/leave, freshmen support and tracking programs, and undergraduate research programs.

Online versus Face-to-Face. While educators have come to accept equivalency of learning outcomes between online and face-to-face courses, there is widespread belief that online students drop out at a higher rate than face-to-face students (Allen & Seaman, 2015). Explanations for the retention gap include: Online students carry more work and family responsibilities than face-to-face students, thus external factors prove more pressing; online enrollments may be more exploratory than in the traditional university; and online students are completing courses rather than programs, thus appear to be dropping out (Allen & Seaman, 2015; Boston, Ice, & Gibson, 2011; James, et al., 2016). (Note that dropouts must be differentiated from transfer students yet tracking online students across institutions has proven challenging.) Empirical research providing evidence for the greater attrition for online students includes the Xu and Jaggars (2011) study of 323,528 Washington State Community and Technical College students in which fully online students had an 8% lower completion rate than face-to-face students. Interestingly, hybrid student completion rates were equivalent to face-to-face.

There is further evidence that hybrid students are retained more than face-to-face and online students. After controlling for background factors, Shea and Bidjerano (2014) found that community college students who took some of their early courses online were more likely to attain their degree than students who took exclusively face-to-face classes (N>18,000). One conceptual possibility used to explain the success was "transactional adaption" of the institution to provide choice, flexibility, and convenience through online learning to nontraditional students (Shea & Bidjerano, 2014, p. 110). Similarly, in a large study across fourteen institutions in the Predictive Analytics Reporting (PAR) Framework (N=656,258), James, et al. (2016) provided empirical support for improved retention through blended and online coursework throughout a student's program.

Demographic Factors. Research has yielded mixed results regarding the influence of demographic factors on retention. Park and Choi (2009) concurred with Aragon and Johnson (2008) and Willging and Johnson (2004) that demographics (age, gender, race, and educational level) were not primary influences. Park and Choi (2009) stated relevance and family and organizational support were the most important factors influencing adult learners to persist. Other researchers found demographic factors to have significant influence on the online student's decision to persist or dropout. James, et al. (2016) found older online students were retained at higher rates than younger online students. Packham et al. (2004) found that older working students were more likely to withdraw from online courses and sometimes lacked realistic expectations of the work involved. Levy (2007) found educational level to be a factor, but not age or gender. In a large (N=40,000), five-year study of students enrolled in 34 community and technical colleges in Washington state, Xu and Jaggars (2013) found White women were more likely to successfully complete online courses and that young Black males with lower incoming GPAs were more at risk. This finding was consistent with traditional retention statistics, but the performance gap was thought to widen by the additional challenges associated with online learning.

Purpose of the Study

Challenged to find ways to better engage learners in online courses, a study was designed to characterize student perceptions of engagement and learning community in relation to success (grades) within the online student population. The purpose of the study was to establish a baseline from which future instructional design and retention efforts could be compared. The research hypotheses include:

H1: Online student success (grade) will be related to student perceptions of engagement and learning community.

H2: The relationship between online student success (grade) and student perceptions of engagement and learning community will vary across subpopulations (age, gender, race/ethnicity, disability, Pell grant eligibility, first-generation, orphan).

Methods

Participants

The participants came from a public four-year institution with a headcount of 15,076 students in Spring 2016. The institution was founded as a community college and now offers four-year degrees. In 2016, the institution awarded 2102 associate degrees and 278 bachelor's degrees. The college has a robust online program, and in Spring 2016, approximately 3000 students were fully online, a 10% increase over the previous year. In Spring 2016, online enrollments accounted for 22% of all enrollments.

Enrollment and withdrawal demographics are compared in Table 1. The online student population has a higher percentage of older, White females who are part-time students. Withdrawal rates were higher for online students than face-to-face students in Spring 2016. Total online courses enrollments were 9716 at the close of the term following 868 withdrawals (8.9%). In contrast, face-to-face enrollments totaled 33,844 and withdrawals totaled 1,904 (5.6%). Minority males disproportionately withdrew from both face-to-face and online courses.

Table 1.

Demographic and Withdrawal Characteristics of Overall Face-to-face and Online Enrollments

Spring 2016 Data	Criteria	Total Student Population	Face-to-face Enrollments*	Face-to-face Withdrawals	Online Enrollments	Online Withdrawals
Total		**15,076**	**33,848**	**1904** **5.6%**	**9716**	**868** **8.9%**
Gender	Female	9240 61%	20,308 60%	1013 54%	6621 68%	529 61%
	Male	5794 39%	13,540 40%	869 46%	3095 32%	335 39%
Average Age	<=24 yrs	71%	75%	75%	55%	58%
	>24	29%	25%	25%	45%	42%
Student Status	Full time	32%	34%	40%	23%	37%
	Part time	68%	66%	60%	77%	63%

Table 1. (cont.)

Demographic and Withdrawal Characteristics of Overall Face-to-face and Online Enrollments

Race	Hispanic	29%	30%	29%	23%	28%
	Amer Indian/Nat Alaska	<1%	<1%	<1%	<1%	<1%
	Asian	2%	2%	2%	2%	1%
	Black/Afr Amer	11%	12%	16%	9%	13%
	Nat Haw/Pac Isld	<1%	<1%	<1%	<1%	<1%
	White	50%	48%	47%	57%	53%
	Two +	2%	<1%	2%	2%	2%
	Unknown	6%	1%	5%	6%	4%

* Face-to-face enrollment demographics were estimated based on face-to-face demographics.

Table 2 identifies the number of Early Alerts processed during Spring 2016 for face-to-face and online students. The Early Alert system is an established intervention system to support at-risk students. A lower percentage of online withdrawals passed through the Early Alert system as compared to face-to-face withdrawals and, of those, only 22% persisted and passed their courses. The primary reasons for online withdrawals were personal (39%), academic difficulty (22%), employment (20%), health (11%), and instructor (3%). The primary reasons for face-to-face withdrawals were slightly different: Personal (45%), academic difficulty (18%), employment (16%), instructor (8%), and moving out of local area (3%).

Table 2.

Withdrawal and Early Alert Data, Spring 2016

Modality	**Criteria**	**Count**	**Percent**	**Reasons/Outcomes**
Face-to-face	Enrollments	33,844	78%	
	Number of withdrawals	1904	5.6%	Reasons: 45% personal, 18% academic difficulty, 16% employment, 8% health, 8% instructor
	Number of Early Alerts as percent of withdrawals	506	27%	For the 506 Early Alert students, 130 withdrew or dropped, 110 persisted and passed, and 266 persisted and failed.
Online	Enrollments	9716	22%	
	Withdrawals	868	8.9%	Reasons: 39% personal, 22% academic difficulty, 20% employment, 11% health, 3% instructor
	Number of Early Alerts as percent of withdrawals	198	23%	For the 198 Early Alert students, 62 withdrew or dropped, 43 persisted and passed, and 93 persisted and failed.

Instrumentation

From the pool of question sets provided by the DETA Research Center, two measures comprised of Likert response options were chosen: One measure operationalized engagement and another operationalized learning community (see Appendix A). An exploratory factor analysis (EFA) was applied to half of the collected survey results, then a confirmatory factor analysis (CFA) was applied to the other half. Based on EFA results, three engagement items did not factor well onto the measure and were therefore removed (questions #1, 16, and 17, see Appendix A for item wording). After running the CFA, learning community questions #1 and 8 were also removed and engagement question #9 was moved into the learning community set, because it aligned with the learning community component. Varimax rotation was applied to diversify the loadings on each factor as much as possible. The resulting two components—Engagement and Learning Community—clearly emerged, accounted for 67% of the variation, and were used for all analyses in this report.

Reliability measures for the two sets of Likert questions showed strong internal consistency as shown in Table 3.

Table 3.

Reliability Measures for Engagement and Learning Community Likert Questions

Question Set	# Questions	Mean	Standard Deviation	Cronbach's Alpha
Engagement	16	63	14	0.962
Learning Community	8	26	7	0.876

There were three qualitative questions included in this study, but only the third one was analyzed: *"How does your interaction with the course materials or other individuals in the class influence your success?"*

Measures

The research hypotheses include:

H1: Online student success (grade) will be related to student perceptions of engagement and learning community, after accounting for known demographic confounders of student outcomes (see Figure 2).

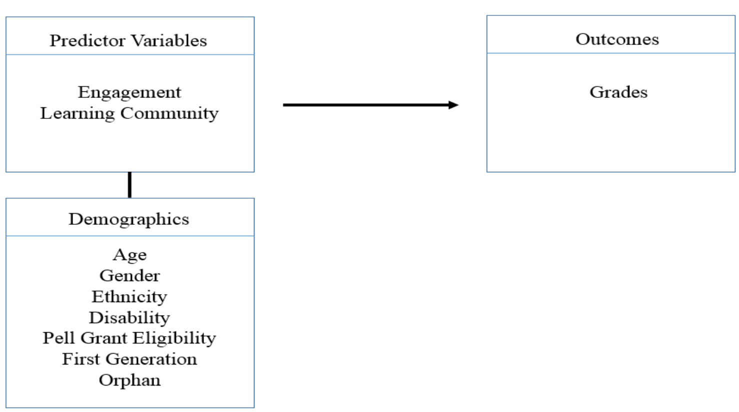

Figure 2. The general research model for Hypothesis 1.

H2: The relationship between online student success (grade) and student perceptions of engagement and learning community will significantly vary between underrepresented populations and their more privileged counterparts (age, gender, race/ethnicity, disability, Pell grant eligibility, first-generation, orphan) (see Figure 3).

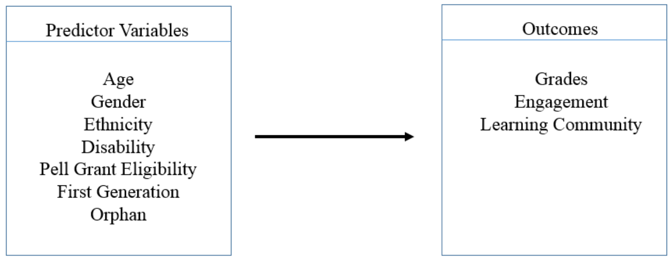

Figure 3. The general research model for Hypothesis 2.

Predictor variable definitions are detailed in Appendix B.

Procedures

After receiving Institutional Review Board approval to conduct the study, the survey instrument was converted to a Qualtrics® survey, online faculty were notified, then the instrument was manually inserted into upcoming modules within all online courses. The survey ran for two weeks. The survey was voluntary, took about 20 minutes to complete, and data were centrally collected on the Qualtrics® server. At the end of the term, the Institutional Research team merged demographic and success data with the survey data, de-identified students, and returned the data to the author. The de-identified data were uploaded to the DETA National Research Center to contribute to the national study. In addition, local analyses were conducted to explore the relationships between success and perceptions of engagement and learning community within the groups of interest.

Data Analysis

All quantitative data analyses were conducted in SPSS 24.0. An alpha level of 0.05 was used for all significance tests in this study. For the post hoc univariate tests following MANOVA, an alpha level of 0.015 was used.

Of the 933 surveys collected, incompletes and duplicates were removed to yield 643 results. Frequency distributions of age, grades, engagement, and learning community scores were generated, as were regression plots of grades, engagement, and learning community combinations. To address Hypothesis 1, hierarchical regressions were run to statistically control for known demographic confounding factors on student grades. This allowed the analysis to investigate the unique associations between student-perceived engagement and sense of learning community. To address Hypothesis 2, MANOVAs were generated to honor the complexity of factors impacting grades, engagement, and learning community. MANOVAs allowed for the simultaneous investigation of between-group differences for underrepresented populations.

Finally, inductive qualitative analysis was conducted on the open response question, *"How does your interaction with the course materials or other individuals in the class influence your success?"* Responses were grouped, then the groups were organized into themes according to the method of inductive content analysis (Elo & Kyngas, 2007).

Demographic data are summarized in Table 4 for the overall sample population, and for each subpopulation. Highlights include the greater age of orphan and first-generation subgroups, the greater full-time employment and part-time student status of the orphan subgroup, the language challenge for the first-generation + minority subgroup (36% report English as a second language), and the higher engagement of orphan and first-generation subgroups. Men and students with disabilities scored lower in engagement. Grades were generally consistent across all subgroups.

Table 4.

Demographic Data for Online Students

Spring 2016 Data	Criteria	Sample Population	Female	Male	First Gen	First Gen Minority	Second Gen	Disability	Orphan
Total		**643**	**495**	**146**	**235**	**22**	**293**	**16**	**19**
Gender	Female	77%	100%	-	79%	79%	85%	69%	95%
	Male	23%	-	100%	21%	21%	15%	31%	5%
Age	Average	29	30	29	31	25	26	27	39
	<=24 yrs	47%	46%	50%	28%	77%	28%	44%	11%
	>24	53%	54%	50%	72%	53%	72%	56%	89%
Student Status	Full time	36%	36%	36%	43%	45%	41%	44%	11%
	Part time	63%	64%	64%	57%	55%	59%	56%	89%
Work Status	Unemployed	21%	21%	18%	17%	19%	23%	75%	16%
	Part-time	28%	28%	23%	30%	30%	30%	25%	11%
	Full-time	48%	43%	53%	51%	51%	51%	6%	68%
Marital Status	Single	57%	56%	60%	56%	64%	67%	69%	37%
	Married	28%	28%	29%	33%	32%	30%	13%	37%
	Separated	2%	2%	2%	3%	5%	1%	0%	0%
	Divorced	8%	9%	2%	7%	0%	10%	19%	26%
Race	Hispanic	23%	22%	25%	25%	9%	25%	37%	11%
	Amer Indian/Nat Alaska	<1%	<1%	<1%	<1%	9%	1%	0%	0%
	Asian	2%	2%	1%	<1%	14%	2%	0%	0%
	Black/Afr Amer	8%	8%	8%	5%	77%	10%	6%	16%
	Nat Haw/Pac Isld	0%	0%	0%	<1%	0%	<1%	0%	0%
	White	52%	54%	47%	52%	0%	55%	69%	63%
	Two +	2%	2%	2%	2%	9%	1%	6%	0%
	Unknown	13%	12%	16%	13%	0%	14%	0%	11%
Orphan	Yes	3%	4%	<1%	2%	9%	4%	6%	-
Pell Grant	Yes	61%	62%	60%	85%	64%	62%	75%	53%
English	Yes	84%	85%	81%	85%	64%	89%	88%	95%
Success	Yes	94%	94%	92%	92%	91%	94%	95%	95%
GPA		3.2	3.2	3.2	3.2	3.0	3.2	3.0	3.0
Engage		73	75	69	75	77	73	69	76
Learning Community		28	28	26	29	29	28	27	28

Results

Characterization of Data: Frequency Distributions

One of the more striking aspects of the sample population was the gender imbalance (77% female). The average online student was 29 years of age in contrast to 24 years for the total student population (Figure 4). Based on a grade scale of 0 to 4, Figure 4 shows that final grades were non-normally distributed, with skewness of -1.480 (SE = 0.097) and kurtosis of 1.817 (SE = 0.193). The average grade was 3.24+/-1.026.

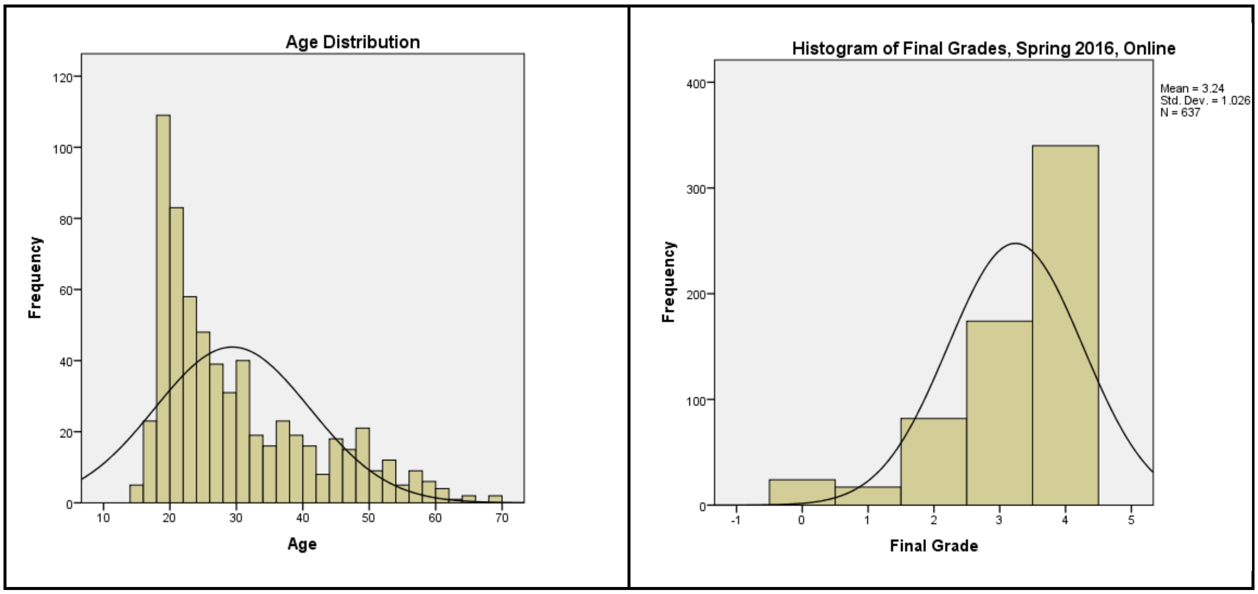

Figure 4. Age and grade distributions for total sample population

Hypothesis Testing

Hypothesis 1. Hierarchical regression analysis was used to examine Hypothesis 1 for the total sample population. Hierarchical regression involves introducing predictors into the analysis on a theoretical basis (Petrocelli, 2003). Because demographic characteristics are known mediators of the relationships between grades, engagement, and learning community, these were entered as Tier 1 independent variables. The “static” demographic factors included age, gender, race/ethnicity, physical disability, Pell Grant eligibility, first-generation, and orphan. This allowed for the evaluation of the pure effect of the “dynamic” and continuous variables of engagement and learning community on grades over and above the demographic mediation (Petrocelli, 2003).

Engagement. Grades were plotted versus mean engagement scores in the left panel of Figure 5. For all students, a statistically significant difference in grades was observed according to student perception of engagement ($F_{4, 537} = 4.560$, $p<.001$; $R^2=0.022$; $\eta^2=0.033$).

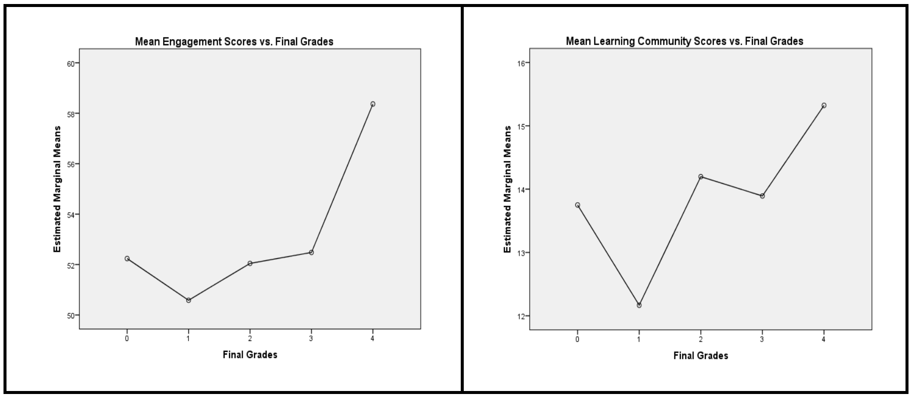

Figure 5. Mean engagement and learning community scores vs. grades.

Learning community. Grades were plotted versus mean learning community scores in the right panel of Figure 5. For all students, a statistically significant difference in grades was observed according to student perception of learning community ($F_{4,\ 516}$= 5.845, $p<.001$; $R^2=0.028$; $\eta^2=0.044$).

An interesting uptick in engagement and learning community scores occurred for failing students and accounted for the low R^2 values. The uptick is a hopeful sign that faculty were reaching out to struggling students.

Regression of engagement versus learning community scores. Student perceptions of engagement and learning community were strongly correlated ($R^2=0.459$; $p<.001$). The average engagement score was 63 +/- 14 and the average learning community score was 26 +/- 7.

Hierarchical regression analysis. Table 5 provides the results of hierarchical regression analysis across three models. For all models, the dependent variable is grades, which were categorical in nature (A to F). Model 1 is a simple regression of engagement and learning community scores on grades to establish an association between our focal independent variables and student outcomes (grades). Model 2 controlled for demographic factors in Tier 1 and entered engagement and learning community scores in Tier 2, which allowed for testing of the effects of engagement and learning community scores on grades above and beyond the variability due to demographic factors. Because there was a theoretical basis for learning community to be incorporated into the engagement term as the "social" aspect of engagement (Fredricks, et al., 2004, 2016), Model 3 placed the *sum* of engagement and learning community in Tier 2 (relabeled "Total Engagement"). Model 3 omitted the concern of collinearity between engagement and learning community by creating one measure. Motivation for using Model 2 originated from the factor analysis which showed engagement and learning community to be independent ideas (Table 3).

Table 5.

Summary of Hierarchical Regression Analysis for Variables Predicting Final Grades (N=514)

	Model 1			Model 2			Model 3		
Variable	B	SE(B)	β	B	SE(B)	β	B	SE(B)	β
Control Variables									
Age									
Gender									
Race/Ethnicity				-.355	.102	-.163**	-.366	.101	-.169***
Disability									
Pell grant eligibility									
First-generation				-.204	.093	-.102*	-.203	.093	-.101*
Orphan									
Key Independent Variables									
Engagement	.007	.003	.103*	.008	.004	.114*			
Learning Community	.031	.014	.112*	.026	.015	.096			
Total Engagement = Engagement + Learning Community							.011	.003	.179***
Adjusted R^2	.032			.058			.058		
F for ΔR^2	4.762*			7.877***			14.736***		

For all models, Hypothesis 1 was supported, meaning student perceptions of engagement and learning community were positively correlated with final grades. Comparing Model 1 to Models 2 and 3, it was apparent that demographic factors were significant in accounting for some of the variability in grades. The demographic factors that emerged as significant were race/ethnicity and first-generation, and these had a negative effect on grades. The overall contribution of demographic factors to grade variability was 2.1%. In both Models 2 and 3, student perceptions of engagement and learning community were significant in accounting for an additional 3.2% of the variability in grades for a total of 5.8% ($p<.001$).

Hypothesis 2: Subpopulations.

MANOVA was used to explore differences across subpopulations with respect to engagement scores, learning community scores, and grades. MANOVA was run twice, first using Model 2 with the dependent variables of grades, engagement, and learning community; then again using Model 3 with dependent variables of grades and total engagement. Results were similar; Model 3 results are reported below.

In Part 1 of the MANOVA analysis, multivariate MANOVA was used to characterize differences between grades and total engagement scores across the underrepresented populations. MANOVA takes into account all demographic factors simultaneously, including the intercorrelations between them. Box's test of equality of covariance matrices failed as expected due to the known non-normality of grade distributions (Box's M = 174, $F(93,3779)=1.552$, $p<.001$).

In Part 2 of the MANOVA analysis, univariate tests were run for each of the independent variables showing significance in Part 1, with the tightened alpha value of 0.015. Post hoc Levene's test of equality of error variances passed for total engagement ($F(41, 398)=1.034$, $p>.005$) and, as expected, failed for grades ($F(41, 398)=1.750$, $p<.005$).

Table 6.

Demographic Factor Results of Multivariate MANOVA Analysis and Univariate Tests for Independent Variables Showing Significance. Demographic factors evaluated: Age, gender, race/ethnicity, disability, Pell grant eligibility, first-generation, orphan.

Independent Variable/ Dependent Variable	**Wilk's λ**	**F(2, 432)**	**Means +/- SE**
Age	.984	3.475*	
Total Engagement		6.345**	65.6 +/- 2.3
			69.5 +/- 2.3
Race/Ethnicity	.963	8.295***	
Grades		8.732***	3.3 +/- .14
			2.9 +/- .15
Total Engagement		5.086***	65.7 +/- 2.2
			69.4 +/- 2.4
Disability	.985	3.322*	
Total Engagement		6.519**	72.9 +/- 1.0
			62.2 +/- 4.1

To summarize the MANOVA results, a two-way MANOVA revealed a significant multivariate main effect for age, race/ethnicity, and disability. Given the significance of the overall test (adjusted R^2=0.917 for grades and adjusted R^2=0.954 for engagement), the univariate main effects were examined. Significant main effects for minority were obtained for grades and total engagement. Significant main effects for age and disability were observed with respect to total engagement. These results support the hypothesis that engagement and learning community influence grades irrespective of demographic factors; however, some demographic factors stand out: Hispanic and Black students were more engaged than Whites but earned lower grades. Younger students and students with disabilities were less engaged than their counterparts but earned equivalent grades.

Qualitative Analysis

Students were asked an open response question: "How does your interaction with the course materials or other individuals in the class influence your success?" This question aligns to Moore's (1989) segmentation according to interaction with content, interaction with peers, and interaction with instructor.

Content. With respect to the nature of the course materials, students noted that interacting with multiple types (i.e., media, reading materials, and web-based learning tools) resulted in increased understanding of course concepts. Students also discussed conditions they believe contributed to their success, including course organization, clear expectations, consistency among course materials and alignment between course materials and learning outcomes. Older students placed a significantly greater emphasis on learning from course materials than did younger students as measured by frequency of course material codes (33% vs 24%).

Time spent interacting with content. Students perceived that time spent interacting with course materials significantly impacted their success such that more time is associated with greater success: "The more interaction and time spent online regarding the class, the more successful I am." Indeed, students reported that time spent reviewing the material resulted in an increased understanding. One student asserted that "more time with the material will ensure [their] success." Unfortunately, some students reported that time restraints (e.g., work obligations) "limit[ed] [their] ability to fully take in the material and interact." One student stated that "I wish I could be more involved but with my work schedule it is hard to be more involved."

Interaction with multiple types of materials. Students reported that interacting with multiple types of materials (i.e., media, reading materials, and web-based learning programs) increased their understanding of course concepts. Media, especially videos and PowerPoint presentations, were described as both enjoyable and helpful. One student stated, "I enjoyed the presentations. It put everything into an easier concept to grasp." Another student stated, "Watching all the video instruction helps with interaction and MasteringChemistry®." Beyond increased understanding, it appeared that PowerPoint presentations and videos contributed to a sense of "being in a classroom."

Many students reported that reading was significantly correlated with their success in the course. Some indicated that textbooks were crucial to learning: "Reading teaches me 95% of the course material." Some students expressed dissatisfaction about the importance of reading in relation to their learning: "There is no teaching done by any professor yet in this program, all learning must be done by reading the text and the professors are merely 'graders' who grade assignments."

In addition to media and reading materials, a few students reported interacting with web-based learning programs. One student mentioned the learning benefits of having access to an interactive course on how to program (i.e., Codeacademy, https://www.codecademy.com/): "Codeacademy [made] it easier for me to understand this course, allowing me to further progress through this course without any major problems." Another student found McGraw-Hill Connect®, an adaptive learning assignment and assessment platform, increased understanding of course concepts.

Course organization and clear expectations. Students wrote that course organization, including organization of course materials, was important to success in their course. One student reported that they were "successful in [their] class so far because [the] course materials are organized and laid out for [them] so there is no confusion about what [they] have to do." "Assignments that stay in a flow or specific pattern" was also found to be helpful. Students reported that clear expectations significantly contributed to their success. One student asserted that clarity in instructions for assignments influenced their success while interaction with others did not: "The interaction with others does not [affect] my success. The material provided and instructions for assignments [are] clear and therefore [do] impact my success."

Consistency and alignment with learning outcomes. Students reported that course materials were most beneficial when there was consistency among course materials and alignment with learning outcomes. One student noted, "The course materials are a great influence on this course. However, they would be more beneficial if they were relevant to the course and modules themselves." Another student stated that inconsistency between materials and assessments resulted in a lack of learning: "The materials have nothing to do with the homework or the exams. I don't feel like I'm learning anything." In one case, a student relayed anger regarding inconsistencies and contradiction between course materials:

> Course materials, what a joke. Watching three-hour videos that [have] nothing to do with my book is ridiculous. Also, the information in the videos contradicted my

> book, then when taking a quiz, which source was I supposed to use? Why even make us purchase a book?

Interactions with peers. Themes related to interactions with peers revealed that peer interaction is most often associated with success. Students reported that discussions between peers increased their understanding of course concepts. Perspective sharing was reported to increase understanding, encourage open-mindedness, and improve critical thinking skills. A few students also noted that the sharing of perspectives was a particularly enjoyable aspect of the course. In addition, students reported that feedback from their peers was useful and that they felt they could rely on other students for assistance when needed. Also reported was that students found interaction with their peers to be motivating. Although the majority of students noted the benefits of peer interaction, some reported a preference for independent learning and believed that interaction with peers did not influence their success in the course.

Discussions increased understanding of course concepts. Students reported that discussions with peers often increased their understanding of course concepts: “I learn and discuss with others, which is very conducive to my success.” Students indicated that many conversations occurred on discussion boards. One student wrote that “reading other students’ questions and answers in the discussion boards helps me understand the material better at times.” Another student found the discussion boards helpful because they could read how other students worded their understanding of course materials: “The interaction with the students in the discussion boards influences my success because it sometimes gives me a better understanding of the reading material in another student’s words.” Some reported that discussions “helped [them] when the book [did] not” and that “students [brought] up subjects relating to [the] course to shed more light on the text.” Although the majority of discussions appeared to take place on discussion boards, one student noted that they “seem to learn better and [are] even more successful when there is live interaction and opportunity for discussion live.”

Discussions provided multiple viewpoints. Students reported that they valued discussions with their peers because it provided them with multiple viewpoints. Some reported that the availability of multiple viewpoints provided them with additional insights into the material: “Upon reading others’ responses to discussions, it sometimes [gave] me a different perspective or an insight into something that I was unaware of.” Other students indicated that multiple viewpoints helped them to think critically about the topic at hand: “The discussion boards are great because I can see how other people interpret the assignment and it makes me think harder.” One student indicated that discussions with their peers was the most important contributor to their success:

> The replies to the discussion posts are what most influenced my success. Not every student agrees on the prompt and doing the replies helps me to think critically about my own point of view and the points of view of others.

Many students wrote that peer discussions that allowed for the sharing of multiple viewpoints helped them to “become more open-minded” and “grow as a person.”

Peer feedback reported to be helpful. Many students indicated that they found feedback from their peers to be helpful: “Interacting with other individuals gives feedback and constructive criticism to be more successful in [mine] as well as their work.” They noted that peer feedback provided them with new ideas and that “you really learn from each other.” One student reported valuing peer feedback even though they do not enjoy interacting with other students: “I personally do not like having to keep in contact with other students, but the feedback from them is sometimes helpful."

Peers viewed as reliable "helpers." Some students viewed their peers as available to them in case they needed help: "I feel that we can contact each other if needed." One student stated that their peers helped them when they were having difficulties with assignments: "They really provided helpful assistance for me while I was struggling with some of the [assignments]." Similarly, another student reported that other students help them "to understand the material we are working on." In general, students reported that "there are others who can help you and have your back" and "if we do not understand, we can always help each other."

Interactions with peers described as motivating. Many students reported that they found interactions with their peers to be motivating. Some students indicated that their motivation was derived from not wanting "to be the student who does the bare minimum." Most others, however, found their interactions with peers to be encouraging. One student wrote that "getting a response from others is encouraging" while another reported that "seeing how the other students respond to the material drives [them] to better [themselves]."

Preference for independent learning. Although many students found feedback from their peers to be beneficial, some reported that they prefer "to learn independently and do not require feedback from [their] peers." These students tended to believe that they are more successful if they are able to work alone. One individual stated, "I am an independent learner, I really need time with the materials to absorb and comprehend information."

Interaction with peers did not influence success. Although many students found that discussions with peers were beneficial, some believed that peer interaction had no bearing on their success in the course unless it was required. One individual stated, "Interaction with the class does nothing to influence my success." Contrary to some findings, a few students reported that group discussions were not helpful and "contribute[d] nothing to the learning process." Some viewed the instructor as the primary influencer of their success, while others reported that it was their own ability to teach themselves the course materials and complete assignments. One student reported that they "do not speak to individuals in [their] online classes unless it is necessary." Indeed, one individual wrote, "I am the only one that influences my success."

Interactions with instructor. Students felt connected to the instructor through assignment feedback, class announcements, emails, and discussions. The majority of students had positive interactions with their professors and appreciated the feedback and support. A minority of students felt disconnected because the instructor was not responsive to emails, did not provide any feedback on assignments, or was out of sync with the course schedule.

Instructor feedback increased success. Many reported that timely feedback from their instructor was critical to their success. Students indicated constructive feedback was the primary way in which their instructors aided their performance and enhanced their motivation to succeed. One student boldly stated, "The professor's feedback makes or breaks the class." Another student commented:

> I like when the professor leaves comments about my assignments that are not generic like, "Good work." It makes me feel like they actually read my work and truly appreciated it. Even if it is constructive criticism it feels like they're treating my work like I am a real person and not just another name in the gradebook.

Delays in response and a lack of helpful feedback were described as inhibiting motivation:

> Well my interaction with the teacher influences my success. If the teacher is responsive and gives good feedback, I strive to do better and continue. When the teacher takes a long time to respond, or her answer does not completely answer my question, or the feedback is only "Nice Work" but I got a B, and there is nothing telling me what I could have improved on, then I feel less inclined to work harder. If the teacher doesn't give a damn, why should I?

Beyond the quality and timeliness of feedback that their instructors offered, students reported that regular interaction is key to maintaining motivation to succeed.

Discussion

Overall Model

Engagement and learning community perceptions were strongly correlated, thus supporting the importance of social connections within the engagement construct (Fredricks, 2004, 2016; Kuh, 2001, 2008; Tinto, 1997, 2006). Although factor analysis showed engagement and learning community to be separate ideas (Appendix A), the questions from the DETA engagement survey encompassed primarily emotional and cognitive engagement prompts and the one question that had social elements (#9) crossed over to learning community in the factor analysis. The significance of the three aspects of engagement—emotional, cognitive, and behavioral—has been strongly supported in K-12 environments (Appleton, et al., 2006, 2008; Fredricks, et al., 2004, 2016). This study summed student perception of engagement and learning community scores into a multidimensional independent variable called *total engagement* and, when regressed against grades (after controlling for demographic variability), provided strong statistical support for Hypothesis 1, which stated perceptions of engagement and learning community positively contributed to student success (grades). Hypothesis 2 explored whether the relationship between engagement, learning community, and grades varied across demographic subpopulations, specifically age, gender, race/ethnicity, physical disability, Pell Grant eligibility, first-generation, and orphan. The model held true for all subpopulations except these: Younger students and disabled students were less engaged but earned equivalent grades, and minority students were more engaged but earned lower grades.

Retention

In Spring 2016, 8.9% of online enrollments withdrew in comparison to 5.6% of face-to-face enrollments. This is consistent with the 3% difference noted by Xu and Jaggars (2013), and superior to their earlier work (Xu & Jaggars, 2010, 2011) and the Instructional Technology Council's 2015 *Trends in eLearning* report, which states online withdrawal rates are typically eight percentage points higher than face-to-face withdrawal rates (Lokken, 2015). One could conclude from the withdrawal statistics that institutional operations seem to be effective, yet there is room for improvement. Withdrawals occur for myriad reasons, but fundamentally represent inefficiencies and loss of human potential. Hence an effort was made to establish a baseline and withdrawal metric by which future improvements could be assessed. For the withdrawals that did occur, the reasons cited were personal (39%), academic difficulty (22%), employment (20%), and health (10%). The academic difficulty category, which translated to 190 students withdrawing, became the focus for future intervention strategies as described in the Recommendations section.

Demographics

Age. The online student population was older than the overall student population (29 vs 24 years) and older students demonstrated strong statistically significant engagement and learning community scores compared to younger students, which positively affected grades (see Appendix C). On the flip side, older students are reported to carry greater work and family obligations (Park & Choi, 2009), which could negatively affect school retention, but in this case did not affect course retention (Table 1). This is consistent with the motivational study of Stewart, Bachman, & Johnson (2010), who found employed, older learners were more motivated to take online courses and complete their degrees. Withdrawals were greater among younger students, further supporting the idea that older students were more persistent. Both younger and older students acknowledged the significance of peer interactions as contributing to their success; however, older students were much more likely to mention the importance of studying course materials thoroughly.

Race/Ethnicity. The withdrawal data for this one semester at this institution showed a tendency for the online student population to be older, more female, and more White. The same demographic shift occurred in the face-to-face population, but to a lesser extent. Why were young males, particularly young minority males, not persisting? MANOVA results showed younger students were less engaged, which aligned, but minority students were *more* engaged. Why would more engaged minority students withdraw? Recall minority students, although more engaged, earned lower grades. Perhaps this subpopulation accounted for those who withdrew due to academic difficulty. These results are consistent with the work of Xu and Jaggars (2013), who suggested young minority males may be more challenged to *adapt* to online learning and that online learning exacerbates performance gaps that are known to exist in face-to-face classrooms. English language learners were concentrated within the minority subpopulation, and average grades were lower among English language learners, which could prove another contributing factor. The disconnect between success (grades) and the greater engagement of the minority subpopulation is an important area requiring further investigation. For this baseline study, the greater total engagement scores registered for the minority subpopulation were encouraging and perhaps reflect cultural differences as well as effective institutional intervention and outreach programs.

Disability. The sampled population had a small number (N=16) of students requiring accommodation, and of these, the primary disability identified was attentional focus. The disabled subpopulation was 95% successful in course completion, but its mean total engagement score was lower than that of the overall population (73 vs. 62). Future work should seek to identify students using the Office of Adaptive Services and characterize its role in student success.

Gender. Nationally, online student populations registered a 60/40 ratio of female to male (Lokken, 2015). This was confirmed by the institution's overall student population (61/39), but not online enrollments (68/32), and less so by the sampled population (77/23). Perhaps females were more motivated to complete surveys. Considering their higher engagement and learning community scores (Table 4 and Appendix A), females expressed motivation in this and other ways. Some researchers claim a higher social orientation for women translates well to a collaborative online learning environment, whereas others state females value the flexibility of online learning in balance with family and work responsibilities (Aragon & Johnson, 2008; Johnson, 2011). It is important to note that this study showed equal success (grades) for males and females, which is consistent with the literature (Arbaugh, 2000; Johnson, 2011).

Orphan. The sampled population had a small number (N=19) of students self-identifying as orphans. The orphan subpopulation was older than the overall online population (39 years versus 29 years) and was equally successful in terms of grades and completion. The majority of students in this subpopulation was employed full time (68% vs. 48%).

First-generation. The first-generation in college student was older (31 years versus 29 years) and more likely to be awarded a Pell grant. This subpopulation appeared equally engaged as the overall online student population (75 vs 73) and earned equivalent grades (3.1 vs. 3.2). Isolating first-generation minority students, language factors emerged (36% English as a second language versus 15%), yet engagement appeared stronger (77 versus 73). Average grades were lower between the first-generation minority subpopulation and the overall population (2.9 versus 3.2).

Pell grant eligibility. The lack of connection between income and successful course completion in this study was inconsistent with the literature, including the work of Terenzini, et. al. (2001); and Tinto (2007), who stated, “For too many low-income students access to higher education has become a revolving door, the promise of a bachelor’s degree unfulfilled” (p.12). Sixty-one percent of the sampled population was Pell grant eligible, which rose to 85% of the first-generation students and 75% of the disabled students. One explanation for the discrepancy between this study and the literature lies in the definition of income as a self-reported “Pell grant eligible” versus FAFSA-based data.

Recommendations

Since student retention must be the goal of the entire institution, meaningful and relevant retention metrics should be established for individual departments and service units. One meaningful metric might be the ratio of successful credits over attempted credits by subpopulation. This metric is more meaningful for students in degree programs who stay to graduate from the institution. With the fluidity of online learning and state-driven efforts to unify course catalogs, registrar, and advising functions, credit tracking will get trickier at the local level.

Once a meaningful metric is established, pre/post analysis of instructional design experiments and retention initiatives are possible. The following recommendations are focused on course-level engagement and organized according to Joosten’s (2015) systematic model into categories of (1) learner support and (2) instructional design. The multidimensionality of engagement in learning requires both social support and instructional design be addressed.

Learner Support

Learner support will prove particularly important for the younger online student who may not have yet developed the self-regulation skills necessary for online learning and who may not proactively communicate and seek out support. Faculty involvement is key to building learner self-confidence, providing feedback to clarify what the learner does/does not know, and guiding the student to support tools and services.

Support tools can be enhanced: Adding an online readiness survey tool to the college website will help to set expectations for the unique demands of online coursework, requiring learning management system (LMS) orientation for all online students (currently only first-year students are required) will alleviate initial start-up troubles, and building more just-in-time support tools within the LMS will improve the user experience (Rovai, 2003).

As far as support services, the efficacy of current academic support services for online students should be regularly evaluated in comparison to those offered to face-to-face students. Online tutoring, for example, is accomplished through partners such as Tutor.com®, Smarthinking®, and Grammarly®. Academic preparation was unaccounted for in this study but has been shown to play a significant role in success (Xu & Jaggars, 2013). Future work should incorporate prior GPA with Early Alert and tutoring usage into the analysis, especially in relation to those students within the pool of withdrawals due to academic difficulty.

Instructional Design

Aragon and Johnson (2008) surveyed 305 students who withdrew from online community college courses and found 28% of these students attributed poor course design or lack of communication for their decision. This concurs with earlier work by Swan (2001) of 1406 online students in the State University of New York system, in which three course design factors emerged as significant: Clear and simple design, interactions with instructors, and lively discussions. Considering the diversity of academic preparation and skillsets by which primarily nontraditional learners enter the online classroom, and the inherent self-regulation required for online learning, instructional designers face significant challenges. Instructional designers should adhere to research-based approaches such as Merrill's First Principles and Keller's ARCS theory of motivation (Keller, 2009; Merrill, 2002). Both Keller and Merrill recommend capturing attention through a relevant task or problem, demonstrating new concepts, applying to the relevant task/problem with feedback, then integrating into the real world.

Assessment. Joosten (2015, Figure 1) highlighted the importance of assessment in driving classroom conversation, resulting in greater learning community and ultimately impacting students' perception of learning. Instructional design should "begin with the end in mind" and craft authentic assessments as the backbone of the course, about which conversation naturally flows. Adult learners require relevancy, so real-world problem-solving scenarios lend great value.

Formative assessments play an important role in developing mastery in preparation for summative assessments (Bloom, 1968). Regular, low-stakes quizzing has proven effective in clearing up misunderstandings early and enhancing learning (DePaulo & Wilkinson, 2014). Gamification elements such as choice, risk, progress bars, and leader boards could prove useful in formative assessments and appeal to at-risk young males.

Content. Students attributed multiple types of course materials as being important to their success. Reading and media presentations were deemed valuable; students recognized that more time spent with these materials improved their learning. This student feedback was consistent with Universal Design for Learning principles which encourage flexible access to content for use by the wide variety of learners (https://library.educause.edu/~/media/files/library/2015/4/eli7119-pdf.pdf). Future efforts will include adding more direct media-rich instructional content (e.g., narrated Articulates®, OfficeMixes®) in combination with readings. Direct instructional content has the added benefit of increasing instructor presence in the course, which builds a sense of learning community (Garrison, et. al., 2010; Moore, 1989).

Organization of content and alignment with learning outcomes were two aspects deemed important to students while busywork was criticized. Alignment with learning outcomes is consistent with Quality Matters® standards and establishes the framework for effective assessment (https://www.qualitymatters.org/qa-resources/rubric-standards/higher-ed-rubric). An intuitive course structure is more important in online learning environments which requires primarily self-guided work.

Interactives

Peers and instructors. Rovai (2002) found a "positive significant relationship between a sense of community and cognitive learning" (p. 328). Garrison & Cleveland-Innes (2005) cautioned that "simple interaction, absent of structure and leadership, is not enough," identifying the critical role of the instructor to guide discourse (p. 145). This study provided empirical evidence for the importance of discussion boards in support of collaborative learning. Given the wide array of courses sampled, there were undoubtedly varying degrees of instructor facilitation and effective structure. More careful analysis of discussion prompt structure and instructor facilitation would prove an interesting study. When prompts and facilitation are thoughtfully approached, students are more likely to learn through the interaction. Additionally, the effectiveness of media-rich responses could be compared to traditional text-based discussion boards.

Peer review, peer presentations, and group projects are other ways to construct knowledge through learning community. Faculty play an important role in setting the expectation for and facilitating the formation of learning community.

Learning activities. Students valued technology-based learning activities such as those provided by CodeAcademy (https://www.codecademy.com/), Pearson's MasteringChemistry®, and McGraw Hill Connect®. Such content interactives can provide the guided practice essential to the construction of knowledge (Keller, 2009; Merrill, 2002). Institutions should evaluate commercial digital products through the lenses of 1) alignment with learning outcomes, 2) grounding in learning science, 3) depth of tiered feedback, and 4) ease of integration with the LMS. Interactives must advance students achievement of learning outcomes to be worth the investment of time and dollars.

Learning activities provide the student with essential practice of concepts and should be both predictable and varied. Predictability is achieved through consistent requirements, e.g. weekly readings, reading quiz, vocabulary flash cards, and problem sets. This predictability contributes to the intuitive nature of the course. On the flip side, too much predictability can be boring, so periodically varying the form of a learning activity can pique interest. For example, periodically require students to post audio responses to a discussion board rather than text. Finally, wrapping up a learning module with a reflective exercise is best practice to build metacognition and self-regulation skills.

Limitations

This study establishes the characteristics of Spring 2016 online enrollments at a public, 4-year higher education institution and may not be representative of other institutions. Surveys were voluntary and had a return rate of less than 10%. Although inserted into every online course, they were most likely completed by more motivated (either negatively or positively) students. Judging from the preponderance of high grades, more positively motivated students completed surveys, skewing results. Sample population was skewed with a higher percentage of females than the institution's overall online population (77% versus 68%.) Several demographic factors were self-reported, such as income, work, orphan, and marital status. Ideally a baseline would include more than one semester of data. Grades were letter grades and non-normally distributed, which affected the analyses.

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Appendix A

Survey Questions and Rotated Component Matrix Scores

Question Code	Component 1	Component 2	Prompt
ENGAGE6	.863		I was absorbed in the experience.
ENGAGE13	.853		The class held my attention.
ENGAGE15	.850		The class aroused my imagination.
ENGAGE4	.849		I was captivated.
ENGAGE10	.849		Class was fun and exciting.
ENGAGE3	.827		I was engaged in the learning experiences.
ENGAGE5	.813		I felt wrapped up in the experience.
ENGAGE8	.784		The class was an enriching experience.
ENGAGE12	.758		The class kept me totally absorbed in the activity.
ENGAGE7	.712		I was attracted to the learning activities.
ENGAGE18	.693		The class was boring (R).
ENGAGE21	.652		The class was a waste of time (R).
ENGAGE2	.511		The learning activities required me to think critically.
ENGAGE20			The activities were not active (R).
ENGAGE19	.421		I was not engaged in the learning activities.
ENGAGE11	.513		I was willing to put in the effort needed to complete the learning activities.
LRNCOMM3	.470	.508	I developed a personal relationship with my instructor.
ENGAGE9		.636	The learning experiences were active and collaborative.
LRNCOMM4		.686	I was able to communicate sufficiently with others.
LRNCOMM7		.691	I did not develop relationships with my classmates (R).
LRNCOMM5		.698	The learning activities encouraged contact between myself and my classmates.
LRNCOMM9		.706	There was little cooperation in completing assignments with my classmates (R).
LRNCOMM2		.771	I developed personal relationships with my classmates.
LRNCOMM6		.784	My classmates and I cooperated in completing assignments.

Two sets of Likert-style questions were chosen from the DETA Data Kit, one set for engagement and another for learning community. An exploratory factor analysis (EFA) was applied to half of the collected survey results, then a confirmatory factor analysis (CFA) was applied to the other half. Engage questions #1, 16, and 17 were removed based on EFA results. After running the CFA, Learning Community questions #1 and 8 were also removed. Varimax rotation was applied to diversify the loadings on each factor as much as possible. The resulting two components - Engagement and Learning Community - clearly emerged, accounted for 67% of the variation, and were used for all analyses in this report.

Appendix B
Predictor Variable Definitions

	0	1
Age	<= 24 years	>24 years
Gender	Female	Male
Race/Ethnicity	Minority? = No	Minority? = Yes
Disability*: Student response to “Do you have a disability or require special accommodations in class?”	No	Yes
Pell Grant eligible?*	No	Yes
Generation*: Students were asked “What was the highest grade level achieved by your mother/father?”	Not first-generation	First-generation
Orphan*: Student response to “At any time since you turned age 13, were both your parents deceased, were you in foster care, or were you a dependent or ward of the court?”	No	Yes

* indicates self-reported data

Appendix C

Subpopulation Means and ANOVAs

			Engage v Grade						Learning Community v Grade					
			Mean	SD	df	F	eta	p	Mean	SD	df	F	eta	p
ALL			55.55	16.79	4	4.56	0.03	0.001	14.64	3.72	4	5.85	0.21	0.000
	Student Status	Full Time	54.57	16.37	4	1.87	0.34	0.119	14.67	3.76	4	5.47	0.33	0.000
		Part Time	56.07	17.04	4	2.67	0.18	0.032	14.62	3.71	4	2.27	0.16	0.062
	Work Status	Full Time	55.98	16.84	4	0.94	0.66	0.442	15.02	3.66	4	2.24	0.19	0.065
		Part Time	55.09	16.52	4	5.15	0.03	0.001	14.41	3.63	4	3.79	0.31	0.006
		Unemployed	55.35	14.32	3	2.54	0.26	0.066	13.82	3.89	3	0.80	0.20	0.499
FEMALE			56.59	16.42	4	5.86	0.00	0.000	14.90	3.70	4	8.24	0.28	0.000
	Age	<=24yr	53.94	18.11	4	4.41	0.04	0.002	14.64	3.72	4	6.09	0.33	0.000
		>24yr	59.24	14.02	4	2.64	0.19	0.035	15.16	3.67	4	3.24	0.25	0.013
	Marital Status	Single	54.71	17.73	4	3.97	0.06	0.004	14.62	3.84	4	5.49	0.30	0.000
		Married	58.67	14.20	4	3.53	0.09	0.009	15.20	3.67	4	4.90	0.37	0.001
		Separated	64.11	10.15	3	6.23	0.19	0.038	16.67	2.60		1.22	0.65	0.393
		Divorced	60.17	12.06	4	0.32	0.90	0.809	15.14	3.03	4	1.36	0.31	0.271
	Race	White	56.18	16.35	4	6.24	0.00	0.000	14.84	3.75	4	8.70	0.32	0.000
		Hispanic	59.91	13.14	3	4.89	0.08	0.007	14.67	2.84	4	1.20	0.33	0.328
		Black	56.19	20.36	4	2.10	0.33	0.109	15.68	3.68	4	1.00	0.65	0.427
MALE			51.75	17.78	4	0.25	0.95	0.911	13.70	3.68	4	0.55	0.14	0.698
	Age	<=24yr	49.13	17.38	4	0.32	0.93	0.865	13.37	3.98	4	0.38	0.17	0.819
		>24yr	54.70	17.94	4	0.97	0.64	0.416	14.08	3.30	4	1.38	0.29	0.260
	Marital Status	Single	49.85	17.48	4	0.47	0.87	0.755	13.33	3.95	4	0.24	0.12	0.913
		Married	55.53	19.38	4	0.69	0.75	0.567	14.59	3.30	4	0.87	0.28	0.469
		Separated	55.33	8.33	1	0.93	0.72	0.512	13.33	1.16	4	0.33	0.50	0.667
		Divorced	51.33	2.52	1	5.33	0.51	0.260	-	-	4	-	-	-
	Race	White	51.99	17.38	3	0.22	0.94	0.879	13.43	3.94	3	0.42	0.13	0.742
		Hispanic	55.45	15.96	4	0.22	0.96	0.924	14.28	3.55	4	0.43	0.26	0.788
		Black	53.78	22.50	2	0.69	0.73	0.538	14.88	2.70	2	0.41	0.38	0.684
GENERA-TION	First		56.69	16.15	4	3.01	0.14	0.019	14.77	3.76	4	2.49	0.22	0.045
	First & Minority		56.06	17.02	4	1.40	0.50	0.246	14.60	3.45	4	0.55	0.19	0.703
	Second		52.39	16.94	4	3.40	0.11	0.012	14.35	3.59	4	1.21	0.21	0.312
DISABILITY			50.85	15.50	3	1.00	0.65	0.419	13.25	3.04	3	1.21	0.43	0.338
ORPHAN			57.79	18.36	3	4.00	0.17	0.028	14.61	3.27	3	0.43	0.29	0.733
INCOME	<$20K		55.92	15.64	4	2.44	0.23	0.052	14.20	3.96	4	3.55	0.34	0.009
	$20-$50K		56.78	16.16	4	0.57	0.83	0.686	14.77	3.66	4	0.24	0.96	0.237
	>$50K		59.02	15.80	4	0.97	0.66	0.431	15.34	3.61	4	1.37	0.23	0.252

Exploring Design Elements for Online STEM Courses: Active Learning, Engagement & Assessment Design

Baiyun Chen, Kathleen Bastedo, and Wendy Howard
Center for Distributed Learning, University of Central Florida

Abstract
The purpose of this study was to examine effective design elements for online courses in the science, technology, engineering, and mathematics (STEM) fields at a large four-year public university in southeastern United States. Our research questions addressed the influence of online design elements on students' perception of learning and learning satisfaction. An online survey was completed by 537 students from 15 online STEM courses in spring 2016. The survey results indicated that student perceptions of learning and satisfaction were correlated with their perceptions of the efficacy of specific design elements, such as integrated active learning activities, interactive engagement strategies, and robust assessment design. In particular, perception of assessment design efficacy was significantly correlated with students' self-perceived learning and learning satisfaction for students of all subpopulations. The findings inform instructors and instructional designers on how to design effective, inclusive, and engaging online STEM courses. Student survey responses were observed to support universal design for learning (UDL) and in light of this, online STEM instructors are also strongly encouraged to utilize UDL principles in course design, which benefit not only students with disabilities but all students.

Keywords: Active learning; assessment; online courses; online education; online interaction; online learning; online STEM courses; STEM education; student satisfaction, student perception; Universal Design for Learning; UDL

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Exploring Design Elements for Online STEM Courses: Active Learning, Engagement & Assessment Design

The number of enrollments in college courses taught using the Internet has soared over the last ten years and the increase in online courses continues. According to the 2017 report of the Digital Learning Compass, over six million higher education students are taking online courses and 30% of all higher education students now take at least one course online (Allen & Seaman, 2017). At the same time, STEM education has become a national priority (STEM Education Coalition, 2014) and in 2010 President Obama dedicated resources to the advancement of STEM education through the *Educate to Innovate* initiative and the *America COMPETES Reauthorization Act of 2010*. With the increase in online learning and a national focus on STEM education, there is a growing need for pedagogical best practices that address the unique challenges of delivering STEM instruction online (Chen, Howard, & Bastedo, 2015).

Review of Related Literature

We searched the EBSCOhost, Directory of Open Access Journals, Google Scholar, and Elsevier databases for key issues and design elements using the following keywords: STEM, science, technology, engineering, mathematics, online, e-learning, science education, distance education, online course activities, universal design for learning, UDL, student feedback, student satisfaction, and student engagement. While limited research was found on effective design elements specific for online STEM courses, ample research has been conducted on effective online course designs in general (Martin, Ahlgrim-Delzell, & Budhrani, 2017; Ralston-Berg, Buckenmeyer, Barczyk, & Hixon, 2015). This search revealed Bayraktar's (2001) meta-analysis which found that computer-assisted instruction increased student performance in science education as well as Schoenfeld-Tacher, McConnell, and Graham's (2001) study in which students in an online section of an upper level science course demonstrated a higher proportion of high-level interactions and outperformed their peers in the corresponding on-campus section. In addition, the articles returned in this search were broader than the specific design elements in our study, but the trends were focused on the use of active learning, student engagement, and assessment in STEM learning.

Design elements for online STEM courses

The current literature shows the efficacy of **active learning strategies** in STEM courses (Aji & Khan, 2015; Freeman, Eddy, McDonough, Smith, Okoroafor, Jordt, & Wenderoth, 2014; Haak, HilleRisLamers, Pitre, & Freeman, 2011; McConnell, Steers, & Owens, 2003; Prince, 2004). Felder & Brent (2009) defined active learning as "anything course-related that all students in a class session are called upon to do other than simply watching, listening and taking notes" (p. 2). Prior studies (Aji & Khan, 2015; Freeman et al., 2014; Haak, et al., 2011; McConnell, et al., 2003; Prince, 2004) show that active learning leads to increased student performance and success rates in STEM learning. In fact, Freeman et al. (2014) conducted a meta-analysis of 225 studies that revealed that active learning led to an increase in exam scores and lower failure rates compared to traditional lecture. Most of the research in this area is independent of delivery modality, but these core pedagogical principles and strategies which allow students to actively engage with instructional content over passively listening to lectures can be applied in the online environment as well as the classroom.

Though we were only able to locate limited information related to online STEM education, **student engagement** has been shown to be a factor in student retention in the STEM fields (Watkins & Mazur E., 2013). For example, Hegeman (2015) found increased student success in an online college algebra course when replacing publisher materials with *instructor-generated videos and guided note-taking sheets* for these videos to increase student engagement with content and the instructor. Tibi (2018) also reported success with student-student engagement using structured discussions in an online computer science course. Another engagement practice noted in literature on STEM education is the effective implementation of *peer mentoring or peer instruction* (Sithole et al., 2017; Vajravelu & Muhs, 2017). Specifically, Vajravelu and Muhs (2016) documented their success using a combination of homework and skills tests online with small group problem-solving sessions in the classroom in a large undergraduate calculus course.

In the limited literature we found on online STEM learning, we noticed a movement that is beginning to incorporate the Universal Design for Learning (UDL) principles into postsecondary STEM education with some basic online components for student engagement. UDL is a set of principles designed to provide all students with equal opportunities to learn (Izzo & Bauer, 2015). In fact, one of UDL's driving principles, multiple means of engagement, has shown that students learn in different ways (e.g., some students prefer to work alone while others thrive in a group setting) and need to be motivated to actively participate in their own learning (Rose & Myer, Eds., 2011). For example, in 2011, a group from the Georgia Institute of Technology implemented a program called SciTrain University, a project funded by the National Science Foundation that was specifically designed to provide training for STEM faculty on how to implement UDL into STEM environments (Moon, Utschig, Todd, & Bozzorg, 2011). The focus was on students with disabilities and though the numbers of students in the study were low, outcomes were promising and feedback from students stated there was an improvement in more inclusive teaching methods. There was also a reported increase in course completion by these students (Moon, et al., 2011). Another study provided instructors with UDL training and students were provided with pre- and post-tests, the results of which indicated that the small amount of UDL training instructors received made a positive difference, especially in the area of engagement, on student experiences in the STEM courses (Davies, Schelly, Spooner, 2012). Neither of these studies mentioned actual student success rates in these courses.

Assessment strategies were another design element that was reviewed. According to John Wells (2005) in the 100-year history of the Mississippi Valley Technology Teacher Education Conference (MVTTEC) annual meeting, pedagogical issues rose to be a dominant topic starting around the year 2000, and in recent decades the dominant subtopic has become assessment. Prior studies have shown that the use of *online formative assessments*, such as short online quizzes, is particularly effective in STEM education (Nicol & Macfarlane-Dick, 2006; Felin, 2016). For instance, online assessments have been shown to be useful for gaining, refocusing, and extending student attention during lengthy science lectures. This is particularly useful, as lectures are a predominant pedagogical approach in STEM instruction. Additionally, recent studies, such as those conducted by Gobert, Baker, and Wixon (2015), deOliveira Neto and Nascimento (2012), and Kruger, Inman, Ding, Kan, Kuna, Liu, Lu, Oro, and Wang (2015) which implemented intelligent tutoring strategies or similar types of strategies, stress the importance of *providing timely, high-quality, individualized assessment and feedback* to students while enhancing and maintaining student engagement.

Research Questions

The purpose of this study is to further explore design elements for online education in the STEM fields. Most of the literature in this area consists of either broad meta-analyses of pedagogical best practices for STEM education in general or case studies based on specific online courses or online course components. This study is a unique large-scale survey research of many online courses across multiple STEM disciplines.

Based on the literature review above, specific research questions were derived.

- Which design elements appear most frequently in online STEM courses?
- Which design elements (activity, interactivity, assessment) impact student perceptions of learning?
- Which design elements (activity, interactivity, assessment) impact student learning satisfaction?

Methods

To identify and evaluate effective design elements in online STEM learning, we conducted a survey research study in spring 2016 at a large four-year public university in the southeastern United States.

Participants

With instructors' permission, 2,949 students from 15 online and five blended STEM courses were contacted to participate in the online survey in spring 2016 through an online course announcement. A total of 1,767 complete and valid responses were collected with a 60% response rate. For this article, we selected only the responses (n=537) from the fully online courses for analysis. Among those participants (aged 18-60, M=23.50, SD=6.14), 41% (n=221) were males, 49% (n=265) were females and 10% (n=51) were unidentified. Forty-five percent of the participants were (n=240) non-Hispanic white, 17% (n=91) Hispanic, 11% (n=58) two or more races, 8% (n=41) African-American, and 5% (n=25) Asian. They came from 12 different colleges within the university with the majority of students coming from the College of Engineering and Computer Science (36%, n=194), the College of Sciences (14%, n=73), and the College of Health and Public Affairs (11%, n=60). Thirty-two percent (n=169) of the participants were seniors, 23% (n=125) juniors, 22% (n=120) freshmen, 11% (n=61) sophomores, and 2% (n=9) graduate students. The majority (76%) of the participants were full time (n=409). The remainder were part-time 12% (n=64), 2% (n=10) overload (more than 12 credit hours), and less than part-time students 1% (n=3). Less than 1% (n=29) of the participants reported one or more disabilities, such as a learning disability (n=14), visual disability (n=7), hearing disability (n=5), and physical disability (n=3). Nineteen percent (n=102) of the participants reported being the first-generation college students. Table 1 presents a brief summary of the demographic information of the survey sample.

Table 1.
Demographics of the survey samples

Survey sample	n=537
Courses	15 online
Colleges	12
Age	Range:18-60, M=23.50, SD=6.14
Undergraduates	56%
Full time	76%
Gender	49% female
Ethnicity	45% non-Hispanic Caucasian
Disabilities	Less than 1%
First-generation	19%

Instrumentation

The survey instrument was constructed using the distance education research toolkit developed by the National Research Center for Distance Education and Technological Advancements (DETA, 2015). The survey included 13 demographic questions, three open-ended questions, and six ranking question sets, which addressed learner characteristics, students' online activities and interactivities, and their perceptions of learning outcomes and satisfaction (see Appendix: Survey Instrument). We invited expert reviewers and student volunteers to test the survey's validity before administration. The instrument was then modified based on feedback from experts and students.

Measures

Summary statistics and definitions for each of the measures are reported in Table 2. Respondents were asked to rate the set of items measuring each variable on a 5-point Likert-type scale ranging from *1=not at all* to *5=very frequently* or *1=strongly disagree* to *5=strongly agree*.

Table 2.
Measures of the Survey

Measures	Definition	N of Item	Cronbach's alpha
Course Activity	Frequency of course activities, e.g. reading, utilizing websites, etc.	19	.819
Interactivity	Frequency of interactions with instructor and students	8	.896
Assessment and Evaluation	Perception of grading system	3	.850
Learn	Perception of learning in this course	3	.916
Satisfaction	Satisfaction with this online course	7	.914

Procedures

The Institutional Review Board approved the survey research in October 2015. We contacted course instructors, department chairs, and college deans in the STEM disciplines at the institution in January and February of 2016 to seek permission for their students to participate in the online survey. With permission from these individuals, students were notified of this survey opportunity through an announcement in the Learning Management System (LMS) during mid-semester. The online survey was hosted in *Qualtrics*, which is a secured survey construction and hosting website. Respondents were able to skip any part of the survey, including demographic-related questions, if they preferred not to answer.

Data analysis

The data collection ended in May 2016. The data were cleaned, and all identifiable information was removed using a coding system within 30 days after collection. Frequencies and percentages were calculated to measure students' perceptions, course activities and interactivities, and general learner characteristics. Chi-square and multiple regression statistics were used to detect if course design practices were correlated with students' online course experience among diverse students. Additionally, the responses from the three open-ended questions were analyzed and coded, and statements were classified into themes to answer the research questions.

Results

The results of the survey research are presented in this section to answer the three research questions most related to learning activities, interactivities, and assessments. In brief, the most frequently student-cited design elements of the surveyed courses included major projects/assignments, readings, website/slide resources, exams, special software applications, real-world problems, and case studies. Assessment design was the most significant factor that was correlated with students' self-perceived learning and learning satisfaction for students of all populations.

RQ1: Which design elements appear most frequently in online STEM courses?

Students reported that the top five required activities in their STEM courses included completing major projects, reading, utilizing websites, taking quizzes/exams, and examining slideshows (Table 3).

Table 3.
Top required activities in online STEM courses

	N	*Mean*	*SD*
Completing major projects and assignments	506	4.12	1.19
Reading	503	3.76	1.27
Utilizing websites	506	3.5	1.26
Taking quizzes/exams	505	3.46	1.30
Examining slideshows	503	3.15	1.30

Of these most frequently reported required activities, the top three **active learning activities** that students reported participating in, included using special software or applications relevant to the course, solving a real-world problem, and analyzing scenarios or case studies (Table 4).

Table 4.
Top active learning activities in online STEM courses

	N	*M*	*SD*
Use special software or applications relevant to the course.	504	3.57	1.51
Solve a real-world problem.	506	3.29	1.40
Analyze scenarios or case studies.	504	3.00	1.47

The top two interaction activities reported by students included reading course news or announcements (M=3.65, SD=1.28) and receiving emails from the instructor (M=3.07, SD=1.19). It appears that students in the surveyed courses engaged more frequently in passive interactions rather than initiating interactions.

The overall attitudes toward assessment methods were positive. The majority of the participants agreed or strongly agreed that the assessment and evaluation methods in the online STEM courses were clear and appropriate (Table 5).

Table 5.
Perception of Assessment Methods in Online STEM Courses

	N	*M*	*SD*
Graded assignments were appropriately timed within the length of the course, varied, and appropriate to the content being assessed.	483	4.15	0.98
Clear standards were set for the instructor's posting of grade, activities, and resources.	482	3.94	1.11
The method of grading my performance was clear.	484	3.89	1.19
My overall course grade was not based solely on exams and quizzes.	482	3.68	1.34

RQ2: Which design elements (activity, interactivity, assessment) impact student perceptions of learning?

The overall perceptions toward learning in the surveyed courses were positive (Table 6). The students perceived that the online activities in which they participated in the online courses helped them learn and achieve a better grade.

Table 6.

Perception of Learning in Online STEM Courses

	N	*M*	*SD*
The online activities allowed me to better understand concepts.	483	3.77	1.06
The online activities helped me get a better grade.	484	3.74	1.06
The online activities helped me think more deeply about course materials.	484	3.69	1.05

Students' perception of learning was correlated with their perception of the efficacy of assessment methods, $F(1, 475) = 241.31$, p=.000. Approximately 34% of the variance (adjusted $R^2 = 0.34$) in students' perceived learning was accounted for by learners' perception of assessment. Course activity or interactivity was not a significant factor that correlated with students' self-perceived learning in this study.

These results applied to all students, including underrepresented minorities. For instance, students' perception of assessment methods was the only factor that was correlated to students' perception of learning for students with disabilities, $F(1, 23)= 13.64$, p=0.001. *Adjusted* R^2=0.35, first-generation college students $F(1, 97)= 189.84$, p=0.000. *Adjusted* R^2=.66, and female students $F(1, 255)= 144.93$, p=0.000. *Adjusted* R^2=0.36.

In the open-ended questions, students offered additional insights regarding practices that an instructor and a STEM program can implement and strategies that they have used to help them succeed in an online STEM course. The most highly-demanded instructor practices included offering more resources, sending reminders, and being clear and concise. Students suggested a STEM program should invest resources to create online videos, offer face-to-face opportunities for them to meet their online instructors, TAs and tutors, and offer face-to-face lab activities. Additionally, the responses show that the success strategies that students have used include collaborating with other people, managing time effectively and taking good notes.

RQ3: Which design elements (activity, interactivity, assessment) impact student learning satisfaction?

The overall attitudes toward the surveyed courses were positive (Table 7). Students reported that the courses were easy to access, and they enjoyed the learning experience.

Table 7.
Satisfaction of Online STEM Courses

	N	*M*	*SD*
Getting online to access the course was easy.	485	4.32	0.82
Participating in this online course was a useful experience.	486	3.80	1.16
I would recommend this course to a friend.	485	3.80	1.29
I liked this course delivered online.	486	3.76	1.34

Students' learning satisfaction was correlated with their perception of the efficacy of assessment methods, $F(1, 475) = 337.43$, $p=.000$. Approximately 41% of the variance (*adjusted* $R^2 = 0.41$) in students' learning satisfaction was accounted for by learners' perception of assessment methods.

Again, these results applied to all male students and underrepresented minorities regardless of gender. For instance, perception of assessment methods efficacy was the only factor that was correlated to learning satisfaction for students with disabilities, $F(1, 23)= 16.01$, $p=0.001$. *Adjusted* $R^2=0.39$ and first-generation college students, $F(1, 97)= 104.84$, $p=0.000$. *Adjusted* $R^2=.51$. For female students, however, both perception of assessment methods efficacy and perception of interactivity correlated to their learning satisfaction, $F(2, 255)= 92.72$, $p=0.000$. *Adjusted* $R^2=0.42$.

Discussion & Conclusion

The findings of this study have significant implications for designing effective online courses in the STEM disciplines. All students, including underrepresented minorities, could benefit from well-designed online courses that improve access and learning. As discussed in the literature review, effective design elements for STEM learning include active learning (Aji & Khan, 2015; Freeman et al., 2014; McConnell et al., 2003; Prince, 2004), multiple means of student engagement (Rose & Myer, 2011), and robust assessment strategies (Nicol & Macfarlane-Dick, 2006; Felin, 2016). Our survey findings echoed prior research in the three design elements related to activities, interactivities, and assessment methods.

Design elements

In the surveyed courses, **active learning activities**, such as the implementation of special software, real-world problems, and case studies, were utilized and reported by students (Table 4).

The surveyed students welcomed projects that apply to the real world and real-life problems/examples/scenarios and include a thorough explanation. They reported better understanding when the instructor related the course content to real life situations. Real-world active learning was an integral part of the online STEM courses included in the survey, and students reported high satisfaction with these activities.

While **interaction strategies** only had a small but statistically significant correlation with learning satisfaction for female students, all participants reported that they paid close attention to course news/announcements and emails from the instructor. Our survey results indicated that online STEM instructors should be clear, concise, and consistent about instructions, assignments, assessments, due dates, course pages, and office hours and make every effort to improve communication with students. In the open-ended comments, students reported their use of peer-mentoring strategies for learning, such as using discussion forums as resources and forming online and in-person study groups via social media, e.g., Facebook, Google Hangouts, Groupme, and Google Drive. All these interaction and communication strategies might especially benefit female students, who, as studies demonstrate, tend to interact and communicate more in the online environment (Sullivan, 2001; Young & Norgard, 2006; Caspi, Chajut, & Saporta, 2010) which may increase their overall online participation in STEM learning.

Aligned with the literature review, perception of **assessment method** efficacy is the most significant factor that was correlated with students' perception of learning and learning satisfaction for all student demographic categories. In the open-ended question responses, students asked for frequent short practice tests and quizzes that provided them with immediate feedback and explanations. Students saw frequent formative quizzes as a practice that would improve their grades on final exams. Additionally, they would like their instructors to be very clear on due dates and grading methods, update grades frequently, and provide samples that are tied to the assignments and exams.

Universal Design for Learning

Within this study, although not intended to address UDL, a pattern emerged within student answers to our survey questions that supports the inclusion of UDL principles. For instance, in the open responses, students recommended practices that instructors should include to help them succeed in the online STEM courses. The recommendations include that instructors should provide a variety of communication methods with students (e.g., using LMS tools beyond discussion to communicate, announcements, posting office hours online). These answers support the UDL principle of Action and Expression, which is also supported in research that implements UDL into online courses in higher education by Rao, Smith, and Wailehua (2015) and Black, Weinberg, and Brodwin (2015), and Burgstahler and Cory, (2008). Additional student responses reported under the same question included statements that they really enjoyed course-related videos, which helped them understand course content better than just having a text representation of a concept. This answer directly supports the UDL principle of Representation, which appears in a UDL research paper published by Rao, et al. (2015) and Fidaldo and Thormann (2017).

In another open question, students recommended a number of resources in which their STEM programs should invest to better serve them as online students. Student responses overwhelmingly included the recommendation that instructors should provide timely feedback and grade information (e.g., update grades frequently, makes grades more available in the learning management system). These answers support the inclusion of the UDL principle of Engagement also mentioned in research conducted by Black, et al. (2015) and Rao and Tanners (2011). This type of feedback from students, supported by UDL research in the field, should serve to encourage instructors to create and include a variety of additional course components that utilize UDL principles, which benefit all students, not just students with disabilities. The goal is to provide all learners with equal access to learning with the intention of decreasing barriers for differently-abled students currently built into instructional techniques (e.g., passive lectures versus using videos, graphical representations, and text that appeals to a variety of learning preferences).

In addition to the UDL components that are mentioned above, and although not described in this study's results, additional UDL practices that benefit students include the following suggestions for faculty:

- Provide students with a variety of ways to submit assignments (Fidaldo & Thormann, 2017; Burgstahler & Cory, 2008)
- Consider that students have various learning preferences and construct online classes with this in mind (Fidaldo & Thormann, 2017; Burgstahler & Cory, 2008)

For more information, and examples of additional best practices, please visit the UDL on Campus website.

Limitations and Directions for Future Research

There are limitations that should be acknowledged in this survey research method and sample. The major limitation is the self-selection bias as participants volunteered for the study. Even though we have a large sample size (N=537), the data only includes volunteer students at one southeastern university in the United States where online learning has been established as a norm for almost 20 years. Thus, it is unclear whether the current findings would generalize to college students engaged in other universities or countries. Future research could focus on students in other universities and possibly from other countries. Some additional areas of future research might focus on correlations between the online course design elements students prefer and measures of learning and persistence, in addition to student self-reported data on learning. This survey research is exploratory in nature. Each of these design practices can be established through experimental or other research design to gain better understanding of what works and in what contexts. The following summarizes some of the current best practices drawn from this study:

- Engage students with real-life problems and active experiences.
- Provide students with a variety of additional instructional resources, such as simulations, case studies, videos, and demonstrations.
- Provide online and face-to-face opportunities for students to collaborate with others, such as peers and teaching assistants.
- Faculty should be clear, concise and consistent about instructions, assignments, assessments, due dates, course pages, and office hours, and improve communications with students.
- Use Universal Design for Learning principles to design online experiences to benefit all students, not just students with disabilities.

Developing quality online courses in the STEM disciplines has the potential to increase access for all populations and engage diverse students, especially underrepresented minorities and students with disabilities. This study has attempted to elucidate and explain the design elements of online STEM courses that students perceive as beneficial for learning for all students. Instructors and instructional designers need to focus on integrated active learning, interactive engagement strategies, robust assessment design, and UDL principles in designing effective, inclusive, and engaging online STEM courses.

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Appendix A: Survey Instrument

Course Activity

How much of each of the following tasks were required in your course? (Virtually None/Very Little; Little; Some; Good Amount; Constant/Significant Amount)

1. Reading
2. Listening to audio
3. Watching videos
4. Examining slideshows
5. Taking notes
6. Utilizing websites
7. Taking quizzes/exams
8. Writing short papers or responses
9. Writing academic papers or essays
10. Completing major projects and assignments
11. Creating and delivering presentations
12. Completing group projects
13. Communicating with other students
14. Communicating with the instructor
15. Utilizing social media
16. Require students to solve a real-world problem
17. Require students to analyze scenarios or case studies
18. Require students to complete a simulation or role-play
19. Require students to use special software or applications relevant to the course

Interactivity

How often do you…? (Never; Little; Somewhat; Often; Very Often)

1. Send email to your instructor
2. Receive emails from your instructor
3. Participate in class discussions
4. Read course news or announcements
5. Participate in group activities
6. Discuss course topics or information with the instructor or other students using social media
7. Discuss course topics or information with the instructor or other students using web conferencing tools
8. Discuss course topics or information with the instructor or other students using tools outside of the course

Assessment and Evaluation

Please rate the degree to which you agree with the following statements regarding the grading of this course. (Strongly Disagree; Disagree; Neither Agree nor Disagree; Agree; Strongly Agree)

1. The method of grading my performance was clear
2. Clear standards were set for the instructor's posting of grade, activities, and resources
3. Graded assignments were appropriately timed within the length of the course, varied, and appropriate to the content being assessed

Learn

Please rate the degree to which you agree with the following statements regarding the performance of this course. (Strongly Disagree; Disagree; Neither Agree nor Disagree; Agree; Strongly Agree)

1. The online activities helped me get a better grade
2. The online activities allowed me to better understand concepts
3. The online activities helped me think more deeply about course materials

Satisfaction

Please rate the degree to which you agree with the following statements regarding the satisfaction of this course. (Strongly Disagree; Disagree; Neither Agree nor Disagree; Agree; Strongly Agree)

1. I would take another online course in the STEM disciplines
2. I would recommend that the instructor continue teaching this course online
3. I liked this course delivered online
4. I would recommend this course to a friend
5. Participating in this online course was a useful experience
6. Getting online to access the course was easy
7. Technical support was available when I needed it

Open-ended Questions

1. What practices can an instructor implement in order to help you succeed in an online or mixed-mode STEM course?
2. What strategies did you use to help yourself succeed in the online/mixed-mode STEM course?
3. Where would you recommend a STEM program invest resources to better serve you as a student taking online/mixed-mode courses? Why?

An Evaluation of Critical Thinking in Competency-Based and Traditional Online Learning Environments

Matthew Mayeshiba
University of Wisconsin-Extension

Kay R. Jansen and Lisa Mihlbauer
University of Wisconsin-Milwaukee

Abstract
Nonterm, direct assessment competency-based education (CBE) represents a significant reimagining of the structure of higher education. By regulating students' progress through the program based on their mastery of tightly defined competencies rather than on the time spent learning them, this learning environment affords students far greater flexibility than traditional programs. This focus on defined competencies has led to concerns that students in these types of programs may not demonstrate higher level skills, such as critical thinking, at levels comparable to those enrolled in more traditional programs. This study evaluated 39 students' demonstration of critical thinking in two assessments administered in parallel versions of one course: one offered through the nonterm, direct assessment CBE University of Wisconsin Flexible Option, and the other offered through a traditional online program. For this study, each of the 78 assessments was scored using the critical thinking rubric from the Valid Assessment of Learning in Undergraduate Education (VALUE) project. We found that students from the CBE version of the course received significantly higher ($p = .0013$) overall scores than the students in the traditional online version of the course. While further research is required to refine these methods and ensure the generalizability of these results, they do not support concerns about students' abilities in this learning environment.

Keywords: AAC&U, competency-based education, direct assessment, disruptive innovation, critical thinking, learning outcomes, non-term, nonterm, UW Flexible Option, VALUE rubric

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An Evaluation of Critical Thinking in Competency-Based and Traditional Online Learning Environments

Competency-based education (CBE) has been a focal point for recent efforts to offer pathways through postsecondary education that are more responsive to the needs of nontraditional students, who require more flexibility than can be offered in traditional programs (Eduventures, 2014). Nonterm, direct assessment CBE programs, such as the University of Wisconsin (UW) Flexible Option, give students a wider array of possible start dates and allow students to progress through the material as soon as they demonstrate mastery. This offers students many more opportunities to tailor their learning experience so they can leverage previous experiences and accommodate outside obligations.

This paper outlines a still preliminary effort to document the higher level competencies of students in a direct assessment CBE program. To do this, the authors of this study examined student critical thinking in two parallel versions of one course: one version through the nonterm, direct assessment UW Flexible Option, and another version offered through a parallel traditional online program. This study leverages the similarities between these two courses to investigate the following research question:

- Do students in the UW Flexible Option demonstrate critical thinking at levels similar to those demonstrated by students enrolled in a comparable traditional online environment?

Review of Related Literature

While the concept is not new, interest in CBE programs has increased in recent years as institutions of higher learning have sought scalable methods of becoming more accessible to nontraditional students (Nodine, 2016). With the emphasis on demonstrated mastery rather than measured seat time, CBE programs have implemented different models to ensure students have greater flexibility in structuring their studies. These models range from maintaining a close resemblance to traditional academic calendars, through various subscription models, to allowing students to move entirely at their own pace (Kelchen, 2015).

This focus on demonstrated mastery, however, has raised concerns about the role of higher level learning objectives in these programs. Ward (2016) raised concerns that CBE programs inadequately focus on broad-based learning objectives that are difficult to measure, even though there is evidence that these learning objectives are in high demand among employers (Hart Research Associates, 2015) and of great social value. If such skills are not adequately incorporated into the learning curriculum, the degrees awarded by such programs would fundamentally be of less value, leading to further stratification of higher education into those students who receive a "good enough" education and those who receive a quality one (Ward, 2016).

In response to this, CBE advocates have identified a number of best practices to ensure the integrity of academic offerings, including robust engagement with multiple stakeholders (CAEL, 2014), explicit mapping of competencies and learning experiences (Johnstone & Soares, 2014), and robust efforts to engage with students throughout the learning process (Gruppen, 2016). Additionally, Krause, Dias, and Schedler (2016) have tested a framework to codify good course design features in CBE. Central Washington University established a rubric to support their CBE FLEX-IT program to evaluate course design elements and found correlations with student assessment scores (2017).

Despite the above efforts, very little empirical research has been conducted to quantify the higher level competencies demonstrated by CBE students. In fact, a review of the literature reveals only one attempt to measure general education outcomes among a "small sample" of students at the College for America, a subsidiary of Southern New Hampshire University and one of the first institutions in the United States to provide postsecondary degrees through direct assessment (Fain, 2015). This effort, reported only in the popular press, used the Proficiency Profile from the Educational Testing Service to assess student skills in critical thinking, reading, writing, mathematics, humanities, social sciences, and natural sciences. This effort showed that the CBE students outperformed the benchmark group in all areas except mathematics. Despite this apparent success, the lack of precise information on the sample size and population, as well as the study's lack of peer review, limit the usefulness of the effort.

Methods

UW Flexible Option: A Nonterm, Direct Assessment CBE Program

The UW Flexible Option was established in January 2014 as an interinstitutional partnership led by UW-Extension on behalf of UW System Administration and in collaboration with various UW campuses. As one of the first adopters in what Nodine (2016) called the third generation of CBE providers, the UW Flexible Option distinguished itself by offering postsecondary degrees in a nonterm, direct assessment learning environment. Unlike students in traditional learning environments, UW Flexible Option students move through the program at a rate based on their demonstrated mastery of the material, rather than on the time they have spent studying it. As a result, students in this program enroll in a series of three-month subscription periods that begin at the start of every calendar month. To facilitate additional flexibility, students have no deadlines by which they need to complete their work, and students are allowed to carry uncompleted coursework from one subscription to another without penalty or special considerations using an "In Progress" grade. These factors allow students to move more quickly through material they already understand, or more slowly when their learning or outside commitments demand it.

These flexibilities necessitate significant changes for the teaching and learning experiences in this program. First, the ease with which students can stop out and reenter the program to accommodate their outside obligations means that students do not move through the program with any consistent cohort of other students. Additionally, because there are no set deadlines for submitting assigned work, even students who are enrolled in the same course at the same time may be engaging with very different parts of the curriculum at any given moment. As a result, the established mechanisms for interstudent interaction found in traditional online programs, such as discussion boards, are not applicable to the UW Flexible Option.

This reality changes a number of aspects of both the teaching and learning experience. For instance, faculty members must be much more careful and explicit in their curation of learning materials and assessments. Additionally, it becomes much more important that students have regular interaction with a broad student support network, including faculty, tutors, academic coaches, and others.

The Critical Thinking VALUE Rubric

This project defined and operationalized the term *critical thinking* using the Valid Assessment of Learning in Undergraduate Education (VALUE) rubric sponsored by the Association of American Colleges and Universities (2016). Assembled between 2007 and 2009 by teams of faculty and other higher education professionals from more than 100 institutions of higher education, this set of 16 rubrics provides a framework for operationalizing student demonstration of a variety of metacognitive skills. These rubrics have been widely distributed within higher education, having been accessed by more than 42,000 individuals from more than 4,200 unique institutions as of December 2015 (AAC&U, 2016).

The VALUE rubric employed for this study defines critical thinking as “a habit of mind characterized by the comprehensive exploration of issues, ideas, artifacts, and events before accepting or formulating an opinion or conclusion.” The rubric breaks this larger concept into five distinct dimensions: explanation of issues, evidence (selecting and using information to investigate a point of view or conclusion), influence of context and assumptions, student’s position (perspective, thesis/hypothesis), and conclusions and related outcomes (implications and consequences). Finally, each dimension is broken into five separate performance levels, scored from 0 (*not present*) to 4 (*capstone*), with language describing the depth of skill demonstrated at each level.

The VALUE rubrics are widely used throughout higher education as a tool for measuring student demonstration of metacognitive skills to facilitate a better understanding of what students know and can do. The AAC&U website documents practices at a wide variety of institutions that have used these rubrics to assess student work from within individual courses, at the program level, and institution-wide to assess student demonstration of broader learning objectives. Additionally, the Multi-State Collaborative to Advance Learning Outcomes Assessment (MSC) is an effort led by the State Higher Education Executive Officers Association (2016) that is currently underway to reliably and robustly measure student demonstration of metacognitive skills across 12 states and 88 two- and four-year campuses.

Course Structure and Assessment Context

The UW Flexible Option and traditional online version of the course that this project examined were hosted by the same University of Wisconsin institution, relied on the same curriculum, and used assessments that had been specifically tuned to incorporate the same assignment prompts and grading rubrics. Nevertheless, significant differences did remain between the two courses. First, instructors between the two versions of the course were not the same. For this project all UW Flexible Option students were evaluated by one instructor, while the traditional online students were split among three different instructors. Additionally, the traditional online course mandated participation in a variety of activities and discussions separate from the scored assessments, while the asynchronous nature of the UW Flexible Option meant that opportunities for this sort of interstudent interaction were not present in that version of the course.

Additionally, the two assessments examined here also were situated within very different contexts based on the expectations of their learning environments. Students in the traditional online course were presented with a series of deadlines for submitting their assessments. These deadlines fell roughly six weeks apart with several activities and mandated feedback occurring between the two dates. These deadlines were not incorporated into the UW Flexible Option version of the course, and students were free to submit either of their assessments at any time during their subscription. Some students allowed significant time to pass between submitting these two assessments, while others submitted the two assessments at nearly the same time. Still other students submitted the two assessments out of order. This behavior is consistent with the flexibilities built into the nonterm, direct assessment design of the UW Flexible Option.

Finally, it is important to note that in these two versions of the course the two assessments were presented in opposite orders. For the traditional online students, Assessment A was due roughly halfway through the semester, while the deadline for Assessment B fell just before the end of the term. In the UW Flexible Option, however, Assessment A was presented to the students as Assessment #2, while Assessment B was referred to as Assessment #1 in course materials. As a result, the vast majority of UW Flexible Option students submitted Assessment B before submitting Assessment A. This complicates the interpretation of the findings. Scores might be expected to increase as students move through the course because of a variety of factors related to student learning, including the incorporation of instructor feedback and deeper exposure to the material. Because these two assessments were presented in opposite orders, it can become more difficult to understand the role of the different learning environment as opposed to the role of these learning effects. For the analysis presented below, however, our results show that traditional online students did not outperform the students enrolled in the UW Flexible Option version of the course on either assessment. Even on Assessment B, where these learning effects should have been largest for the traditional online students and smallest for the UW Flexible Option students, average scores for students in the traditional online version of the course were not higher than those of students enrolled in the UW Flexible Option. Therefore, we believe that this effect does not undermine the essential finding of the paper.

Scoring Process

For this project, two senior faculty from the course's department scored student work samples from 39 students enrolled in parallel versions of a single course. Of these students, 15 were enrolled in a version of the course offered through the UW Flexible Option, while the remaining 24 were enrolled in a course offered through a traditional online degree program. For each student, faculty scored two assessments, both of which were papers with a maximum length of 10 double-spaced pages and submitted as part of the students' course grade. Both faculty scorers were familiar with the course content, and in one case had taught the course during previous terms. Neither, however, had been involved in teaching either version of the course during the project period.

Once students completed their coursework, the lead analyst randomly identified a sample of traditional online students for inclusion in the study. Because the number of students enrolled in the UW Flexible Option version of the course was relatively small, all student work from that version of the course was included. The analyst then created de-identified copies of each assessment that would be scored by converting the submitted work samples into a unified format, removing personally identifying information, such as names, ages, or places of work, as well as removing information identifying the program of study, such as the course number, name of the instructor, or the program name. Assessments were then assigned a random artifact identifier and presented for scoring.

Prior to scoring work included in the study, the faculty scorers participated in a calibration session with a nationally recognized expert in the VALUE rubrics. This process involved a guided scoring session in which the scorers evaluated two assessments written by traditional online students whose work was not included as part of the randomly drawn sample. After scoring each assessment, the scorers and calibration leader discussed their scores and mutually agreed upon how to define and operationalize the terms of the rubric.

For the scoring itself, the faculty scorers read each of the de-identified assessments and assigned a whole number score from 0 to 4 for each dimension of the VALUE rubric. Due to the number of assessments, this process took several weeks, with scorers occasionally comparing scores on completed assessments to ensure continued calibration. Additionally, once scoring was complete, the overall results were checked, and cases where the two scorers differed on one dimension by more than one point were identified. These cases then were referred to the scorers for review, and scorers were given the opportunity to revise the scores to ensure they represented a consistent understanding of the rubric among the two scorers. Of the 390 dimensions scored on the 78 separate assessments examined, 19 such cases were identified in 10 separate assessments. Once this process was complete, the two scores submitted for each dimension were averaged to arrive at a final score for each dimension of the rubric.

To measure the reliability of the scoring process, this analysis applied Cohen's kappa statistic with linear weighting to the results recorded both before and after the reconciliation process. In this case, the kappa statistic measures the degree to which the two faculty members agreed on the score assigned to each dimension of the rubric relative to the odds that the scores would have agreed by chance (Cohen, 1960). Further, because the scale for each dimension was ordinal, a linear weighting procedure was applied that gives partial credit for answers that were close (Cohen, 1968). This scale ranges from -1 to 1 with 1 indicating perfect agreement, -1 indicating perfect disagreement, and 0 indicating agreement equal to what would have been demonstrated if the scores were assigned randomly. For this statistic, scores in excess of .20 are typically considered fair agreement, scores in excess of .40 are typically considered to be in moderate agreement, and scores in excess of .60 are typically considered to be in substantial agreement (Viera & Garrett, 2005). Kappa statistics for both reconciled and unreconciled scores are presented in Table 1 (Lowry, 2016). These statistics indicate that the reconciled scores achieved a linear weighted agreement of .4084 (± .0609), indicating moderate agreement between the two scorers.

Table 1.

Unreconciled and Reconciled Kappa Statistics

			95% confidence interval	
	Kappa statistic	Std. error	Lower bound	Upper bound
Unreconciled scores				
Unweighted	.2375	.0375	.1641	.3109
Linear weighted	.3607	.0337	.2946	.4268
Reconciled scores				
Unweighted	.2382	.0374	.1649	.3115
Linear weighted	.4084	.0310	.3475	.4693

Note. Unreconciled scores are the scores awarded before dissimilar results were reconciled through additional discussion between scorers, while reconciled scores are scores awarded after this process. Unweighted kappa statistics are those that do not award partial credit for scores that were close, while linear weighted kappa statistics awarded half credit for scores that differed by only one point.

Data Analysis

Data analysis for this project examined average reconciled scores for each assessment individually and both assessments overall for each student whose work was scored. Combining these variables into a set of average scores allows for a clearer aggregate look at student performance between these two delivery modalities. At the same time, an analysis of correlations among the variables involved demonstrates that the dimension-level scores are reliably related and that using these aggregate measures does not significantly influence the result. A full correlation matrix for all dimensions of both assessments is presented in Table 2. Dimensions for Assessment A are represented as variables 1 through 5 on this table. These variables demonstrate statistically significant correlations among the final scores awarded for each dimension of the rubric. Furthermore, the standardized Cronbach's alpha coefficient of .879 further supports the utility of a combined measure. Dimensions for Assessment B are represented as variables 6 through 10 on this table. These also demonstrate the high degree of correlation among the dimension-level scores that result in a standardized Cronbach's alpha coefficient of .942. Finally, the correlation matrix for all 10 dimensions of both assessments further supports the combination of these variables and presents a standardized Cronbach's alpha coefficient of .890.

Table 2.

Correlation Matrix for All Dimension-Level Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Explanation (Assessment A)	1.000									
2. Evidence (Assessment A)	.484 (.002)	1.000								
3. Context (Assessment A)	.340 (.034)	.567 (<.001)	1.000							
4. Position (Assessment A)	.481 (.002)	.614 (<.001)	.819 (<.001)	1.000						
5. Conclusions (Assessment A)	.400 (.012)	.595 (<.001)	.764 (<.001)	.849 (<.001)	1.000					
6. Explanation (Assessment B)	.496 (.001)	.325 (.043)	.284 (.080)	.220 (.178)	.124 (.451)	1.000				
7. Evidence (Assessment B)	.354 (.027)	.320 (.047)	.138 (.401)	.167 (.309)	-.048 (.771)	.630 (<.001)	1.000			
8. Context (Assessment B)	.313 (.052)	.344 (.032)	.206 (.209)	.202 (.218)	.039 (.815)	.662 (<.001)	.834 (<.001)	1.000		
9. Position (Assessment B)	.435 (.006)	.456 (.004)	.314 (.051)	.290 (.073)	.092 (.579)	.676 (<.001)	.871 (<.001)	.857 (<.001)	1.000	
10. Conclusions (Assessment B)	.338 (.035)	.481 (.002)	.290 (.074)	.298 (.066)	.094 (.569)	.628 (<.001)	.842 (<.001)	.797 (<.001)	.866 (<.001)	1.000

Note. This table presents correlation coefficients (and confidence intervals) for all dimension-level variables for Assessment A and Assessment B. Variables 1 through 5 were included in the Assessment A average score and have a standardized Cronbach's alpha coefficient of .879. Variables 6 through 10 were included in the Assessment B average score and have a standardized Cronbach's alpha coefficient of .942. Variables 1 through 10 were included in the total average score and have a standardized Cronbach's alpha coefficient of .890.

Except for student age, data describing the traditional online student population were unavailable for this analysis. To examine this variable's importance, this analysis included a linear regression of average total score, the student's age in years, and a quadratic age term. The results of this regression are presented in Table 3. These results indicate that both age (p = .0101) and its quadratic term (p = .0110) are significant predictors of a student's score, with a maximum predicted score among students who are 37.94 years old. For this reason, both terms will be included in further analyses.

Table 3.

Linear Regression of Age and Overall Score

Variable	Estimate	Standard error	t-value	p-value
Intercept	-2.5585	1.6009	-1.60	.1188
Age	0.2399	0.0884	2.71	.0101*
Age squared	-0.0032	0.0012	-2.68	.0110*

Note. Results in this table are over 39 students and have an adjusted R-squared value of 12.4%.
*p < .05.

Using the three average score variables described above, this paper's main analysis examined student performance in both assessments combined and then within each assessment. Therefore, the analysis relied on a set of three linear regressions of the following form:

$$Average\ Score_i = \beta_0 + \beta_1(Age_i) + \beta_2(Age\ Squared_i) + \beta_3(Program_i) + \varepsilon_i$$

In this equation, $Average\ Score_i$ is the average score of student i on either the first assessment, second assessment, or across both assessments. Age_i and $Age\ Squared_i$ are the student's age and its quadratic term. $Program_i$ is a dummy variable indicating the version of the course in which the student enrolled, where enrollment in the UW Flexible Option is coded as 1 and enrollment in the traditional online version of the course is coded as 0. The results of this analysis are described in the section below.

Finally, this analysis used a paired t-test to examine changes in each student's scores between the two assessments. The paired t-test is used to compare changes in means when each subject in a study is measured at two points in time. Because it measures differences in scores for each student, this test provides an indication of whether each student's scores changed from Assessment A to Assessment B.

Results

The first analysis conducted here investigated the role of the course version on the student's overall average score. The results of this regression are detailed in Table 4 and indicated that, overall, students in the UW Flexible Option received higher scores than students in traditional online versions of the course. This linear regression demonstrated that students enrolled in the UW Flexible Option version of the course scored 0.44 points higher on average in each dimension across both assessments. This difference was statistically significant (p = .0013). Additionally, both age (p = .0045) and its quadratic term (p = .0050) were also statistically significant, indicating an approximate age of maximum score at 39.10 years.

Table 4.

Linear Regression of Age and Course Version Against Overall Average Score

Variable	Estimate	Standard error	*t*-value	*p*-value
Intercept	-2.6445	1.39926	-1.89	.0671
Age	0.2347	0.07725	3.04	.0045**
Age squared	-0.0031	0.00103	-3.68	.0050**
UW Flexible Option	0.4499	0.12911	3.48	.0013**

Note. Results in this table are over 15 UW Flexible Option students and 24 traditional online students and have an adjusted R-squared value of 33.1%.
$^{**}p < .01$.

To further investigate these results, this analysis included two more linear regressions investigating each student's average score in each of the two assessments. For Assessment A, while UW Flexible Option students retained an average score that was 0.15 points per dimension higher than traditional online students, this difference was not statistically significant ($p = .3146$). On the other hand, age ($p = .0006$) and its quadratic term ($p = .0007$) were both statistically significant, with an approximate age of maximum score at 38.34 years. These results are further illustrated in Table 5. For Assessment B, the statistical significance of these results was reversed, with UW Flexible Option students receiving scores that were on average 0.75 points per dimension higher ($p = .0002$) but with statistically insignificant effects for age ($p = .1920$) and its quadratic term ($p = .1904$). These results are further illustrated in Table 6.

Table 5.

Linear Regression of Age and Course Version Against Assessment A Average Score

Variable	Estimate	Standard error	*t*-value	*p*-value
Intercept	-4.1101	1.54554	-2.66	.0117*
Age	0.3236	0.08532	3.79	.0006**
Age squared	-0.0042	0.00114	-3.71	.0007**
UW Flexible Option	0.1455	0.14261	1.02	.3146

Note. Results in this table over 15 UW Flexible Option students and 24 traditional online students and have an adjusted R-squared value of 25.2%.
$^{*} p < .05$. $^{**} p < .01$.

Table 6.

Linear Regression of Age and Course Version Against Assessment B Average Score

Variable	Estimate	Standard error	*t*-value	*p*-value
Intercept	-1.1788	1.98485	-0.59	.5564
Age	0.1458	0.10957	1.33	.1920
Age squared	-0.0020	0.00146	-1.34	.1904
UW Flexible Option	0.7542	0.18315	4.12	.0002**

Note. Results in this table are over 15 UW Flexible Option students and 24 traditional online students and have an adjusted R-squared value of 29.6%.
$^{**}p < .01$.

To further investigate this difference in scores, the analysis continued with a paired *t*-test to evaluate the difference between Assessment A and Assessment B scores for each student based on the version of the course they enrolled in. These results are illustrated in Table 7. The results of this test showed that UW Flexible Option students scored better on Assessment A by 0.2333 points per dimension and that this difference was statistically significant at $\alpha = .05$ ($p = .0440$). Additionally, this test demonstrated that the traditional online students scored better on Assessment B by 0.3708 points per dimension and that this difference was also statistically significant at $\alpha =. 05$ ($p = .0186$). In both cases, students scored better on the second assessment that they were presented.

Table 7.

Paired t-Tests on Changes in Score From Assessment A to Assessment B

Course version	Difference in mean	Standard error	*t*-value	*p*-value
Traditional online	0.3708	0.1464	-2.53	.0186*
UW Flexible Option	-0.2333	0.1054	-2.21	.0440*

Note. Results in this table represent combined results for two paired *t*-tests comparing each student's average score on each dimension of Assessment A with their average score on each dimension of Assessment B. Therefore, a positive difference in the mean indicates a higher score on Assessment A than on Assessment B, and a negative difference in the mean signifies a higher score on Assessment B than on Assessment A. Due to differences in the way courses were structured, traditional online students submitted Assessment A before Assessment B. The majority of UW Flexible Option students, however, submitted Assessment B before Assessment A.
* $\alpha < .05$

Discussion

The results of this study indicate that the students in the nonterm, direct assessment UW Flexible Option course demonstrated critical thinking at levels that are at least comparable to those demonstrated by students in a parallel traditional online course. If corroborated by additional research, these findings may help dispel concerns regarding the quality of CBE programs. The small sample size of the scored population and the restriction to only one course in a single CBE program means that these results should be replicated before they are assumed to be broadly applicable.

Furthermore, this study was not experimental in nature and made no effort to gauge changes in student ability. As a result, these findings do not demonstrate the efficacy of nonterm, direct assessment CBE as a learning environment. Rather, these findings merely demonstrate that upon course completion, the CBE students performed at a comparable or higher level than their traditional online counterparts. A variety of factors for which this study did not control could explain these results, such a difference in the academic or professional histories of the students, differing levels of student self-directedness or grit, or differences in advising or teaching support at any point in either version of the course.

Additionally, factors within this project itself complicate the interpretation of some of these results. Among these, the lack of demographic information on the traditional online student body rendered this study unable to control for the variety of student history variables that may otherwise prove significant. However, other studies have found demographic indicators statistically insignificant in a similar population (Mayeshiba & Brower, 2017). The differential ordering of the assessments between the two versions of this course also complicates the interpretation of these results; however, because the traditional online students did not score higher on either assessment, this factor does not alter the essential findings.

In summary, while these findings should be corroborated, they do not support the idea that nonterm, direct assessment programs are categorically of lower quality when compared to more traditional programs. Indeed, these findings suggest that programs such as the UW Flexible Option that have deeply incorporated robust assessment strategies and high-quality student support may serve their students as well as or better than those in other teaching environments. For a previous generation of educators, investigations into new online learning environments demonstrated that what is now considered "traditional" online learning was not intrinsically better or worse than face-to-face instruction. Given these results, it may be that this is also the case for CBE and that eventually questions of quality will need to be rigorously addressed on a program-by-program basis, much as it is for other more traditional programs.

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Introduction to Section II

Peter Shea
Editor-in-Chief, *Online Learning*
University at Albany, State University of New York

This issue of *OLJ* also includes 11 articles from our regular submission process. These articles discuss a broad range of themes, including Massive Open Online Courses (MOOCs), gamification, new approaches to online course development, and online discussion and interaction. We also include a book review in Section II of this issue.

The first of our MOOC articles is "Instructional Strategies That Respond to Global Learners' Needs in Massive Open Online Courses" by Trang Phan of Fresno State University. MOOCs attract a global audience with various cultural, linguistic, and economic backgrounds and, thus, require faculty and staff teaching and designing these courses to learn to respond to diverse student populations. In this paper the author explores MOOC instructors' and designers' perceptions of multicultural learners in a wide variety of MOOC courses as well as students' learning needs and behaviors. The paper investigates how the perceptions of faculty and staff were reflected in the design phase and identifies the various challenges encountered in implementing instructional strategies to respond to learners' needs. The author concludes that certain elements of MOOC design were responsive to diverse learners' needs, including course components that provided assignment submission language choices and content materials categorized by level of difficulty for learners of different language backgrounds and educational levels. This study provides insights about more culturally sensitive course design to future MOOC creators in a globally connected world.

The second paper focusing on MOOCs is "Small Groups in a Social Learning MOOC (slMOOC): Strategies for Fostering Learning and Knowledge Creation" by Marianne Krasny of Cornell University; Bryce DuBois of the Rhode Island School of Design; Mechthild Adameit, an Independent Consultant from Uruguay; Ronnie Atiogbe from the University of Lomé, Togo; Muhammad Lukman Baihaqi Alfakihuddin of Indonesian Biodiversity and Conservation; Tergel Bold-erdene from Ulaanbaatar Broadcasting System, Mongolia; Zahra Golshani from the University at Albany, State University of New York; Rodrigo González-González from the National Autonomous University of Mexico; Ishmael Kimirei of Tanzania Fisheries Research Institute; Yamme Leung of the World Wide Fund for Nature, Hong Kong; Lo Shian-Yun of National Taiwan Normal University; and Yue Yao of World Animal Protection, Beijing. This paper is a qualitative case study of small groups in a MOOC called Environmental Education: Transdisciplinary Approaches to Addressing Wicked Problems offered by Cornell University. The authors describe this course as an "slMOOC" (social learning MOOC), falling between cMOOCs, characterized by highly self-directed learning, and xMOOCs, which have more structure and conventional assessments. The course included small groups that met in person and were facilitated by group leaders. The methods include a survey and interviews of the group leaders, which inquire about their motivations for taking on that role as well as outcomes resulting from leading a group. The researchers also looked at barriers to learning that were experienced and efforts to address them. Together, this and the preceding paper advance our understanding of how we may support more effective learning in international multicultural settings through close examination of online facilitator and learner behaviors, challenges, and strategies for overcoming these.

The next paper is “Meaningful Gamification and Students’ Motivation: A Strategy for Scaffolding Reading Material” by Lynette Tan Yuen Ling of National University of Singapore. This study examines more recent conceptualizations in the field of research on games and learning, applying the notion of meaningful gamification to a flipped classroom setting. Central to the study and to meaningful gamification are Deci and Ryan’s theories of intrinsic motivation and the key components of competency, relatedness, and autonomy. The author hypothesizes that meaningful gamification can be used to enhance these elements of intrinsic motivation to encourage students to complete out-of-class learning tasks (i.e., prereading) to improve in-class discussions and activities. Quantitative results suggest that the approach is more engaging than other kinds of academic tasks measured on the same scales used here. Qualitative methods disclosed both positive and negative student reactions to the use of a game to support prereading. Importantly, the authors conclude that students’ comprehension of the material improved. The paper offers pathways for future studies, potentially with larger samples, and other research methods that would more clearly determine specific elements of meaningful gamification that can improve learning in both blended and online environments.

The fourth paper in this section is “Online Course Design and Development Among College and University Instructors: An Analysis Using Grounded Theory” by Sally Baldwin, Yu-Hui Ching, and Norm Friesen of Boise State University. The purpose of this study is to understand how instructors design online courses at public four-year colleges and universities using a method reflecting authentic practice. Methods include interviews with 14 instructors who design and teach online courses applying a grounded theory approach. The authors are ultimately interested in how the practice of instructional design for online learning can be theorized. The paper concludes that despite the widespread understanding of instructional design principles in higher educational settings, participants approached online course design as a problem to be solved based on whatever informal resources were immediately available. The participants did not see course design as a specialized process requiring expert guidance or design-specific resources, such as guidebooks. Paradoxically, interviewees did report that they spontaneously followed a process similar to the ADDIE instructional design model. This was the case even among participants who are instructors of instructional design. The study includes a depiction of the authors’ “Informal Design Theory: A Process Model of Instructors Creating Online Courses.” Understanding the process that many faculty informally follow has numerous benefits for the practice of online course design and, ultimately, institutional capacity to support faculty in improving online learning.

The next paper is “Students’ Perceptions of Quality Across Four Course Development Models” by Victoria Brown and Mario Toussaint of Florida Atlantic University and David Lewis of the University of Miami. As in the previous paper, the focus of this study is understanding and improving processes of online course design. Here the authors investigate varying levels of support for faculty, including no support (except financial), a course training, a supplementary workshop on the Quality Matters standards, and an instructional-designer-supported model. The researchers collected survey data to assess students’ perceptions of the relative quality of courses developed through each of these models. The most highly rated courses were developed through the instructional-designer-supported model, which include a course template to facilitate development. This paper provides clarity regarding the comparative merits of different faculty development models commonly used for online course design.

Keeping with the theme of faculty development, the following paper is "Educators' Preparation to Teach, Perceived Teaching Presence, and Perceived Teaching Presence Behaviors in Blended and Online Learning Environments" by Lisa Gurley of William Carey University. In this paper the author argues that faculty development preparing faculty to teach online impacts the quality of instruction provided in blended and online learning courses. Further, prior research indicates that instructional design and facilitation of productive discourse tailored specifically to the online environment (elements of teaching presence) are essential to supporting the goals of online instruction. To date, however, research has focused almost exclusively on student accounts of the quality of instructors' teaching presence. In this paper the author focuses instead on faculty perceptions of their own ability to engage in effective instructional design and facilitation based on the form of professional development they received. An adapted Community of Inquiry survey was used to assess faculty perceptions of teaching presence. The study finds a statistically significant difference between perceived ability to engage in effective facilitation for faculty that completed certification courses in preparation for teaching in blended and online learning environments, as compared to faculty that only received on-the-job training. Qualitative data supported this finding. The paper provides additional support for the need for quality faculty development, adding specificity with regard to the format of training that may be more effective for developing specific online instructional skills.

The seventh paper in this section is "Out-of-School Reading and Literature Discussion: An Exploration of Adolescents' Participation in Digital Book Clubs" by Jamie Colwell of Old Dominion University, Lindsay Woodward of Drake University, and Amy Hutchison of George Mason University. Building on New Literacies theory, the core of which is foundational work done by Gee, this study looks at new literacies, defined as the skills necessary for students to successfully navigate and engage in digital reading and writing practices. These practices differ from skills necessary for traditional paper-based reading and composition that define traditional literacy. Such skills are important to fostering more literate adolescents in the 21st century. Specifically, this study examines the new literacy practices exhibited by 13-to-17-year-olds in an online summer reading program and how such a program might inform more authentic opportunities for literacy engagement in school settings. The researchers use a general inductive qualitative approach to code the online interactions of the study's 12 participants. They conclude that the students spontaneously adopted online discussion practices that mixed formal and more personal forms of discourse to develop more affecting interaction through text. As teachers seek to encourage richer dialogue around literature, the study suggests that rather than using traditional approaches assigned in face-to-face discussions, educators might try asynchronous online forums. They observed that students in their study simultaneously adopted more complex and varied discussion techniques that featured more sophisticated transactions with the text. Future research might better articulate how best to facilitate these forums in formal educational settings to ensure all young students succeed in developing new literacies.

The next paper is "A Generalizable Framework for Multi-Scale Auditing of Digital Learning Provision in Higher Education" by Samuel Ross of the University of Leeds, Okinawa Institute of Science and Technology, and Trinity College Dublin, and Veronica Volz, Matthew K. Lancaster, and Aysha Divan of the University of Leeds. This study considers the provision of digital learning resources at an institutional level and whether equity in use of resources exists across various units. The researchers examine to what extent digital learning has been implemented across degree programs, program levels, and schools/colleges within the institution that serves as the case study; identify current gaps and how might they be reduced; and investigate how the results of this audit can be used to inform a digital or blended learning strategy for academic units. This study assists in assessing differences in access to learning resources between students (and discloses such differences across units within the institution studied here). The audit process described in this paper can surface potential issues in resource variability and promote discussion of how such issues might be resolved. For example, if only science students get access to new visualizations, simulations, or digital games, is that a problem? And if so, what should be done about it? As noted by the authors, however, each case will vary, and digital learning should be used only when pedagogically relevant. That said, given current trends in higher education, provision of digital resources will be a growing area of interest, and this paper contributes to our understanding of ways of assessing it.

The next paper is “Undergraduate Kinesiology Students’ Experiences in Online Motor Development Courses” by Takahiro Sato of Kent State University and Justin A. Haegele of Old Dominion University. The study employs a descriptive-qualitative methodology applying a case study design to uncover themes in the experience of online kinesiology students. The authors use open-ended interviews, bulletin board discussion logs, and online assessment projects as data to surface three themes: rigor and flexibility, importance of peer feedback, and the application of video assessment to support learning. The researchers conclude that the study demonstrated that undergraduate students can have positive and meaningful experiences when enrolled in an online life span motor development course, but care needs to be taken in the design of learning experiences for this population. This includes attention to program focus, student age, amount of prior online experience, and the design of assessments.

The tenth paper in this section is “The Impact of Program-Wide Discussion Board Grading Rubrics on Students and Faculty Satisfaction” by Brinda McKinney of Arkansas State University. The researcher notes that online discussion board activities can be confusing to students and daunting for faculty to facilitate and grade both fairly and efficiently. To address this issue, faculty participants in the study collaboratively developed a single, program-wide discussion board grading rubric that clearly outlined expectations for all students and offered consistent guidelines for faculty’s assessment of online discussion activity. The rubric included evaluative criteria for initial post content, frequency of posts, follow-up post content, supportive references, and grammar. The rubric was implemented in each of the RN-BSN online courses in the program under investigation. After implementation of the rubric, faculty time spent grading discussions was reduced by more than 50%. Students had substantially fewer complaints about grading as well. The paper includes the full rubric for reference and additional details on the benefits of a single, program-wide grading scheme.

The final paper here is Susan Ko’s review of the new book *Transactional Distance and Adaptive Learning: Planning for the Future of Higher Education* by Farhad Saba, emeritus at San Diego State University, and Rick Shearer of Penn State University. The book takes up Michael Moore’s well-known theory, applying it to a contemporary context. Ko gives us a good brief synopsis and helpful insights on the book’s strengths and weaknesses.

Please read, discuss, and share these new studies and consider contributing to the scholarly dialogue supporting the future of *Online Learning*.

Instructional Strategies That Respond to Global Learners' Needs in Massive Open Online Courses

Trang Phan
California State University Fresno

Abstract
The purpose of this study was to describe how MOOC learners' diverse learning needs, stemming from their different language, cultural, and educational backgrounds, were perceived and responded to during the course design and delivery. Participants were 15 instructors and instructional designers in American higher educational institutions who were involved in designing and delivering a wide variety of MOOC subjects on the Coursera hosting platform. This qualitative research study adopted a case study format in which multiple sources of evidence are used (Yin, 1984, p. 3). The participants' insights into specific instructional strategies that were designed especially for MOOC multicultural learners' needs were categorized into three themes: language, content, and engagement. These strategies aimed to provide support and engage learners who have English language barriers, or those who did not have the necessary subject background to keep up with the course, or those who were not familiar with American educational culture. The study also investigated the pedagogical challenges and concerns that the participants faced during and after the delivery of the MOOCs. Typical challenges included confusion triggered by the subject during the discussion, the participants' struggle with the efficiency of peer assessment, and the applicability of the content materials for the global audience.

Keywords: Massive Open Online Courses (MOOCs), instructional strategies, diverse learning needs, pedagogical challenges, multicultural learners

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Instructional Strategies That Respond to Global Learners' Needs in Massive Open Online Courses

Culture is central to learning and essential in communicating, information seeking, and shaping individual and group thinking processes (Ladson-Bilings, 1994). A pedagogy that acknowledges, responds to, and embraces knowledge and insights from different cultural groups provides fuller access to education and makes it more appealing (Gay, 2000; Nieto, 1999). Academic achievement of culturally diverse students will be significantly improved if the knowledge is filtered through their own cultural experience (Au & Kawakami, 1994; Foster, 1995; Gay, 2000; Hollins, 1996; Kleinfeld, 1975; Ladson-Billings, 1994, 1995). Designing and teaching courses for a culturally diverse student population faces the challenges of dealing with students' diverse academic performances and their language problems (Fine & Handelsman, 2010). On the other hand, the reward is the wealth of inputs by the students into the teaching and learning environment (Fine & Handelsman, 2010) that allows integration, synthesis, and interdisciplinary learning.

Acknowledging students' culturally diverse backgrounds manifests very differently in an online learning environment than in a traditional classroom. Virtual interaction with the students in an online learning environment precludes the normal nonverbal communication that characterizes the traditional classroom, and these nonverbal cues are different among cultures. While the presence of these cues may or may not produce an effect in a face-to-face classroom, they are missing in an online classroom, which could present a disadvantage to online instructors.

Massive Open Online Courses (MOOCs) are web-based online courses offered for learners around the world at little or no cost regardless of their age, race, social, or educational status. In such a large online learning environment, the learner population multiplies and may be much more culturally diverse than a conventional online course. The need to understand students' multicultural backgrounds that influence learning needs and behaviors is therefore both great and urgent. This study thus aims to explore MOOC instructors' and designers' perceptions of the multicultural learners in these courses, their learning needs and behaviors, how these perceptions were manifested during the design phase, and the different instructional strategies used to respond to the learners' needs and pedagogical challenges the instructors faced when doing so.

Review of Related Literature

Important issues in online instruction across cultures are (1) impact of learners' culture and language on their learning behaviors (Anderson & Simpson, 2007) and (2) the design and implementation of specific models of instruction to address students' ways of learning and interacting online (Llambi et al., 2008; Smith & Ayers, 2006). For example, Johari (2005) suggested responding to learners' language needs, learning styles, and preferences by integrating eight different methods in preparing instructional materials and strategies to match learners to different courses (i.e., language, educational culture, technical infrastructure, primary audience, learning styles, reasoning patterns, cultural context, and social context). Henderson (1996, 2007) built her Multiple Cultural Pedagogical Model of interactive multimedia instructional design that adds to Reeves' 14 dimensions (i.e., pedagogical philosophy, goal orientation, role of instructor, value of errors, motivation, etc.) to incorporate multicultural perspectives and allow learners to maintain their various cultural identities.

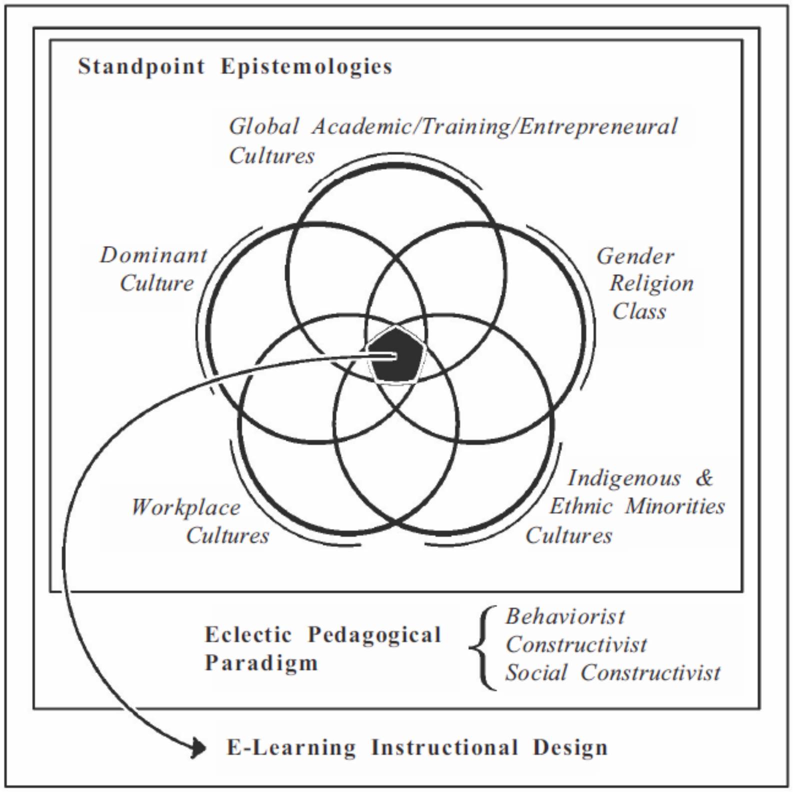

Figure 1. Henderson's Multiple Cultural Pedagogic Model.

Findings on online instruction across cultures indicate that the practices and approaches usually applied in online learning are often at odds with the different ways of thinking and acting by learners of diverse cultures and languages (Ke, Chávez, & Herrera 2013). These cultural and language differences cause major barriers for the design and implementation of online communication (Dillon, Wang, & Tearle, 2007). As an example, different usages of words and writing styles can be a major factor that contributes to their feeling of being culturally disconnected. Different learning styles, different forms of communication, and different personal expectations among different cultural groups of learners also impact their learning and communication effectiveness (Dillon et al., 2007).

Quality of instruction is a critical issue when discussing MOOCs. According to Holland and Tirthali (2014), the question of whether learners gain skills and knowledge in a MOOC has not been straightforwardly addressed because institutions might pursue MOOCs for different reasons other than improving teaching and learning (i.e., expanding reach, increasing the reputation of the school or organization, and maintaining brand identity, etc.). Hence, effective online teaching practices, such as individualizing and personalizing interaction with learners, should be encouraged. Research shows learner-instructor and instructor-learner interaction is a critical factor in increasing the persistence of online learners (Croxton, 2014). At present, learner-instructor interaction in the MOOC learning environment is minimal due to the massive numbers of learners.

Due to some pedagogical similarities between the content-based MOOCs and conventional courses, best practices in MOOCs are also the same ones in a non-massive-scale learning environment. Multiple research studies (Bali, 2014; Tomkin & Charlevoix, 2014; Zhang, 2013) suggest potential best teaching practices in a MOOC environment are within the reach of any instructor. These practices along with brief descriptions are:

- **Presentation skills:** Video presentations of high quality must have good articulation and must convey a personable message to the learners by means of, but not limited to, a warm, friendly tone, humor and personality, and appropriate body gestures.
- **Strong content:** Quality, relevant content, and timely topics with accessible resources help to retain the massive audience.
- **Managerial skills:** These include the management of TAs, course content, and flow (for instance, assigning TAs online hours to maintain 24/7 global presence).
- **Personalization:** A common strategy is to encourage small group gatherings (by language background, by geographic region, common interests, etc.) to offer different opportunities for peer discussions and feedback. Another strategy is to employ different communication channels, create a synchronous section, point out trending conversations, or make regular personalized email notifications that address learners by name.
- **Feedback:** This includes the use of additional instant feedback, such as notifications of responses to threads in which a learner posts.
- **Fostering learner-centered interaction:** Multiple perspectives on interacting with the learners are presented by the participants in Haavind and Sistek-Chandler's (2015) study. For example, one instructor felt rewarded to find conversations that were interesting to him when he surfed the discussion boards. Another instructor felt that building a professional community was the main goal when teaching a MOOC, and yet another enjoyed investing her curiosity in her own subject matter through browsing a large pool of learner discussions (Haavind & Sistek-Chandler, 2015).

Applying best practices in MOOCs varies greatly by the instructors and the subjects that they teach, and the extent to which the instructor can apply these practices effectively in turn is determined by their own instructional competencies, subject expertise, comfort in using technology in instruction, and the group of learners they are interacting with. Thus, matching the instructor's teaching skills and the learners' diverse needs is a two-way negotiation.

While MOOC design and instructional strategies are somewhat burdened by the massive nature of MOOCs and culturally diverse learning behaviors among the learners, they also benefit from these elements. The open content of MOOCs provides the learners with a participatory, widely connected learning environment that was heretofore impossible (Jacoby, 2014). The connection between the learners, the change of the instructor's role to a facilitator and a fellow contributor, and the recognition and practice of learners' expertise and proactivity in an increasingly networked learning environment such as a MOOC (Stewart, 2013) are the predominant values of this type of course.

Research Questions

Current issues in MOOC research include the influence of MOOCs on the future of higher education (Billington & Fronmueller, 2013), the effects of MOOCs on learning and teaching (Martin, 2012), the educational problems MOOCs might solve (Rivard, 2013), the gaps in MOOC research (Liyanagunawardena, Adams, & Williams, 2013), and the blending of face-to-face classes with online MOOC classes (Bruff, Fisher, McEwen, & Smith, 2013). This paper proposed a new research agenda focusing on (1) insights into learners' behaviors and learning needs determined by their multicultural backgrounds, (2) the use of instructional strategies that responded to the identified needs during MOOC design and development, and (3) possible pedagogical challenges identified by the instructors and course designers when attempting to respond to the needs. The following questions were asked:

- What are the MOOC instructors' and designers' perceptions and understandings of the multicultural learners' needs when designing the MOOC?
- What are the instructional strategies used to address the learners' needs in the MOOC learning environment?
- What are the pedagogical challenges that MOOC instructors and designers might have faced in determining and addressing the MOOC learners' needs?

Methods

Data Collection

Qualified participants for this study were professors and instructional designers working at an American institution of higher education and were involved in designing or teaching at least one MOOC on the Coursera platform by the time the interview took place. Their insights and experience in designing and teaching a MOOC on Coursera was foundational to establishing inputs on the MOOC learners and their needs, as well as the development of pedagogical strategies to address such needs.

Merriam (2009), Stake (2006), and Yin (2014) suggest using more than one method for collecting data. For this study, data were collected from two sources:

- investigation of the MOOCs offered by the participants, such as analysis of the course syllabus, including the subject, types of assessment, the calendar, discussion forums, and so on, and
- semistructured interviews with the participants that addressed the following topic domains:
    a. information about the MOOC offered by the participant,
    b. description of learners' demographic distribution and how this might inform their prediction of students' learning behaviors and needs, and
    c. instructional strategies used by the instructors to address the learners' diverse needs and pedagogical challenges in doing so.

The first part of the interview protocol was adapted from the instrument developed by Hollands and Tirthali (2014).

The investigation of the MOOCs on the Coursera platform enabled the researcher to gain knowledge about the MOOC that facilitated conversation during the interview. The interviews were primarily done online using communication tools such as Skype, Google Hangouts, or telephone. Participants in the interview were offered choices on the date, time, and method of communication. Once the candidate agreed to do the interview, a confirmation/reminder email was sent to the participant one or two days prior to the interview date. The interview normally lasted

45–60 minutes. Follow up emails were used with the permission of the participants should there be need to clarify the transcript. The collected data were run through an artifact review in which they would be compared with one another to determine their validity.

Data Analysis

All collected data were kept as individual participant cases for review and unification for the study as recommended by Stake (2006) and Yin (2014). The case database included the secondary research results, the interview transcripts, and other related documents found online or provided by the participant. Each interview record was transcribed into a written format and was emailed to the participant for review and approval (Merriam, 2009).

Building Category List

Each of the approved transcripts was reviewed and sorted by category. A list of categories was created from the contribution of categories from each interview after they were coded. Interviews were coded by broad categories, such as institutional strategies of MOOC development, development of a specific MOOC, MOOC learners' demographic distribution, effects of demographic factors on students' learning behaviors and needs, and instructional strategies used to address the needs.

Building Themes and Testing Findings

In-depth analysis of the categories emerged during the coding process. These categories were aligned to major themes that were in turn aligned to the research questions. The purpose of the alignment was to determine if the data collected would provide insights and understanding that would answer the research questions. Following the process described by Stake (2006) and supported by Merriam (2009), each case interview suggested a list of individual themes. These themes were run across all the interview cases for findings that may be true for the cases.

Report and Interpret Data

Collected data were reported both by individual cases and in a consolidated fashion. Individual cases were described without revealing individual participants' identities, yet they provided sufficient details so that conclusions could be drawn by the reader (Merriam, 2009). Data were interpreted in light of themes and assertions found from each participant and were combined to provide the research findings that answered the research questions using Stake's (2006) process.

Results

Within the 249 email invitations sent out, three failed to be delivered due to obsolete email addresses, eight generated automatic replies that resulted in no further communication from the recipients, 19 responses resulted in declination for a number of reasons, and 15 were responses of acceptance. The main reasons for declination by the recipients were that they were interested but (1) unable to offer a one-hour time commitment or (2) did not believe they had sufficient expertise on the topic to provide valuable insights. All of the participants held a PhD degree in the subject area that they teach and had 5–50 years of academic experience. These participants represented a diverse set of institutions and organizations from the public and private sectors as well as their experience with MOOCs and the subjects they taught.

Aspects of MOOC Design That Address Multicultural Learners' Needs

Most of the investigated MOOCs had the built-in features that demonstrated support for the learning needs of massive and culturally diverse audiences. The built-in support features were grouped into two major categories: language support and course format support. The built-in language support was indicated by the inclusion of transcripts, subtitles, and translation of the content videos into different languages. Course format support included a number of techniques the instructors used to either (1) enhance the learners' comprehension of content (such as the insertion of PowerPoint slides or other forms of visual aids on top of the content videos) or to (2) reinforce learners' engagement, such as (a) creating multiple discussion venues via Coursera discussion forums, Facebook page, or virtual office hours; (b) creating meet-and-greet discussion threads on the discussion forum; (c) encouraging learners to create study groups based on their language background or geographical location; (d) having virtual meetings via Google Hangout; or (e) employing mentors or teaching assistants to monitor the discussion forums, to help translate the course content videos, or to help with assessment. The design efforts in the investigated courses by the participants reflected to a great extent their concerns for diversity in the MOOCs and matched what they shared in the interview. Table 1 shows aspects of MOOC design that address multicultural learners' needs.

Table 1.

Aspects of Course Design That Address Multicultural Learners' Need

Courses	Course format					
	Language support Translation/ sub-title	Multiple discussion venues (Coursera, Facebook page, virtual office hours)	Meet-and-greet/ general discussion	Study groups/ Google Hangout	Teaching assistant	PowerPoint/ study guides
Galaxies and Cosmology	x	x	x	x	x	x
Introductory Human Physiology	x	x	x	x	x	x
Medical Neuroscience	x	x	x	x	x	x
Questionnaire Design for Social Surveys	x	x	x	x	x	-
Object Oriented Programming in Java	x	x	x	x	x	x
Advanced Data Structures in Java	x	x	x	x	x	x
Mastering the Software Engineering Interview	x	x	x	x	x	x
Data Structures Made Easy	x	x	x	x	x	x
Understanding Terrorism and the Terrorist Threat	x	x	x	x	x	x
Curanderismo Part 1: Traditional Healing of the Body	x	x	-	x	x	x
Introduction to Cataract Surgery	x	-	-	-	-	x
Powerful Tools for Teaching and Learning: Digital Storytelling	x	x	x	x	x	x
Rural Health Nursing	x	x	x		x	x
Property and Liability: An Introduction to Law and Economics	x	x	x	x	x	x
Inspiring Leadership through Emotional Intelligence	x	x	x	x	x	x

Goals for Developing the MOOCs

The goals of offering the MOOCs revealed by the participants were dynamic and somewhat set the tone for how they perceived and responded to MOOC multicultural learners' needs. The overarching and probably most common goals of MOOC pursuit by all the participants was to spread the reputation of the university and to assist people all over the world in learning about the topic, although these participants were also attracted to MOOCs by more than these common goals.

Most participants were driven by a philanthropic impetus to offer a free gift to the community by creating a MOOC from a campus-based course that they had been teaching. Thus, there existed an issue with time commitment for the MOOC in addition to what they were doing in their institution. One participant noted the following:

> I think we are all essentially kind of grapple through this and trying to learn how this all are [*sic*] going to work eventually because I think the education is really undergoing profound transformation, and I think most of my colleagues are in a complete denial about that. It'll be very interesting to see how this transformation unfolds. In [name of the university] this is a voluntary activity and, you know, everyone is busy with their lives, and our institution hasn't invested into providing any additional things, this is sort of like a gift to the community.

Another participant expressed a similar struggle she had between the desire to pay more attention to the MOOC versus the constraints of time and other commitments:

> The MOOC is like a side thing that I am doing. I was hoping to go through it really carefully and, maybe, change some lectures, add some lectures, definitely change some of the quiz materials, but I honestly haven't gotten through it yet, so I am not even sure what's going to happen…. But that was my hope before the next offer, to be able to really go through it, and put a lot of thought into changing it.

Thus, they believed MOOC deserved more attention and investment from the university:

> To go to a higher level of providing educational service, I think institutions will have to compensate people who are actually doing it…. I've done it partly out of curiosity, and partly for just doing different things, and thought that it was a nice thing to do…. But at some point I have actual work to do…. So, the institutions have to come up with a reasonable mechanism, by which all this is organized.

A MOOC could also be designed and implemented as a pilot test for the development of an online joint program between two universities for campus-based students, as in the case of Questionnaire Design for Social Surveys MOOC. MOOCs could also be developed in response to a Coursera request for a specialization by an institution who showed strength on the subject. Finally, the MOOC was a means to offer professional development that targeted K-16 teachers in the state of Texas, as in the Powerful Tools for Teaching and Learning: Digital Storytelling MOOC.

MOOC Learners: Expectations and Reality

Most of the participants reported that they came to MOOC design and development with some expectations of diversity among the audience. Yet they became surprised at the tremendous volume of diversity among the population in regard to their age; their language, cultural, ethnic, and educational background; and their patterns of engagement in the course. Table 2 describes the MOOC's expected audience and then the actual participants.

Table 2.

Expectations and Reality of MOOC Learners' Background

Participant	MOOC	Learners' Expected Backgrounds	Reality
1	Galaxies and Cosmology	• Physics • Astronomy • Cosmology • Anyone interested	• 20% expected audience • 20% science education • 60% regular people • Age: 16–82 • Global audience
2 & 3	Introductory Human Physiology	• Biology • Anyone interested	Wide range of academic backgrounds (Engle, Mankoff, & Carbrey, 2015) • Humanities: 15.1% • Natural science: 17.8% • Social science: 13.9% • Health science: 30.6% • Professional: 11.6% • Technical: 11.1%
4	Medical Neuroscience	• Doctors - physicians • Those with neuroscience knowledge • Anyone interested	A lot of non-native speakers of English (who did or did not struggle with the language)
5	Questionnaire Design for Social Surveys	Students and professionals from all fields of social science	N/A
6	Specialization in Intermediate Java Software Engineering*	• Undergraduates around the world • Working professionals • Programming	Diverse programming skill levels
7	Understanding Terrorism and the Terrorist Threat	U.S. government officials (Homeland Security, Intelligence, Justice, etc.)	• 30% from developing economies • 30% from the U.S. • Subject expert (to seek network) vs. novice (to learn something new)
9	The Holocaust: The Destruction of European Jewry	Anyone interested	People who lived during the Holocaust
10	Curanderismo Part 1: Traditional Healing of the Body	Anyone interested	• Mexicans • Tex-Mex
11	Introduction to Cataract Surgery	• Residents in the ophthalmology residency program • Anyone interested	• < 50% expected audience • > 50% laypeople
12	Powerful Tools for Teaching and Learning: Digital Storytelling	• Primarily Texas K-12 teachers • Anyone interested	• 1% Texas K-12 teachers • Everyone else
13	Rural Health Nursing	• Nurses • Other backgrounds	Global audience
14	Property and Liability: An Introduction to Law and Economics	Anyone interested	• 70% Americans • 30% internationals
15	Inspiring Leadership through Emotional Intelligence	Anyone interested	Global audience

*This specialization included five courses: 1. Object Oriented Programming in Java, 2. Advanced Data Structures in Java, 3. Mastering the Software Engineering Interview, 4. Data Structures Made Easy, and 5. Capstone: Analyzing (Social) Network Data.

Participants' Perceptions of Diversity

Participants' perceptions of diversity can be categorized into two groups: (1) those who perceived cultural differences among learners' attitudes toward and satisfaction with MOOCs and (2) those who saw the merits of MOOCs with diverse audiences. In regard to learners' perceptions of MOOCs, one of the participants reviewed the striking cultural differences they observed among the audience's attitude toward, appreciation of, and satisfaction with the course:

> One interesting thing that caught my attention is a lot of students, and I think most of them are probably Americans … were having expectations that were not warranted by the fact…. They're sort of feeling extremely entitled … demanding better service, and I had to remind people that they are not paying customers …. On the other hand, there are a substantial number of students … and those are I think from places like India, or China, or South East Asia in general, or Africa … were extremely grateful…. They were thrilled to have the opportunity to actually participate in a … class from where they are.

To illustrate the counterargument, the participant provided an anecdote of how a student from Egypt expressed their appreciation of the MOOC:

> At one point, I got an email from a fellow in Egypt, who said "I am emailing you on behalf of my brother who is taking your class, who could not email you himself. And here is the fax: "Professor, I love your class, I am so sorry I will not be able to finish it because I was arrested by military police in Egypt during the demonstration, and I don't know when I will get out, but I am so sorry." I am thinking, "Good God, if I were arrested by military police in Egypt, … class will be the last thing in my mind." This person was so grateful that they had the opportunity that they took trouble to send this message from jail.

In the same category, another participant believed that MOOCs were more appreciated by the learners from parts of the world that had limited access to quality learning resources:

> The real value of the MOOC is not that some college sophomores are going to see it in America where the alternative is that the college sophomores could get it in a college class. It's going to be somebody in Vietnam or somebody in Peru or somebody in Africa for whom the alternative is not an American college course but nothing at all. And so for that student, this is an incredible opportunity. Yet many of them wrote to me to tell me it was the best part of the whole experience. They said if it wasn't for this I wouldn't have any idea of the subject that you're talking about and there's no opportunity in my life to do anything remotely like this and yet, it just cheerfully changed my attitude about it completely.

Most participants shared the belief that major merits of MOOCs were created by the diverse student body. They stated that widely diverse MOOC audiences enriched the learning outcomes with their diverse and authentic viewpoints, experiences, and personal stories. Furthermore, another advantage of having a massive audience in the course was that the learners could support and encourage each other during the learning process. Here is an example:

> Another aspect of MOOCs, what I would call spontaneous self-crowdsourcing of education …. Students will post questions on the forums, and other students would answer them. In many cases, almost all cases, those would be excellent answers …

> sometimes it's a fairly trivial thing over such and such lecture, and sometimes it will be a person who actually has a real expertise in that particular aspect, and answered it better than I would.

Yet more evidence of the merits of MOOCs was attributed to the expertise and reputation of the instructor and the institution and the instructor's availability to have a live conversation with learners across the globe:

> I try to do a live chat, about once a month. When I do the live chat people call in for an hour and a half on a video chat and they can ask any questions. The last calls were somebody from Tehran with questions, somebody calling from British Columbia, Canadian teacher who is on strike so she's at home. A young man from Amman Jordan, a high school student from the UK, a man and a woman both are working in Lagos Nigeria called and people from a few U.S. cities. Oh and a young man from India. It was 4 o'clock in the afternoon my time in Cleveland at the university and I said "What time is this there for you?" and he said "its 2:30 in the morning," I said "why aren't you in bed?" he said "Oh, professor, I've been waiting for so many weeks to be able to talk to you."

Perceptions of Multicultural Learners' Needs in a MOOC and Instructional Strategies Used to Address the Needs. Instructors' and instructional designers' perceptions of multicultural learners' needs were paired with the instructional strategies they used to address such needs. The three themes that emerged were language, content, and engagement.

Theme 1: Language. Most of the participants were mindful of the existence of non-native speakers of English among the learners and concerned that these learners might face more language problems when drawn to more specialized subjects. To help solve this problem, the instructor had the teaching assistants (TAs), who were former MOOC students with the relevant background, translate the entire course into different languages, such as Chinese or Portuguese. The instructors revealed that it was hard to assess the course when it was in a foreign language, but it has been successful, as evidenced by its four runs, and there were learners who kept coming back either because they did not pass the first time or to help other people. The instructors shared a confession made in the Google Hangout section by a student who attended the course four times:

> "My English language was not very good. I am trying to learn because I want to get into the medical school" said the student. In the second run he spoke more fluently. His English was really improved and by the fourth run he got on and he said "oh I got into the medical school I am so excited that this course has helped me so much" and he was really selling our course. He said that the course helped him both to learn English as well as to master the information he needed to get into medical school. We thought that was really animated and nice.

Providing PowerPoint slides to aid the video lectures was another common language-support strategy. Others spoke slowly and clearly in the video lectures for their non-native speakers of English:

> I've had the experience myself of being a non-speaker in a foreign country and been struggling to learn German for my whole life so when I was in Germany I appreciated that people speak German to me slowly and clearly. At my university I have many foreign students. Many of them are not native English speakers and so

> for years I've been conscientious that what they need is for me to speak clearly and slowly. So one of the nicest things about my course was people in places like Burma would send me an email on the chat board to say "thank you for speaking slowly and clearly" and that made me feel great.

Or some instructors allowed the learners to upload their works in a language of their choice:

> One of the things that we have done is we have given the option for learners to upload their videos in whatever language they prefer rather than English except if there aren't enough learners who speak that language, they might not be able to be graded. And so the grading depends on having 3 peers who will be able to watch and respond to the video. They might have to work a little harder to find peers who will grade that work because other students won't understand it.

Theme 2: Content. The participants in this study went above and beyond in giving attention to different groups of learners and are deeply concerned about content comprehension of learners who did not have the required subject background knowledge or who were non-native speakers of English. The content support strategies included (1) supplementing the video lectures provided to the learners with additional resources in different formats; (2) providing study guides for the content in the video lectures; (3) gathering global insights, ideas, and stories from the learners; (4) providing notes (that consisted of the same information as in the content video but written in paragraphs like a textbook) for video lectures; (5) customizing content videos for different knowledge levels for learners of different academic backgrounds and skill levels; and (6) simplifying the content presentation and utilizing international content and examples to make the content relevant for an international audience.

All participants provided supplemental resources for their MOOC learners. These supplemental resources provided scaffolding subject knowledge that appeared especially helpful for the novice learners and allowed further exploration or study in-depth for others.

In the Introduction to Human Physiology MOOC, the strategies used by the instructors to facilitate content comprehension for the international learners included the use of notes that went along with video lectures. These notes were written in paragraphs and carried the same information as the videos. They also gave learners—especially those who were struggling to read English—more time at the end of the course to study for the exam.

In the Medical Neuroscience course, the instructor provided study guides to help learners, especially those who had less neuroscience background, better understand the video lectures. In the series of programming courses offered by the University of California at San Diego (UCSD) that were intended for undergraduates around the world and working professionals with programming backgrounds, the content materials were designed for the intermediate level, and yet the audience was more diverse in terms of their programming background and skill levels. To accommodate that, the instructors provided customized video lectures that targeted different groups of learners with different programming skills. They incorporated test quizzes for learners with adequate programming backgrounds and support videos with additional scaffolding knowledge for people with less background in programming. The videos were structured to allow people to review the core concepts being taught and came with programming assignments to be submitted at the end of each module. These videos addressed common conceptions and mistakes and provided a few hints about the programming assignments.

The other sequence of videos, the concept-challenged videos, were made for learners with different backgrounds, adopted from the peer instruction model of teaching computer science. The learners watched the videos, replied to the question, and were showed a segment of three university students with qualified backgrounds discussing common misconceptions surrounding the question in simple language before the instructors revealed the correct answer. The instructors would present a concluding video to explain what the correct answer was and why.

In a number of MOOCs, a majority of learners who signed up for the course came from outside of the United States. The instructors of these MOOCs therefore fostered content comprehension for non-native speakers of English by internationalizing concepts and utilizing examples that were more internationally representative. For example, to customize the content presentation to meet 75% of the learners' needs who came from outside of the United States, the instructor of the Powerful Tools for Teaching and Learning: Digital Storytelling MOOC utilized examples that were internationally representative:

> If we show a picture of something, rather than showing a picture of the Empire State building which is a famous building in the U.S. we show a picture of the Taj Mahal for example, or the Eiffel Tower thinking that might be more recognizable. We try to do things that are more global and not just focus on the U.S. And we try to break down all the steps of the digital storytelling process so that they started it at the very beginning and we understood that people who signed up for MOOCs English is their second or third language and so we did not assume that they knew as much about everything.

The instructor who taught a subject that reflected deep Western-rooted ways of thinking, the Property and Liability: An Introduction to Law and Economics MOOC, was even more deeply aware of simplifying the concepts and ideas for the global audience. The instructor made an effort to pierce through the concepts and the topic, as he was mindful that they were both challenging and unfamiliar to the international learners:

> It's about private property, it's about respecting individuals, and it's about having a distance between you and the state. This is not stuff for example that university students are going to learn in Beijing. This is the subversive stuff in Asia, subversive stuff in China, subversive stuff in Vietnam, subversive stuff in a lot of places in the world. So various students in Beijing are listening to these lectures, they are doing something about Western liberal thinking that they are not likely to hear anywhere else in China because the governments don't recognize these sorts of rights. So I think of my multicultural students as the way I think of all the other students except to say that I try very hard to not talk about anything in the course that requires you to be in America to understand this.

Instructors also enriched and diversified the content strategically by recruiting insights, ideas, and stories from their global MOOC learners. This, however, depended on the subject, particularly the capacity and degree to which the ideas, concepts, or process could be universally interpreted and applied. For example, a diversity-embracing strategy used in the Powerful Tools for Teaching and Learning: Digital Storytelling MOOC was to share exemplary submissions of digital stories by their former MOOC learners (with permission obtained) with the next generation. The rationale was that even though each story had a cultural context on its own and carried its own primary nuances, it could be felt and understood by people of different cultures, especially when it was creatively told with passion from the narrator:

> We give them example stories of different topics but basically we want people to be creative. We want them to pick something that is personally meaningful to them. I think that's what we've learned from teaching digital storytelling is that the best stories come from people who pick a topic that they find personally meaningful so they are motivated to put together a story that comes to the viewers who want the story and they will respond better because they can feel the passion that the story teller had.

Or, the instructors were specifically looking into the global insights from the students' postings because of the nature of the subject, as in the Rural Health Nursing MOOC:

> We addressed unconscious bias, which stimulated a lot of discussion. We did an assessment of resources (i.e.) geographic, economic, political and social aspects of healthcare that the students were provided to see how they're related to health. We even read the posts from participants around the world and got into an exchange with someone who was in India. He was struggling with some of the cultural diversity that involved the castes there. If you're in one particular caste level, you're provided with healthcare that's somehow different from the other caste level from the other areas of the country.

Dealing with the massive diverse audience in a MOOC on a daily basis both challenged the instructors and allowed them to experience the immediate effects of their involvement and pedagogical innovation in the course. The learners' feedback, which was faster paced, nontraditional, spontaneous, and more diverse than that in a conventional course, contributed significantly to this experience.

Theme 3: Engagement. A study by Phan, McNeil, and Robin (2016) indicated that learners who demonstrated active engagement in a MOOC tended to outperform the ones who did not prioritize a similar trait. Thus, participants in this study noticed different patterns of engagement by the learners due to their ethnicity, language, and educational background. These global learners brought with them aspects of their native language and cultural identities that were shaped by their educational background when immersing themselves in the mainstream American classroom culture, even in an online environment.

The implementation of engagement-facilitation strategies was dependent on the subjects being taught, the instructors' and course designers' experiences with and exposure to a global audience, and their time commitment. Learners in the MOOCs investigated in this study were granted the opportunities to extensively communicate with one another from different parts of the world, across different skill levels, and regardless of their language and educational background due to the application of a wide variety of engagement-facilitation strategies by the participants.

A common practice of engagement used by the participants was building a virtual community by personalizing the discussion forum on Coursera with "meet-and-greet" sessions where the learners could introduce themselves, or by organizing the discussion threads by the lecture topics that allowed learners to keep track of different questions. Another strategy used by UCSD to draw in the learners in the specialization MOOCs was the use of real-world resources, such as "When I struggle," where the instructors or the students talked about their experience going through the same materials and what was hard for them and what strategy they used to overcome the challenges, or real-world videos of Google engineers talking about the concepts taught in the course and their real-world applications.

The value the discussion forums, according to the instructor of the Property and Liability: An Introduction to Law and Economics MOOC, was created by the learners' contribution, with the instructor being a monitor or a fellow participant:

> Besides posting the weekly announcement, I would spend maybe 45 minutes to an hour, four or five times during the week in the chat room and most of the time I wouldn't say anything. I just read what people were doing. Occasionally somebody would address something specifically to me that I thought needed to be addressed then I responded to that for everybody.

A couple of strategies used by participants at UCSD were (1) requiring the learners to take charge of their learning by uploading videos of themselves explaining concepts as part of the course assignment and (2) extending the discussion forums to make it an input-gathering place where learners shared their inspiring stories:

> The other thing we have done is we have an extended discussion forum. Our learners are really active on the discussion forum and really supportive of one another. They share the stories about being stay-at-home parent for 10 years trying to get back into the workforce or moving from one aspect of industry to another and they share tips with one another about how to write their resume or how to prepare for interviews. It's just amazing to see this community form from around the world, people who are in the States, in Europe, in Russia and it's just amazing and they are working together, giving each other advice.

Yet a number of instructors offered multiple channels for instructor-learner and learner-learner interaction:

> I've tried different varieties of interacting with students…they certainly appreciate me answering questions in forums. I tried Facebook, Google Hangout, virtual world, and nothing has quite really caught on yet but I think that will be another major issue for the educational industry to sort out how to provide the human interaction experience where knowledge really gets to.

There were certain topics that could trigger some tricky interactions among the learners and which prompted the instructor to strategize their instruction to solve the problem or to distract the audience away from it. For example, in the Understanding Terrorism and the Terrorist Threat MOOC, there was a growing divide between the learners with advanced knowledge on the topic and the other group that had no background knowledge who wanted to learn something new. Recognizing this disillusionment on the discussion board, the instructors broke the audience off into 13 different regional discussion groups and structured the discussion so that people from the same region discussed among themselves and then moved toward other groups. This was perceived as a vehicle to ease out cross-cultural issues. To set up this exercise on the discussion board, the instructors did a survey on the audience's personal experience across the regions. The learners who were required to share their personal stories and opinions about the topic felt they contributed to the discussion:

> We actually had people who affiliated or consider themselves affiliated to radical groups in the same conversations with Nigerian police officers and American agents and Poland refugee workers, etc. So it was really interesting, really active and productive.

Finally, a strategy that the instructor in the Inspiring Leadership through Emotional Intelligence MOOC tackled to encourage engagement, especially in students from the Middle East and women from Japan, Korea, and China, who were normally less vocal than their Western counterparts, was to bring up their voices and insights in the discussion. The instructor believed this was an effective way to make them speak in the class and that it was culturally helpful for students who came from the cultures where they were supposed to be silent.

Pedagogical challenges in addressing multicultural learners' needs in a MOOC. The participants reported facing a number of pedagogical challenges in their attempts to respond to the culturally diverse MOOC learners. These challenges were strongly connected, but not limited to dealing with different aspects of multicultural learners' needs. These challenges could stem from a particular subject, the instructor's personal experience and exposure to a global audience and the context of MOOCs, the instructor's preference for and exposure to online interaction, and finally their time commitment to MOOCs.

Some MOOCs investigated in this study had topics that generated controversies and created heated conversations among the learners. That was the case of the Understanding Terrorism and the Terrorist Threat MOOC or the Rural Health Nursing MOOC, where the invitation of global, rural nurse learners to the discussion allowed the gathering of great insights and revealed learners' struggles for which there were not necessarily solutions. For example, what nurses could do legally varied wildly depending on their respective countries, states, or regions.

In a different category, some instructors described their struggle with the efficiency (i.e., whether it was done on time) with the peer assessment process and the subjectivity and quality of the feedback (i.e., whether it met all the goals or not). One instructor asked how instructors can get learners to think about the personally meaningful digital stories they produce in educational contexts to support and improve the teaching and learning process, as in the case of the Powerful Tools for Teaching and Learning: Digital Storytelling MOOC.

Other instructors confessed that it was very challenging to target the level of difficulty of the materials to broadly serve such diverse groups of learners in their MOOCs, and they became frustrated that what was offered sometimes was not what some learners wanted. They also felt some disconnection from the MOOC learners as opposed to the connection they felt with those in a campus-based course, as they could not see them and attach names or faces to individual learners. Or they felt frustration that they did not get responses about their learning outcomes:

> I feel that gratification as an instructor I would like to know "did they learn?" "Did the course help them?" "What are they going to do with it?" "How are they incorporating this into their education?" and I don't get that response necessarily.

Finally, a number of instructors who were interviewed expressed their struggle with the limited time commitment they could make for MOOCs while desiring to modify and improve the MOOCs. For most of the instructors who were performing a full load of responsibilities at their institutions, MOOCs were a side task that was done either out of intellectual curiosity or with a philanthropic drive to serve the community, among other impetuses. They believed that the institutions should come up with a reasonable and organized mechanism to make MOOCs an independent item on the faculty's agenda, especially when learners were required to pay for the course, so that the expectations for the quality of MOOC design and delivery from the learners would be higher.

Conclusions

Aspects of MOOC design that responded to diverse learners' needs included the built-in course components that offered choices of language of assignment submissions and content materials categorized by levels of difficulties for learners of different ethnic and language backgrounds, educational levels, and so on. During the delivery phase, indications of instructional strategies that addressed multicultural learners' needs were language support, content support, and multiple forms of online interactions (i.e., instructor-student, student-student) to encourage student engagement. Most of the instructors concurred that language played a role in MOOC learning outcomes, especially for learners who spoke English as a second or foreign language. In regard to the course content, the participants showed various concerns regarding content comprehension, especially for two groups of learners: those who did not have the required background knowledge for the course and non-native speakers of English. The content support strategies usually targeted these two groups of learners. Content accommodations to better support global learners were adding supplemental learning resources in different formats; creating study guides for video lectures; utilizing global insights, ideas, and stories; creating notes for video lectures; and customizing the content videos for learners of different academic backgrounds and skill levels. Cultural adaptation in the course content design was reflected as the simplification of the content presentation and the utilization of internationalized content/examples. Support for the international learners with content comprehension included insertion of PowerPoint slides or other forms of visual aids on top of the content videos; encouragement of study groups based on language background or geographical location; or employment of mentors or teaching assistants to monitor the discussion forums, to help translate the course content videos, or to help with assessment. The instructors and designers also showed concerns about patterns of engagement by learners of different ethnicities and educational backgrounds. Engagement-facilitation strategies were usually targeted at minority groups of learners who were not accustomed to the culture of American higher education. The design efforts by the instructors and instructional designers in the investigated courses reflected to a great extent their concerns for diversity in the MOOCs and matched what they shared in the interview.

A common challenge faced by most of the instructors and course designers, which aligned with the findings of Ferguson and Sharples (2014), was that they were not able to provide prompt feedback to the learners but had to heavily rely on the TAs to monitor the discussion forums and to respond to questions from the learners. There were also problems with a high volume of issues in the course that had to be managed by a handful of TAs. Another common challenge was the struggle with the time commitment for the MOOCs, as most of these instructors had to teach regular courses on campus besides conducting research and performing other vital responsibilities in their institutions. They expressed the dilemma they had between the desire to improve the MOOCs and reach broader audiences versus the limited time they had for MOOCs.

Another type of challenge peculiar to niche subjects was that the courses were designed for learners with certain background knowledge of the subject, but in reality the audience was more diverse and included people who did not have the background of the target audience. As a consequence of dealing with a broader, more diverse group of learners that they were not fully prepared for, the instructors received different kinds of feedback from the learners about the level of difficulty of the course, the attitude toward what was available, and the demand for better service, including complaints when the service was not up to students' satisfaction. Another challenge for the participants who taught the MOOCs of niche subjects that required prerequisite knowledge was that they sometimes felt they did not have sufficient expertise to teach the subject to a global audience, as they were trained to work with specific audiences within the United States. There was also an issue with students in other countries not having the correct equipment to perform the tasks. Finally, some instructors who were accustomed to knowing their students well in a traditional classroom struggled with connecting with the learners in the online learning environment, especially at the massive scale of MOOCs. The instructors had the same strong desire to know whether and how much the students learned, as well as how they applied what they learned to practice in the virtual classroom. In the meantime, they understood that this was hardly possible in a MOOC learning environment as opposed to a conventional classroom due to the come-and-go of the MOOC learners and the lack of obligation for them to commit.

Strengths and Limitations

As MOOCs become a more widespread phenomenon in higher education, and formal credits and recognition evolve, responses to questions about the instructional quality of the MOOCs have become more urgent and critical. The researcher believes that one of the most critical issues of developing MOOCs revolves around the umbrella question of how to deal with the global audience's diverse learning needs. This study contributes to the mission of educating the global audience by providing these insights: (1) instructors' and course designers' perceptions about multicultural learners' needs and how these perceptions and identification of the learners' needs guided them in designing and delivering the course, (2) instructional strategies they applied to respond to such needs, and (3) pedagogical challenges they had while pursuing these goals.

The major contribution of this study is the addition of the voices of the instructors who designed, developed, and taught the MOOCs to the literature of MOOC research. Various insights into global learners' backgrounds by the MOOC instructors and designers that shaped their responses to learners' learning behaviors and needs contributed to the knowledge base of MOOC instruction. Instructional strategies that these instructors used to deal with multicultural learners as well as to engage them and accelerate their performances in the MOOCs across disciplines can be valuable sources of reference for subsequent generations of MOOC instructors and designers. In the meantime, the pedagogical challenges reported in this study can serve as references for instructors and course designers when starting their MOOC design and delivery journey.

A limitation of this study is the lack of generalizability of the findings. Even though the participants represented diverse disciplines and both public and private higher education institutions in the United States, it does not reveal the complete story of multicultural learners' needs in MOOCs, how they are perceived and responded to by instructors, or what pedagogical challenges became evident along the way. In addition, only online modes of communication were used for data collection in this study. Other methods, such as in-person observation and discussion, could reveal additional findings.

Implications for Practice

The greatest implication for practice from this study is that MOOCs will probably never be one-size-fits-all courses due to their unconformable body of learners. All of the narratives, anecdotes, and lessons learned from MOOCs serve as a source of reference at best. A successful MOOC model cannot be simply transplanted or replicated because aspects of the learners' diversity (what the researcher would refer as *microlevel diversity*, in which evidence of diversity is shown within an inner group of learners who are normally bounded within a territory and share the same language, culture, and educational background, and *macrolevel diversity* among learners who share none of the above) are magnified and become more critical variables in a MOOC learning environment. The instructors and course designers have to pick and choose their instructional content by trying out different instructional strategies and may have to accept the possibility of failure in the design and delivery of MOOCs. Each MOOC is a unique package: the way it is designed, the philosophy behind it, and most importantly the audience who participates. This is the nature and the beauty of this type of online learning environment: While it gives the instructors and course designers exciting experiences and the freedom of design, it also requires them to provide flexibility, choices, and options for the learners. This could mean a tremendous time commitment on designing a MOOC and challenges in considering all aspects of the learners' diversity.

Findings in this study should not serve as a single reference for MOOC design and development. Instructors and course designers of MOOCs should also consider guidelines on the Coursera Partner Help Center and other sources of references and publications from institutions who pioneered MOOC design and delivery.

Recommendations for Future Research

There are many possibilities to extend the findings of this study in order to tell a more complete story of how MOOC instructors and course designers perceive and respond to multicultural learners' needs. It is recommended that replication of this study be conducted on another MOOC platform besides Coursera, such as edX, Future Learn, Stanford Online, or Udacity, to name a few. Extending this study to another MOOC platform may help identify pedagogical strengths and weakness in different MOOC providers and their potential impact on learning outcomes.

In regard to methodology, it is recommended that the data collection be extended with the inclusion of face-to-face interview components and classroom observations with instructors and instructional designers who develop and launch MOOCs in addition to the online and telephone interview methods employed in this study. Classroom observations on campus would provide great quality of data sources for the study. These resources would in turn set the background and provide guidance for further exploration on pedagogical challenges and instructional strategies at other institutions.

Another possibility to extend this study is to investigate the pedagogical transformation between MOOCs and conventional campus-based courses offered by the same instructors. Insights into pedagogical transformation between MOOCs and conventional courses made by the instructors who teach MOOCs and campus-based courses could paint a larger picture of pedagogical approaches used in both environments.

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Small Groups in a Social Learning MOOC (slMOOC): Strategies for Fostering Learning and Knowledge Creation

Marianne E. Krasny
Cornell University

Bryce DuBois
Rhode Island School of Design

Mechthild Adameit
Independent Consultant, Uruguay

Ronnie Atiogbe
University of Lomé, Togo

Muhammad Lukman Baihaqi Alfakihuddin
Indonesian Biodiversity and Conservation

Tergel Bold-erdene
Ulaanbaatar Broadcasting System, Mongolia

Zahra Golshani
University at Albany

Rodrigo González-González
National Autonomous University of Mexico

Ishmael Kimirei
Tanzania Fisheries Research Institute

Yamme Leung
World Wide Fund for Nature, Hong Kong

Lo Shian-Yun
National Taiwan Normal University

Yue Yao
World Animal Protection, Beijing

Abstract
Social support and face-to-face learning may enhance outcomes for students who face barriers in accessing Massive Open Online Courses (MOOCs). This study investigated how self-identified volunteer leaders guide and foster interactions among small groups of students who face technical and conceptual barriers in accessing MOOC content. Several months prior to the start of the MOOC (Environmental Education: Transdisciplinary Approaches to Addressing Wicked Problems), registered students volunteered to lead small groups for participants whose primary language was other than English and where limited Internet access and cultural barriers curtailed access to and understanding of course materials and pedagogy. Results of a survey and in-depth interviews ($N = 10$) revealed that group leaders were instrumental in overcoming barriers related to language, content, cultural ways of learning, access, and time. Group leaders also fostered cooperative learning strategies, which helped students acquire course content, and encouraged collaborative group projects leading to groups adopting some features of online knowledge communities. The term *social learning MOOC* (slMOOC) is proposed to capture a growing trend of incorporating collaborative learning strategies in xMOOCs and to emphasize how MOOCs use interactive learning strategies to help students apply course content to local contexts and thus may contribute localized knowledge to globalized MOOC learning environments.

Keywords: Small groups, MOOCs, social learning, knowledge creation, hybrid learning

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Small Groups in a Social Learning MOOC (slMOOC): Strategies for Fostering Learning and Knowledge Creation

Multiple challenges threaten our ability to realize the MOOC vision of establishing "education as a fundamental human right, where anyone around the world with the ability and the motivation could get the skills that they need to make a better life for themselves, their families and their communities" (Koller, 2012). Students from developing and other countries may be hampered by limited English language proficiency, "content overload," feeling as if they don't belong and there is no sense of community, experiencing threats to social identity in a large anonymous course with many better prepared participants, and even lack of familiarity with computers and insufficient access to reliable electricity. Further the materials may lack local relevance and thus be in need of "cultural translation" (Bartholet, 2013; de Waard et al., 2014; Godwin-Jones, 2014; Jung & Gunawardena, 2014; Kizilcec, Saltarelli, Reich, & Cohen, 2017; Liyanagunawardena & Adams, 2014; Meinel & Schweiger, 2016; Nkuyubwatsi, 2014; Yuan & Kim, 2014). These barriers likely contribute to the predominance of well-educated professionals from more developed countries in MOOCs, with less than 3% of MOOC students from least developed countries (Laurillard, 2016).

One strategy to address these barriers is forming small groups of students who interact online, meet in person, or use a combination of online and in-person social networking and learning strategies. Such groups often focus on project-based learning (N. Li et al., 2014; Nkuyubwatsi, 2014) or simply understanding the course content. They can be formed as local “MeetUps” (Glader, 2012) or embassy-sponsored “MOOC camps” (Godwin-Jones, 2014), and facilitated by skilled educators (Chen & Chen, 2015), graduate students (Gunawardena and Jayatilleke, 2014), nonprofit organizations (Bartholet, 2013), and volunteers recruited and trained by MOOC instructors (Colas, Sloep, & Garreta-Domingo, 2016). For students whose first language is not English, group leaders can help translate course materials, facilitate course discussions in students’ native language, and help students apply the materials to their own cultural context (Colas et al., 2016; Nkuyubwatsi, 2014). Factors influencing the ability of online language-based peer groups to foster student success include group size and preexisting sense of community engendered by the strength of cultural identity (Colas et al., 2016).

To the extent that small groups promote discussion and sharing among students, they may not only address cultural barriers but also be considered a form of social learning (Bandura, 1977; Wals, 2007). Other strategies to promote social learning and sense of community in MOOCs include discussion forums and social media, such as Facebook groups (Kellogg, Booth, & Oliver, 2014; Laurillard, 2016) and short activities to make students feel part of the course community (Kizilcec et al., 2017). Social network analysis (Kellogg et al., 2014) and content analysis of student posts (Y. Li et al., 2014) in online course discussion forums and Facebook groups suggest that students form connections with each other and that the instructor plays a role in facilitating these student–student connections.

Recognizing that online courses can create learning communities similar to those found in face-to-face courses, Garrison, Anderson, and Archer (2003) proposed the Community of Inquiry framework as a tool to understand not only content acquisition but also social interactions. Researchers applying this framework use discussion board posts and other student text to determine the extent of cognitive and social “presences” and the degree and quality of instructor “presence” during an online course. Social presence and peer-to-peer interaction in MOOCs can promote learning though sharing among students and through learners contributing to the collective knowledge (Margaryan, Bianco, & Littlejohn, 2015). Focusing more broadly on online communities in which participants learn and co-create knowledge (e.g., Wikipedia, citizen science, cMOOCs), Jeong, Cress, Moskaliuk, and Kimmerle (2017) proposed four increasingly intense levels of interactions varying in the degree to which community members share common goals, processes, and outcomes: attendance, coordination, cooperation, and collaboration (A3C). Although the A3C knowledge community framework was developed in the context of large, open online communities, the authors suggest that it could have value for smaller and face-to-face groups (Jeong et al., 2017). Importantly, interactions among students may not only help address cultural barriers and enhance learning but also have the potential to add “local” knowledge to MOOCs, which otherwise may exclude non-Western forms of knowledge. In fact, the large scale of MOOCs can enable interactions and the co-creation of knowledge among diverse learners globally (Stewart, 2013).

In this in-depth study, we apply social learning and knowledge community frameworks to understand participant interactions and outcomes in self-organized, local, and language-based “community groups” formed by MOOC student volunteer leaders in non-English-speaking and developing countries. More specifically, we ask three questions: (1) what are the leaders’ goals for themselves and their community groups? (2) what barriers do MOOC students face and what activities do leaders facilitate to address barriers? and (3) what types of interactions and knowledge co-creation take place in small groups? In the interest of recognizing their contributions to and reflections about their community groups, group leaders are included with course instructors as co-authors on this paper. We hope that our combined perspectives will be useful to MOOC designers seeking to address barriers to accessing MOOC content and pedagogy and will further our understanding of knowledge community practices in MOOCs.

The MOOC that is the subject of this inquiry included lectures and readings consistent with xMOOCs but did not include true/false or multiple-choice questions. Instead our assignments consisted of open-ended discussion questions and a final project, and we facilitated an active Facebook group to afford opportunities for students to connect with others with similar interests, share resources, and think more deeply about course concepts. Reflecting the significant number of xMOOCs that incorporate students learning from each other (Margaryan et al., 2015) but do not approach the more radical self-directed pedagogy of cMOOCs, we propose the term *social learning MOOC* or *slMOOC* to capture this pedagogical approach.

Review of Related Literature

Although the term *massive* in MOOCs conjures up images of untold numbers of students being subject to “mass” education from elite professors, Stewart (2013) argues that the massive numbers of students create possibilities for MOOCs to become a “Trojan horse” upsetting traditional knowledge acquisition pedagogy. Even in xMOOCs where interaction is limited to discussion boards, students are afforded opportunities to network with other students and to share knowledge. Stewart (2013) claims that the larger the number of students the more opportunities for knowledge co-creation that subverts the expert-driven model of xMOOCs.

Many online course instructors encourage networking and knowledge sharing and even knowledge co-creation through social media (e.g., Facebook, WeChat), discussion boards, and small groups (Colas et al., 2016; de la Varre, Keane, & Irvin, 2011; Kellogg et al., 2014; Nkuyubwatsi, 2014). Anders (2015) attempts to capture the ways in which MOOCs afford such networking opportunities in a kind of “hybrid” between cMOOCs, in which learners take the responsibility for self-organizing an open, collaborative learning experience, and xMOOCs, in which experts provide lectures and readings for students to absorb. In integrating aspects of network-based cMOOCs and content-based xMOOCs, hybrid MOOCs draw from sociocultural and cognitive behaviorist pedagogies, attempting to create a sense of community while guiding task-based activities (Anders, 2015). Because the term *hybrid* has also been used for MOOCs that blend in-person and online learning, the term *social learning MOOC* may be a less confusing term for referring to MOOCs that integrate sociocultural and cognitive behaviorist pedagogies.

Social Learning in MOOCS

We propose the term *social learning MOOC* (slMOOC) to focus on the purpose and unique features of MOOCs that integrate peer-to-peer interactions with content provision. Although social learning has a long history with multiple and sometimes confusing definitions (Reed et al., 2010), we draw from the work of sustainability and learning scholar Arjen Wals (2007) in defining the characteristics of social learning. In particular, Wals and colleagues (2009) have identified five elements of social learning that are relevant in addressing wicked issues of sustainability. The first three elements are the following: We learn from each other, we learn more in groups of people who don't all think alike, and trust and social cohesion are essential building blocks in the process of learning from people who hold different views. MOOC instructional design principles reflect these principles; for example, "learning is promoted when learners collaborate with each other" and "contribute to the collective knowledge" (Margaryan et al., 2015), and learning "enables dialogue," "fosters collaboration," and "creates a community of peers" (Conole, 2015). Research applying these MOOC design principles has demonstrated that small groups whose participants are more diverse lead to better learning outcomes (Kulkarni, Cambre, Kotturi, Bernstein, & Klemmer, 2015). Further, Kizilcec et al. (2017) claim that the social identity threat experienced by developing country professionals with poorer educational backgrounds becomes a barrier to learning in MOOCs that can be addressed by simple interventions that foster inclusiveness and equity, thus paving the way for trust and social cohesion in impersonal and sometimes daunting MOOCs.

Wals et al.'s (2009) last two principles reflect a more in-depth process of interaction leading to knowledge co-creation and even action. They state that social learning is a process of collectively coming to understand a situation, and social learners help create the learning process and the solutions to the dilemmas they face and, thus, are more likely than passive learners to follow up with action. Project-based learning, which is common in MOOCs and often takes place in smaller study groups (N. Li et al., 2014, Gunawardena & Jayatilleke, 2014), offers the possibility for learners to develop a collective understanding that could lead to action.

Social Interactions in Online Knowledge Communities

Garrison, Anderson, and Archer (1999) developed the Community of Inquiry model for designing and understanding online course activity, which is composed of three "presences": cognitive, social, and teaching. Here we focus on social presence, which includes open and critical discussion of online material as mediated by group cohesion, open communication, and affective expression. These interactions serve multiple purposes, including supporting cognitive learning (Garrison, Anderson, & Archer, 2010), creating a feeling of being part of a community of learners and developing an identity as a learner in a massive online course (Kizilcec et al., 2017; Macià & García, 2016), and providing opportunities to exchange ideas and co-construct knowledge and even new practices that can be used by other educators (Macià & Garcia, 2017; Macià & García, 2016). Instructors can enhance social interactions through choice of online platform—for example, discussion board versus social media (Clarke & Kinne, 2012; Hou, Wang, Lin, & Chang, 2015; Salmon, Ross, Pechenkina, & Chase, 2015)—and type of discussion question posed (Ke, 2010), as well as by incorporating structured collaborative activities and assessments of collaboration (Collazos, Gonzalez, & Garcia, 2014) and focusing on life experience or case-study analysis (Liu & Yang, 2014).

Jeong et al. (2017) developed a framework for interactions more broadly in online knowledge communities focused on learning and knowledge co-construction, including Wikipedia, citizen science projects, and cMOOCs. As xMOOCs incorporate social learning and knowledge co-construction and, thus, become slMOOCs, such a framework may be helpful in understanding types of interactions and in designing courses consistent with social learning pedagogy.

According to Jeong et al. (2017), four types of interactive processes varying along a continuum between individual and collective responsibility are found in online knowledge communities. At one end of the spectrum of interaction is attendance, in which members are driven by individualistic goals, act as individuals, and seek personal benefits. MOOC participants who “freeload,” or act as lurkers, exemplify this process. A somewhat stronger form of interaction is coordination, in which participants maintain their individualistic goals, but reaching their goals is dependent on the contributions of fellow community members. Moving away from individualistic interaction is cooperation, in which members share goals and participate in joint activities but still work independently much of the time. Finally, collaboration involves shared goals, processes, and outcomes (Jeong et al., 2017). In addition to the degree of shared goals, processes, and outcomes, important factors in distinguishing online communities include the use of artifacts, such as the online platform and community norms, to mediate interactions and their potential to support co-construction of knowledge. Whereas Garrison et al.’s (2010) social presence is useful in describing what types of interactions occur on course discussion boards and other platforms, Jeong et al.’s (2017) framework invites us to look more closely at individual participant and group goals and outcomes as well as the interactive processes through which these outcomes are achieved in small groups and larger online communities.

Cultural Influences in Online Learning

Cultural differences between and within societies strongly influence the ways online learners access and process course materials and participate in course discussions. Cultural factors taken into account in online learning environments include language, ways of perceiving visual images, power differentials between instructors and students, collectivist versus individualistic norms, educational background, and familiarity, use, and access to computers (Jung & Gunawardena, 2014; Liyanagunawardena & Adams, 2014). A key challenge for MOOCs is how to address issues related to the hegemony of Western ways of learning (Jung & Gunawardena, 2014) and Western knowledge and its governance within globally diverse cultures (cf. Hulme, 2010), as well as social identity threat (Kizilcec et al., 2017) and feelings of isolation, sociocultural inferiority or misfit, and lack of necessary technical skills—referred to as psychological, sociocultural, and technical distance, respectively (Gunawardena, 2014b).

Focusing on feelings of being less capable among students from developing countries, MOOC instructors used an intervention in which learners were asked to affirm their values related to reasons for taking the course, which increased MOOC completion rates for students from lesser developed countries while decreasing retention for students from more developed countries (Kizilcec et al., 2017). Other interventions have focused more specifically on helping students understand and apply course materials to their local setting. These “social learning” interventions include self-organized small groups of learners taking the course together (Nkuyubwatsi, 2014); collecting and sharing student narratives (Krasny & Snyder, 2016) or video-based projects (Godwin-Jones, 2014) that apply course content to local contexts; discussions, and resource sharing over social media; discussions over live webinars including chats; and graduate student e-mentors who collaborate with small groups of students on an inquiry-based learning project (Jung & Gunawardena, 2014). Such approaches are generally preferred to MOOC-platform discussion boards, which generally are not user-friendly for online learners accustomed to social media. Further, students from non-Western cultures may feel uncomfortable challenging the instructor’s and fellow learners’ ideas in the formal learning context (Gunawardena & Jayatilleke, 2014). These interactive forms of learning also facilitate participants constructing their own learning subcultures (Jung, 2014) and identities, through processes such as building trust, self-disclosure, and negotiating miscommunications (Gunawardena, 2014a).

In short, multiple strategies have been used to foster social learning in MOOCs, with the goal of addressing cultural barriers and thus fostering learning among students, particularly those from non-Western cultures. Although less researched, social learners in MOOCs also have the potential to create new knowledge, similar to that produced by other collaborative online knowledge communities. slMOOCs might address issues related to Western knowledge hegemony by creating a more localized learning environment for MOOC participants and by contributing locally specific knowledge to the more globalized knowledge of MOOC learning environments.

Methods

MOOC Description

This research focuses on the Environmental Education: Transdisciplinary Approaches to Addressing Wicked Problems MOOC offered by Cornell University in spring 2016. The goal of the course was to create an environmental education “trading zone” (Galison, 1999), or an online space where instructors, university students, and professionals learn about research from multiple disciplines, that sheds light on how to change environmental behaviors and improve environmental quality. In addition to 65 lectures drawing on multiple disciplines, the course promoted trading zones through the discussion board; discussions and sharing resources and practices on course Facebook, WeChat, Telegram, and KakaoTalk social media groups; and the course project, which involved creating a case study applying the course content to a local environmental education program. Students who completed weekly assignments were awarded an achievement certificate, while those who also completed the course project earned an expert certificate.

Prior to the start of the course, we invited registered students to create and take leadership for community groups, including local groups whose leaders were expected to organize weekly in-person meetings to discuss the course materials, bilingual groups whose leaders helped members understand the materials during in-person meetings and using online communications, and interest groups whose leaders facilitated web-mediated discussions of a particular topic. Seventy-two participants were accepted as community group leaders, 42 of whom led groups throughout the course (Table 1). We provided ongoing web-mediated training and support for the community leaders.

Of the 3,306 individuals who registered for the course, 2,294 students from 140 countries entered the course site, 2,355 joined the course Facebook group, and 1,257 completed one assignment. Of students who registered for course, 15.4% earned the achievement certificate and 8.2% earned the expert certificate. Of the 304 students who joined community groups, 29.3% earned an achievement and 36.5% an expert certificate.

Table 1.

Complete List of Community Group Types, Participant Numbers, and Names

Group Type	Groups (*n*)	Participants (*n*)	Names
Local	19	187	Beijing; Chile; Dallas Zoo; Dubai; Eau Claire, WI; Attica, Greece; Hong Kong; Kigoma, Tanzania; Kingston, Jamaica; Toliara, Madagascar; Mexico City, Mexico; Montevideo, Uruguay; Prescott, AZ; Roaring Fork Valley, CO; Taipei, Taiwan; Tehran, Iran; Lomé, Togo; Ulaanbaatar, Mongolia; Xalapa, Mexico
Interest	13	110	Caribbean; Climate Change Mitigation and Adaptation; Climatic Change Biodiversity/Habitat Loss; Conservation Education; Curricular Integration & Applications for Educators; EARTHCARE and Environmental Education; Ecopsychology; Food Security and Environment in Nigeria; Zoos; Application of Global Online Course in Professional and Academic Settings; Informal Education in a Park Setting; Monarch Habitat Restoration Conservation; Urban Environmental Education
Bilingual	9	58	Farsi; Francophone; German; Indonesian; Mandarin (2); Spanish (2), Lusophone
Total	41	304	

This is a qualitative case study of small groups in the Environmental Education: Transdisciplinary Approaches to Addressing Wicked Problems MOOC. We administered postcourse surveys and conducted follow-up interviews with 10 group leaders. The 10 community leaders included in this study of the larger sample of 42 leaders were chosen because they led groups whose primary language was not English and where limited Internet access and cultural and other barriers curtailed access to and understanding of course materials and pedagogy.

Data Collection

A survey and follow-up interviews were used to learn about motivations and outcomes for group leaders as a result of leading a group, barriers experienced and efforts to address barriers, and group process (e.g., recruitment, meeting frequency). The survey and follow-up interviews included discrete and open-ended questions about group leader motivations and professional outcomes; type of social media used to connect group members; learning barriers for group participants (language, access, content, other, no barriers); number of meetings and average number of group members attending; strategies used to facilitate group discussion about the course material, guide participants in course assignments, and support group member social, personal, or professional development; and challenges faced in organizing and running groups.

Data Analysis

Interviews were transcribed verbatim and used along with the survey questions to compile case summaries for each group. We coded themes in interview transcripts and open-ended survey questions related to barriers, professional development outcomes, and motivations for leading a group. The second author used an open-coding strategy in which he wrote memos regarding themes as they emerged from the texts and organized them into categories that represented overlapping themes, using an iterative process until saturation was reached among themes (Saldaña, 2013). To address validity, we used member checking, asking the group leader interviewees to review, edit, and revise the initial case studies. To address validity and ethical issues, the interviewees reviewed drafts and were invited to join us as co-authors on this paper. The group leaders/co-authors clarified details about the cases, including group relationships before, during, and after the course, efforts to overcome barriers, and group activities after the course ended. The first and second authors (who were course instructor and group leader coordinator) deferred to the group leaders where discrepancies emerged. The quotations were chosen for clarity and depth, resulting in perspectives from group leaders who were more fluent in English or more active being better represented. Thus, the results suggest what is possible under favorable conditions for small groups.

Results

The community groups that are the focus of this study were from China, Tanzania, Indonesia, Togo, Mexico, Uruguay, Taiwan, Iran, and Mongolia (Table 2). Group leaders worked in nonprofits and were graduate students, research directors, journalists, and environmental educators. They recruited group members by talking with colleagues, employing word of mouth, and using social media. They held anywhere from one meeting during the course to several meetings a week, and they used informal interactions at work and closed social media groups on Facebook, WeChat (China), and Telegram (Iran).

Table 2.

Survey/Interview Group Leader and Group Descriptive Information

Group name	Demographics (gender, age, education)	Leader	Recruitment	Members	Meetings	Facilitation
Beijing, China	Female, 34, MSc (Environmental Management)	Project communication officer for World Wildlife Fund (WWF)	Through previous workplace (Jane Goodall Institute)	Environmental educator colleagues at Jane Goodall Institute	Informal interactions at work	WeChat
Hong Kong, China	Male, 38, MSc (Environmental Management)	Conservation and environmental educator with WWF	Talking with colleagues and course Facebook group	Environmental educator colleagues at WWF and university students and environmental educators recruited	Informal interactions at work	Facebook to plan meetings
Kigoma, Tanzania	Male, 45, PhD (Ecology)	Director and researcher, Tanzania Fisheries Research Institute	Word of mouth	Fellow scientists at fisheries research institute	Once/week, but interest waned after 2 weeks	Facebook group
Kuta, Badung Bali, Indonesia	Male	Researcher at Indonesian Biodiversity and Conservation, university lecturer, NGO, Mojokerto, East Java	Word of mouth	High school and college students, farmers with little formal education	Twice/week in members' homes	Facebook group
Lomé, Togo	Male, 27, BA	Graduate student at the University of Lomé	Word of mouth	Graduate students	Once/week	Facebook group
Mexico City, Mexico	Male, 36, MA student (Sustainability Science)	Graduate student at National Autonomous University of Mexico and ecological reserve employee	Word of mouth, posting information on university and other Facebook groups	University students or recent graduates who had taken leader's seminar on social-ecological issues	Once/week	Facebook group to post resources (inactive during course), WhatsApp to organize meetings

Table 2. (cont.)

Survey/Interview Group Leader and Group Descriptive Information

Montevideo, Uruguay	Female, 39, MA (Economics)	Intercultural Consultant, Coach, and Facilitator, Rocha, Uruguay	Posting information on Facebook, emails to environmental associations and news lists	College students to retirees, some having met through the Uruguayan Environmental Education Network	25 total	Facebook to discuss topics, WhatsApp to organize meetings
Taipei, Taiwan	Female, 36, MA student (Environmental Education)	Graduate student, National Taiwan Normal University	Her professor announced to students and other professors	Graduate students and a professor	Once/week	Facebook for announcement and to connect course discussion to news
Tehran, Iran	Female, PhD	Iranian-American postdoctoral fellow	Telegram (social media) personal contacts with NGOs and MOOC registrants	University students and NGO employees	2-3 times/week, 3-5 hours each	Telegram group to support communication and discussion, and to post materials
Ulaanbaatar, Mongolia	Female, 24, MA candidate (International Relations)	Student and journalist for Ulaanbaatar Broadcasting Services and *TV Zone* magazine	Through existing Facebook group	Students or part-time workers	Once, then through Facebook	Facebook to stimulate discussion

The groups had from 1 to 20 regularly attending and 6 to 35 total participants, 12 of whom earned achievement and 45 of whom earned expert certificates (Table 3). The total sample of 79 group participants represented 24% of participants who completed at least one assignment, 25% of students who earned achievement certificates, and 59% of students who earned expert certificates (Table 3).

Table 3.

Survey/Interview Community Group Numbers and Completion Rates

Group name	Number of meetings	Participants		Certificates by group		
		Regularly attending	Total members*	Achievement	Expert	Total (%)
Beijing, China	5	5	15	5	0	5 (33)
Hong Kong, China	5	5-7	15	1	3	4 (27)
Kigoma, Tanzania	3	1	10	0	0	0 (0)
Kuta, Badung Bali, Indonesia	11	9	15	0	1	1 (7)
Lomé, Togo	9	15	15	0	0	0 (0)
Mexico City, Mexico	17	5	7	1	6	7 (100)
Montevideo, Uruguay	25	7	8-9	0	7	7 (78)
Taipei, Taiwan	15	5	6	4	0	4 (67)
Tehran, Iran	12	15-20	35	0	28	28 (80)
Ulaanbaatar, Mongolia	4	5	13	1	0	1 (8)
Total community group members earning certificates			140	12 (9%)	45 (32%)	57 (42%)
Total regularly attending group members earning certificates				(15%)	(57%)	(72%)

* Includes participants who did not attend all sessions

Group Leader Motivations and Benefits

Group leaders described altruistic motives for leading a group, including those related to helping fellow students, helping their community, and helping the environment (8 of 10 leaders, Table 4). Interestingly, this motivation reflects the course instructors' motives, which are to teach courses that go beyond helping individuals advance their careers to encompass making a difference in the local community and environment. Four leaders spoke about professional development motivations, including increasing knowledge of online teaching as a potential career and learning more about the environment.

Prominent among the leaders' professional development outcomes was networking or expanding existing networks (4 of 10 leaders). Also important were professional opportunities beyond the course, including receiving an internship, enhancing community engagement around stewardship projects, additional lecturing responsibilities, organizational skills applied to participants' NGO, confidence to apply to a U.S. graduate degree program, and further opportunities to collaborate with U.S. colleagues in teaching online courses. Other outcomes included acquiring pedagogical skills, learning about environmental education, and learning about country needs related to online learning.

Table 4.

Group Leader Outcomes and Motivations, Responses to Open-Ended Questions

	Themes across group leaders (# of leaders)
Motivations	• Help environmental educators/NGO/community/environment (4) • Help other students (4) • Take on additional responsibilities (1) • Motivate young people to take action (1) • Love of teaching (1) • Meet people from different cultures through group leader trainings (1) • Career/professional development (4)
Outcomes	• Network (4) • Professional development beyond course, such as leadership in NGO and community, university, and other educational opportunities (4) • Pedagogical skills, such as group organization, communication, conflict management (3) • Learned content (2) • Confidence/empowerment leading to opportunities beyond course (2) • Learned about country's environmental education needs (1) • None (1)

Social Learning and Interactions to Address Barriers to MOOC Learning

Barriers to learning included time, language, access to technology, cultural differences in pedagogy, and difficulty of content (Table 5). Group leaders and participants translated course materials, and participants took turns presenting the readings at meetings so that not every student had to read all materials. They commonly downloaded or printed materials to help participants with limited Internet access; in one case (Togo), slow Internet speed prevented the group leader from accessing the prerecorded lectures, so the group focused only on readings. For the Beijing and Tehran groups, the Canvas platform was blocked, requiring workarounds (e.g., instructors sending the course content on a hard drive). Leaders summarized and simplified content and shared real-world, local examples to address cultural barriers, including participants not being familiar with open-ended discussion questions and personal reflection, and content not relating to students' past experiences or local context. In the three groups whose members did not know each other beforehand (Iran, Uruguay, and Mongolia), leaders spent time helping participants get to know one another, which they deemed necessary for participants to engage fully in the course.

Table 5.

Barriers and Group Leader Strategies to Address Barriers

Barrier type	Description	Strategies used to address
Time	Limited time given content complexity	Divided up course readings among participants
Language	Limited English proficiency	Translated material or divided up translation responsibilities among group.
Access	Inability or difficulty accessing Canvas and Facebook platforms, lack of access to computers, slow Internet	Moved course content to a different platform accessible to group, received hard drive with course material from course leaders, downloaded videos, printed readings and discussion board questions
Cultural	Unfamiliar pedagogical approach, course design, or course content based on unfamiliar culturally specific examples	Provided culturally relevant examples. Discussed main course concepts at length
Difficulty	Difficulty understanding course content due to lack of familiarity with topic or educational background	Provided synopses of the readings and lectures along with additional examples, asked participants that understood material to share. Attempted to simplify and narrow concepts and disciplines discussed

Below we use quotes from community leader interviews to describe social learning and interaction processes in more depth. We draw heavily from more active groups; thus, our intent is to shed light on the possibilities for social learning and interaction rather than to make a statement about the "average" group.

A common strategy for learning in groups was what we refer to as *divide and conquer*. Leaders divided up responsibility for learning the content by assigning individual group participants to review and share lectures and readings at group meetings. Shian from Taiwan describes this strategy:

> Every week one person led the discussion about one topic. We watched the lecture together. The leader shared the reading and what they learned about the topic and led a discussion. Everyone didn't read everything. Anyone interested took on a topic. People just chose what they liked and led for that topic.

Mechthild, the community leader in Uruguay, describes the process as follows:

> I took a topic, asked someone to do a small presentation, asking what has been a problem, terms, or something that has not been well understood, or something that they wanted to talk about … that seemed very interesting.

Yamme describes a similar process for the Hong Kong group:

> Students relied on the community group to learn. It became a channel to learn from each other. Students were busy and so did not have enough time to access the materials. They learned the course material indirectly.

That this process benefitted from leaders getting to know students and group facilitation skills is evident in Mechthild's statement:

> When asking for contributions from the group, I knew what I could ask from someone and what I could not. So when distributing tasks that was not always, let's say, the most democratic way. I asked, always, if they wanted to do something, but if there was no volunteer I would suggest the person that I would think would most easily be able to do the task.

Shian goes further to explain how she tried to connect the content with students' individual experiences:

> I encouraged people in the group to share and connect their experience with the content. Some things were new and I tried to connect them with personal experience. This helped people to understand what they were learning. Everyone shared their opinion and experience with the topic. We watched the lecture together and the topic leader would start the conversation, talk about the reading and then discuss connections with the content. Then we worked together on the discussion board. Although we entered our answers separately we collectively prepared for the discussion.

The group learning also benefitted from the different interests and expertise of course participants. As Mechthild describes,

> We had different interests. We had some that were more interested in geography, some more interested in social sciences. And so we divided. We said ok, someone is doing a summary on that topic, another person on another. And so that helped as well because you could have someone say, "while I was trying to do the summary I saw this video, and it is fantastic! You have to watch it." And then you get more ideas.

This divide-and-conquer strategy meant that group members became dependent on each other for learning and provided an impetus for them to work together. As Mechthild commented,

> The group really became such a team, like it was very hard for someone to get all the questions and to get all the points to pass.

Much group learning was focused on simply getting through the course content, leaving little time for discussion. Zahra (Iran) described how most of her group meetings focused on translating and understanding the class content with only 1 or 2 sessions having sufficient time for discussions. For Zahra's group, this inability to engage in deeper discussions was due not just to the content being challenging for Farsi speakers but also to the unfamiliar pedagogy. At first Zahra did not understand why her group members were not answering the discussion questions but then realized they weren't comfortable and were not grasping the questions. The challenge was that the discussion questions did not directly reflect the content but required students to make connections between the content and personal experience. To address this challenge, Zahra developed a second Telegram group she called "discussion question nights," in which she helped students to translate and understand the questions.

Some groups went beyond divide and conquer to engage in what more closely resembled collaboratively trying to understand a concept like wicked problems or even creating new knowledge. Rodrigo González-González's Mexican university group rarely split up readings but spent significant time discussing readings, issues, members' perspectives, and possibilities, methods, and results related to their course project (local case study).

The course project offered additional opportunities for collaboration, as Mechthild relates:

> All had an interest in going for the expert certificate, so rather early I started to ask what would be a topic they would like and whether they would do it individually or as a group and so… after 3 or 4 meetings we already started to think what would be the case study.

Although community group participants lived nearby and spoke a common language, some groups included both university students and faculty alongside NGO and government professionals. This diversity was challenging for the group in Iran, which was not used to learning in such "mixed" settings. Despite this challenge, the groups in Iran and Uruguay formed tight social connections through communal meals during meetings and helping each other get through the course. As Mechthild explains,

> There was a lot of sharing. … We had one case where one person was really behind. And I remember the last hours before the deadline that she needed to have all of these done, there was all of these people supporting her to be able to pass, so that we could go on as a group to do the expert certificate.

In the Iranian and Uruguayan groups, this bonding extended beyond the course content, as when Iranian students supported a colleague who had a family emergency and Uruguayan students supported peers who were trying to become licensed horticulturalists. Similarly, the Mexican community group leader continues to work with several group members beyond the course.

It is important to couch these findings from active community groups in the context of community groups that were less active, in large part due to issues related to slow Internet and accessibility. For example, in Ishmael's group of coworkers in Tanzania, few students engaged with the course materials, and the main communication was informal conversation in the workplace. And in Togo, most students—including the community group leader—were not able to access the course lectures due to slow Internet. In Mongolia, students' unfamiliarity with environmental education led to lower levels of group activity. Finally, it is important to point out that community leaders put not only significant time but also their own resources into the course; Zahra delayed returning to the United States so that she could work with the group in Tehran, and Lukman (Indonesia) copied the course materials for his students so they would not have to pay for access in Internet cafés.

Discussion

This in-depth study of small group interactions in a MOOC reveals barriers to universal access related to slow Internet (Togo, Tanzania, Indonesia), blocked access to course platform and social media groups (Iran, China), and unfamiliar Western-based course content and interactive pedagogies. In addition, this study sheds light on the altruistic and professional development motives and benefits that led MOOC participants to volunteer to lead small groups, which are consistent with the instructors' motives for teaching an environmental education online course. Below we focus on how these self-identified group leaders addressed understanding and pedagogical barriers by fostering aspects of social learning and cooperation and collaboration. We discuss types of interactions related to sharing knowledge and course projects in the community groups and place the groups and larger MOOC within the context of online knowledge communities where small groups, discussion boards, and other course sociotechnical artifacts afford different types of interactions, learning, and co-creation of knowledge (cf. Jeong et al., 2017).

Whereas social learning is often conceived as creating knowledge to address wicked sustainability issues for which there is no right answer (Krasny & Dillon, 2013; Wals, 2007), in the MOOC community groups in this study, social learning centered primarily around the course content and secondarily around co-construction of knowledge. Students learned from each other in groups of diverse professionals consistent with social learning tenets (Wals et al., 2007), which resulted in them depending on fellow group members to understand the content and earn a certificate. The groups' divide-and-conquer strategy emphasized helping each other get through the course content and become comfortable with the course pedagogy, whose weekly assignments were exclusively open-ended discussion questions rather than more familiar "right answer" questions. Dividing tasks is also a common pedagogical strategy used by classroom instructors in assigning work to groups, which similar to our community groups exhibit limited capacity to create new knowledge (Zhang, Scardamalia, Reeve, & Messina, 2009) compared to Wikipedia, citizen science, and other online knowledge communities specifically designed to co-create knowledge (Jeong et al., 2017). That said, the community group interactions in this study did incorporate features of knowledge communities, including cooperation, characterized by shared goals of learning course content but distributed action related to individual students taking responsibility for specific lectures and readings (Jeong et al., 2017).

In the Iran group and several other groups, interactions expanded to encompass collaboration (Jeong et al., 2017) as students jointly undertook local course projects, which provided greater opportunity for social learning to create new knowledge and action. Small project-based groups are a common form of interaction in online university courses (N. Li et al., 2014) and increasingly in MOOCs (Grünewald et al., 2013; Gunawardena & Jayatilleke, 2014). When focused on applying course content to local contexts (Gunawardena & Jayatilleke, 2014; Nkuyubwatsi, 2014), these projects can foster social learning and address critiques related to "diminishing, or even erasing, of a geographical sensibility in the making, mobilising and consumption of knowledge about global environmental change" (Hulme, 2010, p. 559). Collaborative course projects in this study provided opportunities to come to a common understanding around an issue and foster collaborative action, as when the Iranian students went on a field trip to a small village and gained an understanding of the role of traditional doll making in ecotourism and developed a joint ecotourism case study for their course project. To encourage collaboration and knowledge co-creation, instructors can incorporate specific design elements into online courses. For example, instructors can assemble local course projects into eBooks that become sharable knowledge or artifacts for future knowledge communities (Civic Ecology Lab, 2017; Krasny & Snyder, 2016; Russ, 2015, Y. Li, 2016).

The community groups in this study may also have changed over time, as has been seen when students move from individually to collectively oriented goals, assume joint responsibility, and form a group identity (Jeong et al., 2017; Tajfel & Turner, 1986). Although we did not trace change in leader or member goals or identity during this study, in postcourse interviews leaders talked about a mix of professional development and more altruistic goals, some of which may have changed as they interacted with students. In the Uruguay and Iran groups, participants supported each other as they pursued professional goals outside the group (e.g., professional licensing) or experienced a family emergency. It is possible that as group members met over the course of the MOOC and assumed important roles (e.g., summarizing lectures), they also developed a group identity and felt more welcome and efficacious in the large online course (cf. Kizilcec et al., 2017).

Members of small groups may form professional networks that join together and continue after the course, thus spurring knowledge co-construction (Zhang et al., 2009) and formation of larger online knowledge communities, such as those described by Jeong et al. (2017). During one of our lab's subsequent online courses (Urban Environmental Education), the Beijing group in this study spawned a new community group, which conducted multiple "extra-MOOC" activities during the course and has now expanded to an active online (WeChat-mediated) community of over 1,200 members. As members share resources, pose questions, and find out about and take advantage of additional face-to-face and online learning opportunities, they are becoming not only a knowledge community but also a support network for an emerging cadre of environmental educators in China.

Conclusion

The importance of participant interaction to promote learning and, to a lesser extent, knowledge co-creation is not only foundational to cMOOCs but also recognized by a significant proportion of xMOOCs. In a study of 76 MOOCs, Margaryan et al. (2015) found that nearly half of xMOOCs and nearly all cMOOCs required participants to learn from each other, whereas 10% of xMOOCs and 42% of cMOOCs required learners to contribute to the collective knowledge. Conole (2015) developed a system for classifying MOOCs along 12 dimensions, two of which emphasized participant interaction (extent of student collaboration and student communication through discussions and blogs). As xMOOCs come to incorporate more social learning elements, including social media and collaborative projects, they increasingly resemble online knowledge communities and take on features of social learning or slMOOCs. Related to our course, analyzing our students' definitions of wicked problems, environmental education, and other terms that do not readily transcend language and culture submitted to the discussion board might provide new perspectives on the use of these terms in diverse global contexts and artifacts to be used in future courses, consistent with the work of knowledge communities that incorporate local knowledge.

In short, self-identified small groups in MOOCs can be used to address access issues, promote social learning, and potentially generate new knowledge used in future courses. In this study, small groups used divide-and-conquer strategies, group discussions, and collaborative projects to learn the course content and apply it to local contexts. Moving closer to becoming knowledge communities, some small groups demonstrated additional types of activities and interactions, such as the Iran group where students supported a member experiencing a personal difficulty, ate meals together, conducted a field trip, and helped students grapple with questions, such as how they would be viewed by the other MOOC students, how a group composed not just of students but also professionals could come together in a course, and suspicion about why a U.S. university would provide a free course for students in Iran. In a subsequent slMOOC with significant numbers of Chinese students, community groups met not only to discuss course content but also invited outside speakers, helped each other develop work-related projects, and created active WeChat networks across groups to discuss applications of the course content. Thus, small groups not only help students succeed in MOOCs but also may extend the impact of MOOCs as knowledge communities beyond the period of active instruction and beyond the goals initially defined by instructors.

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Meaningful Gamification and Students' Motivation: A Strategy for Scaffolding Reading Material

Lynette Tan Yuen Ling
National University of Singapore

Abstract
Gamification is an innovative pedagogical strategy where digital games are used in an educational setting and as an aid to learning. Recent publications on gamification in the classroom investigate the concept of *meaningful gamification*, where, in line with Ryan and Deci's self-determination theory, competency, autonomy, and relatedness are prioritized. The paradigm of meaningful gamification works well as a catalyst in motivating students to read background material and grasp key concepts that facilitate a flipped classroom. This study measures the impact of meaningful gaming on students' motivation in a higher education setting. The context for this study is the module Women in Film, which is part of the Ideas and Exposition Programme at the Centre for English Language Communication, National University of Singapore.

Keywords: game-based learning; learner-centered; meaningful gamification; motivation; self-determination; serious games; technology; technology enhanced learning (TEL)

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Meaningful Gamification and Students' Motivation: A Strategy for Scaffolding Reading Material

At the frontier of new and intriguing pedagogical approaches is *gamification*, where digital games are used in an educational setting and as an aid to learning. The allure of gaming appears to have even worried academics teaching ever-popular film studies modules. Jodi Brooks (2010) in a recent article writes the following:

> As the current century is increasingly identified as the century of gaming (as opposed to the twentieth century as the century of cinema) one can only assume that questions about the discipline's value and future will continue to be raised. (p. 792)

The significance of gaming is an indisputable fact of the 21st century, bolstered by statistics such as the sale of Minecraft maker Mojang to Microsoft for $2.5 billion (Mac, Ewalt, & Jedeur-Palmgren, 2015) and pronouncements of a mass exodus of the world's population from reality to online games and virtual environments (McGonigal, 2011). Gamification sits well with the globalized and modern English language class in higher education, where student-centric approaches cater to a more culturally heterogeneous and technologically inclined learning environment. Distinct from game-based learning, gamification adds game elements to a nongame situation, while the former uses existing games to enhance the learning process. Notable examples of game-based learning include SimCity, Minecraft, and World of Warcraft (Al-Azawi, Al-Faliti, & Al-Blushi, 2016, pp. 134–135).

Recent publications on gamification in the classroom investigate the concept of *meaningful gamification*, where, in line with Ryan and Deci's self-determination theory, competency, autonomy, and relatedness are prioritized (Ryan & Deci, 2000a, p. 68). Meaningful gamification works as a catalyst in motivating students to read background material and grasp key concepts that in turn facilitate a flipped classroom, as students come to class with a level of competency with the material that enables them to participate in discussions. The tool of gamification also allows writing skills to be reinforced after they have been introduced in the classroom, by providing an engaging platform whereby students can practice these skills in various quests that are created for this purpose.

This study aims to measure the impact of meaningful gaming on students' motivation within a Women in Film module designed for students studying English Language Communication at the National University of Singapore (NUS). Below, I outline the theoretical framework underlying meaningful gamification and then introduce the unique context of the study.

Gaming, Education, and Meaningful Gamification

Gaming and education have long been seen as separated by a huge gulf, the former associated with a misspent youth and addiction, and the latter with a respectable acquisition of knowledge and skills needed in life. Yet the idea that the twain shall meet and that game-based learning is a reality is now gaining currency. The use of gaming in an educational context was established with the Serious Games Initiative by the Woodrow Wilson Center for International Scholars in Washington, DC, in 2002 (Michael & Chen, 2006). What differentiates "serious games" from other forms of gaming is that education is the primary goal, rather than entertainment (Yap, 2012, p. 7). Scholars now take seriously the notion that "using games as an educational tool provides opportunities for deeper learning" (Mackay, 2013), and a Pearson research report suggests that educational digital games (1) are built on sound learning principles, (2) provide more engagement for the learner, (3) provide personalized learning opportunities, (4) teach 21st-century skills, and (5) provide an environment for authentic and relevant assessment (McClarty et al., 2012).

Recent work on gamification in the classroom shifts the focus from the generic benefits of gaming to specific game design elements, such as "reward-based gamification" techniques centered on points, levels, badges, achievements, and leaderboards (Deterding, 2012). Nicholson (2013) coined the term "meaningful gamification" as the antonym of reward-based gamification, where users are able to find "meaningful connections with the underlying non-game activities," and rewards are only used when "truly necessary" (p. 671). With meaningful gamification, the emphasis is on elements of play rather than those of scoring.

The emphasis on play rather than scoring is intimately tied to motivation. In their research on self-determination theory (SDT), Richard Ryan and Edward Deci (2000a) point to "intrinsic motivation" as a desired outcome. The researchers define intrinsic motivation as "behaviours done in the absence of external impetus that are inherently interesting and enjoyable" (Ryan & Deci, 2000b, p. 55)—and its departure from extrinsic motivation is clearly spelled out. In comparison to motivation that is externally imposed, motivation that is intrinsic is "authentic," "self-anchored or endorsed," and people who have it express more "interest," "excitement," and "confidence." These last three qualities result in "enhanced performance, persistence, and creativity," "heightened vitality," "self-esteem," and "general well-being" (Ryan & Deci, 2000a, p. 69).

Based on their numerous empirical studies, Deci and Ryan (1985) formulated the theory of intrinsic motivation known as "cognitive evaluation theory" (CET), which posits that intrinsic motivation is driven by three supportive conditions. While intrinsic motivation may be an "inherent tendency," it is easily disrupted and needs to be maintained by these three conditions working in tandem—competency, relatedness, and autonomy (Ryan & Deci, 2000a, p. 70). Competency refers to "the experience of behavior as effectively enacted," accompanied by the feeling of being able to meet the challenges of the task. Relatedness is attained when "people … internalize and accept as their own the values and practices of those whom they feel, or want to feel, connected, and from contexts in which they experience a sense of belonging," and autonomy is "the experience of behaviour as volitional and reflectively self-endorsed" (Niemiec & Ryan, 2009, pp. 135 and 139).

Deci and Ryan's three conditions map well onto the cognitive, social, and emotional components of meaningful gaming (Lee & Hammer, 2011). Competence—the feeling of effective enactment of an objective and the ability to meet its challenges—is tied to the mastery process that games guide players through as they complete increasingly difficult tasks (Koster, as cited in Lee & Hammer, 2011, p. 3). The emotions evoked by gaming, including curiosity, frustration, joy, and pride (Lazarro, 2004; McGonigal, 2011) enhance competence by helping "players persist through negative emotional experiences and even transform them into positive ones" (Lee & Hammer, 2011, p. 3). In general, gamification reframes failure as an essential part of learning and creates a sense of resilience through instant feedback. The stigma of failure evaporates when effort (the process) is rewarded, rather than mastery (the end product) (Lee & Hammer, 2011, p. 4).

Gaming may also enhance autonomy by pushing players to "try on new identities and roles, asking them to make in-game decisions from their new vantage points" (Squire 2006; Gee, as cited in Lee & Hammer, 2011, p. 4). Players experience the freedom afforded by these new vantage points, endorsing a new self that enables them to see things from new perspectives. By enhancing competence and autonomy and reducing a sense of failure, gaming may also nurture the sense of relatedness, or the connection that the student has with the educator. An environment where one's efforts are valued develops a context where a sense of belonging can thrive. Students internalize the values and practices of the educator because they align with their own in the first instance—students desire their efforts to be acknowledged and validated. Thus, the potential that gamification has for raising students' intrinsic motivation appears to be high. Overall, with the meaningful gamification approach, external rewards are de-emphasized, and intrinsic motivation is prioritized, with the condition of competence being most prominent. While some preliminary research has been conducted on the effect of meaningful gamification on motivation (Nicholson, 2013), the concept is a relatively new one, and further studies, such as this one, are needed to establish a more direct connection between the two.

Context: I&E Modules at NUS and the Pedagogical Challenge

The environment in this gamification study is the Ideas and Exposition Programme at the Centre for English Language Communication, National University of Singapore (NUS). The program is at the outset interdisciplinary (drawing students from different faculties and departments) and learner centered: Students are able to choose from a large variety of topics, often outside of their own disciplines. Though a large part of these students are Singaporean, a significant number come from regional countries, such as Malaysia, Indonesia, Thailand, China, and India. The game medium, in line with the interdisciplinary thrust of the program, extends beyond cultural boundaries.

Women in Film, the module that is the focus of this paper, is one of 19 content-specific, rhetorically intensive writing modules offered in the program. Other modules include Sport and Socialization, Bioethics, The Detective, Science Fiction and Empire, Risk and Popular Culture, and the module that I teach, Women in Film. What links the various topics is the common set of instructional strategies used by the lecturers. A key strategy is the set of 10–12 readings that accompany the teaching of the module. Engagement with the required readings on each module ensures in large part the success of the student at completion. The readings enable the students to acquire concepts, contribute during seminars, and write intelligently for their assignments. There are a triad of pedagogical challenges faced by lecturers teaching these modules: First, students are rarely motivated to read background material (they often depend on the lecturer to explain the reading to them); second, even when they are motivated to read the material, they may not be able to decode the key issues of the reading accurately (in a recent classroom activity where I tasked first-year undergraduates to summarize the main arguments of an article, about half of their focus was inaccurate); and third, this lack of comprehension impedes their ability to contribute during seminars and ultimately to write good student papers.

This pedagogical challenge has not gone unnoticed; attempts to scaffold the reading material for students have included providing a list of questions on the specific article for them to consider or a Facebook activity where some discussion of the reading is carried out, before coming to seminars to discuss the same. While these activities have been successful to a degree, the desire to improve students' comprehension of the reading prior to their coming to class and a Centre for the Development of Teaching and Learning (CDTL) workshop at NUS led me to formulate the research hypothesis that meaningful gamification will positively impact students' motivation for prereading.

Research on prereading as an essential strategy to student performance has been tested within the domain of English language teaching (Tudor, 1989), and the relationship between prior knowledge and learning in general has already been established in pedagogical discourse. Recently, however, a body of research is once again pointing to the importance of prior knowledge for learning, alongside a key best/essential practice: "retrieval" or "testing" (see Roediger & Butler, 2011; Van Blankenstein et al., 2013). It is this section of the module—prereading, or the engagement with reading material prior to classroom discussion—that is gamified. After discussions with Playware Studios, a new digital game was created with a story arc that featured the journey of a protagonist accompanied by a series of quests and challenges stemming from one of the main readings of the module. The challenges directed students to areas of focus and provided scaffolding for their comprehension of the material, and it also allowed for a flipped classroom where they are empowered to contribute to discussions during the seminar. This may, accordingly, foster a growing sense of competency—students are aided in their understanding of core areas in the readings, take part in conversations and debates about these ideas, and thus will be able to apply rhetorical and writing skills to this content in a more sophisticated manner. The combination of an enhanced competency as well as the engaging platform of gamification will, it is predicted, raise levels of students' intrinsic motivation with regard to the reading and scaffolding activities between classes. In addition to Nicholson's parameters for meaningful gamification, the three criteria utilized by Domínguez et al. (2013) and first proposed by Lee and Hammer (2011) for successful gaming in education, those of the cognitive, emotional, and social arenas, were also employed. These conditions (competency, autonomy, and relatedness) and components (cognitive, social, and emotional) were effectively worked into the game design of *The Protégé*, the game that Playware Studios designed specifically for Women in Film.

The narrative of *The Protégé* was developed to meet the requirements of scalability—having a game that could ostensibly be used in all the I&E modules. In the story, the protagonist (who has since graduated from university) receives information about his professor. The professor is missing, and the protagonist's help is needed to find him—an added cause for urgency is that the professor requires daily medication and will possibly die if he is not found in time. The student navigates through four rooms of a medical facility where he faces four quests. Each quest involves locating items that the professor has left, spawning letters that will lead to the three questions that the protagonist must answer correctly before proceeding to the next part of the story and stage of the game. Figure 1 and 2 illustrate the game environment:

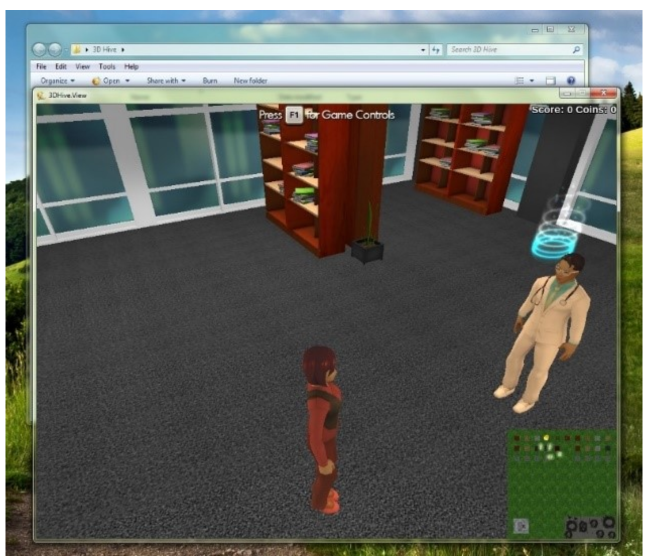

Figure 1. The three-dimensional world of *The Protégé*.

Figure 2. The narrative trajectory of *The Protégé*.

Integral to the game mechanics is the affordance of high-quality instant feedback. When a question is incorrectly answered, a thorough explanation for why the answer is incorrect is given immediately, and the student is given the opportunity of redoing the same question and selecting a more appropriate or correct answer. Feedback was designed to provide "corrective advice" rather than "merely pointing out strengths and weaknesses" (Nicol & MacFarlane-Dick, 2006, p. 210), which is thought to help students self-correct and improve their self-regulated learning skills.[1] Figures 3, 4, and 5 show how the quiz is presented to the student and examples of feedback after an incorrect versus correct answer.

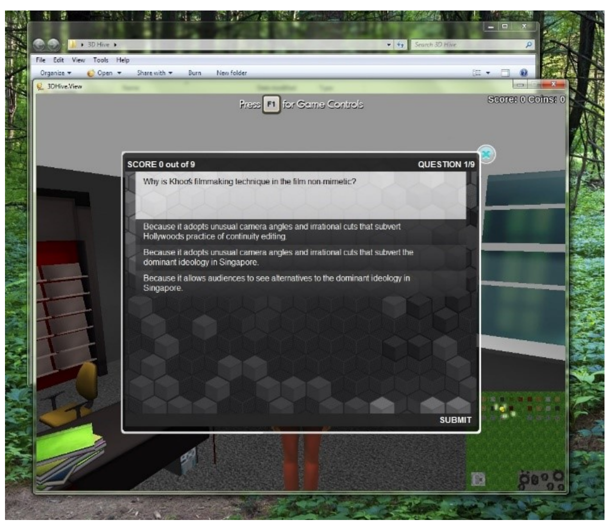

Figure 3. The quiz question and possible answers.

[1] A working definition of SRL: "Self-regulated learning is an active constructive process whereby learners set goals for their learning and monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and the contextual features of the environment" (Pintrich & Zusho, 2002, p. 64).

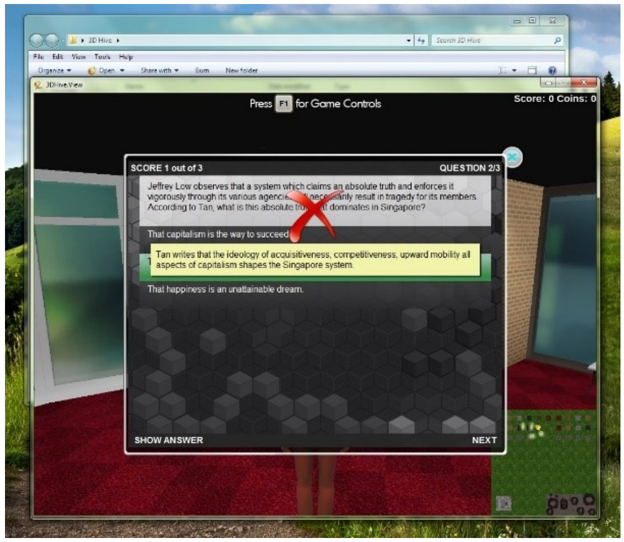

Figure 4. Incorrect answer with instant feedback.

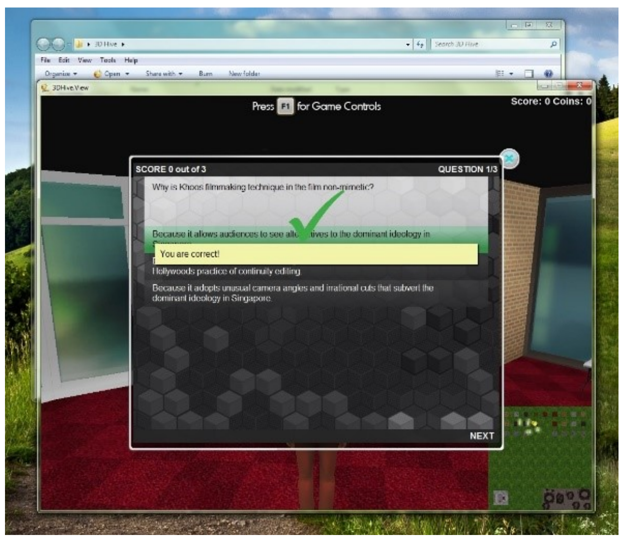

Figure 5. Correct answer with instant feedback.

The game was designed to fulfill the conditions and components that help cultivate intrinsic motivation. The conditions of competence and the provision of cognitive and emotional stimuli are facilitated when students gain mastery of the reading as they progress through the game. They will be able to meet the challenge because every wrong move is accounted for, and the right answer will become apparent. High-quality instant feedback helps reframe a wrong answer (usually associated with failure) as the route to success, and the students' effort to correct that mistake is rewarded via progression in the game. Autonomy and social stimuli occur in the game with the creation of "Rachel," the avatar protagonist, the "new self" that enables different vantage points and perspectives. In addition, the student relates to the game because mastery in the game parallels mastery of the reading material. In order to progress and succeed in the game, the student must in effect understand the key concepts of the reading material.

Methods

The participants of this project were undergraduates at the NUS, in their first year of study. Participation was voluntary. Most of the students were Singaporean, with a number coming from regional countries, such as Malaysia, Indonesia, Thailand, China, and India. The ratio of male to female students was about 3:1. All of the students were enrolled in the module that I taught, IEM1201S Women in Film, now with the new prefix of UTW1001S. The students ranged from 19 to 25 years in age and had native to near-native abilities with the English language.

The first phase or pilot of *The Protégé* was initiated during e-learning week, where students are encouraged to participate in online activities in place of face-to-face sessions with the lecturer. Twenty-two students from IEM1201S watched Eric Khoo's *12 Storeys* (1997) and read a corresponding section (pp. 198–206) of Kenneth Paul Tan's book on Singapore cinema on the film and then downloaded and played the game. A pretest attached to the game assessed students' comprehension of the reading material, using the same questions that would be repeated in the game, however without the aid of feedback. The pretest showed that students were unable to accurately understand key concepts of the reading: Among those whose pretest data was captured, students scored an average of 58.9%.[2] This relates to the second and third in the triad of pedagogical challenges discussed earlier in this paper—students lacking the ability to decode the key issues of the reading accurately. In order to complete the game, students would need to answer all questions correctly, and as the procedure entails a redoing of the questions in different order, as well as receiving feedback for incorrect answers selected, this suggests that their comprehension of the material had improved.

This study sought not only to gauge these students' competence with the reading material but also their levels of intrinsic motivation with regard to *The Protégé*. To assess their levels of intrinsic motivation in engaging with the readings, at the conclusion of *The Protégé*, students completed Ryan and Deci's Intrinsic Motivation Inventory (IMI; see www.selfdeterminationtheory.org). To measure intrinsic motivation in research participants, Ryan and Deci map competency to a Perceived Competence scale, and autonomy to a Perceived Choice scale. The element of "relatedness" is not measured. Intrinsic motivation itself is tapped through Ryan and Deci's scales of Interest/Enjoyment (which is often considered a proxy for intrinsic motivation) and Pressure/Tension (which should be minimal when motivation is intrinsic).

The questionnaire is comprised of 22 items, distributed over the four constructs of interest/enjoyment, perceived competence, perceived choice, and pressure/tension. Items 1, 5, 8, 10, 14, 17, and 20 measured interest/enjoyment (e.g., "While I was working on the task I was thinking about how much I enjoyed it"); Items 4, 7, 12, 16, and 22 perceived competence (e.g., "I think I did pretty well at this activity, compared to other students"); Items 3, 11, 15, 19, and 21 perceived choice (e.g., "I felt like I was doing what I wanted to do while I was working on the task"); and Items 2, 6, 9, 13, and 18 pressure/tension (e.g., "I felt pressured while doing the task"). All items were scored on a 7-point Likert scale ranging from 1 (*not at all true*) to 7 (*very true*).

The validity of the questionnaire is based on two factors. Firstly, the IMI was used in several experiments related to intrinsic motivation and self-regulation (e.g., Ryan, 1982; Ryan, Mims, & Koestner, 1983; Plant & Ryan, 1985; Ryan, Connell, & Plant, 1990; Ryan, Koestner, &

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[2] Due to technical problems, pretest data was not captured for 31.8% of the students.

Deci, 1991; Deci, Eghrari, Patrick, & Leone, 1994), and secondly a study by McAuley, Duncan, and Tammen (1987) examined the validity of the IMI and found strong support. The questionnaire from the IMI was modified to include a short reflection at the end so that both quantitative and qualitative results could be mined.

Results: E-Learning Week and *The Protégé*

After e-learning week, the quantitative and qualitative results of the intrinsic motivation questionnaire were collected and analyzed. The quantitative results of the intrinsic motivation questionnaire are tabulated in Figure 6, where the highest score is 7, and the lowest score is 1.

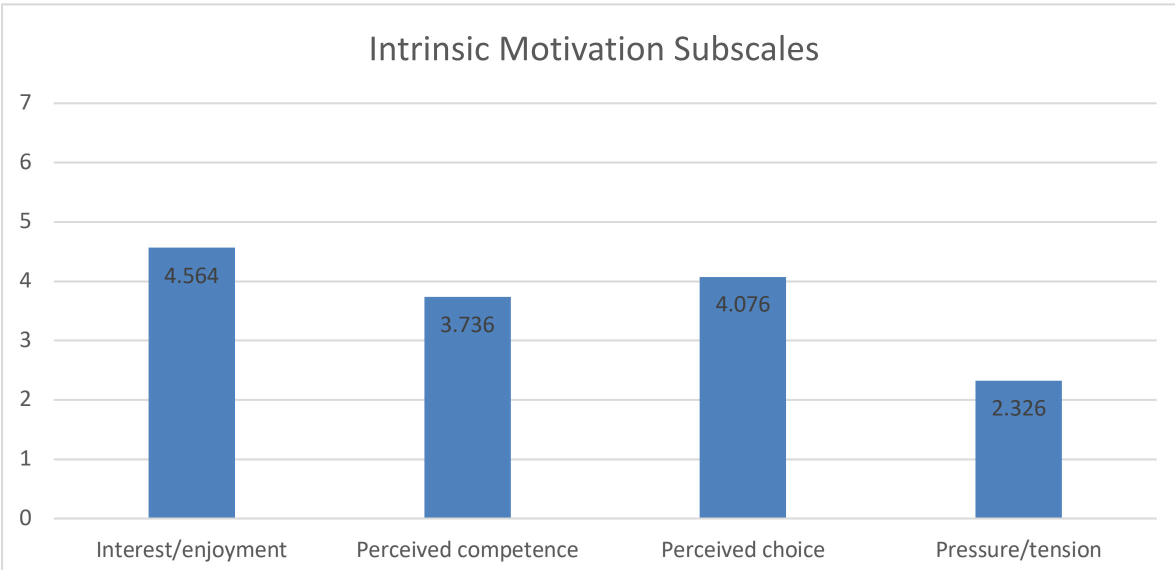

Figure 6. Initial findings: Quantitative evidence of students' intrinsic motivation.

In interpreting Figure 6, we see that the scores are consistent with students experiencing marginally higher than average levels of interest/enjoyment, as well as perceived choice (i.e., autonomy). These results are particularly significant when taking the technical issues of downloading the game into consideration (some students complained of download times of 5 hours or more) and the fact that students were told to play the game during e-learning week instead of being asked to volunteer for the task, which should have resulted in low scores for the element of perceived choice. Perceived competence received a lower score; however, on average students felt they were "somewhat competent" playing the game (this is also echoed in the qualitative results). The most dramatic indication was that of the low pressure/tension that students felt in the gamification experience, with a rating of 2.326 out of 7.

To provide a context for the interpretation of these scores, I compared them to a study of Singaporean students performing academic project work (Liu et al., 2006).[3] The study measured Ryan and Deci's constructs of interest/enjoyment, perceived competence, and perceived choice

[3] Liu et al. renamed the construct of "interest/enjoyment" as "intrinsic motivation" and explained that they saw the former as the biggest factor in the development of the latter. For consistency, I have retained the original title of the construct here, as well as omitted the element of relatedness, which is not measured in my study.

using the same Likert-scale items used here; collected data across 254 students enrolled at seven educational institutions in Singapore; and reported results separately for two groups. For interest/enjoyment, their two groups had means of 3.94 and 3.84; for competence, means of 3.68 and 3.55; and for choice, means of 4.25 and 4.06. When pitted against the mean results in this study, with interest/enjoyment scoring 4.564, competence at 3.736, and choice at 4.076, the total mean of the three scores in the gamification study exceeded the scores of both groups in the comparison study—surpassing the first group by 0.506 and the second by 0.926.

Qualitative Results: Student Reflections

The student reflections mostly indicated that they found the game "engaging" and "fun" and "more interesting" than working on a traditional quiz. Many also found that their understanding of the reading improved after playing the game, particularly in clearing up misconceptions that they had. Each of the statements that follow are from different students:

> Student A: "Overall, playing this game was definitely more interesting than merely doing a quiz."
>
> Student B: "This way of playing and learning at the same time is very novel and enjoyable to me compared to just reading the article and trying to understand it. The game provides a very interactive and engaging choice for me to understand and learn from the article and the movie."
>
> Student C: "I feel that the game was an interesting way to reflect on the reading and to test my understanding of the reading. The game setting provided a stress free way of learning as it brings focus on the reading in an indirect way."
>
> Student D: "I found the game very helpful in understanding the reading as it allowed me to identify concepts that I did not grasp very well."
>
> Student E: "The questions in the game definitely helped me to understand the reading better and also helped me clear up some of the misconceptions that I had."
>
> Student F: "The questions definitely motivated me to explore key ideas in our reading that relate film analysis (especially mise-en-scene), insights into ramifications of dominant ideologies in patriarchal societies, as well as the investigative role of the film-maker. The game is an interactive way in achieving the above mentioned as it creates a feeling of suspense (when I ask myself, what's next?) that is gradually uncovered along the way."

This was tied to the ability to attempt the quiz multiple times until they got the answers correct, as well as the facility of instant feedback:

> Student G: "The in-game quizzes are helpful for understanding the reading and the ability to retry the quiz until all the questions are right is good as well."

However, there were two main drawbacks: download time (a few hours in some cases) and narrative dissonance or the "disconnect" between the task and the story of the game. Students consistently had technical difficulties, sometimes finding them insurmountable:

> Student H: "I got booted out about halfway through the game and some of the controls didn't work for me. … The downloading process was very difficult and long and I encountered numerous problems. I guess the technical issues could be better

> improved to make the game more enjoyable. It was a really commendable effort though, if not for the technical issues, the dialog and tasks would have been better executed."

> Student I: "It does spend a lot of time downloading and updating."

> Student J: "I had trouble starting the game due to technical difficulties."

It is illuminating, though, that students appreciated the facility of multiple tries as well as instant feedback, in spite of the frustration they experienced with the technical difficulty of downloading the game:

> Student K: "I had quite a bit of difficulty getting the game up and running due to the download time. However once I started playing and got the hang of the game, I realised that it was actually rather addictive and I found myself repeating some of the quizzes to get the full score, it was effective in getting me to understand the reading better as it got me thinking and immediately corrected me if I got something wrong in a fun and interactive way. The addition of a storyline and a goal made the experience even more engaging."

Narrative dissonance was the other challenge faced by students, and these outweighed the comments from students who enjoyed the story:

> Student L: "I did not see how the quiz needed to be placed in the context of a game or how they relate."

> Student M: "At times it felt like the 'story' of the game didn't really matter – I had to just go through the doors and speak to the avatars."

> Student N: "I do feel that the components of the game, namely the plot, characters and setting, are very randomly put together, in how they do not seem to make much sense."

Some students also found the availability of just one avatar too limiting, and the single-player mode isolating:

> Student O: "As I was the only player I did not get to hear or understand other students' points of views and perspectives. If there could be more avatars involved, or a multiplayer aspect integrated into the game it would be perfect."

> Student P: "I would definitely recommend more things like this (game) but maybe on a more social level such as having more players at once."

Discussion

In Ryan and Deci's (2000a) "Self-Determination Continuum," intrinsic motivation occurs when the "perceived locus of causality" is internal, and the "relevant regulatory processes" include "interest," "enjoyment," and "inherent satisfaction" (p. 72). As mentioned, students were not asked to volunteer for the game, and this externalized their locus of causality. However, the regulatory processes, as seen from the quantitative and qualitative results, are remarkably close to those of intrinsic motivation. Students expressed some "interest, excitement, and confidence" (Ryan & Deci, 2000a, p. 69) in their gamification experience, with most indicating an increase in competence (cognitive stimuli/mastery) after playing the game. The improvement in competence takes into account not only students' qualitative comments but also the fact that in completing the game they would need to respond correctly to all questions regarding the reading material. The sense of inherent satisfaction is highlighted with the repetition of how helpful students found the game, as found in their reflections. None of the students (apart from the one that failed to download the game) experienced a sense of failure. The two challenges faced—technical issues and narrative dissonance—(mostly expressed through the qualitative evidence) did not overwhelm the students' engagement with the game to the degree that they did not benefit from the learning experience, and these two challenges will be addressed in the second run of the game, where the technical issues will be ironed out, the narrative will be adjusted, and the multiplayer facility will be provided.

The results point to the potential that meaningful gamification has in motivating and helping students in scaffolding reading material before their classes, and shows it to be not only a viable but also a worthwhile facility to invest in and develop—particularly for facilitating a flipped-classroom environment. To reiterate, the study also indicates that students' comprehension of the material improved, as the completion of the game provided evidence that inaccuracies in understanding key concepts of the reading (as manifest in the pretest) were addressed. Further studies are needed to meet the final pedagogical challenge raised in this paper: students' contribution in seminars as well as their ability to write good student papers. However, the game's potential to intrinsically motivate students as well as in aid their understanding of the associated reading material does suggest this to be a logical consequence. At present, a study is also being undertaken that compares students' preferences for various scaffolding strategies. Among these strategies is a comparison of the gamified quiz and the traditional quiz.

As a response to the rapid rate of technological advancement in society and a greater attention to not only *what* students are learning but *how* and *when* they learn, this paper extends research that places the student at the center of the learning process— in particular, research on students' motivation in a writing module. One of the key outcomes of this pilot project provides evidence for the use of gaming, specifically meaningful gamification, as a pedagogical tool that has a positive impact on students' motivation, by targeting a group of students pursuing the module Women in Film in a global, research-intensive university in Asia.

Acknowledgements

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Online Course Design and Development Among College and University Instructors: An Analysis Using Grounded Theory

Sally J. Baldwin, Yu-Hui Ching, and Norm Friesen
Boise State University

Abstract
In this study, a grounded theory approach was used to investigate the process college and university instructors undergo to design and develop online courses. Fourteen instructors who created online courses for four-year colleges and universities were interviewed about their experience designing and developing online courses. Results showed that participants begin the process with objectives and/or existing course outlines, typically taken from online and face-to-face courses. Next, the instructors structure the course and chunk content. The instructors interviewed rarely use formal instructional design models, but their design tasks show a striking similarity to those formalized in the ADDIE model. Student feedback (evaluation) motivated the instructors in their development efforts after initial course delivery. The study discusses practical implications and suggests opportunities for future research.

Keywords: instructional design, instructional strategy, learning management system, online learning

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Online Course Design and Development Among College and University Instructors: An Analysis Using Grounded Theory

Instructional design focuses on improving the process of instruction by "prescribing optimal methods of instruction to bring about desired changes in student knowledge and skills" (Reigeluth, 2013, p. 4). The instructional design of a course creates learning environments and experiences that favorably impact conditions for learning (Merrill, Drake, Lacy, & Pratt, 1996). In online courses, there is a strong link between the tasks of designing and teaching. A national survey of 10,700 college and university faculty instructors found that "over 80 percent of faculty involved in online teaching and/or development are involved in *both* the development and the teaching aspects" for a given course (Seaman, 2009, p. 21). However, research shows that creating an online course involves a different set of skills than delivering content in a traditional course setting (Miller, 2007).

Research also confirms the importance of instructional design for online instructors. Baran, Correia, and Thompson (2011) performed an extensive literature review and used a constant comparison analysis to determine online instructors' key responsibilities. The researchers found that aspects of instructional design (i.e., planning, organizing, and structuring the course) were often considered the most important tasks for online instructors. Bawane and Spector (2009) conducted a study to help identify instructor competencies for new online teaching programs. The ability to design instructional strategies and develop appropriate learning resources, implement instructional strategies, and facilitate participation and sustain motivation among students were found to be the most important skills for online instructors (Bawane & Spector, 2009). The "ability to design courses well is usually the most limiting factor" (Fink, 2003, p. 34) in teaching effectively online. In a poorly designed course, students become disengaged, and learning suffers (Koszalka & Ganesan, 2004). Student satisfaction and perceived learning have been linked to clarity of design in online education (Swan, 2001).

Educational researchers have focused on the attitudes of instructors toward online instruction, typically using surveys (Allen & Seaman, 2016; Jaschik & Lederman, 2014; Seaman, 2009; Worthen, 2013), and as a result there is limited insight into individual experiences and know-how involved in online course design. While survey data is valuable, no existing survey studies address the online course design aspect. A review of the literature failed to provide information on how instructors design online courses. This information is important in order to provide instructors with a voice to explain their process of online course design.

The purpose of this study is to determine how instructors design online courses at public four-year colleges and universities. The intent is to help direct the conversation about instructional design to one that is grounded in practice. This study utilizes interviews with instructors who design and teach online courses and employs a grounded theory approach to add to the scant knowledge on this common design condition. This research aims to answer the following question: How do instructors design online courses at public four-year colleges and universities, and how can this practice be theorized?

Review of Related Literature

Instructional Design Models

This study uses grounded theory to generate a theory that is grounded in instructors' reports of their online course design experiences. In the context of instructional design, research suggests explicit models and processes (i.e., steps). ADDIE, an acronym naming the processes of analysis, design, development, implementation, and evaluation (Huguet, 2008), is among the most important of these design process models (Smith & Ragan, 2004). During the analysis phase, the instructor establishes the direction of the course, reviews the learning environment, and identifies learners' existing knowledge and skills. In the design and development phase, the instructor takes systematic and specific actions to write learning objectives, create content, plan lessons, choose assessment instruments, and select media based on the results of the earlier analyses. The instructor conducts instruction during the implementation phase, and in the final phase, evaluation, the instructor evaluates and revises the course or lesson (Clark, 2015). According to instructional design models, instructors must understand learners' characteristics and needs before they determine how to deliver content to meet these needs, while providing formative and summative evaluations to confirm needs are met (Dick, Carey, & Carey, 2014; Morrison, Ross, Kalman, & Kemp, 2010; Smith & Ragan, 2004).

ADDIE is a generalized instructional design process model (Ippoliti & Gammons, 2016), but there are other closely related instructional design models. These models use a formalized systems view of the process, as well as its components and outcomes (e.g., the Dick and Carey systems approach), in which each component (i.e., instructor, learners, materials, and learning environment) is deemed crucial to success. Other instructional design models include, but are certainly not limited to, Keller's ARCS model of motivational design (Keller, 1987), Wiggins and McTighe's backward design model (Wiggins & McTighe, 1998), and the Kemp design model (Morrison et al., 2010). Instructional design, as formalized in these and other models, is defined as "a system of procedures for developing education and training curricula in a consistent and reliable fashion" (Branch & Merrill, 2012, p. 8). It involves a "systematic and reflective process of translating principles … into plans for instructional materials, activities, information resources, and evaluation" (Smith & Ragan, 2004, p. 4). As depicted in these models, instructional design is "widely considered to be equivalent to process" (Boling & Smith, 2012, p. 358), and students of instructional design are often encouraged to use these models to guide their instructional design endeavors.

Instructional Design in Practice

While the theoretical approach to instructional design is popular in academia, this popularity does not extend to practice (Zierer & Seel, 2012). Instructional designers, professionals whose primary responsibility is to design courses, tend to use instructional design models broadly. Instructional designers are aware of process-based instructional design models but do not follow these models in a rigid fashion or spend a great deal of time using them (Kenny, Zhang, Schwier, & Campbell, 2005). York and Ertmer (2011) found that instructional designers often use general guidelines and modified models to design courses, based on the results of a series of surveys sent to 50 experienced instructional designers. In another study, Ertmer et al. (2008) provided ill-structured instructional design problems to seven instructional designers and asked the practitioners to use a think-aloud procedure to investigate their problem-solving processes. The researchers found that instructional designers use their previous knowledge and personal experience to interpret the problem and then use a mental model of the instructional design process to solve the problem. The researchers also discovered that it was important for the instructional designers to be able to draw on past designing experiences. Other research supports these findings, suggesting that instructional designers adapt instructional design models (Christensen & Osguthorpe, 2004; Kirschner, Carr, van Merriënboer, & Sloep, 2002; Silber, 2007). Wedman and Tessmer's (1993) survey of instructional design activities practiced by 73 instructional designers indicated that the practitioners alter activities and the sequence of activities included in instructional design models. The practitioners cited lack of time, decisions already made, and activities considered unnecessary as reasons for omitting design activities.

Instructors Designing Online Courses

Institutions often recruit instructors to design online courses (Baran et al., 2011; Seaman, 2009). Instructors are content experts, familiar with the learners, and already a part of the institution. However, there is a paucity of research about how instructors design online courses. Researchers have examined the design and implementation of online learning activities, such as discussion forums (Clark, 2015; McDonald, 2009), wikis (West & West, 2009), and student assessment (Anderson, 2004). Researchers have also investigated instructors' assessment of the usefulness of various components in specific courses (Kihato & Bednar, 2004). Faculty from public and private institutions have been surveyed about their perception of online learning (Straumsheim, Jaschik, & Lederman, 2015). The Coalition of Contingent Academic Labor surveyed faculty from 107 institutions to understand online instructors' professional concerns (Worthen, 2013). These concerns focused on control of work, job security, and ownership of copyrights, not the process of course design. Barberà, Layne, and Gunawardena (2014) found prior experience and institutional systems played a part in the quality of online course design in three academic disciplines, but the study did not provide detailed information to explain the role of instructors involved in course design. Alvarez, Guasch, and Espasa (2009) identified the course design process as consisting of "[1] defining the procedures of instructional design; [2] considering the resources and the assessment in a virtual context; [3] presenting content/questions; [4] translation of traditional content in online contents with interactive activities for students; [5] creation of online interactive content" (p. 332). However, the instructors' perspective on these tasks was not included. Kang (2000) performed a case study to investigate the process of moving traditional courses to an online format at Northern Illinois University. Kang identified instructional strategies based on interviews with instructors, instructional designers, and administrators. Kang limited this study to one university, and it included instructional designers who assisted with the process.

Existing instructional design models mostly prescribe the design process, components, and outcomes (Becker, 2007), but current literature offers little insight about how instructors actually design online courses. Grounded theory provides an opportunity to gain a different understanding of course design by speaking directly with instructors about what they are actually doing, rather than relying on literature written about how courses *should* be designed. In the next section, more information will be provided to describe the method used in this study.

Methods

This study used grounded theory to investigate how instructors design online courses. Grounded theory involves the "discovery of theory from data systematically obtained from social research" (Glaser & Strauss, 1967, p. 2). The goal of grounded theory is to generate a theory "that accounts for a pattern of behavior which is relevant … to those involved" (Glaser, 1978, p. 93). Glaser and Strauss (1967) note that the theory produced is not a perfect description of the whole field. Rather, it is "a theory that accounts for much of the behavior" (Glaser & Strauss, 1967, p. 30) of the participants by generating general categories and their properties, to serve as a guide for others. Grounded theory results "are not proven; they are theory" (Glaser, 1992, p. 87). In accordance with this method, the researchers began by identifying an area of interest: the process of course design, as completed by university instructors.

Data Source

Fourteen college and university instructors (five males and nine females) from public four-year institutions volunteered to take part in this study. Institutions ranged in size from 4,400 to 38,000 undergraduates. The instructors were from both teaching (57%) and research (43%) institutions located in urban environments. All but three of the participants held tenure-track or tenured positions. The participants' experiences ranged from having designed only one online course to having designed more than 50 online courses. Similarly, their experience teaching online varied between one and 19 years (M = 9.21) and included a variety of subjects (e.g., education, instructional design, statistics, English). All participants described themselves as having advanced technology skills, and all held terminal degrees in their fields. Using purposive sampling, the participants were chosen because they had different backgrounds but shared the experience of creating and teaching online courses.

Procedure

Instructors who had designed online courses were interviewed using open-ended interviews. Each participant was interviewed once, and the interviews were performed over the telephone. An application on the interviewer's cellular phone recorded the interviews. Before each interview began, the participant was told the purpose of the study and asked for his or her informed consent. Basic demographic information was acquired, and the participant's concerns and questions were discussed. Next, participants were asked the broad question, "Tell me about the process of how you design an online course…. Where do you begin?" with the intention to "instill the spill" (Glaser, 2009, p. 22). By following Glaser's (1999) guidelines of using an open question and prompting for more detail, participants were encouraged to keep talking about their main concerns within the area of interest (i.e., online course design). Additional questions were asked to understand the participants' perspective better, including the following:

- Where do you begin when designing online courses?
- How do you decide what to add?
- What training have you had to designing online courses?
- What supports are provided by your institution for online course design?
- Do you take advantage of these supports? Why or why not?
- Do you use a course evaluation rubric?
- What are the best and worst parts about designing an online course?

Stages of Analysis

To highlight information that appeared particularly significant, we took notes during each interview. Immediately after each interview, we transcribed the data. After reading through the transcripts several times, we coded the data by making notes of common categories and highlighting ideas of interest. Constant comparative analysis was used to compare data to find commonalities and variations (Creswell, 2007).

After the initial interviews, categories began to emerge. Morse (2008) describes categories as a collection of similar data brought together into the same place. In keeping with grounded theory procedures, we adjusted our interview questions. For example, the best and worst aspects of online course design were frequently mentioned by early participants, so these questions were incorporated into the interview procedure.

As patterns emerged, categories were distilled into general themes. Themes are a higher level of categorization that distill the concept further and have been described as "the meaningful 'essence' that runs through the data" (Morse, 2008, p. 727). For instance, one theme that surfaced in our study was refining the course based on student feedback. We made a list of themes and added pertinent points from each transcript. After the data had been taken apart through the coding analysis, these themes were used to piece the story together to develop a theory (Glaser, 1992). To determine whether the proposed theory held true for other participants, discriminant sampling (gathering additional information from new individuals) was used (Creswell, 2013) by interviewing additional participants (these instructors are included in the 14 individuals discussed earlier).

When (a) no new data emerged from the category, (b) the categories were dense enough to cover variations, and (c) relationships between categories had been delineated appropriately (Brown, Stevenson, Troiano, & Schneider, 2002), theoretical saturation was determined to have been reached.

Results

The following themes emerged from the analysis:

- Instructors are assigned the task of course design and begin with objectives and/or existing course information, often utilizing information from face-to-face courses.
- Instructors build a structure, chunking content.
- Instructors rarely use formal instructional design models and rubrics.
- The learning management system (LMS) often reduces instructor freedom in online course design.
- Feedback from students is a major motivator for online course design after initial course delivery.

A central phenomenon in the design of online courses emerged as the data were examined: Online instructors do not follow formal instructional design processes. In fact, many of the participants were not aware that instructional design models even existed. The instructors designed online courses based on their experience with face-to-face courses and in accordance with the limitations of the LMS. Figure 1 shows the course design process that constitutes a theory "grounded" in the participants' reports. We have named this process and theory "informal design." The information provided by participants was conceptualized into a process model, using the themes that were developed from the coding of data into categories.

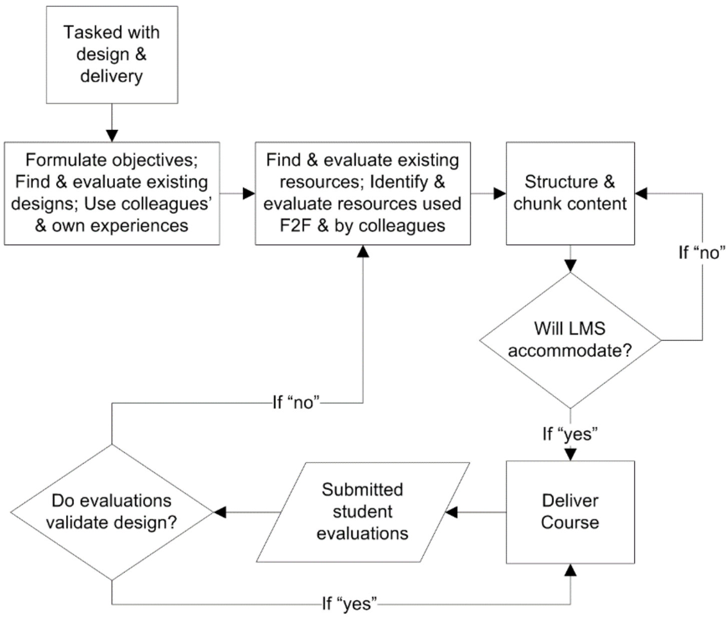

Figure 1. The informal design theory: A process model of instructors creating online courses.

For the participants, the entry point "tasked with design and delivery" represents the first stage of course design. Most of the participants learned how to design online courses by being the most technologically adept person in their department. This ability or interest designated them as the "go-to person" to design online courses. The participants described first looking at existing courses (e.g., face-to-face courses that they or someone else has developed). The participants look at course syllabi, which typically include course objectives, and work to understand the end result. If a face-to-face course does not exist at their institution, the participants report searching online for syllabi to help guide their course development. A common sentiment was, "I start by seeing what other people have already done." This information helps guide the participants, particularly in the early stages.

The participants consider the objectives for the course. A participant explained that he thinks about how to "translate those goals and objectives into online learning activities and formative assessments that can be carried out in the online environment." One participant stated,

> I look at the objectives of the course. I obviously look at the course title and, I kind of think, okay, what key things regarding this specific topic do we want our students to be prepared with, and what objectives and standards do I need to interject to make everything align?

The next step the participants described was to find and evaluate existing resources. A participant suggested, "I look online to see if there are … other resources that are out there." Gathering resources can be time consuming, but the participants indicated that this process helps provide students with current information and avoids the even more time-consuming task of building materials from scratch. Past teaching experience informs course design. Many of the participants mentioned "finding ways to take what was being done in the classroom and replicating those things online" or figuring out how to make an assignment work online, since the media and affordances are quite different. As one participant acknowledged, "Not all content or activities that work well in a face-to-face environment are going to translate online, but at least getting the sense of what has been done in the past I think is always helpful." Another participant described how he uses online reflective journals and VoiceThread peer reviews to "find ways to take what was being done in the classroom and replicate those things online."

Once resources have been collected, the participants structure and chunk content. The participants consider the length of the semester, the number of students, and available resources (e.g., technology, students' comprehension level, and existing knowledge). The instructors keep students engaged by distributing assignments and activities throughout the semester. Tasks are evenly paced to avoid overwhelming the students or the instructor. One participant noted, "I take the topics and … plot out the various chunks of the course, so its organized by weeks or modules, then I try to break out each of those pieces." The participants often put the content into a set format. For example, one participant stated, "Each week I try to have the same order…there is always an overview, with the objectives, assignments due, and what is coming up in the future to try to keep [students] up to date."

The participants upload the course content to their institutions' LMS as the next step in the online course design process. The participants are often frustrated by this step, regardless of the brand of LMS (e.g., Blackboard, Canvas, Moodle). The LMSs were not deemed difficult to use, but they were described as "unresponsive," "unwiedly," and "time-consuming." And these were evaluations reported by participants who had earlier self-identified as "technologically savvy." A participant stated, "There are things I want to do that I can't do, I get frustrated by the limitations of [LMS]." Another participant stated, "The LMS constrains what you are able to do." Other participants mentioned redundant features within the software: "I tried to be responsive for students wanting more time, so I changed the due date in one place, but I didn't realize that I had to change it in another place." The participants saw the LMS as a component that demands time and energy and represents a hurdle in the course design process.

Once an online course has been deployed, the participants are eager for student feedback. The participants liked

> getting to the end of the course and reading in a student's evaluation that they never thought that they could be successful or that they would even like an online course, but, by golly, they liked mine, their attitude adjusted, and that's my victory.

Another participant felt validated by

> the feedback I get from students when it is a well-designed course. When things are easy to find, students find that they are engaged and they get so much out it. To get the feedback from the students saying this was the best course they ever taken. That kind of feedback, that really makes it all worth it.

Feedback from students motivated participants and encouraged them to continue to improve their courses. Since the initial goal for many of the participants was to get the course up and running for students, course refinement was often mentioned by participants as a way to adjust the course design to student feedback. Student feedback was also seen as a way of improving the experience for themselves and students. A participant reported that student feedback about course navigation led her department to implement a template for all online courses. Now, according to the participant, students "know where to find things because it's always pretty much in the same spot in every class so they're not trying to find where the information is, which could lead to confusion." As a result of this change, the participant reported spending less time helping students find items within the course. She stated, "I think that the feedback from students really improved … the consistency in our department across courses."

Discussion

Course design for our participants began with a need to take action to complete a task (i.e., develop an online course). While our participants did not follow a formal instructional design process or rely upon instructional design models *per se*, they seem to have followed a process that mirrors the ADDIE model to a surprising degree (Figure 2). Similar to the ADDIE model, objectives were established, and the learning environment was analyzed, but our participants did not mention identifying learners' existing knowledge and skills. It is possible that analyzing learners' needs was less significant to our participants since most already had experience with teaching similar content and presumably similar students face-to-face. Next, our participants created content, and selected media, often based on existing resources (the design and development phases of ADDIE). And then the instruction was implemented, evaluated, and revised (the last two phases of ADDIE). Generally, the steps our participants outlined involved creating a solution for a complex task more than undertaking a systematic series of predefined actions or processes.

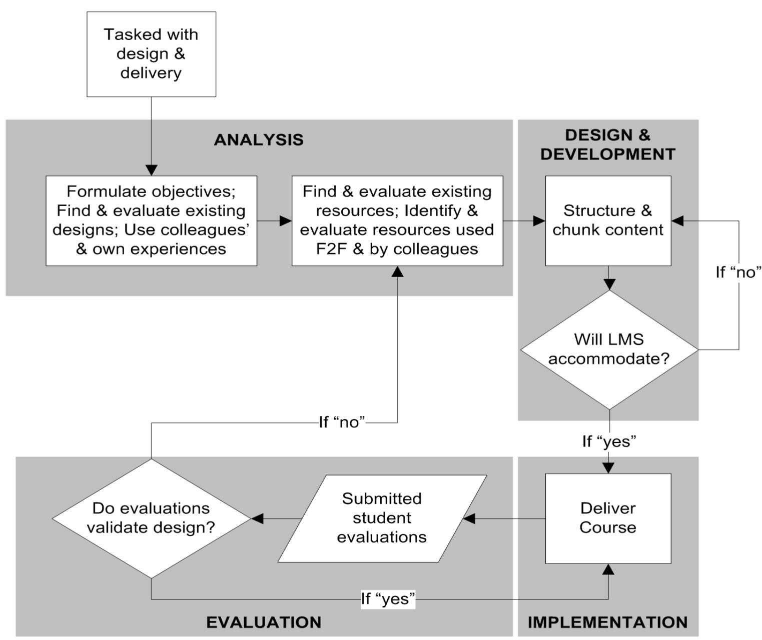

Figure 2. The informal design theory process model with steps in the ADDIE model superimposed.

The informal design theory represents a dynamic problem-solving approach to the online course design process. Research demonstrates that design is often solution driven (Rothwell & Kazanas, 2011; Visscher-Voerman & Gustafson, 2004), as seen by the participants in this study.

As mentioned, many of the participants start with objectives, often obtained from face-to-face courses. However, to ensure students meet these objectives in an online course, the participants must develop new curriculum with instructional strategies effective for online learning. Online instructors must deliver content in a way that attracts, engages, and educates students in this environment (Rovai, 2004). Effective online courses utilize a range of instructional activities designed to engage the learner (Dempsey & Van Eck, 2012). To this end, an updated definition of instructional design has been suggested as "the conscious generation of interventions into the experience of others for specific purposes" (Bichelmeyer, Boling, & Gibbons, 2006, p. 39). This explanation aligns with our study's findings.

Scholarly Significance of the Study

The findings of this study provide a better understanding of how instructors design online courses and the factors that influence their actions. The participants approached online course design as a problem to be solved directly, on its own terms, based on whatever informal resources were immediately available. The participants did not see course design as a specialized undertaking, requiring expert personnel or highly specialized resources (e.g., research articles or guidebooks). At the same time, they reported following steps that generally correspond to those in the ADDIE process model, at least in its broadest outlines, in a pattern of actions that apparently arose almost spontaneously.

This presents a significant paradox for instructional design: Many are doing it—at least in rudimentary ways—but without knowing or explicitly following its established models and prescriptions. Systematic design processes and design models have been developed through scientific research, but these processes are not used as such, as our study shows. In this study, even participants who are instructors of instructional design do not explicitly follow the very models and processes they teach and espouse. Other studies (e.g., Gray et al., 2015; York & Ertmer, 2011) indicate that this disconnect also applies to instructional design professionals in their own course design processes. Perhaps these models are not well suited for use in the everyday context of online course design at colleges and universities. The roots of instructional design are in training and developing materials for the military and industry, not for online education *per se*. It may also be the case that instructional design models are not readily accessible to instructors. In cases where they *are* available, it may be that the design models are presented in a manner that is difficult to use or in a way that fails to address the instructors' immediate concerns. Or, the time commitment required to follow systematic design processes and design models may be too much. Future research could investigate why these processes and models are not widely referenced. Future research could also provide more information on *why* instructors' use this process when designing online courses.

The findings of this study help to shed light on the design process used in a wide range of courses developed under similar conditions. In so doing, it also provides a basis for generating hypotheses for future research. Future research could investigate whether introducing the informal design theory could better prepare instructors who are new to online course design to course design tasks. This information could then be disseminated to instructors who are creating online courses to encourage greater quality and, correspondingly, more confidence in online courses.

Practical Implications

There are practical implications for colleges and universities interested in improving the quality of online courses. By understanding how instructors design online course (e.g., the informal design theory), institutions may be able to provide professional development activities to reinforce solution-driven design. Professional development could be developed to help instructors create effective objectives for their courses, learn how to better analyze the learning environment and their learners, provide resources to create content, and learn how to select appropriate media for online courses, as well as best practices when using learning management systems. The ADDIE process could be presented (or in some cases reintroduced) to help support instructors who design online courses.

Understanding the process instructors use when designing online courses provides insight into the steps instructors take to bring content to students. Stakeholders interested in improving online course quality may consider providing more resources for instructors at the key points mentioned (e.g., when faculty are reviewing existing designs). This could be done by sharing exemplary courses or providing fellow instructors with feedback on effective elements and content in their online courses. Also, institutions or LMS organizations may consider offering templates to help structure and chunk content.

Limitations

As with all research, there are limitations to this study. The use of grounded theory as a research method relies upon the researchers' ability to be sensitive to drawing concepts from the data. We attempted to increase the plausibility of the theory by fitting (almost) all of the evidence or concepts provided in the data into the theoretical account to show the participants' viewpoints. The theory fits the current set of participants based on the data collected. This study may be limited in its fit and modifiability should new or different data be collected. However, we attempted to limit these issues by performing constant comparison of data throughout the data collection and analysis process and by reaching theoretical saturation with the data collection.

Furthermore, this study was based on interviews with instructors whose views may or may not represent the views of a larger group. The transferability may be questioned since the instructors who volunteered to participate may represent a sample that views online education, course design, and instruction in particular ways. They also represent a group that designs courses without the assistance of instructional designers.

Finally, the use of grounded theory as a research method relies upon the creativity of the researcher and his or her ability to be sensitive to drawing concepts from the data. In working through the collection and coding process, we tried to focus on the tenets of grounded theory, based on our understanding. Grounded theory is subjective, and our personal bias formed a part of the study. The researchers' backgrounds include the roles of instructor, instructional designer, and online student. This knowledge and understanding helped generate categories (i.e., develop theoretical sensitivity), but the process of constant comparison encouraged us to look at the emerging phenomenon from many directions. These aspects should be considered for researchers wishing to verify the research.

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Students' Perceptions of Quality Across Four Course Development Models

Victoria S. Brown and Mario Toussaint
Florida Atlantic University

David Lewis
University of Miami

Abstract
Four course development models were compared over a 3-year period, based upon student perceptions of the integration of the Quality Matters (QM) Standards, course structure, and quality. Points of comparison included (a) faculty training, (b) instructional designer supported, (c) additional QM training course, and (d) no training or support used. Students were randomly selected from online courses from each of the categories to receive a survey that measured their perceptions about the courses. Students were asked about the design of the courses in terms of the integration of the QM Standards, structure, and quality. Significant results were found across all eight standards, course structure, and quality for the instructional designer supported course model as compared with the other course design models.

Keywords: Course development models, course structure, quality, professional development, Quality Matters, training

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Students' Perceptions of Quality Across Four Course Development Models

With projected declines in freshman enrollment in postsecondary institutions (Selingo, 2012), enrollment services are exploring various approaches to attract nontraditional students. Beyond enrollment figures, the traditional profile of freshman students is also changing as tuition costs increase. To reduce debt after graduation, many students now choose to work full- or part-time while they attend classes. To respond to the needs of these students, 70.7% of postsecondary institutions provide distance-learning courses as an option (Allen & Seaman, 2013). Distance-learning classes enable flexible scheduling for students as they work or care for children. In an evaluation of the impact of distance learning on student success, one university found that the higher the percentage of distance-learning courses, the shorter the time to graduation (Affordability Workgroup 2025 Strategic Plan for Online Education, 2016).

Adapting courses from traditional to online formats requires faculty members to shift their pedagogical beliefs, improve technical skills, and adopt different classroom management skills (Allen & Seaman, 2013; González-Sanmamed, Muñoz-Carril, & Sangrà, 2014; Neban, 2014). Faculty members continue to have a negative perception of the quality of online courses, primarily based on the belief that their instructional content is incompatible with online instruction (Neban, 2014). Teaching styles, often developed very early, are difficult to change mid-career. Teaching online challenges faculty members to learn new technology and adjust pedagogy, creating a degree of discomfort in converting courses to online formats (Osika, Johnson, & Buteau, 2009). An additional challenge is the belief that online courses are impersonal and that faculty members will miss student-teacher interactions (Neban, 2014; Osika et al., 2009).

Training faculty members to either design online courses or to understand the online course development process often includes professional development or a collaborative course design process. In a survey of 48 institutions with membership or representation in either the Sloan Consortium or the Western Interstate Commission for Higher Education, 90% of the institutions used a variety of professional development options, including 2-to 5-hour workshops, one-on-one trainings, hands-on trainings, online courses, or one-time training to support faculty members (Meyer & Murrell, 2014). A community of practice was used by 57% of those institutions. Of the course training options, faculty members placed higher value on pedagogical training than on technological training, and webinars were valued the least by faculty members (Meyer & Murrell, 2014). Another approach to teaching pedagogy is through collaborative partnerships with instructional designers and faculty. Within these partnerships, the instructional designer serves multiple roles as the editor and the reviewer of work, the project manager, a coach, multimedia and graphic designer, and help desk functions for students and faculty (Hawkes & Coldeway, 2002). Given faculty's continual concerns and the desire to improve pedagogy in their online classes, this study explores the integration of best practices by faculty into online courses based upon the course development models used.

Review of Related Literature

With the expansion of distance-learning, best practices have emerged. Using the best practices literature, a rubric was developed by MarylandOnline Inc. as a tool to evaluate the quality of online courses. MarylandOnline provided training in the implementation of the rubric guidelines and for course evaluators (MarylandOnline, 2017). Higher education institutions used the rubric to develop training courses, resulting in improved faculty confidence in the use of technology (Hixon, Buckenmayer, Barczyk, Feldman, & Zomoiski, 2011). The institution where this study was conducted adopted the QM Rubric as a guide in the development of online courses.

Quality Matters Quality Assurance Framework

Quality Matters (QM), a nonprofit organization that offers a subscription-based service developed by MarylandOnline Inc., constructed the QM Rubric as a guide for the development of high-quality online courses. The QM Rubric was created by the University of Maryland as a part of a federal grant-funded project (MarylandOnline, Inc., 2014; Shattuck, 2007; Shattuck, 2012). Perhaps one of the most important components of the QM quality assurance model is that it included a faculty-centered, peer-review process through the QM Rubric. The 2014 Quality Matters Rubric 5th ed. (MarylandOnline, Inc., 2014) has eight general standards (Course Overview, Learning Objectives, Assessment, Instructional Materials, Learner Interaction, Course Technology, Learner Support, and Accessibility). The reviewers received additional guidance through the 43 additional criteria embedded into the eight standards. This rubric was designed to promote continuous course improvement over time by faculty and instructional designers. Below is a description of those standards.

Standard 1: **Course overview and introduction.** The creators of the rubric included criteria in this section to address the introduction to a course. A "start here" section was encouraged in course development (Lohr, 1998) because it provided an easily accessible course overview complete with schedules and technical requirements.

Standard 2: Learning objectives. Educational research and decades of instructional design practice have led designers and developers to provide learning objectives within each lesson. For this reason, learning objectives were included as part of the QM Rubric. The objectives act as an advance organizer for learners, providing some level of scaffolding for the current lesson. For example, advance organizers allow learners to tie their previous knowledge to new information (Clark & Mayer, 2003).

Standard 3: Assessment. Assessments, which are broad and varied, were included into the QM Rubric to provide an indication of student learning in the course. The guidance in this standard is used by the instructional designer to provide constructive feedback that aids in the design of appropriate assessments and presentation techniques to encourage learning (Lee, Srinivasan, Trail, Lewis, & Lopez, 2011).

Standard 4: Instructional materials. A systematic application of design principles is used to create learning experiences that promote understanding and maximize the strengths of the students in the context of the instruction. The systematic process aligns the assessments to the instructional materials and the learning objectives. Activities are designed to ensure skill development (Dick, Carey, & Carey, 2009; Gagné & Briggs, 1974). Currency of the materials is included in this standard to ensure that a course, developed from 15- to 20-year-old course notes, has progressed and included recent discoveries in the content area.

Standard 5: Learner interactions. The developers of the QM Rubric felt learner interactions were important to reduce student isolation in the online course (Moore, 1989; Moore & Kearsley, 2011; Zhao, Lei, Lai, & Tan, 2005). The learner interactions required in a high-quality course promotes a feeling of belonging to a community of learners who support and motivate each other.

Standard 6: Course technology. Instructional technologies may reduce the transactional distance between the instructor and the students created in distance-learning courses due to the delivery mode. Instructional technology functions best in a transparent and seamless way (Saba & Shearer, 1994). Email is often considered impersonal by students (Biesenbach-Lucas, 2007), whereas a synchronous discussion can feel friendlier and can allows for quick communication and feedback.

Standard 7: Learner support. The QM Rubric developers insisted that student support services be available from within the course so that students can find help (e.g., technical or financial aid support) when necessary. Universities that provide online courses often have learner support centers and services for learners at a distance (Brindley, 2014).

Standard 8: Accessibility. All learners must have access to the course materials to learn, including those individuals with disabilities. The Americans with Disabilities Act, or Section 508, Compliance Regulations state that courses should be accessible by individuals with a variety of disabilities. Universal design also proposed that disabilities occur along a continuum, and any efforts developed to support those with disabilities assist all students to achieve learning outcomes (Rose, Meyer & Hitchcock, 2005; Silver, Bourke, & Strehorn, 1998).

While the QM Standards may seem extensive and a good scaffolding tool to develop high-quality courses, the guidelines can be overwhelming to faculty as they begin developing online courses (Chao, Saj, & Hamilton, 2010). Within the rubric criteria are the underlying principles to the design of online courses, but faculty often need pedagogical assistance in the selection and deployment of instructional strategies and assessments. The rubric provides a guide in the development of the course and a place to build the relationship with the faculty. The designer can alleviate concerns the faculty have about the quality of the course (Kumar & Geraci, 2012). Based upon the relationship, the instructional designer guides the faculty into adopting best practices in the rubric. With the instructional designer in support in the design of the courses, student reported better feedback and better instructional practices (Brown, Myers, & Roy, 2003).

Course Structure and Course Quality

Although, the QM Rubric provides good measurements of quality within courses, the rubric does not offer a measurement of the course structure and overall quality of the courses. The QM Rubric focuses upon the lesson structure and the alignment between the learning objectives, instructional strategies, and the assessments. Course structure is how the overall course is organized and whether that organization supports learning. However, quality consists of more than the structure and the lessons. Quality from students’ perceptive is about the implementation of the distance-learning course.

Much has been written about course structure. Curriculum, as a field of study, began with the development of the course syllabus, course objectives, and assignments (Tyler, 1949). Much has changed since 1949. Today, alignment of performance objectives connects the course content to the course objectives and to the assessment. The performance objectives determine the types of assessments. The assessments drive the lesson material (Dick et al., 2009; Gagné & Briggs, 1974). In the 1960s, Gagné (1965) proposed conditions of learning, and that lessons should be structured or organized to promote learning. One way to organize the instruction was to start with prior learning and gradually increasing the complexity of the learning tasks (Gagné, 1968; Gagné & Brown, 1961). Later, a modular design was developed for the online learning environments with course material organized around topics (Gagné & Brown, 1961; Simonson, Smaldino, Albright, & Zvacek, 2003). Organization evolved into weekly time-based modules or weekly lessons which contributed to improved student performance (Tenam-Zemach & Lewis, 2014).

Early studies identified overall course quality as easy to rate but difficult to define (Johnson, Aragon, Shaik, & Palma-Rivas, 2000). However, students seem to define quality based on their satisfaction (Moore & Kearsley, 1996; Sun, Tsai, Finger, Chen, & Yeh, 2008). Students appeared to view the course materials and instructor performance as one. Quality in a course goes beyond connecting objectives with assessments and instructional materials. Courses designed on objectives can promote the use of limited designs with video recording and multiple-choice tests

(Lowenthal & Hodges, 2015). Structuring of the course as isolated objectives can create a disconnected curriculum design and a focus on program competencies (Krusen, 2015).

Models for Course Development

The development of high-quality courses can be a complex process. Faculty often do not think through the delivery of course material in their face-to-face courses. In face-to-face courses, the faculty often rely upon teaching styles that were developed early in their careers (Osika et al., 2009). Faculty also need to re-envision their courses because they often do not view the content taught as adaptable to online (Neban, 2014). Models for development of courses address these concerns as faculty adopt online as a delivery model for the courses they teach. Often institutions that provides online courses have an approach to assist faculty in the transition to online. Those approaches can be grouped into four different models described below.

Training/professional development model. Training courses which teach faculty how to design online course materials have mixed results. The training course must be carefully designed with the faculty members' expectations in mind. Faculty often have high expectations of the course trainer because the trainer exemplifies the same skills the instructors themselves practice in their classrooms (Terantino & Agbehonou, 2012). For the best results, the instructors of the training course must be prepared, the technology skills should be limited to a few necessary skills, and the guest speakers should be selected to represent different vantage points (Terantino & Agbehonou, 2012). Frequently, training courses require additional time, leading to low participation rates in the course. To mitigate the lack of participation, the extra time commitment needs to be communicated to the faculty members so that they understand the extent of the work required to participate in the course (Cho & Rathbun, 2013). Even with training, faculty members often report lack of confidence in their use of the online technology (Kerrick, Miller, & Ziegler, 2015).

To address concerns about the time commitment required as faculty participate in discussions and complete instructional activities, the training is often presented online or in a hybrid format. Self-paced online courses provide the flexibility to match faculty members' variable schedules and provide the instruction accommodating a range of teaching styles and levels of technology expertise (Rhode & Krishnamurthi, 2016). The implementation of the faculty development for online courses takes extra time compared with face-to-face training. However, once developed, the implementation is frequently scalable (Rhode & Krishnamurthi, 2016).

Online training also has the added advantage of creating learning experiences for faculty members. For example, as faculty interact with the online training material, they experience the challenges as an online student. Through their involvement in the online training, the faculty develop a deep appreciation for precise instructions and immediate feedback. The experience gives the faculty an idea about the amount of effort and time required to successfully complete assignments. The experience changes faculty attitudes in their beliefs about the ability of students to complete assignments and the amount of interaction that occurs in an online course (Gold, 2001).

Instructional designer-supported model. In this model, instructional designers often collaboratively build courses with a faculty member (Hawkes & Coldeway, 2002). Designing online courses is a complex process requiring clear definition of the many tasks involved. Those definitions can be mapped to the roles of the instructional designer and faculty member. The result is creation of courses consistent in the development processes, and reinforcement of the preexisting competencies of the faculty member (Chao et al., 2010). The use of a rubric for the design of a course promote the development of a relationship between the faculty member and the instructional designer. That relationship enables the instructional designer to assuage faculty concerns about the quality of the course under development (Kumar & Geraci, 2012).

The collaborative partnership of the instructional designer and the subject matter expert is ideal. The courses built through the partnership promote interaction between students and faculty, provide many opportunities for students to share ideas, and include multiple active learning activities. Students also reported higher probability of receiving prompt feedback in courses designed with instructional designer support than those designed without a designer (Brown et al., 2003).

The instructional designer-supported model functions better when the institution has course development guidelines. Guidelines, such as those provided by the Quality Matters Rubric, clarify what is required for a successful course delivery, creates consistency across the courses, and promotes a collaborative working relationship between an instructional designer and the faculty member (Chao et al., 2010).

Lone ranger model. In this model, the faculty members designed their courses independently without training or instructional design support (Bates, 2000). The model is frequently used to encourage adoption of new technology to design or deliver instruction. Through a series of small grants, faculty can experiment with the technology. The experiments resulted in strategies and gradual adoption of the new technology (Bates, 2000).

The lone ranger model does have its drawbacks. The laissez-faire approach to development and the experimental origins of the resulting courses caused variability to emerge (Bates, 2000). The approach is an expensive way to develop courses; while, impacting a small number of faculty. The ideas developed, and skills learned often do not transfer to another faculty member (Bates, 2000). Adoption can be slow because faculty serve many roles, functioning as graphic artist, web designer, and instructional designer (Puzziferro & Shelton, 2008).

Combination training and instructional designer-supported model. This approach includes training courses often taught by instructional designers to orient faculty to the instructional design process. The training course is then followed by one-on-one support through the process, with experienced online instructors acting as mentors. The instructional designer supports faculty to ensure their online classes are well-structured and work as the semester begins. Faculty who have participated in this process are more likely to feel prepared to teach their newly designed course (Vaill & Testori, 2012). The process appears to work well. Students reported higher rates of timely feedback and more opportunities to share ideas in courses that used a collaborative design process (Brown et al., 2003).

This model has challenges. To make the collaborative process work, the faculty member is often introduced to guidelines about the development of the courses. The design of online courses can be complex. Faculty can feel overwhelmed about the process (Chao et al., 2010). Within the process, conflicts can arise about the roles of the instructional designer and the faculty member because both members of the partnership understand instructional processes and evaluation (Xu & Morris, 2007).

Context of Study

The university in which this study took place is a large research institution with over 30,000 students attending undergraduate and graduate programs. The university has approximately 1,500 faculty in both tenure-track and nontenure-track positions. The Center for eLearning (CeL), as a centralized service unit, provides training in teaching online and instructional design support for faculty. Approximately 28% of faculty participate in professional development offered by the CeL. Currently, 19% of the 15,000 courses at the university are delivered through an online learning format. Within a 3-year period, four different course development models were used, allowing the evaluation of students’ perceptions of course quality across four different design models.

Course Training Model (CT)

To facilitate the development of online courses, the staff at the CeL implemented a strategy which included paying faculty a stipend for participation in a training course which taught them how to design a course. The stipend was paid when the faculty taught the course online the first time. Topics in the course included behavioral objectives, assessments, best practices, delivery of instruction, building community, and disability accommodations. The faculty members were given a sandbox (an empty course shell), that could be used to practice developing a course. The culminating activity of the training course was the development of an online lesson which could be shared with the class. Designers were available for advice on course development.

Within the training, faculty were taught how to design and to teach online courses. Faculty were taught how to write lesson objectives and encouraged to include “start here” videos and to do a syllabus quiz. Other course modules provided information about the types of assessments and instructional materials that could be created. Different types of technology tools were demonstrated for the faculty members. The concepts of learning interaction and accessibility were introduced. The faculty were taught to have a table of contents that included unit, module, or lesson titles with a short description of the topic or the objectives for the lesson. Also, the courses often included the syllabus quiz. The faculty created the actual lesson design. This resulted in variability between courses.

Instructional Designer Supported (DS)

Upon a review of feedback from the faculty and evaluation of students’ perceptions of teaching reports, the staff at CeL decided to take another approach to training faculty. The approach was based upon a partnership between the faculty member and the instructional designer. In this model, online courses were developed using the QM Rubric criteria with several refinements. The design partners used rapid prototyping tools to facilitate quick development of online classes.

One development tool was a course template. The template used an attractive design and contained the basic navigational design and support services essential for students. The flexible template accommodated the course organization the instructor wanted, with images and multimedia relevant to each course. The template organized the courses at two levels. The first level was the overall course structure with student support services embedded in the navigation system, a start-here module, and lesson module placement. At the second level, each lesson was organized with an introduction, course objectives, to-do lists of readings, lectures, and a list of assignments (see Appendix A for a snapshot of the lesson template). This common structure provided scaffolding for faculty to understand what to include as a part of their course, at the same time allowing flexibility in the use of pedagogy elements in instructional strategies and assessments. The course templates became the foundation that promoted rapid design, permitting faculty to quickly develop their courses.

The second development tool was a course blueprint in a matrix format. The matrix promoted the course planning and communication about the course content assessments and strategies. Through the matrix, the instructor easily saw the connections between course goals, lesson objectives, instructional strategies, and assessments. The matrix then served as the bridge to the template. The matrix details the objectives, assessments, instructional activities, and resources. The information is transferred to the course template. Both the designer and the instructor updated the course template with completed instructional products.

Another component of the new model promoted a collaborative partnership between the faculty member and the instructional designer. The faculty content expertise complemented the designers’ knowledge of the course design processes and technical knowledge. The instructional designers provided as much support and assistance in the development of the content as possible.

Through the instructional designer, the broad knowledge about instructional design and pedagogy was narrowed to the best practices for the development of the content for that course. Faculty were required to produce instructional materials to replicate what would otherwise have been a campus-based lecture. Faculty developed notes, videos, or podcasts to supplement course readings. The additional advantage to the partnership was the opportunity to guide the faculty members in how to both teach their course and to use the technology in their course. Rather than teaching faculty to be an online expert, they became the online expert in their course.

Designed with No Support (NTS)

In NTS model, the faculty members designed their own courses without support or training from CeL. Instead, these faculty used their own learning and teaching experiences to design and to teach the course. Many of the members of this group were innovative and became the leaders of distance learning at the university. Because this group of faculty members were innovators, they developed courses before professional development or instructional designers were available.

Based upon the faculty experience and expertise in teaching online, the courses developed using this model varied in quality. The structure of these courses was dependent upon the instructors’ level of knowledge about online instructional pedagogy. The instructional strategies also varied across the courses as well. Faculty in these courses were often experimenting with delivery strategies. Some of the experiments were grounded in research and intuition based on instructors’ classroom experiences.

Additional Training to Meet QM Standards (QM)

Online courses developed to meet QM Standards were revised courses formed using either the NTS or the CT course development models. Before submitting an online course for QM review, the faculty members participated in additional training, exposing them to the QM criteria. As part of the course activities an instructional designer reviewed the online course with the faculty member using the QM Rubric. The instructor would then modify the online course based on his or her experiences in teaching the course along with the suggestions for improvement provided by the instructional designer.

Courses developed that met QM Standards and received the certification through the QM outside peer review process were developed using the training course method. Because of the need to teach and to revise the courses, instructors developed few of these courses using the instructional designer-supported method at the time of this study. The characteristics of the lesson structure, overall course organization, and interface variability continued to exist in these courses. To pass the QM review, however, those elements were improved.

Within a 3-year period, courses were developed using the four different models. This unique situation allowed for the comparison of four course development models: (a) course training (CT), (b) instructional-designer support (DS), (c) QM course training (QM), (d) designed with no support (NTS). The motivation for the evaluation was to ensure that dollars spent on the DS model resulted in a better quality of online classes. The second motivation was to evaluate the quality of the courses from the students' perceptions as part of a broader evaluation about quality in online classes to determine whether the students felt the classes were effective in supporting their learning. If classes developed using the CT or the DS models were determined not to be of high quality, then courses would be redesigned based on the students' feedback. Therefore, the following research questions guided this study:

(1) Are students' perceptions of course quality equivalent across all development models?

(2) Which course development models did students perceive supported their learning?

(3) Which course development models were perceived as higher quality by learners?

(4) Which course development models were perceived by students as meeting the general QM Standards as described in the survey question for their online courses?

Methods

A questionnaire was developed based on the 43 standards in the 2014 QM Rubric (MarylandOnline, Inc., 2014). To maintain the integrity of the QM Rubric, the questions were modified from the standard to provide relevance to the students or to clarify terms that would not be understood. A Likert-rating scale ranged from 1 =*strongly disagree* and 5 = *strongly agree* was used for each of the questions. For example:

> **Standard 7.3**. Course instructions articulate or link to an explanation of how the institution's academic support services and resources can help learners succeed in the course and how learners can obtain them.
>
> **Student question**. Course instructions explain (or are linked to) academic support services (library, tutoring services, advising, writing center, or labs) and resources are available to help you succeed in the course.

In addition, separate items were developed to measure student perceptions of course quality (CQ) and course structure (CS). Students were asked if the course was structured in a way in which they felt they could learn and whether they felt the course was of high quality. Sampling occurred over an academic year (~12,000 students) across 3 semesters, from Fall 2015 to Summer 2016. The research team at this university kept records of online course development. Groups were based on the design model used to create the online course.

The following hypotheses guided this investigation:

(1) The overall mean score differed across the different course-development models.

(2) The mean score for each standard differed across course development models.

(3) The mean score for the general QM Standards differed across course development models.

(4) The mean scores for course quality and structure differed across course development models

The course roster from each course section was used to generate a student email distribution list. A total of 9,998 students were emailed a consent form and were told which course was to be evaluated. This sampling occurred after the midterm exams but before final exams. The timing of the request was designed to prevent biased responses based upon the grade received. Quantitative analyses were performed to ascertain the students' perceived differences of quality among the groups. A response rate of 3.24% resulted in a total of 324 (n = 324) responses to the survey: 33 from the QM group (n = 33), 115 from the CT group (n = 115), 98 from the DS group (n = 98), and 78 from the NTS group (n = 78).

Results

In evaluating the data for Hypothesis 1, differences were noted based upon the development model. The mean for the designer-supported (DS) group was the highest (M = 196.95). Further, this group displayed the lowest standard deviation (SD = 28.41) and the lowest standard error (E = 2.87). The no training support group (NTS) had the next highest mean (M = 182.28); this group also had the next lowest standard deviation (SD = 35.33) and the next lowest standard error (E = 3.76). The means of the Quality Matters (QM) and course training (CT) groups were slightly lower and nearly equal (M = 181) and (M = 180.6). The standard deviations were slightly higher and almost the same, 37.15 and 37.36. These results suggested that students' perceptions of the overall quality of QM and CT professional development models were similar.

An ANOVA compared the group mean scores and revealed that students' perceptions differed among groups. With respect to Hypothesis 1, the ANOVA found that the null hypothesis of equal means among all four groups must be rejected, F=(3, 320) = 4.80, (p = .003). The DS group scored higher than the QM, CT, and NTS groups on all standards, course structure, and course quality (see Table 1).

Table 1.

Descriptive Statistics per Standard per Group

	CT *Mean (SD)* *n*=115	*DS* *Mean (SD)* *n*=98	*NTS* *Mean (SD)* *n*=78	*QM* *Mean (SD)* *n*=33
Standard 1: Course overview and introduction	37.1 (6.4)	**39.2 (5.2)***	36.6 (6.2)	38.3 (5.8)
Standard 2: Learning objectives	23.8 (6.0)	**26.0 (4.6)***	24.0 (6.2)	23.8 (5.6)
Standard 3: Assessments	19.2 (5.1)	**21.8 (3.2)***	20.1 (4.4)	20.2 (4.1)
Standard 4: Instructional materials	23.2 (5.8)	**25.3 (4.5)***	23.6 (5.2)	22.9 (5.9)
Standard 5: Learner interactions	14.9 (4.2)	**16.9 (2.9)***	15.3 (4.3)	14.8 (4.2)
Standard 6: Course technology	20.0 (4.2)	**21.2 (3.7)**	20.1 (3.9)	19.3 (4.6)
Standard 7: Learner support	15.7 (3.5)	**17.4 (2.7)***	15.9 (2.9)	16.2 (3.8)
Standard 8: Accessibility	19.5 (4.6)	**20.9 (3.9)**	19.4 (4.5)	18.8 (5.1)
Course structure	3.7 (1.4)	**4.1 (1.2)***	3.8 (1.4)	3.3 (1.5)
Course quality	3.99 (1.0)	**4.3 (0.9)***	3.9 (1.1)	4.0 (1.4)

Note. Bold indicates the highest mean
Statistically significant mean difference observed: *$p < .05$.

The DS mean score for each standard was higher than the other course development models (see Table 2). To identify significant differences in the means per standard and to address Hypothesis 2, an ANOVA was run for each standard. The results revealed the null hypothesis must be rejected because differences were noted for every standard, course quality (CQ), and course structure (CS). To examine the cause of those significant differences, pairwise comparisons were conducted.

Table 2.

ANOVA Results per Standard

	Between groups	*Within groups*	*F*	*p*
Standard 1: Course objectives	198.85	38.66	5.14	0.002**
Standard 2: Learning objectives	160.59	33.67	4.77	0.004**
Standard 3: Assessments	120.59	22.37	5.39	0.002**
Standard 4: Instructional materials	137.47	29.74	4.62	0.004**
Standard 5: Learner interactions	112.97	13.40	8.43	0.00004****
Standard 6: Course technology	96.76	20.12	4.81	0.003**
Standard 7: Learner support	58.91	14.76	3.99	0.009**
Standard 8: Accessibility	136.49	23.21	5.88	0.0009***
Course structure	7.03	1.83	3.84	0.01*
Course quality	3.8	1.15	3.27	0.02*

Note. *$p < .05$. **$p < .01$. ***$p < .001$. ****$p < .0001$.

As shown in Table 3, different results emerged from comparing pairs of course development models for each standard using the Bonferoni correction method. The results indicated that differences existed across the QM Standards, CS, and CQ. Therefore, Hypotheses 3 and 4 were accepted. The mean of the DS group was statistically significantly higher than that of the QM group for Standard 5, as well as for the students' perceptions of CS and CQ ($p < 0.05$). The mean score for CS for the DS group was statistically significantly higher than that of the QM and CT groups. The means of these two groups were statistically equivalent for the remaining standards. The students' perceptions of the CS were statistically nonsignificant across the remaining course development models. Finally, there were no statistically significant differences between the mean of the QM group and the mean of the CT group across all standards ($p > 0.05$). Similar results were observed between the QM and the NTS groups.

Table 3.

Pairwise Comparisons Indicating Statistically Different Standards

	QM	CT	DS	NTS
QM	----	No difference	QM5, Quality, Structure	No differences
CT	No differences	----	QM2, QM3, QM4, QM5, QM7	No differences
DS	QM5, Quality, structure	QM2, QM3, QM4, QM5, QM7	----	QM1, QM5, QM7
NTS	No differences	No differences	QM1, QM5, QM7	----

Note. QM = Quality Matters certified, CT = course training, DS = instructional design supported, & NTS = no training or instructional designer support

Discussion

As a result of conducting the study, significant differences were found between the course design models of course training (CT), instructional designer-supported (DS), no training support (NTS), and Quality Matters training (QMT). At the institution where this study took place, faculty control of the curriculum was highly valued. Within each of the course development models, the faculty member selected the content and the delivery method of the course materials. In the CT courses, the faculty member also designed the organizational structure of the course. In the DS model, the templates were provided; however, the faculty member controlled the deletion or addition of elements to the courses. In the DS model, the designer suggested strategies that complemented course content. The differences in the models were reflected in the students' perceptions. The courses developed with the assistance of an instructional designer were of significantly greater quality and had a better course structure. Students scored courses developed using the designer-supported model (DS) higher on all Quality Matter Standards. These courses employed the talents of both a faculty member and an instructional designer, the best of both worlds. An instructional designer provides pedagogical and technical expertise to support the faculty members as they implement their vision of the course.

Students identified the differences in the courses by the development models in the quality, structure, and all QM Standards. The DS group scored better from the students' perceptions across all standards, course structure (CS), and course quality (CQ), including the QM-certified group. However, this should not be completely unexpected since instructional designers used a course template designed with the QM Standards for the instructional design- supported courses. Also, instructional designers have an awareness of the standards. Thus, they built upon the quality level provided by the QM Rubric. Specifically, instructional designers were very important for this process as those courses were perceived to have significantly better course activities, student interaction, accessibility, and usability. While QM Standards are supportive in guiding the development process, the study shows instructional designers are an important part of the process. Future research should explore how the instructional designer amplifies the use of those standards, CS, and quality.

Surprisingly, those courses developed without training (NTS) still performed relatively well with students scoring this group of courses as better than the QM and CT groups based upon the standards for learning objectives, instructional materials, learner interaction, and course technology. The concept of training faculty in the development of courses should have improved their ability to implement the QM Standards in the courses. The students in this study indicated that courses developed without training were just as likely as courses with faculty trained to design their own courses to include the QM best practices. Perhaps training courses for CT and QM overemphasized a few instructional strategies and instructional technology. A possible explanation for the higher scores in these areas could be the NTS faculty. The professors in this group were the distance-learning leaders who developed these courses before the CeL was in existence. Therefore, they would have incorporated instructional strategies they were exposed to at conferences or content journals. The NTS group struggled with learner interaction, indicating a skill that needs to be developed through training or support. Learner interaction appeared to be very important to this group of students. The NTS faculty could benefit from guidance in packaging the courses into a student-friendly interface.

Students perceived some strengths in the QM-certified courses over the CT and NTS courses in course overview, learner support, assessment, and quality, but not DS. This would indicate that the additional training provided by the staff improved these areas. However, the QM-certified courses scored lowest in instructional materials, learner interaction, course technology, accessibility, and course structure. Possibly, the limitations of the first course training were reinforced in the second course. The training of the second course further constricted the strategies used by providing too much structure in meeting the QM Standards. For these courses, a QM-approved template was not in place which would have addressed the course structure issues. The additional training did not lead to a reflective process to improve the courses. With the NTS group scoring the lowest in the course overview, training was beneficial in teaching faculty the importance of adding a course overview resulting in the higher score for the CT faculty group.

This study has several limitations. One was in the design of the survey itself. The question about quality should have been asked first. As the students answered the questions about the course structure, they may have been guided into believing those elements were the only ones to consider in the evaluation of quality. Another drawback was the students' ability to judge some elements of quality. For example, they may not be able to judge the accuracy of the content of the course.

The Quality Matters Rubric itself has limitations. The alignment of the learning objectives, instructional material, and assessment is an exercise within itself and is highly valued in the rubric. However, the best written objectives do not necessarily result in good instruction. The use of performance objectives can result in fewer examples of creativity in the delivery of the instruction, a finding identified by Lowenthal and Hodges (2015). With emphasis placed on the writing of objectives in the training course, it is possible the courses became disconnected, as described by Krusen (2015).

The QM Rubric identified evidence of some best practices, but not necessarily other variables of quality. Although the rubric evaluated types of interaction including learner-instructor interaction, the rubric cannot measure the quality of instructor presence as the course was implemented. These considerations can improve students' perceptions of quality within a course (Baran & Correia, 2014). Students may perceive quality based upon the quality of instructor interaction and relevance of the instructional material to their own educational goals rather than those outlined in the learning objectives for the lesson. Finally, the rubric itself does not evaluate the faculty expertise in the content area (Krusen, 2015).

Conclusions

Designer-supported courses provided personalized, one-on-one consultations with an instructional designer. During these consultations, instructional designers focused on the alignment of performance objectives to course activities. This allowed for a well-crafted course that reflected the instructor's vision and included a strong sense of teacher presence. For example, in the Standard 3 comparisons shown from students' perceptions, the designer- supported courses had significantly better assessments. After taking a training course, a faculty member may be able to align the course with the instructional methods and assessments. However, they are not as skillful in articulating that alignment throughout the course through lesson structure, text formatting, or word choice.

On several of the criteria, faculty without training scored better than those with training. It is suspected that those faculty who had taught campus-based courses had good strategies for teaching that content. Therefore, it is likely that some of those faculty were somewhat successful in translating their classroom-based strategies into the online environment without training or support. These faculty. as leaders in the field, would have attended conferences discussing best practices and implemented those strategies in their courses. Training courses often focus on assessment and instructional technologies embedded in the learning management system, which may have limited faculty creativity in the course training group.

This study gives additional insight into the importance of instructional designers in the design of online courses (Brown et al., 2003). The nature of the consultation meetings could have led to the higher scores over the course training model. The strategies discussed in consult meetings are immediately relevant to the faculty as they apply the skills in the design of their course. A deeper understanding of the impact of the instructional and assessment strategies in their courses resulted in the higher student perception scores. Through the consultation process, faculty members were willing to try different strategies, enhancing the perception of quality and the identification by students of the QM Standards in their courses.

The course training model approach at this institution had several challenges in its implementation. The course development training was a one-size-fits-all and one-stop approach to teaching faculty how to design courses. To finish the course, the faculty spent time completing and turning in assignments rather than designing an online course. Without a quality evaluation before teaching a course and receiving a stipend, wide variability resulted in the quality of the courses developed. Some courses were not well organized, with low levels of student interaction or engagement. The instructional materials developed utilized limited technology options based upon the technical skills of the faculty members designing the courses. With course development in the hands of the faculty members, who had many other responsibilities, very few of the courses were developed in a timely manner. Faculty incorporated the QM Standards taught in the course; however, they lacked the experience of an instructional designer. The result was the culmination of trial-and error-approaches by the faculty occurring in every course to determine what would work well for each instructor.

Training courses are commonly used to promote the development of courses. Training provided generic procedures, tools, and instructional strategies. Instructional designers who supported faculty combine two sets of skills, those of the faculty member and those of the designer. The best courses are developed through the partnership. All institutions may not have the budgetary means to institute the instructional design model. This would suggest that training needs to be carefully designed to honor the faculty members’ knowledge and to maintain flexibility so that best practices are deployed within the courses.

Since this study, a system of professional development has been developed and implemented. With the instructional design support at the core, additional components have been added to enhance the faculty’s experience and to provide additional support. Those components included the community of practice, a certification workshop, with ongoing professional development sessions, and open lab support. The system is flexible, allowing faculty to enter professional development from multiple points. The instructional designer then guides the faculty into using the additional resources to improve their online teaching practice (Golden & Brown, 2016). The next step for this institution would be evaluating the impact of the system of ongoing professional development and the impact upon student perceptions of the courses to see if more interactions create higher quality of courses.

The findings of this study can be extended in several ways. Replication of the study at another institution would assist in generalization of the study findings. A deeper evaluation of student success variables could determine if the standards in the QM Rubric improve course design, reducing the frustration of the students in online courses. For example, the students may be less likely to drop or withdraw from the course. Finally, it is possible results would be different using a different course evaluation tool, such as the OSCQR Course Design Review Scorecard that is part of the Online Learning Scorecard Quality Scorecard Suite.

Authors' Note

Victoria S. Brown, Center for eLearning, Florida Atlantic University; Mario Toussaint, Center for eLearning, Florida Atlantic University; David Lewis, Department of Dermatology & Cutaneous Surgery, University of Miami.

Correspondence concerning this article should be addressed to Victoria Brown, Center for eLearning, Florida Atlantic University, 777 Glades Road, Boca Raton, Florida 33431. E-mail vbrown22@fau.edu

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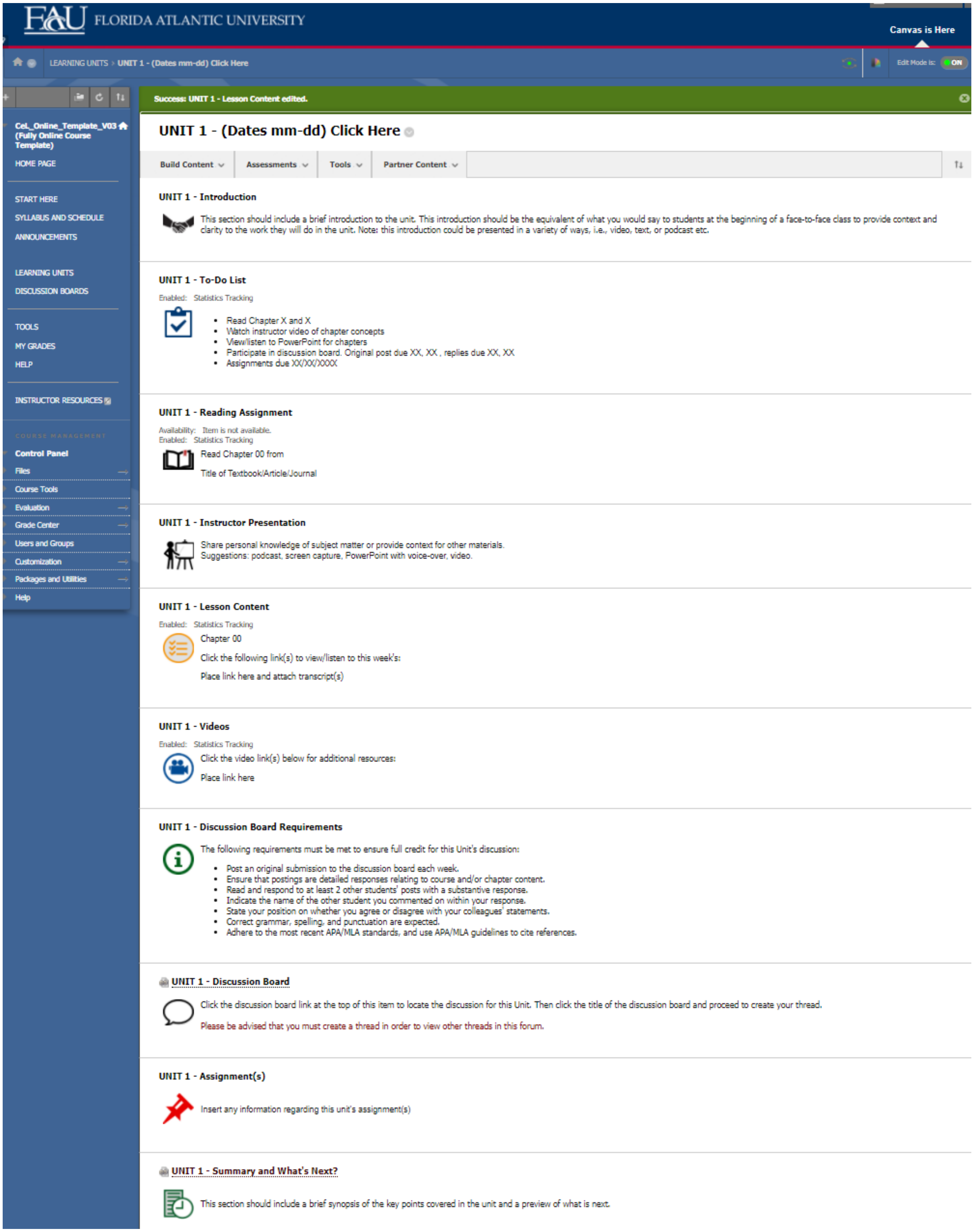
Appendix A: Sample Course Template



APPENDIX B: Sample Blueprint Course Design Matrix

Course Prefix and No.:	**CCJ 4644**
Course Title:	**White-Collar Crime**
Course Developer:	

Course-Level Objectives
1. Identify the concepts and issues in the prosecution, defending and sentencing white-collar crime criminals as well as alternatives to incarceration. 2. Explain the origins, history, and components of the social movement against white-collar crime. 3. Recognize the different occupational crimes committed by professionals in the medical, legal, academic, and religious fields. 4. Recognize the differences between state, federal, and other agencies involved in the policing and regulating of white collar crime. 5. Recognize the difference between enterprise crime, contrepreneurial crime, and technocrime. 6. Differentiate between white-collar crime and conventional crime offenders. 7. Compare and contrast the legal and theoretical implications related to white-collar crime. 8. Compare the various historic and contemporary examples of state-corporate crime, finance crime, and crimes of globalization. 9. Analyze the various forms of abuse of power, fraud, and economic exploitation that are directed at citizens and taxpayers, consumers, employees, franchisees, and suppliers, competitors, and owners and creditors. 10. Analyze the ramifications of white-collar crime on the American public and the impact on the country's political, economic, and social structure. 11. Evaluate the various underlying assumptions and different perspectives that pertain to white-collar crime and the assessment of its costs. 12. Appraise the strengths and limitations of different theories as applied to different forms of white-collar crime.

Alignment Matrix

Unit #	Module/ Unit Topic	Module/Unit Objective(s)	Assessment(s)	Lesson Content
1	The Discovery of White- Collar Crime	Objective 1: Identify the competing definitions and typologies of white-collar crime. (CO #1) Objective 2: Identify the agents involved in exposing white-collar crime. (CO #2, CO #3) Objective 3: Explain the origins and components of the social movement against white-collar crime. (CO #2)	• Discussion Board Post: Relationships and Crime (1:5- 7) • Quiz 1 (1:1-6)	• Chapter 1 Reading (1:1-7) • Chapter 1 Instructor PPT (1:1-7) • White-Collar Crime website (1:2)
		Objective 4: Explain why Criminologists find the term *white-collar crime* difficult to define. (CO #6) Objective 5: Distinguish between white-collar crime and conventional crime offenders. (CO #4, CO #6) Objective 6: Examine the relationships between trust, respectability, risk, and white-collar crime. (CO #9, CO #10) Objective 7: Discuss the range of definitions of white-collar crime. (CO#2, CO #4, CO #5)		

Center for eLearning Alignment Matrix (Updated 2016-01-25)

Educators' Preparation to Teach, Perceived Teaching Presence, and Perceived Teaching Presence Behaviors in Blended and Online Learning Environments

Lisa E. Gurley
William Carey University

Abstract
Teaching in blended and online learning environments requires different pedagogical approaches than teaching in face-to-face learning environments. How educators are prepared to teach potentially impacts the quality of instruction provided in blended and online learning courses. Teaching presence is essential to achieving student learning outcomes, yet previous research has focused on student perceptions of teaching presence. Therefore, the purpose of this mixed methods convergent parallel study was to explore educators' preparation to teach, perceived teaching presence, and perceived teaching presence behaviors in blended and online learning environments. The study was designed to examine the differences in educators' perceived teaching presence and preparation to teach in blended and online learning environments. An adapted Community of Inquiry survey instrument was used to measure faculty perceptions of teaching presence. Results indicated a statistically significant difference between perceived teaching presence of facilitation for faculty that completed certification courses in preparation to teach in blended and online learning environments, as compared to faculty that only received on-the-job training. Qualitative responses to corresponding interview questions supported the findings. The findings of this study provide information to university educators and administrators supporting the importance of faculty preparation specific to teaching in blended and online learning environments.

Keywords: teaching presence, teaching presence behaviors, teaching presence of facilitation, certified online instructor, faculty perceptions, blended learning, online learning, faculty development, faculty preparation, Community of Inquiry instrument, Community of Inquiry framework

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Author Note

Dr. Gurley is now Assistant Professor and Director, Accelerated Second-Degree BSN Program in the Ida Moffett School of Nursing, Samford University, Birmingham, Alabama.

Educators' Preparation to Teach, Perceived Teaching Presence, and Perceived Teaching Presence Behaviors in Blended and Online Learning Environments

The trend for distance education is increasing in higher education (American Association of Colleges of Nursing [AACN], 2003; McDonald & Picciano, 2014; U.S. Department of Education, 2014). In 2012, the National Center for Education Statistics reported 11.1% (1,807,860) of degree- or certificate-seeking students enrolled in Title IV institutions were enrolled exclusively in distance education courses, 15.2% (2,466,785) were enrolled in some distance education courses, and 73.7% (11,950,900) were enrolled in non-distance-education courses (U.S. Department of Education, 2014). The number of private nonprofit institutions with online offerings had the greatest increase, with a doubling of the proportion with fully online programs—from 22.1% in 2002 to 48.4% in 2012 (Allen & Seaman, 2013). The number of students enrolled in distance education courses is expected to increase (AACN, 2003; Allen & Seaman, 2013; Allen, Seaman, Poulin, & Straut, 2016).

Increased delivery and expectations for distance education (AACN, 2003; McDonald & Picciano, 2014; U.S. Department of Education, 2014) have prompted administrators and faculty in higher education to voice concerns related to the quality of these courses (Allen & Seaman, 2013; Allen et al., 2016). Course quality is influenced by teaching presence. Teaching presence behaviors for blended and online learning environments differ from the face-to-face classroom, as educators must effectively communicate when separated from students by time and place. According to the Community of Inquiry (CoI) framework, teaching presence includes the constructs of design and organization, facilitation of learning, and direct instruction (Garrison, Anderson, & Archer, 2000). Effective design and organization of blended and online courses requires educators to thoughtfully and intentionally select course content, design learning activities, design evaluation activities, and establish a course calendar that is congruent with blended and online course delivery (Arbaugh et al., 2008; Garrison, Cleveland-Innes, & Fung, 2010). Effective facilitation of learning in blended and online courses requires educators to engage in activities during the course that help students build a deeper level of understanding (Swan et al., 2008). Reviewing student discussion posts and completed course assignments and then providing reflective feedback are methods of facilitating learning (Garrison et al., 2010). Effectively directing instruction during blended and online courses requires educators to constantly evaluate student achievement of learning outcomes and provide timely instructional feedback (Arbaugh et al., 2008; Garrison et al., 2010). Feedback to students should encourage reflection and confirm learners' understanding (Garrison et al., 2010).

How educators are prepared to teach in blended and online learning environments impacts indicators of course quality, such as achievement of student learning outcomes and student satisfaction (Dereshiwsky, 2013). Methods for faculty preparation range from formal certification courses and faculty development programs to informal mentoring and on-the-job training (Dereshiwsky, 2013). The increase in blended and online course delivery in higher education places an increased burden on educators to design and organize courses, facilitate learning, and provide direct instruction for students separated by time and place. Understanding educators' perceived teaching presence and its associated behaviors is necessary to address how to best prepare faculty for teaching in blended and online learning environments in higher education.

Therefore, the purpose of this study was to explore educators' preparation to teach, perceived teaching presence, and perceived teaching presence behaviors in blended and online learning environments. The CoI framework (Figure 1), developed by Garrison, Anderson, and

Archer (2000), provided the theoretical framework for this study. The CoI framework was developed to describe the necessary components of an ideal learning experience in an asynchronous, virtual higher education environment and has been used extensively to guide conceptualization of the online learning environment. Congruent with the principles of collaborative constructivism, a community of inquiry is made up of teachers and students working together for an educational purpose (Swan, Garrison, & Richardson, 2009). Critical thinking and practical inquiry are at the foundation of the CoI framework (Shea, Vickers, & Hayes, 2010), which hypothesizes that direct instruction alone is insufficient for knowledge construction in online environments. The depth of knowledge construction is dependent on the ability of teachers and learners to establish social presence, teaching presence, and cognitive presence (Shea & Bidjerano, 2009). Educators must be intentionally present by selecting meaningful course resources, promoting student–student and student–faculty interactions, and guiding students through self-directed learning (O'Neil, 2014). Teaching presence is integral for higher level learning to occur (Garrison & Cleveland-Innes, 2005). Results of this study help to fill the gap in the literature and support the necessity of faculty development programs in improving faculty transitions from face-to-face learning environments to blended and online learning environments.

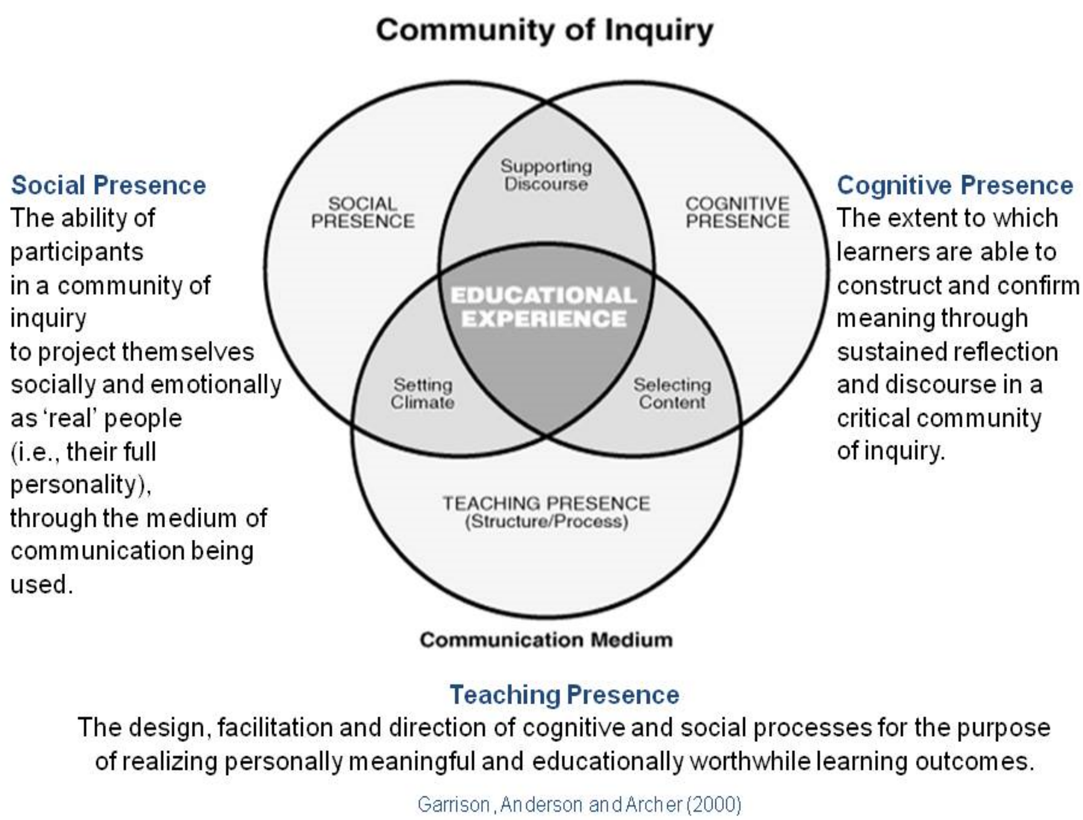

Figure 1. Community of Inquiry framework. Permission was received to use this figure.

Review of Related Literature

Review of the literature provides supporting evidence of the need to explore educators' preparation to teach, perceived teaching presence, and perceived teaching presence behaviors in blended and online learning environments. The literature lacks exploration of teaching presence from the educator's perspective, with most studies exploring the student's perspective. Most of the literature addressing how educators are prepared for teaching in blended and online learning environments is from primary and secondary education settings (Luo, Hibbard, Franklin, & Moore, 2017; Shepherd, Bolliger, Dousay, & Persichitte, 2016). Research has shown that teaching in blended and online learning environments requires different pedagogical approaches (theories, methods, and activities) than teaching face-to-face (Dereshiwsky, 2013; Sadera, O'Neil, & Gould, 2014) and is often more challenging (Allen & Seaman, 2013; Costello et al., 2014; Swan et al., 2008). Challenges to teaching from a distance are often related to the absence of nonverbal methods of communication, such as facial expressions and voice inflections (Rovai & Jordan, 2004). In face-to-face learning environments, these nonverbal cues help guide facilitation of student learning and direct instruction. Through teaching presence behaviors, faculty help students interact socially and emotionally despite the use of technology (Garrison et al., 2000). Teaching presence behaviors also guide learners through the processes of knowledge construction, reflection, and discussion (Garrison et al., 2000). Teachers are ultimately responsible for establishing and maintaining teaching presence (Anderson, Rourke, Garrison, & Archer, 2001).

Blended and Online Learning

Blended and online learning are modalities of distance education. Distance education has been defined as "education that uses one or more technologies to deliver instruction to students who are separated from the instructor and to support regular and substantive interaction between the students and the instructor synchronously or asynchronously" (U.S. Department of Education, 2014, p. 1). Blended courses have been defined as courses that incorporate face-to-face class meetings with online learning activities, with at least 30% to 79% of the course materials and activities delivered online (Allen & Seaman, 2013). Allen and Seaman (2013) defined online courses as having at least 80% of the course materials and activities completed online with limited face-to-face meetings.

Preparation to Teach

Traditional methods for preparing educators to teach are not sufficient or appropriate for blended and online learning environments (Baran & Correia, 2014; Baran, Correia, & Thompson, 2013). Teaching in blended and online learning environments requires different pedagogical approaches than teaching in face-to-face learning environments (Baran & Correia, 2014; Baran et al., 2013). Pedagogical approaches include learner-centered learning theories, teaching and learning methods, and methods for evaluating learning outcomes (Shea, Li, Swan, & Pickett, 2005). The CoI framework describes teaching presence as consisting of pedagogical approaches that help learners progress through the process of critical inquiry or deep learning (Garrison et al., 2000). Often, educators who perceive themselves as expert teachers in face-to-face classrooms perceive themselves as novice teachers in virtual classrooms (Ali et al., 2005). Effectively teaching in the virtual classroom requires educators to reconceptualize the role of teacher (Ali et al., 2005). Baran and Correia (2014) proposed that some organizations will need a cultural change in support of faculty members transitioning from face-to-face to online learning environments. Literature describing levels of preparation to teach in blended and online learning environments is lacking, yet the literature does indicate that teacher preparation specific to the online classroom is necessary to provide high-quality learning environments (Ali et al., 2005; Baran et al., 2013).

Several studies have demonstrated the importance of preparation to teach in blended and online learning environments through exploration of changes in faculty role, pedagogies (Ryan, Hodson-Carlton, & Ali, 2004), and perceived level of teaching expertise (Ali et al., 2005) when transitioning to an online teaching environment. Ryan, Hodson-Carlton, and Ali (2004) revealed the following six dimensions of teaching online that must be considered when faculty move from face-to-face learning environments to online classrooms: addressing faculty role issues, redesigning/rethinking courses, handling communications, developing partnerships, managing time, and dealing with technology. Using the six dimensions identified by Ryan et al. (2004) and Benner’s five-stage sequential transformation from novice to expert framework, Ali et al. (2005) assessed faculty’s perceived level of teaching expertise in online learning environments, as well as priorities for faculty development. Results of the study revealed that faculty who reported teaching online scored higher for all dimensions than faculty who had not taught online. Participants ranked redesigning/rethinking faculty roles as the highest priority. The researchers concluded that faculty not teaching online perceived themselves as novice-to-advanced beginners in the online learning environment. Faculty teaching online perceived themselves as advanced beginners or competent in the online learning environment. Participants in this study did not perceive themselves as proficient or expert teachers in the online learning environment, even though they had previous experience in the face-to-face classroom.

Baran and Correia (2014) recognized the challenges faculty face when expected to master unfamiliar technical skills while developing course materials, learning activities, and evaluation methods appropriate for the online learning environment. The researchers developed a professional development framework for online teaching based on research supporting best practices in online teaching and faculty preferences for professional development activities. The professional development framework for online teaching provides a holistic approach that guides support of teaching, community, and organizations. Baran and Correia (2014) proposed that administrators must provide support and professional development programs that not only address technologies but also pedagogies specific to utilization of the technologies. In addition, faculty must receive support at the community level (peer support and mentoring) because teaching in the online environment can lead to isolation from other faculty members. Organizational support is necessary, especially for novice online faculty, to recognize the increased workload and time commitment of faculty learning unfamiliar technologies and pedagogies (Baran & Correia, 2014). These studies support faculty development as a priority in preparing faculty to teach in the online learning environment and support the need to explore how faculty are currently prepared to teach in blended and online learning environments.

Teaching Presence

Limited research has been conducted on teaching presence in the online learning environment (Campbell, 2014). Much of the research related to teaching presence has focused completely on the contents of threaded discussions (Shea et al., 2010), thus neglecting other indicators of teaching presence. Indicators of teaching presence (design and organization, facilitation, and direct instruction) have been used to measure how visible the instructor is in the online learning environment from the student’s perspective. Several studies have identified teaching presence as a predictor of student perceptions of satisfaction, learning, and connectedness

(Akyol & Garrison, 2008; Arbaugh, 2008; Saint-Jacques, 2013; Shea & Bidjerano, 2009; Sheridan, Kelly, & Bentz, 2013).

Research related to faculty perceptions of teaching in an online environment have primarily focused on faculty satisfaction (Bolliger & Wasilik, 2009). The Online Learning Consortium, formerly the Sloan Consortium, has identified faculty satisfaction as one of the five pillars for achieving quality in online education (Moore, 2010). According to Moore (2010), faculty satisfaction in online learning environments reflects a strong institutional commitment to promoting personal and professional growth of faculty.

Bolliger and Wasilik (2009) utilized the Sloan Consortium's Quality Framework for Online Education as the theoretical framework to explore issues that affect teaching in the online learning environment, including factors influencing faculty satisfaction with teaching online. Consistent with the literature related to faculty satisfaction in the online environment, the survey items addressed three subscales of faculty satisfaction: student-related issues, instructor-related issues, and institution-related issues. Results of the study were consistent with the literature related to perceived faculty satisfaction. Student-related issues, such as flexible and convenient course access, were indicated as most important in measuring perceived faculty satisfaction. Student-related issues were found to impact perceived faculty satisfaction more than instructor-related issues. Based on the relationship between the student factor and faculty satisfaction, the researchers concluded a student-centered approach is necessary in online instruction.

Shea, Vickers, and Hayes (2010) used a revised CoI framework to measure productive instructional effort through analysis of instructor and student interactions in online courses. Data sources included discussion forums, small-group student discussion areas, full-group discussion, course announcements, private student–instructor communications, public questions, syllabi, and all instructional materials. Results indicated that teaching presence and instructional efforts occurred more often in communications outside of discussion posting in both courses. In addition, a statistically significant correlation was revealed between the expression of teaching presence and assignment grades of the students. These studies support the importance of student-centered pedagogies in facilitating teaching presence in the online learning environment. In addition, there is a need to explore faculty perceptions of teaching presence, and when and where instructional effort is most focused.

Several studies have described specific teaching presence behaviors. In 2013, Arinto conducted a qualitative study exploring pedagogical rationales for faculty use of web technologies, approaches to course design, perspectives on how course design approaches have changed, challenges of changing course design approaches, and implications for faculty development. The study explored perceptions of how faculty teaching practices have evolved during the transition from face-to-face to online learning. Analysis of the interview transcripts revealed four areas of change in course design practices: content development, learning activities, teaching strategies, and assessment. Based on the study results and literature on faculty development, Arinto proposed a framework for developing open and distance e-learning course competencies for faculty at universities transitioning to online learning. The framework included examples of each competency at the basic, intermediate, and advanced proficiency levels. Arinto recommended future research related to holistic and integrated faculty development programs to prepare faculty for teaching in online learning environments.

Similarly, Baran, Correia, and Thompson (2013) conducted a qualitative study exploring the successful teaching practices, challenges, concerns, and solutions of six expert online teachers. The university had a decentralized online education policy; thus, online teachers implemented a variety of approaches and strategies. Interview questions were related to "program organization, student and faculty profiles, faculty support and professional development services, course design processes, and technology platforms" (Baran et al., 2013, p. 8). Following the interviews, program coordinators nominated exemplary online teachers, supported with criteria for success. The six top-ranked teachers described how they transitioned into successfully teaching in the online learning environment. Data analysis of the program coordinators' transcripts revealed criteria for nominating exemplary online teachers: "knowledge of students, knowledge of content, effective communication with the students, and high scores on the course evaluations" (Baran et al., 2013, p. 11). Within- and cross-case analysis of the online teachers' transcripts revealed the following concerns and challenges related to transitioning to the online learning environment: "knowing and creating the course content, designing and structuring the online course, knowing the students, enhancing student-teacher relationships, guiding student learning, evaluating online courses, and maintaining teacher presence" (Baran et al., 2013, p. 11). This study supports the importance of challenging traditional pedagogical beliefs and practices and of exploring best practices for preparing and supporting faculty to teach in the online learning environment.

Community of Inquiry Survey Instrument

The literature supports the CoI Survey instrument as reliable for measuring teaching presence (Arbaugh et al., 2008; Carlon et al., 2012; Shea & Bidjerano, 2009). Reliability has been supported with Cronbach's alpha reported as .95 for cognitive presence, .96 for teaching presence, and .92 for social presence (Shea & Bidjerano, 2009); .95 for cognitive presence, .94 for teaching presence, and .91 for social presence (Arbaugh et al., 2008); and .927 for cognitive presence, .966 for teaching presence, .944 for social presence (Carlon et al., 2012). These studies support the CoI Survey instrument as a valid tool for identifying learners' perceptions of cognitive presence, teaching presence, and social presence in a variety of disciplines and educational settings, thus adding strength to the generalizability of the instrument.

Review of the literature clearly identifies traditional pedagogical approaches as ineffective in facilitating teaching presence in blended and online learning environments (Shea et al., 2005). Teaching presence is a necessary element in facilitating quality instruction and student satisfaction. Yet, research related to how educators perceive their ability to achieve teaching presence and which behaviors educators believe facilitate teaching presence in blended and online learning environments is lacking. This study addresses the gap in the literature by exploring educators' perceptions of how well they facilitate teaching presence and specific behaviors associated with facilitating teaching presence in blended and online learning environments. Therefore, the following research questions and hypotheses guided the study:

1. What preparation to teach in blended and online learning environments have educators received?
2. What behaviors do educators perceive as facilitating teaching presence in blended and online learning environments?

Hypothesis 1: There is no statistically significant difference between educators' overall perceived teaching presence based on preparation to teach in blended and online learning environments.

Hypothesis 2: There is no statistically significant difference between educators' perceived teaching presence of design and organization based on preparation to teach in blended and online learning environments.

Hypothesis 3: There is no statistically significant difference between educators' perceived teaching presence of facilitation based on preparation to teach in blended and online learning environments.

Hypothesis 4: There is no statistically significant difference between educators' perceived teaching presence of direct instruction based on preparation to teach in blended and online learning environments.

Methods

Study Population

The sample population for this research study was a convenience sample of full-time, part-time, and adjunct educators who have taught one or more undergraduate or graduate level blended or online course within the past 5 years at two private universities in the southeastern United States. The selection of the population sample is supported by the literature showing the greatest increase in online courses and fully online programs having occurred in private nonprofit institutions (Allen & Seaman, 2013; Allen et al., 2016). Educators teaching in all disciplines or schools within the universities were included in the sample population. Power analysis was performed to determine the minimum sample size needed for the quantitative data to be significant (MaCorr Research Solutions Online, 2015), which was determined to be 80. Of the 100 estimated full-time, part-time, and adjunct educators that have taught at least one blended or online course within the past 5 years, 86 (86%) responded to the survey, exceeding the minimum adequate sample size. Table 1 summarizes the teaching demographics.

Table 1.

Frequency Distribution of Participant Teaching Demographics (N = 86)

Teaching Demographic Characteristics	*n* (%)
Preparation to teach (select all that apply)	86 (100.0)
None	0 (0.0)
Informal on-the-job training	68 (79.1)
Some college courses	26 (30.2)
Professional development program	61 (70.9)
Certification course	29 (33.7)
Certification to teach blended/online courses	86 (100.0)
No	57 (66.3)
Yes	29 (33.7)
Teaching level	86 (100.0)
Undergraduate	20 (23.3)
Graduate	29 (33.7)
Both	37 (43.0)

Table 1. (cont.)

Frequency Distribution of Participant Teaching Demographics (N = 86)

Teaching Demographic Characteristics	*n* (%)
Years teaching in higher education	86 (100.0)
0–3 years	8 (9.3)
3–6 years	11 (12.8)
6–10 years	18 (20.9)
10 years or more	49 (57.0)
Employment status	86 (100.0)
Full-time	76 (88.4)
Part-time	4 (4.7)
Adjunct	6 (7.0)
Blended courses taught past 5 years	86 (100.0)
None	9 (10.5)
One	12 (14.0)
Two	17 (19.8)
Three or more	48 (55.8)
Online courses taught past 5 years	86 (100.0)
None	9 (10.5)
One	14 (16.3)
Two	8 (9.3)
Three or more	55 (64.0)

Data Collection

Institutional Review Board for the Protection of Human Subjects in Research (IRB) approval was obtained from the participating universities for both the pilot and study. Data were collected through an online survey and open-ended questions administered through Qualtrics research platform to ensure the security and anonymity of the data. No identifying information was collected.

This study used a mixed methods convergent parallel research design. The convergent research design is the most common mixed methods design used by researchers new to mixed methods (Creswell & Plano Clark, 2011). In convergent research design, both quantitative and qualitative data are collected at the same time, analyzed separately, and then merged (Creswell, 2014). Merging quantitative statistical results with qualitative findings provides a method for further substantiating, explaining, and understanding statistical relationships. Strengths of utilizing this design include ease of use and efficiency of data collection and analysis. Convergent design is appropriate when limited time is available for data collection, and both quantitative and qualitative data are valuable in understanding the problem. Quantitative data were collected via an Adapted CoI Survey Instrument. Qualitative data were collected via open-ended questions asking participants to share their personal experiences related to teaching behaviors in blended and online courses.

An Adapted CoI Survey Instrument (Arbaugh et al., 2008), modified by this researcher, was used to measure educators' perceived teaching presence in blended and online learning environments. The CoI Survey instrument was originally designed to measure the three constructs of the CoI framework (social presence, teaching presence, and cognitive presence) from the students' perspective. Permission to adapt the CoI Survey instrument was granted by the authors of the survey. The original 13 closed-ended items measuring perceived teaching presence were reworded to address the educator's perception. Participants were asked to rate to what degree they consistently achieve the teaching presence behaviors associated with course design and organization, facilitation of learning, and direct instruction. Ratings were on a scale of 1 (*strongly disagree*) to 4 (*strongly agree*). The rating of *neutral* was removed from the original CoI Survey instrument. One categorical item targeting educators' formal and informal preparation to teach in blended and online learning environments was included. Teaching experience in blended and online courses was examined. Participants were invited to respond to open-ended questions and asked to share personal experiences related to teaching behaviors in blended and online courses.

The Adapted CoI Survey Instrument was reviewed for content and face validity by two experts not involved with this study. One expert has extensive experience as an online educator and is familiar with the CoI framework through past research endeavors. One expert has extensive experience as an online educator, has completed college courses related to online teaching, has completed an online teaching certificate course, and has earned certification to teach online courses. Both experts hold doctoral degrees in nursing education. Major revisions to the Adapted CoI Survey Instrument were not recommended.

Following expert review, a pilot study was conducted to validate the reliability of the instrument in measuring perceived teaching presence. The research study was conducted following the pilot. The dean or chair of each school or program at the participating universities was contacted via email to request permission to allow faculty to participate in the research. The email to the faculty introduced the research topic, provided information about the purpose and significance of the study, and requested permission to participate. The link to the online survey and open-ended questions was contained in the email to faculty. Submission of responses indicated consent to participate. Data were collected through an online survey and open-ended questions administered through Qualtrics to ensure the security and anonymity of the data. No identifying information was collected. Data were collected from full-time, part-time, and adjunct university faculty that had taught at least one blended or online course within the past five years, thus representing the target population.

Reliability

Internal consistency for the Adapted CoI Survey Instrument was measured following collection of pilot study data. The Adapted CoI Survey Instrument was utilized to measure overall perceived teaching presence and the related constructs of design and organization, facilitation of learning, and direct instruction. The pilot study consisted of 21 participants. Overall perceived teaching presence consisted of 13 questions. The scale had a high level of internal consistency, as determined by Cronbach's alpha of .852. The construct of design and organization consisted of four questions. The scale had a high level of internal consistency, as determined by Cronbach's alpha of .788. The construct of facilitation of learning consisted of six questions. The scale had a high level of internal consistency, as determined by Cronbach's alpha of .808. The construct of direct instruction consisted of three questions. The scale had a low level of internal consistency, as determined by Cronbach's alpha of .377. Due to the low level of internal consistency, the construct of direct instruction was not measured.

Data Analysis

Congruent with mixed methods convergent parallel research design, statistical analysis of quantitative data were performed separately from qualitative thematic content analysis. Statistical Package for the Social Sciences (SPSS) was used for quantitative statistical analysis. Following separate analysis of quantitative and qualitative data, results were merged.

Research Question 1 was addressed through descriptive statistical analysis. Research Question 2 was addressed through qualitative thematic content analysis of open-ended responses of survey items 1, 2, and 3 of Part III of the Adapted CoI Survey Instrument. Separate one-way analyses of variance were conducted to address Hypotheses 1, 2, and 3. Hypothesis 4 was not tested due to low reliability of Part I Questions 11 through 13 of the Adapted CoI Survey Instrument in measuring perceived teaching presence of direct instruction.

Results

Descriptive Statistics of Dependent Variables

The research study included four dependent variables: overall perceived teaching presence, perceived teaching presence of design and organization, perceived teaching presence of facilitation, and perceived teaching presence of direct instruction.

Overall perceived teaching presence was measured using survey items 1 through 13 of Part I of the Adapted CoI Survey Instrument. Participants rated level of agreement with these 13 statements from *strongly disagree* (1) to *strongly agree* (4). Perceived teaching presence of design and organization was measured using survey items 1 through 4 of Part I of the Adapted CoI Survey Instrument. Perceived teaching presence of facilitation was measured using survey items 5 through 10 of Part I of the Adapted CoI Survey Instrument. Perceived teaching presence of direct instruction was measured using survey items 11 through 13 of Part I of the Adapted CoI Survey Instrument. Table 2 presents the mean scores and standard deviations for each item representing participants' level of agreement with statements concerning overall perceived teaching presence. Table 3 presents comparison of the mean scores and standard deviations for each dependent variable.

Table 2.

Descriptive Statistics for Overall Perceived Teaching Presence, Survey Items 1–13 of Part I

Question	*N*	*M*	*SD*
1. Overall, I clearly communicate important course topics.	86	3.66	.476
2. Overall, I clearly communicate course goals.	86	3.67	.471
3. Overall, I provide clear instructions on how to participate in course learning activities.	86	3.65	.479
4. Overall, I clearly communicate important due dates/time frames for learning activities.	86	3.81	.391
5. Overall, I am helpful in identifying areas of agreement and disagreement on course topics that help students to learn.	85	3.27	.543
6. Overall, I am helpful in guiding the class towards understanding course topics in a way that helps students clarify their thinking.	86	3.49	.526
7. Overall, I help to keep course participants engaged and participating in productive dialogue.	86	3.31	.637
8. Overall, I help keep the course participants on task in a way that helps students learn.	86	3.51	.503
9. Overall, I encourage course participants to explore new concepts in courses.	86	3.35	.609
10. Overall, my actions reinforce the development of a sense of community among course participants.	86	3.17	.654
11. Overall, I help to focus discussion on relevant issues in a way that helps students to learn.	86	3.53	.567
12. Overall, I provide feedback that helps students understand their strengths and weaknesses relative to the course's goals and objectives.	86	3.44	.606
13. Overall, I provide feedback in a timely fashion.	86	3.58	.583

Scale: 1 (*strongly disagree*), 2 (*disagree*), 3 (*agree*), 4 (*strongly agree*)

Table 3.

Comparison of Overall Perceived Teaching Presence, Perceived Teaching Presence of Design and Organization, Perceived Teaching Presence of Facilitation, and Perceived Teaching Presence of Direct Instruction

Dependent Variable	*N*	*M*	*SD*
Overall Perceived Teaching Presence	85	3.49	.325
Perceived Teaching Presence of Design and Organization	86	3.70	.355
Perceived Teaching Presence of Facilitation	85	3.35	.406
Perceived Teaching Presence of Direct Instruction	86	3.52	.398

Quantitative Findings

For statistical analysis, the independent variable preparation to teach was grouped as three categories. Frequency distributions of preparation to teach as grouped for statistical analysis have been reported in Table 4.

Table 4.

Frequency Distribution of Preparation to Teach as Grouped for Statistical Analysis (N = 86)

	N (%)
Preparation to teach	86 (100.0)
Informal on-the-job training only	15 (17.4)
Some college courses and/or professional development program	43 (50)
Certification course and/or professional development program, and/or some college courses, and/or informal on-the-job training	28 (32.6)

Hypothesis 1: *There is no statistically significant difference between overall perceived teaching presence based on educators' preparation to teach in blended and online learning environments.*

One-way analysis of variance was conducted to determine whether there was a statistically significant difference between overall perceived teaching presence based on educators' preparation to teach in blended and online learning environments. Data were analyzed based on participants perceived overall teaching presence score (survey items 1 through 13 of Part I) and preparation to teach in blended and online courses (survey item 1 of Part II). There was homogeneity of variances, as assessed by Levene's test for equality of variances ($p = .279$). There was no statistically significant difference between educators' perceived overall teaching presence based on preparation to teach in blended and online learning environments, $F(2, 82) = 3.093$, $p = .051$.

Hypothesis 2. *There is no statistically significant difference between perceived teaching presence of design and organization based on educators' preparation to teach in blended and online learning environments.*

One-way analysis of variance was conducted to determine whether there was a statistically significant difference between perceived teaching presence of design and organization based on educators' preparation to teach in blended and online learning environments. Data were analyzed based on participants' perceived teaching presence of design and organization (survey items 1 through 4 of Part I) and preparation to teach in blended and online courses (survey item 1 of Part II). There was homogeneity of variances, as assessed by Levene's test for equality of variances ($p = .220$). There was no statistically significant difference between educators' perceived teaching presence of design and organization based on preparation to teach in blended and online learning environments, $F(2, 83) =1.202$, $p = .306$.

Hypothesis 3. *There is no statistically significant difference between perceived teaching presence of facilitation based on educators' preparation to teach in blended and online learning environments.*

One-way analysis of variance was conducted to determine whether there was a statistically significant difference between perceived teaching presence of facilitation based on educators' preparation to teach in blended and online learning environments. Data were analyzed based on participants' perceived teaching presence of facilitation (survey items 5 through 10 of Part I) and preparation to teach in blended and online courses (survey item 1 of Part II). The assumption of homogeneity of variances was violated, as assessed by Levene's test for equality of variances ($p = .038$). There was a statistically significant difference between educators' perceived teaching presence of facilitation based on preparation to teach in blended and online learning environments, $F(2, 82) = 3.772$, $p = .027$. The perceived teaching presence of facilitation was statistically significantly different for different levels of the preparation to teach group, Welch's $F(2, 42.970) = 5.492$, $p = .008$. Games-Howell post hoc analysis revealed a significant difference between perceived teaching presence of facilitation score of educators that received on-the-job training ($M = 3.13$, $SD = .28$) as compared to educators that completed a certification course ($M = 3.48$, $SD = .40$). The mean increase of .35 for educators that completed a certification was statistically significant ($p = .006$). Multiple comparisons in ANOVA for the independent variable of preparation to teach and the dependent variable of perceived teaching presence have been presented in Table 5.

Table 5.

Multiple Comparisons of Preparation to Teach for the Dependent Variable of Perceived Teaching Presence of Facilitation

	(I) Preparation to Teach	(J) Preparation to Teach	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Tukey HSD	On-the-job-training	Some college and/or professional development	-.21938	.11805	.157	-.5012	.0624
		Certification course	-.34815*	.12677	.020	-.6508	-.0455
	Some college and/or professional development	On-the-job training	.21938	.11805	.157	-.0624	.5012
		Certification course	-.12877	.09666	.382	-.3595	.1020
	Certification course	On-the-job training	.34815*	.12677	.020	.0455	.6508
		Some college and/or professional development	.12877	.09666	.382	-.1020	.3595
Games-Howell	On-the-job training	Some college and/or professional development	-.21938	.09717	.075	-.4567	.0180
		Certification course	-.34815*	.10633	.006	-.6076	-.0887
	Some college and/or professional development	On-the-job training	.21938	.09717	.075	-.0180	.4567
		Certification course	-.12877	.10030	.410	-.3701	.1126
	Certification course	On-the-job training	.34815*	.10633	.006	.0887	.6076
		Some college and/or professional development	.12877	.10030	.410	-.1126	.3701

*The mean difference is significant at the .05 level.

Qualitative Findings

Research Question 2 explored behaviors educators perceive as facilitating teaching presence in blended and online learning environments. Three open-ended questions addressed teaching presence behaviors of design and organization, facilitation, and direct instruction. The identified teaching presence behaviors were explored to better understand the phenomenon of teaching presence. The responses for each question were reviewed, compared, and contrasted to identify similarities and differences. Major themes were formed according to participants' responses.

Design and organization. Open-Ended Question 1 asked the following: *Please describe how you provide clear communication of important course topics, goals, due dates, and instructions for participation in learning activities.* The Adapted CoI Survey Instrument Quantitative Questions 1 through 4 of Part I provided the framework for survey item 1 of Part III. The qualitative data were analyzed to identify emerging themes.

Of the 86 study participants, 83.7% ($n = 72$) responded to Interview Question 1. Four major themes emerged describing teaching presence behaviors of design and organization: providing a course syllabus, utilizing learning management system tools, providing a course orientation video, and email, phone, or video conferences or reminders. Exemplar participant responses to Open-Ended Question 1 representing each theme included the following:

> P3: “Students are provided with all course documents, including a detailed syllabus that delineates what topics will be covered and the dates they should be prepared to cover those topics, what the goals/learning objectives are for each topic as well as the course in general, specific dates topics will be covered and when applicable how to access the information if it is provided via an electronic link or resource.”

> P38: “Documents are placed in the learning management system including a syllabus, faculty contact information, and a course calendar. An AV conference is held with students to go over these documents.”

> P75: “I provide a course orientation at the beginning of the course. This is either done in video recordings or in a conference. I also open up a discussion board to encourage questions regarding the syllabus, course calendar, course expectations.”

Facilitation. Open-Ended Question 2 asked the following: *Please describe how you facilitate student learning. For example, what teaching methods have worked well to engage students in course topics, clarify students’ understanding, keep students on task, and encourage students to explore new concepts?* The Adapted CoI Survey Instrument Quantitative Questions 5 through 10 provided the framework for Interview Question 2. The qualitative data were analyzed to identify emerging categories.

Of the 86 study participants, 83.7% (*n* = 72) responded to Open-Ended Question 2. Three major themes emerged describing teaching presence behaviors of facilitation of learning: providing timely feedback, assigning group projects, and course assignments. Exemplar participant responses to Open-Ended Question 2 representing each theme included the following:

> P18: “I give immediate feedback so students will know they are on the right track.”

> P33: “We break into small groups where students who are physically present communicate with those who are present electronically to complete group brainstorming and problem-solving projects.”

> P62: “I usually assign a reading topic or video viewing, followed by an online pre-test, so that students get the basic information required to meet course objectives. Then I develop a project, a group discussion board, or other active learning strategy to apply or manipulate the concepts for deeper learning.”

Direct instruction. Open-Ended Question 3 asked the following: *Please describe how you provide direct instruction for students. For example, what teaching methods have worked well to focus discussion on relevant issues, provide constructive feedback, evaluate students’ understanding, and direct students to a deeper level of understanding?* The Adapted CoI Survey Instrument Quantitative Questions 11 through 13 provided the framework for Open-Ended Question 3. The qualitative data were analyzed to identify emerging categories.

Of the 86 study participants, 82.6% (*n* = 71) responded to Open-Ended Question 3. Three major categories emerged describing teaching presence behaviors of direct instruction: providing constructive feedback, student and faculty participation in discussion forum, and assigning guided and active learning assignments. Interestingly, some participants shared that direct instruction in the blended or online environment is challenging. Exemplar participant responses to Open-Ended Question 3 representing each theme include the following:

> P4: "I give students both positive and constructive feedback to help them know where they stand at all times. Further, I will let students know when they can go further with their information to take it to a challenging level...which is where they will grow...."

> P22: "Regular engagement in the discussion board highlighting key points from student posts and suggesting additional things to think about. Group projects where students have to work together to solve real world problems, WebEx discussions to answer questions and make sure students are understanding the material. Online quizzes and tests to encourage students to stay current with assigned readings and to gauge understanding. Case studies have been very instructive."

> P59: "One example is clinical notes - rather than just grade a clinical note, I use a 3 chance pass/fail approach. The student has to make corrections and learn from their mistakes, rather than just earning a grade. The constructive feedback with an opportunity to correct their note really helps them reach a deeper level of understanding."

Discussion

The findings of this study indicated a statistically significant difference between perceived teaching presence of facilitation score of educators that received on-the-job training as compared to educators that completed a certification course. When levels of preparation were compared, the study did not reveal a statistically significant relationship between educators' preparation to teach and overall teaching presence or between teaching presence of design and organization. This could indicate that the most significant differences in teaching face-to-face and teaching online occur during in-course activities, rather than during precourse activities of course development and planning. Qualitative responses support the statistically significant difference in perceived teaching presence of facilitation between participants that received informal on-the-job training only and those that completed a certification course in preparation to teach blended and online courses. For example, participants that reported completing a certification course in preparation to teach blended and online courses reported the following when asked to describe how the participant facilitates learning:

> P1: "I respond to any questions promptly. I state if I do not respond to you in 24 hours, your email or question has been overlooked, please send an email again OR call OR text me. Within course content, I jump in for discussions. I respond and make comments along the way with discussions. I let my students know that I am there. I email questions regarding specific topics that are heavy in the discussions. I always remind students to email or call me for clarification of topics. I remind students who have not completed certain tasks, that the deadline is approaching soon and contact me ASAP if they have an issue. I also communicate in the beginning that we all have lives and things change--- please just communicate with me!!"

> P14: "Incorporating learning style approaches to provide multiple options for student driven learning. Formative assessment to provide multiple checkpoints. Discussion boards to assess level of understanding. Student driven teaching to allow students to apply new skill sets. Adult Learning Theory to maintain learner driven outcomes and competency development."

> P28: "One of the primary modes for engaging students in the course content is online discussions. Students are encouraged to select a topic that represents knowledge they would like to develop or enhance. They research the topic and then post a summary presentation. Each student is then expected to engage in active dialogue with classmates regarding the presentations. Discussion instructions clearly indicate what should be included in the presentation. A date is identified for the initial presentation with responses being due by close of the next week's class day. A rubric indicating criteria for grading the discussions is posted and applied to all discussions. To achieve full credit for a discussion students must provide substantive responses that are supported by personal experiences and information from the texts and literature. I also include two additional discussion forums to support engagement and clarify understanding: (1) Ask the Professor, and (2) Student Lounge. The Ask the Professor forum provides an opportunity for students to ask overall questions regarding the course or assignments. Other students can see the question as well as my answer. The Student Lounge forum provides an opportunity for students to ask each other questions, share major life events, etc. It is often used when students ask for prayer during difficult times or share news of a child's wedding or birth."

In contrast, participants that reported receiving informal on-the-job training as preparation to teach blended and online courses described the following activities when asked to describe how the participant facilitates learning:

> P9: "I provide opportunities for students to use videos, YouTube, discussion board, and grouping."

> P36: "Require students read corresponding assignment as well as summarize a scholarly article they find related to the topic and post in discussion. Students respond to each other's posts. Reminder e-mails about upcoming due dates are sent. Asking students questions about what they post."

> P52: "Projects work well for my classes. I give online exams. I have eliminated required posts from students based on student feedback that they do not feel the required posts are helpful."

The teaching presence of facilitation requires greater reliance on pedagogies and learning theories. Baran et al. (2013) recognized "increasing teacher presence for monitoring students' learning" and "reconstructing student-teacher relationships" as the greatest areas of pedagogical change when teachers transition from face-to-face teaching to teaching online (p. 5). This is supported by one participant's response regarding teaching behaviors of facilitation:

> P30: "This is the hardest part of teaching online. I've created talking head videos of myself to go along with each module that work pretty well. I also have discussion boards that students are required to participate in. I haven't had much success using

> synchronous instruction. There always seems to be a technical difficulty or time management issue. Probably the greatest tool I use for communicating, keeping students on task, etc. is email."

These findings are congruent with the literature indicating that educators' preparation to teach in blended and online learning environments influences educators' perceptions of how well they facilitate learning. This study of educators' preparation to teach, perceived teaching presence, and perceived teaching presence behaviors in blended and online learning environments supports the need for faculty preparation specific to facilitating learning in blended and online courses. The results of this study indicate that faculty that completed a certification course in preparation to teach blended and online courses perceived greater teaching presence of facilitation as compared to faculty that only received on-the-job training. This study also supported the Adapted CoI Survey Instrument as a valid tool to measure educators' perceptions of teaching presence and the teaching presence indicators of direct instruction and facilitation.

With the increasing trend for blended and online courses in higher education (American Association of Colleges of Nursing, 2003; McDonald & Picciano, 2014; U.S. Department of Education, 2014), the results of this study offer several implications for educators and administrators of universities that traditionally have not offered blended and online courses. For example, educators transitioning from the face-to-face learning environment to the online learning environment must understand the challenges of facilitating learning when separated by time and place. Faculty must learn and implement innovative ways of communicating meaningful feedback to students.

In addition, this study supports the importance of assessing how the current culture of the institution supports and affects teaching in nontraditional learning environments (Baran & Correia, 2014). As Ali et al. (2005) indicated, quality faculty development programs must be established to support faculty involved in developing and teaching online courses. Although many professional development opportunities are available to prepare educators to teach in blended and online learning environments, these are often limited to learning how to use the technology (Lane, 2013). The greatest need for educators teaching in blended and online learning environments is learning how to apply pedagogies that support a variety of technologies (Lane, 2013). Administrators must assess the needs of faculty teaching in blended and online learning environments and then provide professional development programs that address the identified needs.

Study Limitations

Limitations of this study were related to the sample population. The sample population was limited to a convenience sample of full-time, part-time, and adjunct faculty employed in two private universities in the southeastern United States; therefore, results could not be generalized beyond the study population. It is likely that differences in technology infrastructure, faculty resources, and administrative support exist between private and public universities. In addition, the study did not consider the possible influences of length of teaching experience or employment status on educators' perceived teaching presence.

Conclusions

As one of the first studies exploring the relationship between educators' perceived teaching presence and preparation to teach, the findings of this study have significant implications for faculty development programs in higher education. This study revealed a statistically significant relationship between perceived teaching presence of facilitation and completion of a certification course in online instruction as compared to those receiving on-the-job training only, indicating that how educators are prepared to teach influences their perceptions of how well they facilitate learning. Although this study did not explore reasons for the increased perception, consideration of characteristics of certification courses might provide conceptual insight into why participants indicated greater perception of facilitating learning in the online environment. Certified online instructor courses are intensive and comprehensive, requiring participants to commit anywhere from 9 weeks to 6 months or longer to complete learning and evaluation activities related to learner-centered pedagogies specific to teaching in the online learning environment. Participants experience online learning from the student's perspective, exploring common challenges to facilitating online learning, as well as theory-based methods for addressing these challenges. Participants must interact with technologies used in online courses and learn how to implement supporting pedagogies. Networking opportunities are provided, thus promoting faculty bonding and support during the transition from face-to-face to online educator. Lastly, some certification courses include an end-of-program certification exam and critique of participants' online courses. Perhaps it is the dedication of faculty completing these rigorous certification courses, immersion in pedagogies specific to online learning, peer support, and increased self-efficacy as an online educator that influences perceived teaching presence of facilitation.

The findings support the assertion that educators that complete formal training programs, such as certification courses, are more confident in their abilities to facilitate student learning in blended and online courses. Higher education administrators must invest in faculty development and mentoring programs that teach pedagogies and teaching presence behaviors specific to distance education environments. Administrators must consider the time required and foundational knowledge and skills necessary for faculty to engage in behaviors that facilitate teaching presence. Future research should explore how to best support faculty transitioning from teaching face-to-face to teaching in blended and online learning environments. Perhaps exploration of the overarching concepts included in certification courses will provide a strong foundation for faculty development programs that include content development, learning activities, teaching strategies, and assessment techniques based on pedagogies best suited for blended and online learning environments.

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Out-of-School Reading and Literature Discussion: An Exploration of Adolescents' Participation in Digital Book Clubs

Jamie Colwell
Old Dominion University

Lindsay Woodward
Drake University

Amy Hutchison
George Mason University

Abstract
This research used an inductive qualitative method to examine how adolescents participated in online literature discussion, with limited guidance from adults, through a summer reading program. Using a New Literacies framework, the authors considered that literacy is social and collaborative and that adolescents often engage in such literacy practices on the Internet outside of school. This study considered these literacy practices to examine an eight-week voluntary online summer reading program at a public library and how such a program might inform such activities in school settings to promote more authentic opportunities for literacy engagement. In this program, 12 adolescents (ages 13–17) read print-based young adult novels and responded to their reading in threaded discussion boards, called book clubs, in a closed, online social network. Results indicated two overlapping themes related to students' formality in writing that promote shared learning and personalize digital discussions to make connections. Researchers found adolescents spontaneously adopted online discussion techniques that hybridized formal discussion practices with more personal practices to encourage emotive transaction with text. These results raised implications for integrating such activities in classroom settings to support all learners and to promote academic literacies.

Keywords: digital book clubs, adolescents, literature discussion

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Out-of-School Reading and Literature Discussion: An Exploration of Adolescents' Participation in Digital Book Clubs

Today's adolescents live and participate in a digital world, connected by numerous social technologies that support continuous sharing and discussion of information online. These social digital tools are often appealing because they afford adolescents opportunities to build relationships and adopt roles to interact with others online (Alvermann et al., 2012). For example, online social networks can facilitate a host of sharing and discussion features that encourage students to navigate online spaces, assume online identities, and voice opinions using digital text (Lankshear & Knobel, 2011; Leu, Kinzer, Coiro, Castek, & Henry, 2013). Studies targeted at understanding how adolescents engage in such online practices build on scholarship within the New Literacies Studies and employ the view that literacy is social, collaborative, and situated (Gee, 2004; Street, 1993). Further, adolescents frequently engage in rich collaborative and social literacy practices on the Internet outside of school (Hutchison & Henry, 2010). Thus, it is useful to study adolescents' authentic engagement in online communities in out-of-school settings to consider the literacies that students bring with them to school contexts (Alvermann, 2008; Buck, 2012). To examine these issues, the current study focused on adolescents' engagement in asynchronous book club discussions about young adult (YA) literature in an online social network (OSN) developed for a public library's online summer reading program and focused on the following research question: *How do adolescents participate in asynchronous online book club discussions about literature with limited guidance from adults?*

Review of Related Literature

The current study is first informed by the idea that "knowledge construction is a situated process that includes social and cognitive interactions ranging from simply sharing information, to negotiating meanings, to summarizing and synthesizing new knowledge" (Oztok, 2016, p. 158). As such, peer discussion and interaction play a critical role in how a learner will come to understand a concept or topic and how they learn particular ways of speaking within a domain of activity (Gee & Hayes, 2013). Such an understanding of knowledge construction emphasizes the role of engagement, participation, and membership in a community and discredits the idea that learning is an in-the-head phenomenon (Nasir & Cooks, 2009). Considering the role that digital technology plays in adolescents' lives, much of the discussion, interaction, and community participation in which adolescents engage often takes place online. New Literacies theory, which addresses the transformation of literacy skills in digital spaces (Gee, 2004; Lankshear & Knobel, 2007), reinforces this idea, with the scholars arguing that digital youth

> seek out memberships and peers in areas of affinity and interest, and pursue different kinds of relationships between "authors" and "audiences" from those characterizing many conventional literacy practices. They generally value attending to the interests and knowledge of others, recognize that quality is judged by groups rather than appointed experts, welcome diversity of opinion in decision-making, and so on. (p. 98)

As such, new literacies are those skills that are necessary for students to successfully navigate and engage in digital reading and writing practices (e.g., navigating digital hyperlinked texts and responding to those texts using digital tools) and that differ from skills necessary for traditional practices (e.g., paper-based composition and print-based reading and comprehension) that define literacy. Such skills are important to creating more literate adolescents in the 21st century (Leu et al., 2013). Accordingly, adolescents' participation in an online social network and an analysis of their interactions and discussion in that digital space was the focus of the current study, in which adolescents participated in an online summer reading program. From an academic standpoint, online discussion has much to offer. When used in school settings, online discussion with peers has prompted upper grade students to write more comprehensive responses to print literature compared to traditional pen-and-paper writing activities (Grisham & Wolsey, 2006) and provide thoughtful analyses of others' responses due to the additional time provided by an asynchronous structure (Larson, 2009; Day & Kroon, 2010). Further, students are more likely to return to the text and generate deeper and more meaningful text-driven interactions in such online environments (Larson, 2009; Wolsey & Grisham, 2007). Additionally, students can use combinations of formal and informal language to communicate their interpretations and how they are positioning themselves as readers dialoguing in a digital space (West, 2008). In sum, online discussion can provide a voice for each student to deeply reflect on text in a setting that encourages all students to participate (English, 2007; West, 2008).

Although the literature regarding online discussion in school settings informs the current study, we were primarily interested in how adolescents participate in online book clubs when these discussions are not accompanied by explicit academic instruction. Our interest was driven by the notion that such participation may offer more genuine discussion and engagement in online settings, which may in turn inform methods for more authentic instruction in classroom settings. Although online discussion may sometimes result in shallow discussion or unsupported opinions, discussion in an anonymous online setting may allow adolescents to take on unique identities, express opinions, and adopt practices particular to the space in which they engage (Alvermann, 2008; Alvermann et al., 2012; Black, 2009; Stewart, 2014), and such practices shape online interactions. Many of these practices involve collaboration as adolescents trade digital data, such as images, and engage with others to build digital resources (Leander & Frank, 2006). Other online practices align more with social roles as adolescents engage with one another to offer support in common interests (Alvermann et al., 2012), an idea which is pertinent to this study, as these roles may influence students' participation in and the subsequent angle of discussion.

One of the ways that adolescents participate in online discussion and take on new roles is through *affinity spaces*. Online affinity spaces are sites of informal learning among people drawn together by a shared interest and opportunity to learn with others (Padgett & Curwood, 2015). Gee (2005) argued that affinity spaces are an important form of social affiliation, with which young people are particularly familiar and in which effective informal learning occurs. Further, affinity spaces provide a place where users can pick up "practices through joint action with more advanced peers, and advance their abilities to engage and work with others in carrying out such practices" (Gee, 2004, p. 70). Examples of affinity spaces include sites such as Figment (figment.com), where adolescents read, write, and critique poetry, and fan fiction sites, such as wattpad.com and fanfiction.net, where writers create and receive feedback on new stories based on existing stories, characters, or settings. Affinity spaces provide rich opportunities for youth to write for an authentic audience of peers interested in the same topic. For example, as Curwood's (2013) study highlighted, a fan fiction OSN can support adolescents' active engagement in text, specifically critical consideration of events, themes, and literary techniques, through reflection and sharing of opinions with others interested in the same discussion topic. Such findings were important as we considered how the asynchronous nature of the book club discussions might support or inform students' various viewpoints about the literature they read in a setting outside of school with little teacher influence and few guidelines for response.

A discussion of affinity spaces is particularly germane to the current study because the online social network students used to participate in the book clubs in this study was similar to an affinity space. However, our book clubs differed in important ways and fill a gap in the literature related to adolescents' online participation. Adolescents in the current study were not participants in any affinity spaces, such as fan fiction sites, when they enrolled in the study and thus were not involved in any out-of-school discussions or activities about the literature they were reading outside of the summer reading program. Many adolescents may be unaware of sites such as Figment or Wattpad or may not be inclined to seek out such sites on their own. Yet these adolescents may enjoy and benefit from participation in online discussions about literature that take place outside of school. As such, we designed and studied online book clubs that youth could participate in through the public library during the summer, a time when they may desire opportunities to engage in literature discussion. It is important to study adolescents' engagement in these informal, out-of-school online book clubs because participants were not given guidance on how to participate or respond, but rather were only given general response prompts. Studying adolescents' participation in these online book clubs informs us about how adolescents naturally participate in this setting, which is informal and similar to affinity spaces, but by virtue of being offered through the public library is somewhat academic in nature. Understandings of adolescents' participation in this setting can illuminate ways to (1) engage students who do not belong to affinity spaces in out-of-school literacy activities but who actively engage in online discussion about literature and (2) connect students' out-of-school online discussion activities to what they do in the classroom.

Methods

The purpose of this study was to explore adolescents' voluntary participation in online book clubs with limited guidance from adults. To do so, after receiving Institutional Review Board approval, multiple sources of data were collected during an eight-week online summer reading program and analyzed using a general inductive qualitative approach (Thomas, 2006).

Description of Context and Participants

The program was hosted at a public library that expressed interest in an online program to encourage adolescent participation in summer reading. The library was located in a midsize city in the southeastern region of the United States and has 13 locations throughout the city that provide access to print and digital materials and technological resources. The researchers collaborated with the Youth and Teen Services Director to develop the program and recruit students. Participation was voluntary, and participants were recruited through the library's summer reading program flier and website. Sixteen adolescents (ages 13–17) attended the orientation meeting for the program and registered to participate in the summer program. However, four adolescents who registered never posted in any of the discussion forums. Thus, only the 12 adolescents (10 females and 2 males) who posted in the book club forums were considered participants. Hereafter, we refer to the participants as "students" because we considered them active learners in this summer reading program. Ten students identified as Caucasian, one as Asian-American, and one student as African-American. Only two students indicated in the orientation meeting that they knew each other prior to the online summer reading program. Table 1 provides an overview of participants.

Table 1.
Book Club Participants

Pseudonym	**Gender**	**Age**
Hallie	Female	13
Melissa	Female	13
Bryce	Female	13
Lexi	Female	13
Amy	Female	13
Frank	Male	13
Paige	Female	13
Trish	Female	13
Bonnie	Female	14
Grey	Male	14
Chloe	Female	17
Sam	Female	17

Because this study was conducted outside of a school setting, data regarding students' socioeconomic status and school-related literacy skills were unavailable. Further, the orientation meeting was held at the main branch in the city center. This branch was not necessarily the branch all students used on a regular basis, which further limited our understanding of their socioeconomic status. However, we do note that a parent for each student attended the program's orientation meeting with their child, and all students indicated that they owned a computer.

The purpose of the orientation was to familiarize students with the OSN, provide an overview of the books that could be discussed, and collect informal data regarding students' motivation to participate in online book clubs and self-perceptions of their reading ability. To do so, we used the Adolescent Motivation to Read Profile (AMRP; Pitcher et al., 2007) and an open-ended survey regarding reading and online interests and habits (see Appendix A). These data provided a window into students' reading habits and perceptions of their reading ability prior to the study and provide context. All the participants reported they were "good" to "very good" readers. Six students indicated their participation was based on an interest in reading and participating in a book club that was online. The remaining students responded that they were participating in the summer reading program for the following reasons: (a) parent influence/requirement (two students); (b) the program fulfilled a requirement for community and service hours for their school (two students); or (c) the program fulfilled a summer reading requirement for their school (two students). However, survey results indicated that all students were enthusiastic to join the program and discuss literature with others, which somewhat mitigated differences in motivation to participate.

Description of the Online Summer Reading Program

A Ning network was selected as the OSN because of its appealing user interface and safe, private online setting that supported multiple group interactions. The network hosted a discussion forum, which facilitated multiple topical discussion threads, where all online discussion was held. Students could easily access all of the discussion threads from the discussion forum and were invited to participate in multiple forum discussions if they chose.

The online book clubs. We adopted the term *book clubs* to describe the discussion threads hosted in the forums on the OSN. Although multiple traditional models exist, we referred to Daniels's (2002) description of a book club as a group of K-12 students who gather to discuss a common work of literature. These book clubs are formed around students' interest in reading a particular book rather than their level of reading achievement. Specifically, Daniels described book clubs as "open, natural conversations about books" (p. 18). In keeping with book clubs as described by Daniels, students selected the book they read, engaged in small group discussions based on book choice, and determined their own discussion topics. Though many associate Daniels's model of book clubs with assigned roles and role sheets (e.g., connector, literary luminary) to guide discussions of literature, he argued that such roles could be a temporary scaffold but need not be a permanent structure in discussion groups. Given the informal out-of-school setting for our study, we opted not to use assigned roles and role sheets; rather, students selected their own roles and engaged in discussion as they felt comfortable.

Yet, moving book clubs online, particularly in out-of-school settings, fundamentally alters the literacy practices and the manner in which students must navigate discussion to be active participants and the lens through which we study such practices (Moje, 2009). Thus, we also considered Larson's (2009) approach to online literature discussion about print-based texts in a fifth-grade class to further situate and organize online book clubs. Online book clubs may be appealing to adolescents who regularly participate in digital practices (Scharber, 2009), but summer reading programs must also offer texts adolescents find interesting to voluntarily participate in such a program (Allington & McGill-Franzen, 2013). Additionally, we considered that contemporary young adult (YA) titles would likely be most appealing to students given the relevance of such books to their lives (Ivey & Johnston, 2013). We, along with the Youth and Teen Services Director at the library, utilized these concepts to offer students five book clubs to participate in, hosted in separate discussion threads on the Ning, which were distinguished by genre (i.e., Graphic Novels, Ghost Stories and Hauntings, Dystopian, Chick Lit, and Action & Suspense). Each genre contained four or five novels. The director guided this selection, as one of her primary roles in the library was to research and select popular YA literature to motivate adolescents to engage in reading outside of school. Table 2 outlines the book clubs and the books read in each.

Table 2.

Book Club Titles

Book Club Genre	**Titles and Authors**
Action & Suspense	*Au Revoir, Crazy European Chick* (Schreiber, 2011) *Altered* (Rush, 2013) *Dust Lands: Blood Red Road* (Young, 2012) *The Girl Who Could Fly* (Forester, 2010)
Chick Lit	*Almost Home* (Bauer, 2013) *I'd Tell You I Love You, but Then I'd Have to Kill You* (Carter, 2007) *Twice Upon a Time: Rapunzel* (Mass, 2012) *The Teashop Girls* (Rim, 2009)
Ghost Stories and Hauntings	*Wait Till Helen Comes* (Hahn, 2008) *Amber House* (Moore, Reed, & Reed, 2013) *Haunted* [*Name of City Blinded*] *The Ghost of Graylock* (Poblocki, 2012)
Graphic Novels	*Tiny Titans* (Baltazar, 2009) *Amulet* (Kibuishi, 2008) *Wonderstruck* (Selznick, 2011) *Maus* (Spiegelman, 1986) *A Monster Calls* (Ness & Kay, 2013)
If You Liked *The Hunger Games* (Dystopian)	*Graceling* (Cashore, 2009) *Delirium* (Oliver, 2012) *The Maze Runner* (Dashner, 2010) *The Selection* (Cass, 2013)

Discussion in the book clubs. To participate in discussion, students set up an account on the Ning, using a self-selected screen name that did not include their first or last name for anonymity. We offered students the opportunity to change book clubs at any time during the summer if they decided to read a book from a different genre, and they could participate in more than one book club at a time. A schedule was created for book club discussions that allowed students 10 days to read a book and five days to engage in online discussion about the book through asynchronous written posts on a designated forum. A screenshot of a sample book club page, with identifying information removed, is provided in Figure 1.

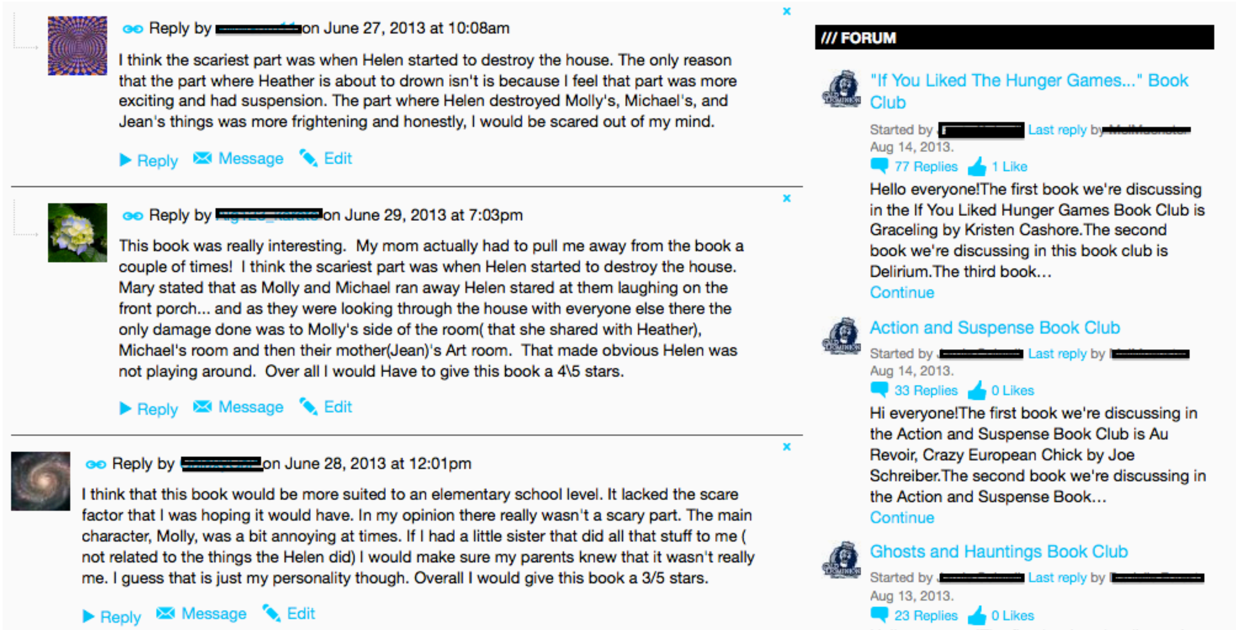

Figure 1. Sample book club page.

Students were invited to read only one book in one genre per discussion cycle. Yet, eight students read multiple books and participated in multiple book clubs during each cycle. We acted as participant observers (Patton, 2002) and facilitated discussion by posting general opening prompts to spark discussion (e.g., "What interested you most about this novel?") and posing follow-up questions only if discussion stalled. We decided prior to the program that if a book club had only one participant, we would engage in discussion with that student, but would not consider that discussion in data analysis. This decision was moot, however, as every book club had at least three participants throughout the program. On average, researchers posted content-related responses only one time, aside from the initial prompt, during discussion.

Data Sources and Collection

Data sources included the prestudy AMRP (Pitcher et al., 2007) and corresponding open-ended survey questions described in a previous section and all book club discussion posts on the OSN. Student discussion posts were considered primary sources of data to address the research questions. Discussion posts unrelated to content of books, such as reminders of upcoming book discussion dates or students/researcher online conversation regarding the availability of a book title at a certain library branch, were excluded from this count. Table 3 provides a breakdown of the number of posts made by each student in each book club.

Table 3.

Book Club Postings and Participation

Book Club Genre	**Students and Number of Posts**	**Total Student Posts**
Action & Suspense	Melissa, 10 posts Lexi, 4 posts Bryce, 3 posts Sam, 2 posts	19 posts
Chick Lit	Hallie, 6 posts Melissa, 6 posts Bryce, 2 posts Chloe, 1 post	15 posts
Ghost Stories & Hauntings	Amy, 5 posts Lexi, 4 posts Sam, 4 posts Bonnie, 1 post	14 posts
Graphic Novel	Melissa, 11 posts Chloe, 2 posts Grey, 2 posts Amy, 1 post	16 posts
Dystopian	Melissa, 29 posts Grey, 8 posts Frank, 7 posts Sam, 5 posts Bryce, 5 posts Paige, 3 posts Trish, 3 posts Amy, 3 posts Hallie, 1 post	64 posts
		128 total posts

The Dystopian book club was the most popular and generated the most discussion, but consistent participation was also observed in the other online book clubs. We also note that one student, Melissa (this and all other names are pseudonyms), posted more frequently than any other student. Length of posts in each book club remained consistent across book clubs and throughout the program, with an average of three complete sentences per post. There were only three instances of two-word, nondescriptive responses (i.e., "Me too!" and "I agree."). The remaining data sources were used in triangulation to confirm, disconfirm, and inform themes that emerged from the data.

Data Analysis

We used a general inductive approach to qualitative data analysis (Thomas, 2006). To address our research questions regarding students' roles and new literacies, we used this approach "to allow research findings to emerge from the frequent, dominant, or significant themes in raw data" (Thomas, 2006, p. 238). Discussion posts were our primary data source; posts were transferred to Word documents, and separate transcripts were created for each of the five book clubs. We then read through every transcript once to gain a holistic understanding of the data. After this first reading, we decided to code all five transcripts as a whole because (a) discussions were similar across book clubs in that students responded primarily to their interests, understandings, and questions about the books, and (b) we wanted to consider the summer reading program as a whole. This decision was grounded in the idea that "inductive coding begins with close readings of text and considerations of the multiple meanings that are inherent in text" (Thomas, 2006, p. 241). Thus, we wanted to conduct a "close reading" of all book club discussion data considered in this study to look for overall themes that might emerge from online literature discussion, rather than look at each book club as a separate entity. Further, the multiple conversations happening in each genre's discussion thread constituted one connected discussion space because students participated in multiple book clubs during the summer reading program. This decision allowed for coding transcripts holistically to summarize raw data (Thomas, 2006). Coding thus began during the second holistic reading of transcripts. These codes were considered and collapsed into themes relevant to our research questions. Specifically, we developed codes and then determined links or relationships between codes that were relevant to our research questions; these relationships emerged into the themes that organize our findings. Themes were then further informed by open-ended survey data to better understand students' participation and discussion in the book clubs. To organize codes and relationships, we created tables to describe each code and note data that corresponded to each code for reference as we worked through data. Table 4 outlines our coding process of themes, codes, code descriptions, and corresponding data samples.

Table 4.

Sample Coding Scheme

Theme	Code	Code Description	Sample Corresponding Data
Personalizing Digital Discussion	Emotional Connections	Response explains a specific personal or emotional connection to an element in the book.	"I think it is because he wanted to make his father proud. Every kid, no matter how mean their parents may or may not be, still wants their parents to be proud of them, even if that means giving up on things they love to do."
	Communicating Reactions	Response demonstrates an attempt to relay personal reactions or emotions through digital text features.	"In the book they refer to the heart as fragile...Maybe that's why they get the operation...It's because these people might be scared of heart break...The operation may fix all their heart break, but the operation could never really save each person that gets the operation from "the horrible disease" called love, because we need love to learn lessons, to protect, and to live life."
	Relating to Characters	Response discusses a specific connection to character experiences or interaction with setting through an imagined interaction in the book.	"When we first met Macey I really didn't like her and when Cammie's mom came up with excuses to have Macey in the school, I was running through possible comebacks in my head."

Results

Two primary themes related to adolescents' participation in online book clubs emerged from analysis: (a) formality to promote shared learning and (b) personalizing digital discussion to make connections. Although distinct in analysis, we note here that overlap existed between these themes. For example, students used formal discussion techniques to convey personal and emotional reactions in discussion, hybridizing formal and personal discussion, a concept we explore further in the discussion. However, to fully examine both themes, we describe them separately as findings to better illustrate each theme.

Formality to Promote Shared Learning

Formal writing in discussion. Analysis indicated, with the exception of a few posts, that students almost solely employed formal language in their book discussions to clearly convey their response to literature. Characteristics of formal language reflected an academic approach to language and conventions, rather than informal language containing abbreviations, emoticons, and acronyms (West, 2008). Not only did they respond formally in the mechanics of their responses, such as using proper spelling and grammar, but more importantly through using language particular to academic environments. For example, students rarely included emoticons (two instances were noted), acronyms, abbreviations, or other conventions that are often present in online, informal discussions among teenagers (Crystal, 2001; Turner, Abrams, Katic, & Donovan, 2014), suggesting the online book clubs promoted an awareness of academic, Standard Written English (Grisham & Wolsey, 2006), seemingly to promote a learning-centric online discussion environment, even outside of an academic sphere.

We recognize that students may have viewed the public library and our status as university faculty as being associated with formal institutions, which may have influenced their language and formality, and we must consider that the setting and our roles had some influence on their use of formal language. However, we remained on the periphery of the discussion, only noting the transition from one book discussion to the next, and we encouraged students in the orientation to make the online space their own discussion space, posting ideas and opinions as they saw appropriate without the limitations that often exist in a school environment. Yet, students in this study used formal conventions of writing to clearly explain their ideas to an audience of peers. We noted the primary form of informal writing that appeared in students' responses was the use of ellipses to indicate thoughtfulness, rather than the omission of material. For example, Paige wrote about her connection to *Graceling* and utilized ellipses to indicate contemplation: "I would prefer unorganized and unplanned future more because I like surprises. If I knew what was going to happen every day it would get a little boring…you know?" (July 15, 8:36 p.m.). With the exception of nonstandard use of ellipses and capitalization in some places to express emotion, there was little evidence of intentional informal writing in the book club. Overall, students seemed concerned with communicating with multiple readers as clearly as possible and utilized formal writing and academic writing conventions to do so.

Additionally, students were careful to remain purposeful in their comments and used language and grammar that were accessible to other members of the online group. For instance, students discussed the theme of love in the Dystopian book club after reading the book *Delirium*, and their comments were clear and focused:

> *Bryce*: I most definitely would not want to live in the Delirium world. Love isn't a disease and [should] be encouraged, not crushed. (July 11, 7:44 p.m.)
>
> *Trish*: Love isn't something that can be cured. Love is something that is not only in your mind and in your heart, but it's in your spirit. That's not something I would give up for anything. (July 15, 3:21 p.m.)
>
> *Grey*: In the book they refer to the heart as fragile…. Maybe that's why they get the operation…. It's because these people might be scared of heart break. The operation [to keep people from feeling love] may fix all their heart break, but the operation could never really save each person from "the horrible disease" called love, because we need love to learn lessons, to protect, and to live life. (July 16, 8:46 a.m. Ellipses added to indicate excerpt.)

Each of these three students demonstrated strong academic writing, and all three indicated a clear understanding of the previous post(s). Further, this exchange highlighted students' understanding of audience, communication, and that different interpretations are acceptable in literature discussion, which are often foci of academic discussion in English. Although Grey did not include page numbers for his direct references in the book, he seemed aware that using examples from the text is a useful tool when defending a claim, which is common in academic writing and supported in widely adopted ELA standards (see National Governors Association, 2010). Bryce also utilized the text to engage others in a discussion of theme of emotional safety in a parallel discussion about the same book, *Delirium*. She drew on the setting of the story to make her claim: "Now no one is perfect, and in this world in the story they're trying to make everyone 'safe' and 'perfect'. Would any of you want to be a person nothing like themselves?" (July 15, 9:12 a.m.). These examples demonstrate that students extended their use of language beyond the colloquial and into the academic to engage with other students, which promoted shared learning in the online book clubs. Yet, according to Turner and colleagues (2010), the use of formal writing conventions is not always common in adolescents' online writing.

Students were also concerned with fully understanding each other's posts and, when there was the possibility of multiple interpretations, using concise and formal language to identify the author's purpose. Melissa and Grey had a brief conversation about a plot point in the book *Graceling*, which demonstrates how multiple interpretations were resolved:

> *Melissa*: Do you think when a Graceling is born and has two different colored eyes that another person with a Grace has the same two colors? (July 28, 10:45 a.m.)
>
> *Grey*: What do you mean? If the two people are born with the same Grace I do not think they would have the same eyes (if that is what the question meant). (July 28, 11:55 a.m.)
>
> *Melissa*: I mean, if they had a Grace, any Grace, do you think there is [*sic*] at least two people with same exact colors? (July 28, 1:44 p.m.)
>
> *Grey*: I really doubt it. There are so many possible color combinations out there. (July 28, 8:57 p.m.)

Grey wanted to engage Melissa in the conversation but was unclear as to her intent with the question. Thus, he explained his answer by identifying his own interpretation of her question in his response. Both Melissa and Grey demonstrated an attentiveness to audience in this exchange, as they sought to draw on common background knowledge in order to clarify and further their questioning.

Additionally, students revealed an awareness of writing and language by using specific literary terms or noting text features, akin to those that might be found in dialogue in a classroom setting. When describing *Graceling*, Sam drew on literary terms in her explanation of feelings about the book: "The Hunger Games is a Young Adults [*sic*] Dystopian novel and although this book would fit under the category of a Dystopian novel, when I think about a novel similar to the Hunger Games I think more of a post apocalyptic setting" (June 28, 11:53 a.m.). Sam focused here on genre and drew on characteristics of setting to explain her claim that she did not feel the book was appropriately placed in the Dystopian book club. Similarly, students also discussed how specific book features, such as images, supported their consideration of text. Amy noted, "I felt the graphics [in *A Monster Calls*] made me understand more about what the kid was feeling, the creepiness, sadness, and loneliness really shined through them" (August 12, 5:01 p.m.).

Formal facilitation of discussion. Students also spontaneously utilized more formal academic classroom techniques to facilitate and guide online discussion, often adopting roles that teachers frequently employ in face-to-face classroom discussions of literature, such as facilitators (see Short, Kaufman, Kaser, Kahn, & Crawford, 1999, for a full description of roles). In an attempt to facilitate discussion and keep exchanges moving forward, some students posed formal, efferent-response questions focused on textual, nonpersonal topics commonly used by teachers to prompt discussion (Short et al., 1999), throughout the book clubs. Yet, this type of formality often restricted, rather than promoted, discussion. For example, in response to the graphic novel *Maus*, Grey questioned, "Can anyone else name any other differences from what they read in this book set in the 1940s in Europe to today in America?" (July 30, 12:12 p.m.). Such questioning was used to elicit specific and direct text responses from book club members in a manner similar to that of an Initiate-Response-Evaluate (IRE; Mehan, 1979) model in which a teacher poses direct questions to students to evaluate their knowledge on a particular topic.

Some students posed similar questions to target connections found within the literature. Melissa posed one such question when she responded in the Action & Suspense book club forum: "I thought the craziest part [of *Au Revoir, Crazy European Chick*] was when after Gobi killed someone she would act as calm as can be and wouldn't explain why she killed them. Did anyone see a relation to the title of the chapter and the chapter?" (June 28, 10:38 p.m.). Questions such as Melissa and Grey's often seemed out of place in the mostly fluid online discussion and failed to stimulate response from book club members. While no group member responded to Grey's question about *Maus*, Melissa's question elicited only one response: from Sam, who wrote, "Hey, finally finished the book today. I agree with you that the craziest part was how nonchalant Gobi was after killing someone. That was downright creepy." (June 29, 5:38 p.m.). Sam's response only addressed only Melissa's opinion about the novel, not her question, which was also found in students' responses that followed similarly focused questions. Although both discussions continued after these questions were posted, the questions were not referenced or addressed by other group members. Therefore, these types of questions were a way that some students attempted to more formally facilitate discussion, but it did not prove to be an effective approach to meaningful discussion in this setting. Thus, formality served students well in their attempts to convey their own connections to the text and engage in conversation about compelling aspects of the text, but it was less successful when used to mimic teacher-led discussion questions. However, students also facilitated discussion by asking personal questions and drawing text-to-self connections, which prompted rich discussion about books and is described in the second thematic section.

Personalizing Digital Discussion to Make Connections

Emotion as expression. Although students used formal language and sometimes employed teacher-like approaches to facilitating discussion, perhaps in part due to the program's library affiliation and our university affiliation, they often simultaneously shared emotional responses to literature that personalized the online book clubs and expressed their connections to literature. These emotional responses that made us consider that the library's and our roles may not have been as influential in their discussion. These responses revealed sometimes raw emotional responses to their readings and expressed personal reactions we considered outside of the norm for formal settings. While they continued to facilitate discussion by posing questions and prompting responses from one another, many of these questions elicited responses that forged personal connections with one another. For example, participants discussed emotional connections with books, and several stated they cried in response to a book and likened those responses to those they had when reading other popular YA novels not on the book club reading lists. For example, some students, such as Bryce, discussed crying during sad scenes: "It was so touching that I actually cried when Alex was shot [in *Delirium*]. It was like killing of [*sic*] Peeta (from the *Hunger Games*) or Edward (from *Twilight*)" (July 11, 7:44 p.m.). Consequently, intertextuality was a consistent undertone of these emotionally driven responses, as students seemed to enjoy comparing books in the forums and making recommendations for further reading, as neither books from *The Hunger Games* or *Twilight* series were a part of this program's book club readings. Further, personal responses such as these were present from the start of the book club discussions, suggesting an initially high level of comfort with the online space that persisted until the close of the summer reading program.

Along with explicit responses describing emotions, some students used the book clubs to indulge personal connections through emotive expression. For example, Sam, in posting a response to *Wait Till Helen Comes*, used multiple techniques to communicate her emotional reaction to another student's previous post that the main character, Molly, was annoying. Sam posted the following:

> I agree with you about Molly. She was kind of annoying at times! I will say, though there were plenty of times I wanted to jump into the book and -BONK- her upside the head and tell her to do something about it instead of just sit there complaining. I also kind of understand how it feels to not have a parent believe you and it is practically impossible to change their minds once their [*sic*] set on something (though I guess teens do it to…heh…). I also agree that it wasn't necessarily "scary" as it was suspenseful (is that the right term???). (June 28, 10:10 p.m.)

Although Sam continued to use formal language in much of this post, she confided in her book club that she has had similar feelings to Molly's in regard to her relationship with her parents.

Considering perspectives. Other students adopted such personal and expressive stances through threaded discussion surrounding how they might feel if they were in the place of a character, what Ivey and Johnston (2013) call "social imagination" (p. 262), to make connections with text and one another. This is exemplified in the following exchange between three students about *Maze Runner*:

> *Amy*: I would have felt the same way as Thomas did and be confused and angry. Everything would have felt so surreal and imaginary that I would think I am dreaming. I would also have the same enthusiasm as Thomas and have that urge to explore and learn more about the mysterious place. (July 25, 7:26 p.m.)
>
> *Melissa*: I think I would have felt fear because of the feeling of not knowing about who I really am, how I got there, WHY I'm there, and where I am. (July 26, 8:27 p.m.)
>
> *Melissa*: I would feel confused and want to get as many answers as I could. I would feel angry at anyone if they did not answer my questions even thought [*sic*] they know the answer. Also, I would try to remember as much as I could while being stuck in the box. (July 27, 4:37 p.m.)

> *Frank*: I would feel fear because I couldn't remember anything… (July 27, 4:39 p.m.)

Exchanges such as this were common as students often took the perspective of a character in the novel being discussed and shared their feelings to connect their personal stance to the character's. Further, these types of emotive discussions often prompted increased participation, as exemplified in the previous exchange that took place in the Dystopian book club. We also note that this forum had the most posts and discussion members, and discussion was dominated by students' emotional responses and connections to text.

Posing questions to elicit personal response. Finally, analysis indicated students asked questions to prompt personal connection, which served to further facilitate socially connected discussion focused on emotion. For example, Bryce used questioning to stimulate further response by posting, "I like *Delirium*, because it creates a world in the future so different from ours...This is an interesting world...,but it's not a world I'd want to live in. Would you want to live in this world?" (July 8, 10:06 a.m.). Unlike the efferent-response questions referred to in the previous section, questions such as Bryce's sought to prompt students to consider their own reactions and opinions to place themselves in the literary world they were discussing. Often these types of questions allowed students to draw connections between their own lives and the literature and facilitated discussion, such as Frank's and Melissa's:

> *Frank*: Though this world has its pluses – not having to worry about your future and knowing when you get "cured" everything will be fixed. I would definitely not want to live in it because love is such a magical thing that should not be discouraged. (July 14, 11:42 p.m.)
>
> *Melissa*: Me too, love isn't something that can be cured. Love is something that is not only in your mind and in your heart, but it's in your spirit. (July 15, 3:21 p.m.)

Students' questioning often encouraged agreement or disagreement to convey personal opinions and connections. For example, in a conversation about the behavior of Molly in *Wait Till Helen Comes*, Amy disagreed with others' opinions and began questioning to encourage others to weigh in:

> *Amy:* I am going to have to disagree with the statements about Molly. I mean, what could she do? She tried telling her mom/Dave, didn't work. If she spent more time with her mom, Heather would bother her more about 'needing mommy'. She had a somewhat good feeling about Dave, but that vanished when he took Heather's side way too much. What else could she do? (June 29, 7:44 p.m.)

Amy's contribution incited responses from Grey and Sam, who elaborated on Amy's ideas by providing evidence that they read her response.

> *Grey*: I really doubt if she spent more time with her mom Heather would have complained. Heather hated her mom. (June 29, 8:50 p.m.)
>
> *Sam:* I understand what you're saying, after all we all saw (or read I suppose) how her mother took Dave and Heather's side...I have to say I did not like how their mother chose her relationship with Dave over the welfare of her children, and Dave was just plain mean to them. (June 29, 11:54 p.m.)

Students consistently used agreement or disagreement statements to sustain discussion throughout the book club forums not only to prompt discussion but also to reveal others' opinions and ideas about text content. These types of exchanges encouraged others in the book club to tap into their emotional or personal responses to literature, highlighting how students used the OSN as a personal—as well as formal—space for discussion about YA literature.

Discussion

The online book clubs seemed to prompt adolescents to spontaneously adopt online discussion techniques that hybridized formal discussion practices with more personal practices to encourage emotive transaction with text. The fluidity with which students moved among these practices and the characteristics of their responses in the online book clubs contribute important insights into our understanding of how students participate in online book clubs with limited guidance from adults. Further, we consider how teachers may utilize such practices in literature instruction to promote engagement in online literature discussion. We discuss here these insights.

Formality in language and response set the tone for digital writing practices across book clubs in this study. Students were intentional about the language used in their responses. They consistently demonstrated that they valued using grammatically and mechanically correct traditional language to clearly communicate their own interpretations and personal experiences with the text. This finding contrasted with Turner and colleagues' (2014) conclusions regarding adolescents' tendencies to use an abbreviated and symbol-driven language when engaging in social digital writing. We considered that this may have been because, unlike face-to-face book club conversations, the OSN enabled students to share at times that were convenient to them and when they could reflect on or edit a response before sharing it with others, similar to Wolsey and Grisham's (2007) findings. Further, all but two of the students were strangers to one another prior to the study. Students may have used formal language to clearly express their opinions and create online personae as knowledgeable readers prepared to engage in exchange about literature to create specific identities in out-of-school contexts, as Alvermann et al. (2012) found. Without being able to interview students about this formality, due to the voluntary nature of participation in this program and students not being available to meet with us following its conclusion, we considered that students wanted to present their ideas and selves in a manner that was appealing for the space and for their audience. For instance, although the program was set outside of school, the basic premise of discussing literature through a public library program facilitated by university researchers may have been perceived as school-like by students, particularly as many students were participating in the program for reasons outside of simply wanting to discuss literature for pleasure or interest. Yet, almost all indicated they enjoyed reading and discussing literature, and as noted previously, their high level of comfort in revealing emotion and discussing personal reactions somewhat offset the potential of the library and our university affiliations to be major influential factors in discussion. Still, those factors must be considered.

Students also may have been wary of deviating from the tone and style of initial discussion posts. Students could navigate among book club discussions in the online social network before posting their responses and participate in multiple book clubs simultaneously, which seemed to create a consistent tone and writing style across book clubs. This explanation is powerful in examining how initial interactions and opportunities to participate in multiple book club discussions shape an online space. This study suggests initial interactions in the book clubs were important to shaping the type of discussion that took place over the course of the summer reading program, and it is essential to consider development of online spaces for discussion in classrooms and the types of discussion and literacies teachers want to promote. For example, the students in this study were self-described good readers and enjoyed reading, and discussion data indicated they had a firm understanding of formal writing and language. However, students who struggle with formal writing and discussion techniques may be turned off by these types of book clubs. As teachers step into a facilitator role in online settings (Leu et al., 2013), they must consider the tone being set for the online discussion space, either by them or by students, and how to engage all literacy learners in the space and encourage multiple types of accepted discussion techniques to promote new literacies.

Educators may consider promoting text-to-self and text-to-world connections, as students clearly favored discussion that was personal and promoted text-to-self connections. The online book clubs in this study highlighted the multifaceted nature of adolescents' participation in online discussion as they formally considered and responded to new information and negotiated among each other to both defend and revise their interpretations and responses to a text outside of a grade-oriented classroom space in a personal and often emotive manner, confirming Rosenblatt's (1995) longstanding support for promoting student transaction with text in literary response. Rather than adopting and rotating through the traditional literature-circle student roles, often assigned in face-to-face discussion (Daniels, 2002), students simultaneously self-adopted multiple discussion techniques that allowed for their transactions with the text to be the focus of discussion. For example, students adopted discussion practices to promote their own interests to facilitate a particular type of online space, choosing to ignore some aspects of discussion while emphasizing others, which is more difficult to accomplish in a face-to-face setting. Rarely did a question arise about a specific plot point or clarification, but when it did, students either responded to these clarification questions quickly and with little elaboration or ignored the questions altogether. Instead, students were drawn to more meaningful conversation in which they could make personal connections to the text and with one another, similar to the fan fiction space described by Curwood (2013). Such connections drew parallels between these book clubs and affinity spaces, noting the importance of students' self-selection of literature to engage in more meaningful and connected discussion. Finally, the OSN allowed students extended time to join multiple conversations and consider different viewpoints simultaneously. These features highlighted the importance of asynchronicity (Larson, 2009), extended time in which to read and respond to literature, and spatiotemporal affordances of such a platform for facilitating meaningful and multiple discussions about literature.

Limitations

Although this study yielded promising results for online summer reading programs to connect traditional and online literacies, limitations must be considered. First, we did not compare the OSN book clubs to face-to-face book clubs and can only offer results regarding how an OSN was utilized in this summer reading program. Additionally, participation in this study and the summer reading program was voluntary, and we were unable to follow up with participants to interview them on their experiences and discussion techniques, as parents would have had to drive participants to a central location to meet with us. Further, our attempts to set up phone interviews were unsuccessful, possibly due to back-to-school activities and schedules.

We also note that our population of students was largely homogenous, consisting primarily of Caucasian female adolescents. Students in our study did not indicate a struggle with reading or discussing books, and most students indicated they enjoyed reading. Further, as the library director created the list of books, we do not have data that explicitly addresses the rationale for selecting those texts. We cannot address the extent to which book characteristics affected the type of discussion and response that occurred on the OSN.

The students also met us during the initial orientation meeting and knew we were affiliated with a university and worked in education. Further, we did provide broad initial prompts to move students from discussion about one book to the next, following the discussion schedule. Our findings could be informed by future research that attempts to diversify the population engaged in an online summer reading program and the roles adults play in facilitating discussion in a summer reading OSN. Also, even though students sometimes made book recommendations and remarked about books being made into films, they did not incorporate hyperlinks, images, or sound features (which are all features offered on the Ning) into their posts to elaborate their written responses. We did not explicitly encourage or instruct them in how to use these tools, but we did show students where to access the tools in the overview of the Ning network at the orientation meeting. Further, the Ning's structure was similar to Facebook, which all students indicated that they used. However, we did not collect data regarding students' use of such tools on Facebook or other online social networks. Therefore, we note the lack of these practices and this data as limitations in this study and encourage future research in online summer reading programs to explore how to better integrate all features of an OSN into literature discussions and the decisions students make to include or exclude these features from their online writing.

Conclusions

Leu et al. (2013) contended that in new literacy classrooms the role of the teacher may change but becomes increasingly important. We concur, but we also consider how students' discussion techniques of YA literature in online book clubs transformed literature discussion to become both formal and personal, and we also consider what specific roles the teacher may play to support such discussion in a classroom setting. Additionally, we found that online spaces with minimal adult support have strong potential for encouraging academic discussions of literature: Students participating in the OSN kept their discussion focused on the books and consistently utilized formal writing skills, while simultaneously employing sophisticated discussion skills to navigate and respond in the book clubs. These findings suggest minimal teacher involvement in online discussion spaces can yield thoughtful discussion about literature, if students are engaged in the literature being discussed. Under these specific circumstances, the absence of a teacher within a literature discussion seemed to be beneficial to students. Students explored their own questions and ideas, engaged in sustained discussions about literature, listened more actively to each other, developed their own strategies to initiate discussions, and encouraged each other to share or expand their ideas. The minimal role of adults in online discussion spaces seemed to offer increased opportunities for engaging students in out-of-class online conversations about literature, which suggests promising possibilities for including an additional learning project or activity in what are already full curricular schedules.

Thus, continual adult guidance may not always be necessary for meaningful discussions about literature in online spaces, but findings do suggest a need for teacher scaffolding for adolescents to sustain productive discussions of literature. As an example, we noticed that while some students in our study asked questions that prompted extensive discussion about their books, other students asked questions that received no responses. To prepare all students for engaging in discussions about literature, it may be necessary for teachers to model and integrate into instruction how to ask meaningful, thought-provoking questions, such as inferential or analytical questions into instruction (see Serafini, 2004).

This study also suggests positive implications for including YA-literature-focused online book clubs and out-of-class literature discussions to support literacy learning. Although book clubs and literature discussion have fallen somewhat out of favor in instruction in recent years, primarily due to a decreased focus on these literacy skills in standardized testing, the skills promoted through such activities are important for students to build academic literacy, for example, in English (Langer, 2011). Students in this study relied on traditional literary analysis skills, such as identifying literary elements, making specific intra- and intertextual connections, and using the text to support their claims. As a result, literary elements such as setting, characterization, and theme were prevalent topics throughout the conversations. Students grappled with issues of character motivation, the influence of setting on the plot, and overall thematic message, and they explained and revised their positions as a result of extended conversation with other students. Further, there were no established expectations for posting a response, so it is likely that students' responses were the result of genuine interest in engaging other students and in the literature selection (Curwood, 2013). Thus, establishing online book clubs focused on popular YA literature in English classrooms to supplement a traditionally canonical curriculum may authentically build literary skills prioritized in the study of English literature and support authentic learning experiences.

As noted previously, students may spontaneously adopt a more formal tone in online book clubs, as did students in this library program. However, we also encourage teachers whose students do not adopt such a tone, (e.g., students who struggle with writing or discussion) to consider the content being promoted in the discussion, as informal digital writing may still promote important thinking about a topic (Turner et al., 2014). Teachers may also consider how digital tools, such as video and audio recordings, might support all students' participation in an OSN book club and offer alternative routes to discussion for those who struggle with writing.

Finally, findings suggested that participation in an OSN could promote more concentrated student engagement with reading YA literature. Ivey and Johnston (2013) reported multiple dimensions of engaged reading as a result of interviewing and observing eighth-grade students in classrooms where self-selected YA literature was a predominant feature of the English curriculum. Several of these dimensions were also observed in our study. For instance, they noted that engagement was demonstrated by "widespread talk" about books (p. 261); we saw this often in our study when students made connections between book club selections and other titles they knew and when they recommended books to each other. Additionally, like us, they identified "social imagination," or the ability to assume another person's perspective, as a dimension of engagement. The parallels between Ivey and Johnston's findings and ours suggest that OSNs may be a useful tool for promoting reading and literary engagement with adolescents. Moreover, the ability of students to join multiple book clubs, a feature distinct to an OSN, may provide increased opportunities for engagement. Thus, we consider that the online book clubs in our study have the potential to encourage the sort of relational and socially interactive engagement with books called for in recent research.

About the Authors

Jamie Colwell is an associate professor in the Darden College of Education at Old Dominion University. Her research interests include digital literacy and disciplinary literacy, primarily focusing on adolescents and preservice teachers.

Lindsay Woodward is an assistant professor at Drake University. Her research focuses primarily on the intersection of technology and literacy, particularly in the fields of adolescent literacy and professional development.

Amy Hutchison is an associate professor at George Mason University. She studies the use of technology for educational innovation.

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* *Indicates a book club book title.*

Appendix A

Summer Reading Survey

Please read each prompt and bubble in **one** response for each prompt.

Next school year, I will be in _____________.
- o sixth grade
- o seventh grade
- o eighth grade

I am a _______________.
- o Female
- o Male

My race/ethnicity is _______________.
- o African-American
- o Asian/Asian American
- o Caucasian
- o Hispanic
- o Native American
- o Multi-racial/Multi-ethnic
- o Other: Please specify _______________.

1. My friends think I am _________________.
- o a very good reader
- o a good reader
- o an OK reader
- o a poor reader

2. Reading a book is something I like to do.
- o Never
- o Not very often
- o Sometimes
- o Often

3. I read __________________.
- o not as well as my friends
- o about the same as my friends
- o a little better than my friends
- o a lot better than my friends

6. I tell my friends about good books I read.
- o I never do this
- o I almost never do this
- o I do this some of the time
- o I do this a lot

7. When I am reading by myself, I understand
- o almost everything I read
- o some of what I read
- o almost none of what I read
- o none of what I read

8. People who read a lot are _________.
- o very interesting
- o interesting
- o not very interesting
- o boring

9. I am _____________.
- o a poor reader
- o an OK reader
- o a good reader
- o a very good reader

10. I think libraries are ___________.
- o a great place to spend time
- o an interesting place to spend time
- o an OK place to spend time
- o a boring place to spend time

11. I worry about what other kids think about my reading _____________.
- o every day
- o almost every day
- o once in while
- o never

4. My best friends think reading is ______.
   - really fun
   - fun
   - OK to do
   - no fun at all

5. When I come to a word I don't know, I can ___________.
   - almost always figure it out
   - sometimes figure it out
   - almost never figure it out
   - never figure it out

13. When my teacher asks me a question about what I have read, I ___________.
   - can never think of an answer
   - have trouble thinking of an answer
   - sometimes think of an answer
   - always think of an answer

14. I think reading is ____________.
   - a boring way to spend time
   - an OK way to spend time
   - an interesting way to spend time
   - a great way to spend time

15. Reading is ______________.
   - very easy for me
   - kind of easy for me
   - kind of hard for me
   - very hard for me

16. As an adult, I will spend _________.
   - none of my time reading
   - very little time reading
   - some of my time reading
   - a lot of my time reading

12. Knowing how to read well is _______.
   - not very important
   - sort of important
   - important
   - very important

17. When I am in a group talking about what we are reading, I ____________.
   - almost never talk about my ideas
   - sometimes talk about my ideas
   - almost always talk about my ideas
   - always talk about my ideas

18. I would like for my teachers to read out loud in my classes during the school year ______________.
   - every day
   - almost every day
   - once in a while
   - never

19. When I read out loud I am a ______________.
   - poor reader
   - OK reader
   - good reader
   - very good reader

20. When someone gives me a book for a present, I feel _____________.
   - very happy
   - sort of happy
   - sort of unhappy
   - unhappy

We would like to know more about you and your reading! Please answer the questions below to tell us more about yourself as a reader.

1. Why did you decide to participate in this online book club?

2. What is the most interesting story or book you have read recently? How did you find out about this story or book?

3. Did you read anything at home yesterday? What?
4. Who is your favorite author? Why is this author your favorite?
5. What are some things that get you really excited about reading?
6. Who gets you really interested and excited about reading?
7. Do you have a computer in your home?
8. If yes, please answer the following:
    a. How much time do you spend on the computer a day?
    b. What do you usually do on the computer?
    c. What do you like to read when you are on the Internet?
9. If you do not have a computer in your home, please answer the following:
    a. What would you like to do with a computer if you had one?
    b. Is there anything on the Internet that you would like to be able to read?
10. Do you share and discuss books, magazines, or other reading materials with your friends outside of school? If so, what do you share?
11. Do you write letters or email to friends or family? If so, how often?
12. Do you belong to any clubs or organizations for which you read and write? If so, which one(s) do you belong to?

A Generalizable Framework for Multi-Scale Auditing of Digital Learning Provision in Higher Education

Samuel R. P-J. Ross
University of Leeds, Okinawa Institute of Science and Technology, and Trinity College Dublin

Veronica Volz, Matthew K. Lancaster, and Aysha Divan
University of Leeds

Abstract
It is increasingly important that higher education institutions be able to audit and evaluate the scope and efficacy of their digital learning resources across various scales. To date there has been little effort to address this need for a validated, appropriate, and simple-to-execute method that will facilitate such an audit, whether it be at the scale of an individual program, department, faculty, or institution. The data are of increasing value to ensure institutions maintain progress and equity in the student experience as well as for deployment and interpretation of learning analytics. This study presents a generalizable framework for auditing digital learning provision in higher education curricula. The framework is contextualized using a case study in which the audit is conducted across a single faculty in a research-intensive UK university. This work provides academics and higher education administrators with key principles and considerations as well as example aims and outcomes.

Keywords: digital learning, audit, evaluation, learning resources, analytics, blended learning

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A Generalizable Framework for Multi-Scale Auditing of Digital Learning Provision in Higher Education

Digital learning resources, defined here as "learning content facilitated by technology with some element of student control over time, place, path or pace" (Horn, Staker, & Christensen, 2015), are increasingly being recognized to play a valuable role in the student learning experience (Fink, 2003; Gilbert, Morton, & Rowley, 2007; Weigel, 2002; Wong, 2013). Digital supplementation and enhancement of learning has frequently been shown to have positive effects on the student experience, both in terms of student grades (e.g., Papastergiou, 2009) and student satisfaction (Golden, McCrone, Walker, & Rudd, 2006; Davies, Mullan, & Feldman, 2017);

indeed, recent surveys of students indicate the importance of having digitally skilled staff providing appropriate experiences to support learning as well as the students' perception of the value of having technology deployed to support their education (Sclater & Mullan, 2017).

With the continued design and implementation of more interactive, engaging, and even personalized experiences, integration of digital learning in teaching settings continues to show promise (Wagner, 2006). Accordingly, the majority of higher education institutions are rapidly integrating digital resources into their programs of study (Garrison & Kanuka, 2004; Hiltz & Turoff, 2005; Brown et al., 2014), driven by considerable recent advances in the availability and range of such resources along with advances in the technology and theory behind their use (Alpert & Blitzer, 1970; Hiltz & Turoff, 2005; Littlejohn & Pegler, 2007; Brown, Jacobsen, & Lambert, 2014; Reiser, 2017). Indeed, it has become the expected norm that programs will offer digital resources to support teaching, with students seeking out digital resources to support their learning if they are not specifically offered by the institution. With this increasing adoption of digital learning resources, the onus is now on the institution to offer a curated, tailored experience to optimally support learning and ensure the accessibility and appropriateness of such support. Naturally, some areas—be they institutions, faculties (i.e., a division within a higher education institution comprising one or more related subject areas), or subdisciplines—begin to fall behind in this "digital revolution," and institutions that fail to meet these expectations are increasingly viewed as giving substandard provision and support (Sheehan & Mihailidis, 2007; Bigum & Rowan, 2008; Davies et al., 2017).

Digital learning resources may be adopted in higher education in a variety of contexts and to varying degrees. At one end of the spectrum are completely digital online courses, such as Massive Open Online Courses (MOOCs; Christensen et al., 2013; Kop, 2011). Conversely, there are currently numerous smaller ways that digital technology or resources can be integrated into traditionally nondigital teaching and learning practices, such as for species identification in biology field courses (Jeno, Grytnes, & Vandvik, 2017); professional development and peer review (Collins, Cook-Cottone, Robinson, & Sullivan, 2004; Laru, Järvelä, & Clariana, 2012); music creation and evaluation using individual mobile applications (Birch, 2017); and for enhancing learning through the use of interactive, responsive games (Kiili, 2005). The use of such tools and resources needs to be optimized for and appropriate to the learning context, but deployment is frequently spearheaded by enthusiasts or by localized initiatives in selected areas of a curriculum or overall learning experience. This organic and relatively unmoderated spread of digital tools and resources within the curriculum can lead to large variation within the student experience (Gilbert et al., 2007), which is important to understand and visualize if student feedback and the overall student experience are to be analyzed appropriately and developed in a constructive, strategic, and progressive manner.

As such, the importance of measuring and monitoring the implementation of different forms of digital learning and associated resources within higher education institutions is continually growing. Although Leacock and Nesbit (2007) present a framework for evaluation of individual learning resource objects in terms of their quality, there is currently no published method of measuring the deployment of digital learning in higher education institutions. Such a methodology is increasingly required to allow monitoring of trends as well as progression, variability, and development of the efficacy of digital learning alongside the uptake and deployment of blended learning (Adams Becker et al., 2017). This has become particularly relevant in the UK with the introduction of the Teaching Excellence Framework (TEF; Business, Innovation and Skills Committee, 2016), putting the onus on institutions to demonstrate progression in the development of teaching excellence and resources to support students. Another key driver to implement such an audit is the increasing use of learning analytics to assess key indices of student progression and attainment, potentially permitting early intervention and individual tailoring of the learning experience to optimize progression (Sclater & Mullan, 2017). Such information is potentially uninformative if not supplemented with key data on the elements of the learning experience the student encounters.

This study presents a generalizable framework for auditing digital learning in higher education institutions, with the aim of providing a method that allows higher education administrators and academics to monitor and evaluate the deployment of digital learning resources and techniques. A case study audit of digital learning conducted across a biological sciences department in a research-intensive UK university is presented as an illustrative example of how the framework can be implemented to address specific key aims and objectives. It also illustrates how such an audit can be used as a developmental tool in the longer term by setting baseline values of digital learning provision. This framework aims at generalizability and thus presents ideas for extensions beyond the scope of the present study. This study fills a critical gap in how audits of digital learning resources could be conducted in a higher education context.

Methods

Study Design

This study aimed to establish a robust means to audit digital learning, allowing comparison of resource use and types of resource deployed and, consequently, help address issues regarding equity and development of the learning experience. The resultant tool and approach are also intended to permit monitoring of progress, feed into future work considering the efficacy of resource use, and intrinsically encourage development. The approach taken is an evaluative case study using an embedded single-case design permitting a holistic overview but also analysis and cross-comparison of subunits (see Yin, 2014). The audit tool was initially conceptualized, developed, and then trialled using the data available locally, forming the case study presented here.

Audit Method

A flagship audit of digital learning resources was conducted in a large faculty within a research-intensive UK university. This audit had the key aim of being able to measure the deployment of digital learning resources, and support of teaching through such resources, at multiple levels within an educational institution. The basic unit used for assessment was a module. A *module* represents a largely self-contained unit of teaching on perhaps a single topic or group of related topics or concepts. Such modules could consist of material developed over several weeks or over shorter periods, but for the purposes of this schema they represent a unit that can be clearly delineated and defined as a distinct element of taught content contributing to the overall student learning experience. Modules may vary in their format and assessment style. Some modules may be entirely lecture based and assessed solely by written exam in a manner very traditional in higher education, while others may be entirely coursework based, research focused, and operated with or without lectures, exams, or practical classes. A module is a convenient unit of assessment for many institutions since such units of classes are usually readily identified as such by students and staff alike and typically have their own space for resources on learning management systems (LMS).

Each module was audited individually as part of the protocol for evidence of digital teaching and learning resources. This involved reviewing the LMS space and associated materials for any digital resources and recording their quantity and nature (see Table 1). Module staff were consulted via e-mail to confirm the findings and ensure the identification of resources that might not be linked to the LMS space for the module. This resulted in a module-by-module breakdown of the volume of digital assets deployed for use in learning and teaching. The full audit process is outlined in Table 1.

Table 1.

The Audit Framework

Audit Stage	Purpose	Details of process
i	**Decide what to audit**	Digital learning resources, other learning resources, examinations, teaching audits, and blended learning resources are all options.
ii	**Decide where to audit**	The scale at which the audit is being conducted (e.g., university level, faculty level, school level, or specific degree program).
iii	**Decide the aims/goals of the project**	Is this an exploratory audit aimed at getting baseline values, one with specific comparisons that need to be made (e.g., does A have more digital learning resources than B?), or one with aims/goals set externally or at a higher level?
iv	**Decide what to measure**	If measuring digital learning resources, then should they be partitioned according to student value or some other measure? The example case study presents a categorization of digital learning resources based on volume of resource provision balanced with their anticipated interactivity value and role in promoting digitally supported self-directed learning.
v	**Conduct the audit**	This is generally a simple count, but it may require several hundred person hours for large-scale audits. For reference, the faculty-level audit described in this study took approximately 400 person hours.
vi	**Confirm findings**	Check the accuracy of the audit by verifying with those who own or contributed to the resources.
vii	**Visualize and interpret results**	Has the audit resulted in enough data to sufficiently address the aims/goals set out in Stage iii? If not, continue auditing (Stage v).
viii	**Answer questions**	Report findings and answer questions or address aims/goals set out in audit Stage iii.
ix	**Revisit and monitor trends**	Most audits are not likely to be used as a single instance answering one question, but rather as a tool for monitoring/evaluating long-term changes in the audited unit. As such, an initial audit is necessary to establish baseline values, but then planned follow ups at regular intervals should be considered to monitor trends.
x	**Respond to results**	After monitoring trends, audits should be followed by actions to allow for improvement in areas that appear to be consistently underperforming or those which could be used as beacons of good practice.

Note: Table presenting the recommended framework for conducting audits of digital learning, broken into Steps *i–x*. It is recommended that these steps be followed to ensure the success of such an audit.

Digital resource formats. To identify the type of digital resource being deployed, resources were each associated with discrete categories depending on their nature. Some resources are inherently more difficult to categorize than others, but broadly speaking, all resources could be matched to the categories presented in Table 2.

The resource format categories were ranked on a scale of 1 to 5 (lowest to highest, respectively) in terms of their considered interactivity value and contribution to enhancing the student learning experience (see Hill & Hannafin, 2001; Song & Hill, 2007; Traxler & Kukulska-Hulme, 2005). At their most basic, resources are passive and, although useful, lack the interaction and feedback elements which encourage further exploration and interaction with the subject matter. Learning is generally considered to be enhanced if the number of interactions with the material via several differing viewpoints can be increased along with useful feedback to permit correction and reinforcement (Laurillard, 2002). This, of course, is situation and subject dependent and so must be tailored as appropriate. For this study, a team of experts utilizing blended learning locally discussed and trialled values as deemed appropriate to score the anticipated impact on student learning of the resources for this context. While such scoring has a high level of subjectivity and should be adapted based on further evidence as it becomes available and as an audit operates, the current values presented in this study aim at generalizability, with the interactivity of digital learning resources representing general patterns which should hold true across most contexts.

Table 2.

Digital Learning Resource Formats and Interactivity Values Used in This Study

Learning resource type	Description	Examples	Interactivity value
Noninteractive web links	Web links that allow students to passively read information without actively having to interact with a resource.	Wikipedia page or similar read-only site.	1
Internal skills development links/resources	Resources provided by the host institution that aid skills development and are hosted within the institution's web space.	Resources for improving numeracy or English skills in spare time, etc.	2
Audio/video resources	Video or audio resources provided directly via the digital course space or indirectly via external links.	YouTube videos, podcasts, etc., but *not* the university's lecture recording scheme.	3
External teaching/learning resources	Learning resources available from sources external to the institution or digital material associated with guest speakers that do not form a mandatory part of the course.	MOOCs provided by other institutions.	3
Games	Online and interactive educational games.	Game-show-style multiple-choice quizzes with feedback created in Adobe Captivate from built-in templates (note: this is categorized as a game because of attempts to mask the test component/lighten the experience).	4
Discussion boards	Online forums for students to interact with each other and teaching staff.	Blackboard Learn discussion boards within the VLE.	4
Interactive external web links	Websites which involve user interaction (i.e., more than just reading a page).	Textbook supplements, blogs, interactive maps, etc.	4
Online quizzes/coursework	Formative/summative digital tests, interactive workbooks/laboratory books, blogs, and resources that respond to student response and progression online.	Multiple-choice, fill-in-the-blank, matching, and calculation questions or interactive workbooks made in packages such as Adobe Captivate and Articulate Storyline.	5

Note: Digital learning resources audited in the case study all fall into one of the categories presented here. Each category is accompanied by a description and example resource that would fall within that category. Additionally, this table provides interactivity values which can be used to weight digital learning resources by their a priori potential for self-directed student learning (see Equation 1), with higher values representing more interactive and engaging resource categories.

Digital Learning Score Formula

Equation 1 shows the calculation for the digital learning score, which accounts for both quantity of resources and a weighting to account for the interactivity value of the resource. These scores are valuable ensuing data analysis and comparison.

$$DL_S = 1 + \sum | DL_N \text{ x } DL_I | / C$$

Equation 1

Where DL_S is the digital learning score, DL_N is the total quantity of digital learning resources in a given category (see Table 1), DL_I is the interactivity value assigned to each digital learning resource category (Table 1), and C is an absolute measure of course size. As such $\sum | DL_N \text{ x } DL_I |$ represents the sum of the absolute value of the quantity of each digital learning resource category when accounting for their interactivity. This is then standardized as a relative unit size for each course being audited (C). The basic unit here was a module, as defined above, but due to variation in the weighting or size of each module within a program of study undertaken by any student, it is necessary to account for potential bias. At many UK institutions, the weighting of teaching is defined by credits, where each module can be given a credit value representative of its taught content volume. As such, this was the most appropriate factor to use for weighting this audit. Normalization to credit value is therefore simply accomplished by dividing the summed product of DL_N and DL_I across all digital resource categories by the credit value of each module (C) (e.g., a 20-credit module was divided by 20, while a 40-credit module was divided by 40).

By taking account of both the quantity (DL_N) and interactivity (DL_I) of digital resources, the digital learning score (DL_S) can be assessed to check that it does not systematically bias the results of the audit toward courses of large size (and hence those that are naturally expected to have a greater quantity of resources) or those with few but highly interactive resources. This was the intended aim of this study: to approximately equate quantity with interactivity such that an increase in digital learning score across modules represents roughly even increases in both these components of a module's digital learning score, balancing the consideration of volume and estimated teaching value of resources (as verified in the illustrative case study that follows). This, of course, could be deliberately weighted to prioritize one or the other element.

Case Study

The core aim of this study is to outline how an audit of digital learning resources can be conducted at a large scale in a higher education setting. The concepts and practical application of this are explored through a case study of a digital learning audit in a biological sciences faculty in a research-intensive UK university. This is a large faculty with approximately 2,275 undergraduate students enrolled in taught programs at any one time and 160 teaching staff. This audit focused on modules that formed a compulsory or optional component of any single-honors undergraduate degree within the faculty for the 2015–16 academic year. The faculty operates taught programs within subject-orientated schools, designated here as School A, School B, School C, and School D. A total of 183 individual undergraduate taught modules are run within the faculty each academic year, ranging in content value from 10–60 credits, of which students must take 120 credits per academic year. The modules are units of teaching taken from a range of disciplines at the undergraduate degree level and, as such, represent the typical challenge of auditing a very diverse set of activities. Each module has its own digital space on Blackboard's Virtual Learning

Environment (VLE; Blackboard, 2017) where students can find resources and support for each module.

The case study was undertaken to address the following key questions:

1. To what extent has digital learning been implemented across modules, degree programs, program levels, and schools within the faculty?
2. Where are the current gaps in provision and how might these gaps be reduced?
3. How can the results of this audit be used to inform a digital or blended learning strategy for the faculty?

Results

Analysis of Digital Learning Score (DL_S)

All analyses were performed in R version 3.2.2 (R Core Team, 2016). To assess the scoring methodology, a Spearman's rank correlation between digital learning score (DL_S) and raw volume of resources (DL_N) for the case study example was produced. The results, as shown in Figure 1, reveal a significant positive relationship between volume of resource provision and anticipated interactivity and engagement (Spearman correlation $r = 0.77$, $p < 0.0001$). For the purposes of this audit's aims, this indicates that the weighting had appropriately balanced the scoring between the type of resource and the volume of provision, as desired. The presence of either a lower volume of highly interactive resources or many less interactive resources did not more heavily influence overall digital learning scores here. This suggests that despite less interactive resources being easier to develop and deploy, digital learning scores were not effectively penalized by investing more in one resource type than another, so DL_S approximately equates the contribution of volume (DL_N) with resource interactivity (DL_I).

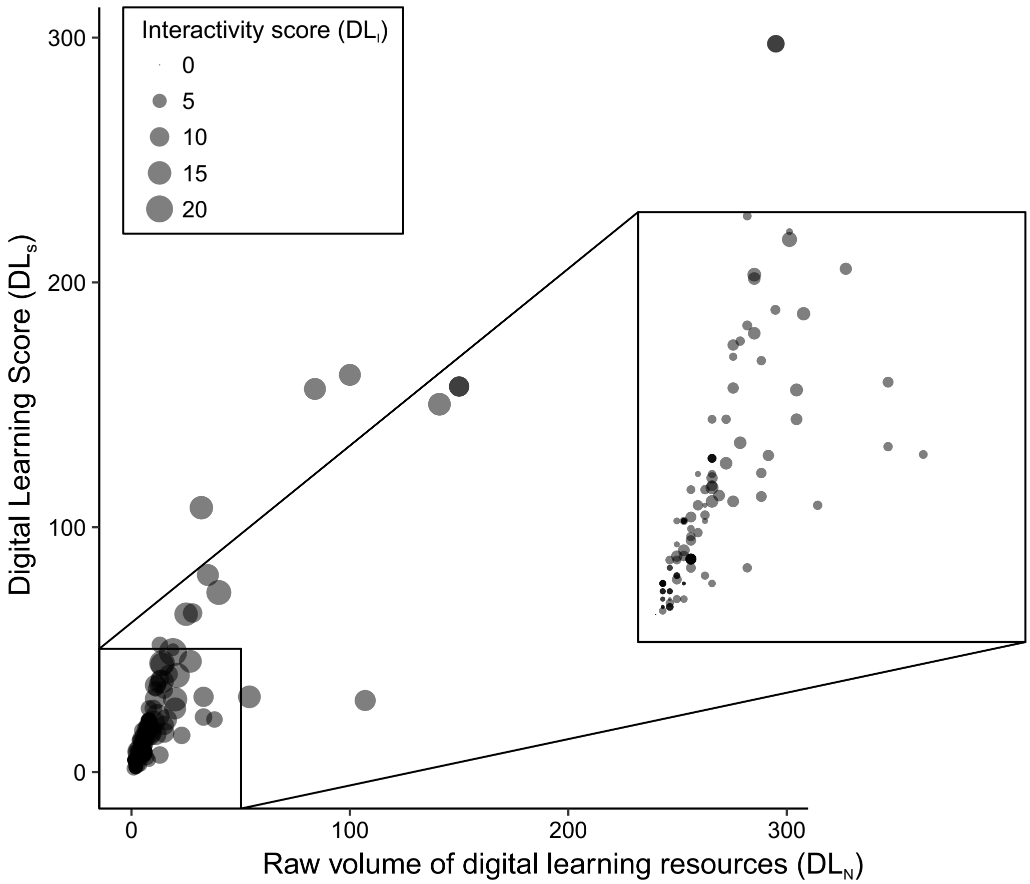

Figure 1. Relationship between raw volume of digital learning resources (DL_N) across all digital resource categories (see Table 2) and digital learning score (DL_S) for all modules in the case study audit. Individual data points are specific modules within the faculty. Data-point size represents an increasing interactivity score (DL_I) of all the combined digital learning resources for a given module. The expanded section shows scores in the range 0–50 for both axes.

Case Study Results

To address the first main question of this case-study, "To what extent has digital learning been implemented across modules (see Fig. 1), degree programs, program levels, and schools within the faculty?" this section presents results of the digital learning audit across schools, degree programs, and program levels, and highlights some trends in resource use across the faculty.

Learning by school. To determine if there was parity between schools in terms of digital learning resource provisioning, variation in volume of digital learning resources (DL_N), their interactivity (DL_I), and digital learning scores (DL_s) of all modules were compared across schools and with amalgamated values from across the entire faculty. Figure 2 shows significant variation in the volumes (ANOVA: $F = 6.35$, $p < 0.001$), interactivity (ANOVA: $F = 4.11$, $p = 0.008$), and scores (ANOVA: $F = 4.18$, $p = 0.007$) based on digital learning resources between schools, with Schools B and D showing the highest average DL_S, particularly with several extreme values within School D. The variation in all boxplots displayed in Figure 2 suggests disparity within as well as between schools. Note that in the case of School D, the main driver of variability appears to be a particular subset of six modules with high numbers of resources but not necessarily high interactivity values; a potential issue worth further investigation. Note however, that School D also appears to have the highest average interactivity values within the faculty. School C appears to have the lowest values across the board, with lowest DL_N, DL_I, and DL_S values on average, all below the faculty-level average (Fig. 2).

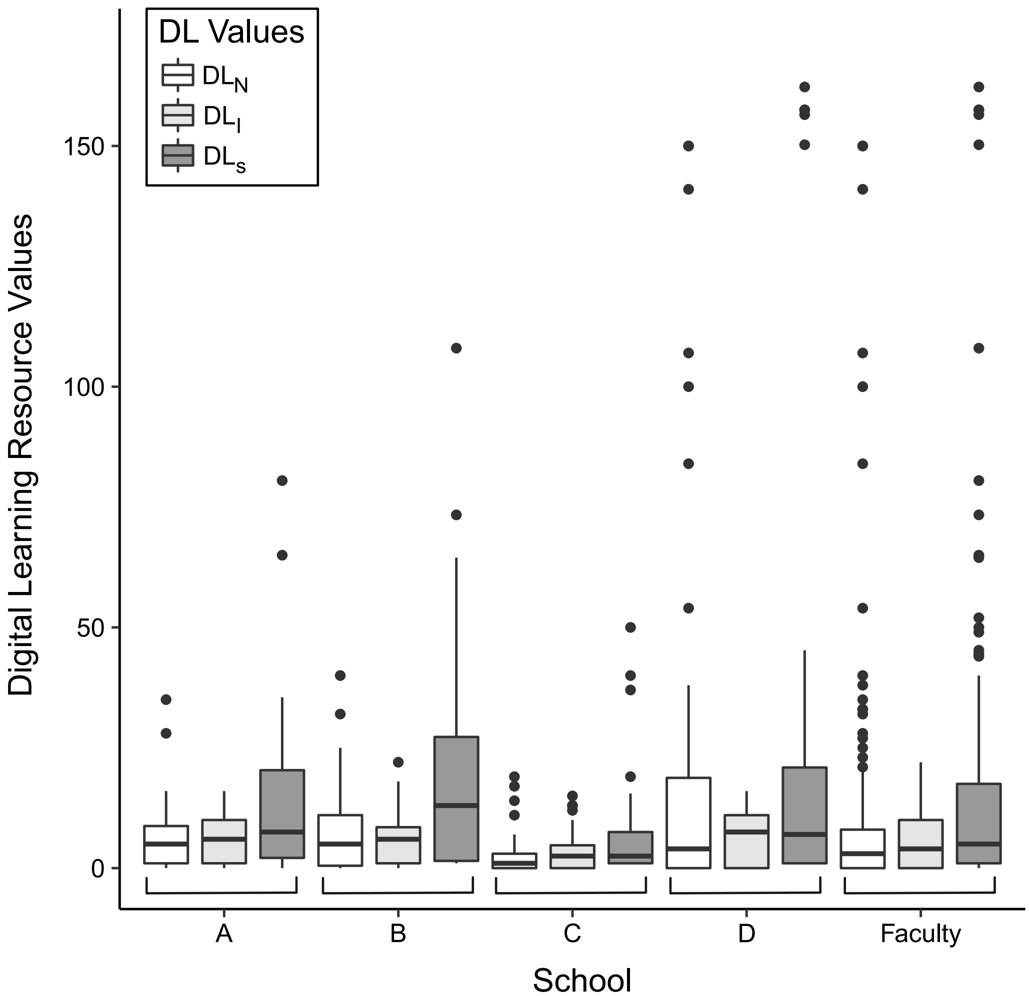

Figure 2. Boxplot of digital learning resource provisioning of schools within the case study faculty (named A–D) and at the faculty level. Each data set is plotted to show the median (line), quartiles (box), and 95% confidence limits (whiskers) along with outliers (points). The first column of each plot set (white boxes) represents the raw volume of digital learning resources (DL_N), light grey boxes represent the cumulative interactivity score (DL_I) of all different digital learning resource formats used in each school, and the last of each group—the dark grey boxes—represent the digital learning scores (DL_S) of each school as calculated using Eqn. 1. Note that for visual clarity, two outliers each at ~300 DL_N and DL_S for School D and, consequently, the entire faculty data are not shown at this scale.

Digital learning by degree program. By subdividing the school data, a refined examination of individual degree programs can determine the extent to which student experience of digital learning differs by degree program. By presenting the variation in DL_S values from all modules (compulsory and optional) available to students of a given degree program, a general trend for which degree programs are currently providing greatest exposure to digital learning and the variance between programs can be identified (Fig. 3).

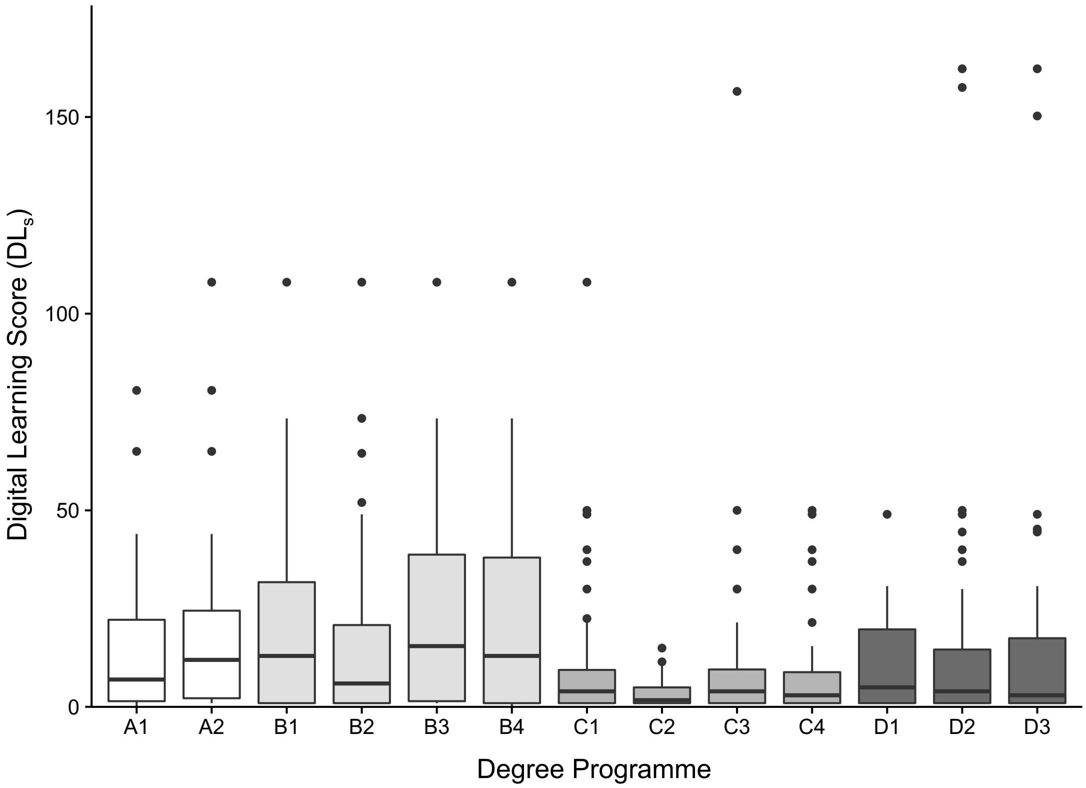

Figure 3. Boxplot of digital learning scores (DL_S) for each degree program within the case study faculty. Colors and codes correspond to parent schools (A–D) from Figure 2 such that Programs A1 and A2 (white) fall within School A, Programs B1–B4 (light grey) fall within School B, Programs C1–C4 (medium grey) fall within School C, and Programs D1–D3 (dark grey) fall within School D. Each data set is plotted to show the median (line), quartiles (box), and 95% confidence limits (whiskers) along with outliers (points). For visual clarity, two outliers each at ~300 DL_S for Programs D2 and D3 are not shown.

As opposed to the school comparisons (Fig. 2), we did not find significant variation among degree programs in their average DL_S values (ANOVA: $F = 0.58$, $p = 0.86$; Fig. 3). It should be borne in mind that these values are based on all the compulsory and optional modules available to students on a given degree program and, as such, the actual experience of students in these programs likely varies based on individual choice of optional modules. The variability around each mean in Figure 3 thus reflects the extent to which module choice can impact student experience of digital learning provision. For example, module choice of students on Program C2 will not affect their exposure to digital learning resources as much as students on Program B3 (or most other degree programs).

Digital learning by program level. It could be expected that as program level increases, general deployment of digital learning resources to support teaching decreases (Gow & Kember, 1990; Kemp & Jones, 2007), predominantly due to the increased focus on independent learning and further focused study outside of more generic resources/material provided in the latter years of most degree programs. Faculty-level data on DL_S values across program levels support this, with significant variation among program levels in their DL_S values (ANOVA: $F = 41.1, p < 0.001$) and DL_S values decreasing on average across Levels 1 to 3 (see Fig. 4).

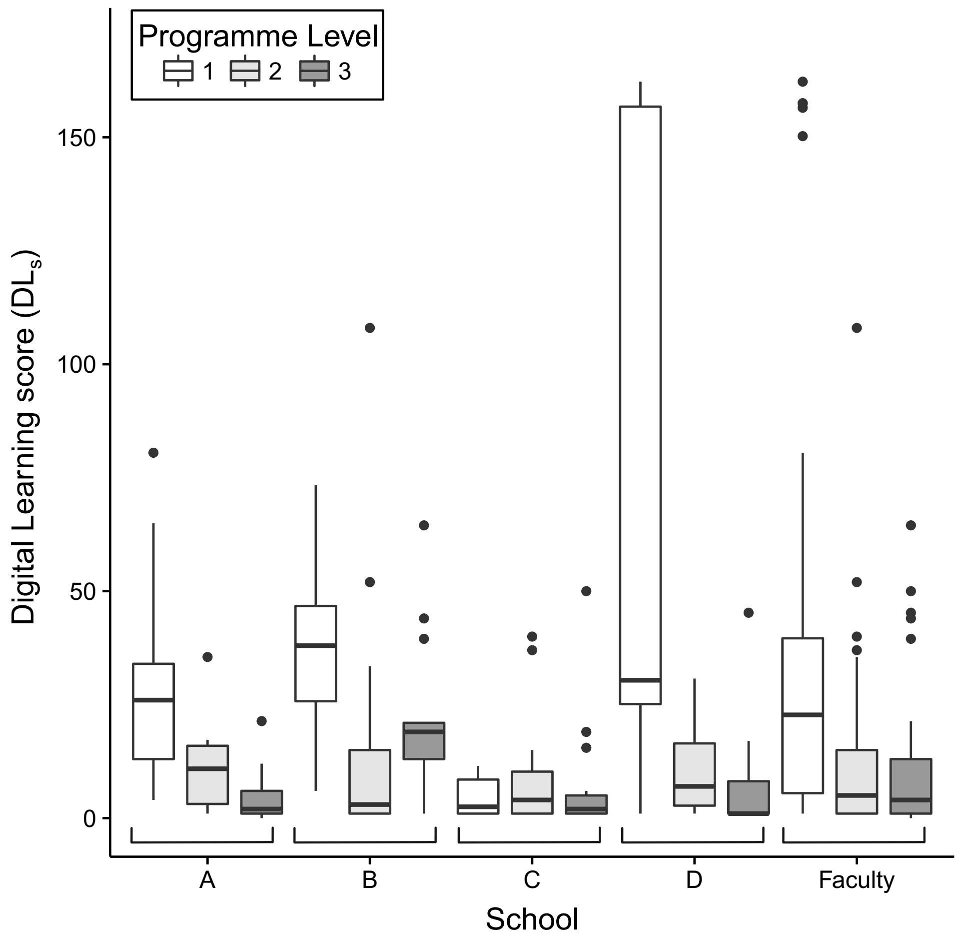

Figure 4. Boxplot of digital learning scores (DL_S) of each school (A–D) and at the faculty level, broken down by degree program level. Each data set is plotted to show the median (line), quartiles (box), and 95% confidence limits (whiskers) along with outliers (points). Box colors represent program levels such that white boxes represent Level 1 (first year), light grey boxes represent Level 2 (second year), and dark grey boxes represent Level 3 (final year). (For visual clarity, two outliers at ~300 DL_S for School D at Level 1 and the entire faculty are not shown).

Two schools follow this faculty-wide trend of decreasing DL_S with increasing program level, with the exception of Schools B and C, which have lowest and highest digital learning scores during the second year of the three years, respectively, highlighting an unusual outlier of activity and inconsistency for further investigation.

Resource-use trends. Moving away from digital learning scores across the faculty, raw volumes of digital learning resource provision (DL_N) can reveal which types of resources are most common and in which areas. Indeed, we found significant variation among resource categories in their provision across the faculty when testing for differences in the observed and expected provision of different types of resource and assuming as a null hypothesis that resources should be equally implemented irrespective of their format (chi-square test: $X^2 = 2667$, $p < 0.001$). Figure 5 shows that online quizzes/coursework, the most interactive resource types (see Table 1), are the most commonly used across the faculty, followed by noninteractive web links and audio/video resources. Games and discussion boards were among the least used resources across the whole faculty in this case study.

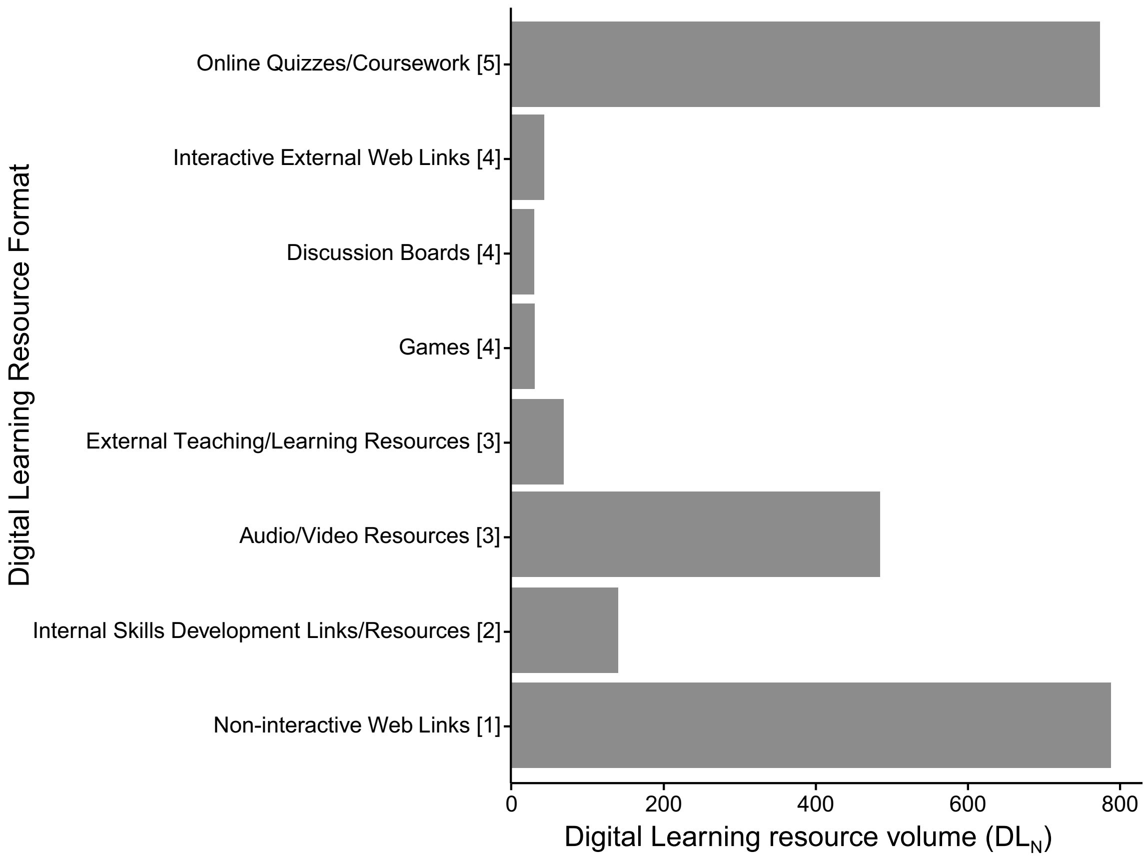

Figure 5. Raw volume of digital learning resources (DL_N) by resource category across the entire case study audit. Results are absolute volumes of digital learning resources falling within the categories first outlined in Table 2. Interactivity values used to calculate DL_I are shown in square brackets, and resource format categories are ordered by interactivity values (Table 2) from most interactive (5) to least interactive (1).

Discussion

This study addresses the increasing popularity of and advances in digital learning resources and technology (Hiltz & Turoff, 2005; Kim & Bonk, 2006), and the subsequent need for higher education institutions to monitor their use of such resources (Mitchell & Honore, 2007). Students at all levels of education are routinely exposed to a wide range of teaching and learning techniques satisfying the definition of *blended learning* (Horn et al., 2015). The extent to which digital support of learning is experienced by any individual student will, however, frequently vary depending on the use of such tools across the elements or modules of their program of study. This potentially wide variation is typified in the results of the case study above, often due to varying taught content but also the fact that much development in the use of digital resources has been pioneered by individuals who independently develop and experiment with the use of such resources. Indeed "top-down" approaches implementing digital solutions that are not tailored to learning content have a notorious history of poor success (e.g., Lapowsky, 2015; Oppenheimer, 2003). Nonetheless, it is increasingly important to get a meaningful, potentially quantified oversight of the student experience, and data of this type are of increasing value in the rapidly developing area of learning analytics (Sclater & Mullan, 2017). Yet, to date there is no widely recognized method for auditing digital or blended learning, making such monitoring unprecedented and ultimately challenging (Garrison & Vaughan, 2008).

An audit of digital support of learning assists in assessing differences in learning experience between students. It is only with this contextual backing that we can understand the perception of teaching and learning by individuals and the entire student body as well as identify trends and developments, such as those observed between levels of study (see Fig. 4). Such insights, as permitted through the accrued data, will prove valuable in directing strategic development as well as highlighting pockets of excellence. Ultimately, such data could also be used to empirically test the general efficacy of blended learning approaches, giving direct evidence to ensure efficient and appropriate development of digital resources. As an example from within the presented case study, for one module it had been identified in a previous year that there was a lack of online support tools. Subsequently, a package of teaching materials was developed to allow revision of the taught material interspersed with a variety of online quizzes. Introduction of this resource was popular with the students and led to a quantifiable significant increase in average attainment on the module (data not shown). This clearly indicates the value of using an audit such as this to identify areas where such support is missing and using it to direct development. It also has great potential for cross-comparing effectiveness of different tools. For example, if resources such as this had been introduced and had no influence or relatively limited impact compared with such changes elsewhere in a program, it could indicate a lack of use or relative ineffectiveness, allowing for rationalized prioritization of development and investigation of resource impact.

Reviewing the Audit Process

The audit process as outlined proved straightforward to implement, largely due to the highly centralized containment of resources and links to these from the LMS system. Additional resources were identified from staff and, thus, helped ensure the validity of the study. This extra requirement negated the ability to implement possible automated or semi-automated implementation of the audit, although with extensions to the data-gathering process, this remains a possibility, with further developments from many LMS providers increasingly allowing this semi-automated approach (e.g., Blackboard Analytics; see Blackboard, 2017). Table 1 outlines the framework that was used to undertake the audit, along with key considerations for the audit process. This framework outline is valuable for developing audits of such resources at the same scale as that implemented in the case study (a higher education institution faculty) but is also readily adaptable to other scales, such as an institute, individual program or single subject/school. Critically, whether these audits are conducted following this framework or not, it is increasingly important that evaluation of digital learning in higher education take place (McGee & Reis, 2012; Pahinis, Stokes, Walsh, Tsitrou, & Cannavina, 2008; Wagner, 2006), especially as students are now, more than ever, being raised in a digitally connected world (Buckingham, 2013; Kennedy, Judd, Churchward, Gray, & Krause, 2008).

Analysis of Digital Resources

For the present case study, scoring was balanced to construct a synthetic statistic equating volume of resource provision (DL_N) with resource type and, hence, interactivity (DL_I). The premise was that more highly interactive resource types promote greater engagement, which is a key driver for use of digital resources (Davies et al., 2017), but also require more time and resources to develop and deploy. It is not desirable to simply weight by volume of resources since this is likely to encourage and misinterpret the use of large volumes of poor-quality resources. Equally, it is not desirable to have very limited resource availability making for a limited or restrictive digital learning experience. This study aimed to recognize any use of resources that encouraged directed exploration of associated materials and allowed multiple repeated interactions from novel perspectives and modalities, since this best promotes learning (Laurillard, 2002).

The balance reached in the case study was appropriate to the purpose, but in future work and for other audits elsewhere, attempts may be made to score use according to documented efficacy to create a more strongly evidence-based audit of teaching practice. For example, online practice of questions has been shown to subsequently improve performance when answering similar questions in examinations (Bailey, Jensen, Nelson, Wiburg, & Bell, 2017). A cautionary consideration for this, though, is the fact that learning context may be more important than digital resource type in identifying what best supports the learning experience (Manches, Bligh, & Luckin, 2012). As such, an additional consideration for future development is tailoring of the scoring for individual programs and modules where there is evidence to support the preferred use of one type of resource over others.

Case Study Outcomes and Analysis

The results presented above successfully addressed the first key question of this audit: “To what extent has digital learning been implemented across modules, degree programs, program levels, and schools within the faculty?” The second question, “Where are the current gaps in provision and how might these gaps be reduced?” was similarly addressed by analyzing these results. Disparities between schools and program levels were noted, but there were limited differences among degree programs. For example, School C had the lowest average digital learning scores across the faculty, so it seems likely that targeting additional support at School C would make a significant contribution to improving parity between schools. Conversely, using modules and areas with high digital learning scores as beacons of good practice may provide examples of how certain areas can improve the implementation of digital learning resources to even out any gaps in provision. A key piece of future work building on this study will be to validate the scoring of resources by testing the efficacy of the component resources, refining the methodology but also permitting appropriate prioritization of development. For example, if the introduction of elements which are currently underutilized in particular areas (e.g., games) correlates with improvements in learning attainment, this would clearly justify development and further deployment of these types of resources. Conversely, if the increased deployment of simple online quizzes produces no further gains in attainment, then this may indicate diminishing returns on investment even for such a relatively simple-to-deploy asset type. Of course, further data on use alongside deployment may be required to properly analyze this type of development, but such data offers a rationalized and justified approach to future digital learning resource development.

Analyzing digital learning by program level generally reveals an overall decrease in the use of digital learning resources across program levels (see Fig. 4), with the highest at Level 1.

However, Schools B and C display different relationships between program level and digital learning score than the other schools, with DL_S being lowest in Level 2 and highest in Level 1. Further investigation into the cause of this trend suggests that the higher digital learning scores observed in School C at Level 2 are likely driven by the high digital focus of several compulsory modules specific to that school at Level 2, and similarly with School B at Level 3, where there could otherwise be expected to be a decrease in digital learning resources with program level (Kemp & Jones, 2007). These modules provide a different focus than Level 1 modules generally do with respect to digital learning; the nature of digital resources in School C's Level 2 modules are more revision focused and self-directed than the digital content accompanying many Level 1 modules (e.g., audio/video resources, online coursework). This supports the general trend toward greater self-direction throughout a learner's development as described by Grow's (1991) staged self-directed learning model (see Fig. 1 in Grow, 1991), and a concomitant decrease in supporting digital resources and/or a shift in the nature of those resources toward less structured instructional resources seems logical as students are required to rely more on self-directed learning throughout their degrees (Gow & Kember, 1990; McGee & Reis, 2012; Pratt, 1988).

Value of Data for Strategic Planning and Monitoring

As the aim of the case study audit was to determine baseline use of digital learning and identify where support should be subsequently targeted, a few brief examples will now be presented to illustrate how audit results can be used for targeting support from, in this case, the faculty's blended learning team.

Online quizzes/coursework were found to be the most frequently used digital resource type across the Faculty (Fig. 5). This is likely due to the ease with which they can be implemented and their potential for reuse year upon year. This is potentially a good feature to identify since the use of such quizzes has been shown to improve subsequent performance in examination conditions (Bailey et al., 2017), highlighting the value of digital learning resources aimed at providing immediate formative feedback under near-examination settings. As part of the updated digital learning strategy in response to the case study audit, the faculty's blended learning team will be recommending that all modules with written exams implement online quizzes/coursework in some format and highlight the large range of options for the design and use of this type of digital learning resource. This is a logical reaction to identifying a lack of equity across schools and levels, representing a potentially easy gain from a simple-to-implement resource. It is anticipated that greater gains can be made through repeated use of this approach and these analyses in conjunction with student performance and feedback data. For example, deployment of novel tools and the relative benefits of currently potentially underutilized elements (e.g., games, blogs, etc.) can be monitored across programs, schools, and levels to track any changes in student attainment or satisfaction where introduction occurs. This is the real power of using such a tool; it allows the justified development of such resources across the range of courses on offer, supported by an audit trial and subsequent analysis.

The faculty has planned additional audits of digital learning technology in future years at key points to ensure the development of long-term goals is progressing as intended. In the short term, this involves continual support and guidance from the blended learning team to ensure modules can provide digital content where possible, as well as annual reviews of digital learning with key staff and stakeholders from each school (Stages *ix* and *x* in Table 1). Over the longer term, faculty-wide implementation of the updated digital learning strategy will result in greater focus on improving digital learning resource provisioning in those areas identified by the case study audit to currently have greater need of such resources. This will require several additional audits, albeit perhaps on smaller scales (e.g., a school-level audit rotating annually throughout the four schools). This should satisfy the final aim of the case study audit: "How can similar audits be used in future to ensure the long-term development of digital resources and digital learning strategies?"

Limitations of This Approach

While the aim of this case study was to increase the parity of digital learning provisioning across the faculty, it should be noted that this may not be the goal of an evaluation audit. Each case will be different, and digital learning should be used only when appropriate and pedagogically relevant (Sclater & Mullan, 2017). For example, field courses are by their very nature extremely interactive and provide great opportunities for self-directed student learning. Combined with often frequent movement and potentially remote locations, field courses provide an example of a setting in which digital learning is not necessarily appropriate. Additionally, all audits conducted following this framework are limited insofar as they rely on resources being visible in digital space or being identified by the academic staff who teach any given module. The baseline results of our case study are therefore reliable in the sense that repeating the audit based only on the data available on the virtual learning space would produce consistent results, but these results may be modified when consulting with teaching staff. Nevertheless, our audit technique is a good representation of the provisioning of digital learning resources across the faculty in this case, indeed gaining a holistic view of digital learning resource provision and any disparities among schools, programs, program levels, and the types of resources being provided to students.

Potential Extensions to the Framework

We believe this framework can be applied to different contexts and for various purposes. For example, it could be used within different disciplines or across an institution. It could be used to identify strengths and gaps in provision (as was the aim for our work). It could be used to audit other types of learning resources, such as the extent of examination by coursework or extent of blended learning.

This final section notes several ideas for extending the generalizable audit framework and case study audit presented here (Table 2 and main text, respectively). Several simple additions can expand the scope of the presented audit framework. For example, by including taught postgraduate degrees in the audit rather than undergraduate degrees alone; auditing both digital resources and resources and techniques that are not digital *per se* but collectively contribute to the definition of *blended learning* (Garrison & Kanuka, 2004); or by increasing the scale of the audit to a cross-faculty audit of digital learning, allowing questions to be asked, such as whether parent faculties have equal amounts of disparity between their modules.

Note that all resources were counted here irrespective of student engagement. Determining student engagement with different resources is an alternative and complementary audit that may help to elucidate the value of certain resource types (e.g., Boulos, Maramba, & Wheeler, 2006; McGarr, 2009). This is potentially a challenging task though, particularly due to the very large volume of data that would need to be collated and analyzed. Currently, the LMS used in our flagship audit (Blackboard, 2017) can collect statistics on the accesses to each item, but the data accumulated is considerable and set to auto-delete after a certain time to avoid the unnecessary accumulation of a vast archive of data. Developments in terms of learning-analytics-type approaches are beginning to permit a more accessible and feasible approach to interrogating and utilizing this usage data.

This audit included all taught undergraduate modules within the faculty. This means that modules with widely different formats were included in the same framework. An extension of the digital learning formula presented here (Equation 1) toward a more "blended" framework, could therefore be to include the format of certain modules, as some are inherently more interactive than others (e.g., a practial-based class might a priori be assumed to be more interactive than a module of a traditionally didactic nature, when disregarding teaching methods), contributing to the interactive student experience and the definition of *blended learning* (Garrison & Kanuka, 2004). This would require some classification of how interactive each format is, but it could prove useful for those auditors wishing to gain a fuller understanding of the student experience in terms of interactive learning. It is beyond the scope of this study to suggest which formats are most interactive, but for this to be of value, decisions should be made based on existing knowledge of the interactivity of module formats (e.g., Kolb & Kolb, 2005).

Along these lines, similar extensions could focus exclusively on specific formats that are harder to audit by looking at digital space. For example, in the case study audit, field courses and practical classes commonly had low DL_S values, despite these being some of the most interactive modules available. It may therefore be useful to focus on the use of digital technology outside of the module's virtual space, such as by auditing field courses or practical classes for interactive digital material in the field/laboratory. An illustrative example would be the use of programs such as LabArchives (LabArchives, 2017), which might not appear on the LMS space (Blackboard, 2017) and so may otherwise be missed in a virtual space audit as described here.

A final extension of this framework could be to audit lecture content for within-lecture use of digital or blended learning resources, technology, or techniques (reviewed in O'Flaherty & Phillips, 2015). This has potential and has been trialled by the case study faculty with some success (data not shown), but the audit techniques need refinement before being presented explicitly.

Conclusions

This study presents a generalizable framework for audits of digital learning with the aim of encouraging the monitoring of digital learning resources across degree programs, faculties, and even higher education institutions. The case study audit of digital learning is provided as an example of how the presented framework can be implemented to ask and answer questions regarding the use of digital learning at a faculty level. This case study audit was used to set a baseline, from which future audits and follow-up work will expand. There are numerous options for extending the audit framework presented here, as discussed, and we highlight the value of and need for such audits in higher education, particularly in light of the digitally connected environment in which students are being raised.

Author Contact

S.Ross.Res@outlook.com (SRP-JR), V.Volz@leeds.ac.uk (VV),
M.K.Lancaster@leeds.ac.uk (MKL), A.Divan@leeds.ac.uk (AD)

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Undergraduate Kinesiology Students' Experiences in Online Motor Development Courses

Takahiro Sato
Kent State University

Justin A. Haegele
Old Dominion University

Abstract
The purpose of this study was to investigate kinesiology students' experiences in an undergraduate online life span motor development course. This study was based on a theory of transactional distance (Moore, 1997). Seven undergraduate kinesiology majors (5 females, 2 males) enrolled in an online course at a Midwestern public university in the US participated in this study. Data collection included face-to-face, open-ended interviews, bulletin board discussion logs, and online assessment projects. A constant comparative method was used to interpret the data, which allowed themes to emerge from the data as well as from the theoretical framework. Three interrelated themes emerged from the students' narratives: *rigors and flexibility in online course learning, peer feedback experiences,* and *video assessment analysis.* The results of this study demonstrate that undergraduate students can have independent learning styles and kinesthetic characteristics and concepts when enrolled in online life span motor development coursework. Online kinesiology courses should be centered on a set of student tasks (lectures, projects, and assignments) that constitute learning experiences that engage students, either independently and collaboratively, in order for them to master the objectives of the course (Carr-Chellman & Duchastel, 2001).

Keywords: Online education, kinesiology, undergraduate students, engagement, and assessments

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Undergraduate Kinesiology Students' Experiences in Online Motor Development Courses

Online learning is a popular form of education for both undergraduate and graduate education, a point underscored by the fact that in the United States, 5.5 million students took at least one online course in 2012 (United States Department of Education [USDE], 2014). Moreover, online learning is acknowledged as a unique educational experience unlike face-to-face learning (Cavanaugh & Jacquemin, 2015). Therefore, effective online education is not simply a matter of adapting the structure and modes of interactions of a face-to-face classroom environment to an online platform. Rather, cognitive expectations, instructional choices, and supportive practices need to be carefully reconsidered with recognition of the complexity of issues (Peters, 2003). For example, part of the challenge of online education is for students and instructors to become comfortable in the virtual educational milieu. Based on their educational experiences in face-to-face courses, students and course instructors have a clear sense of the roles that both should play (Rice & Carter Jr, 2015). However, when the domain of the class moves online, course instructors and students are left to determine their new roles (e.g., online mentors or teachers; dependent or independent learners) and how to perform those roles within the online space (Rourke, Anderson, Garrison, & Archer, 2001).

Ideally, online courses are centered on a set of student tasks (e.g., lectures, projects, and assignments) that constitute student learning experiences, both independently and collaboratively, and that provide mastery of course objectives (Carr-Chellman & Duchastel, 2001). Despite a dramatic growth in online education in various academic areas in kinesiology (Bryan, 2014), there is a lack of research examining the effectiveness of online modalities, and guidelines are limited in terms of developing and implementing an appropriate educational experience for undergraduate students enrolled in online courses. Recently, adapted physical education (APE) scholars studied graduate students' and in-service physical educators' experiences (Sato, Haegele, & Foot, 2017a), engagement (Sato & Haegele, 2017), online course materials and content (Sato, Haegele, & Foot, 2017b), and graduate professional development (Sato & Haegele, 2018) through online APE graduate courses using andragogy (adult learning theory). In summary, the results of these studies demonstrated that in-service physical education teachers can have positive learning experiences when learning about teaching students with disabilities and that online APE courses can help participants store and access online reading materials and assessment tools that solve teaching issues and concerns (Sato & Haegele, 2017; 2018). The participants of these studies believed that online courses helped them to improve the quality of APE classes at their own school districts.

While research has begun to look at how graduate students and in-service teachers experience online coursework in some kinesiology areas (i.e., APE), these experiences may not be transferable to all undergraduate students or content areas. Thus, it is important to evaluate experiences in other content areas, such as motor development, to examine whether these content areas within kinesiology can be effectively and appropriately disseminated using online modalities. Furthermore, because of the popularity of online courses across student rank (e.g., undergraduate, graduate), it is important to broaden the research base to include undergraduate students' experiences. Therefore, the purpose of this study was to investigate undergraduate kinesiology students' experiences in an online life span motor development course. The research questions that guided the study were as follows: (1) How did the online life span motor development course influence undergraduate students' interpersonal interactions with other classmates and the instructor? (2) How did undergraduate students' academic and social experiences contribute to student learning outcome?

Theoretical Framework

This study was based on the theory of transactional distance (TTD) (Moore, 2013). This theory posits that the inherent physical distance between the teacher and students in distance learning “leads to a communication gap, a psychological space of potential misunderstandings between the instructors and the learners” (Moore & Kearsley, 2005, p. 224). It is then the obligation of the instructor to bridge this transactional distance by using special teaching techniques (Moore & Kearsley, 2005). According to Moore (1983; 2007), transactional distance is determined by three factors and three variables. The three factors are: the teacher, the learner, and a means of communication, without any of which there can be no educational transaction (Moore & Kearsley, 2005).

Moore (2013) also cited three important variables that distance learning teachers and students need to take into account: dialogue, structure, and learner autonomy. Dialogue refers to the interpersonal interaction aimed at the communication, construction of knowledge, skills, and dispositions between students and teachers (Moore, 2013). Online course components can accommodate or be responsive to each learner’s individual needs (Moore & Kearsley, 2005). This requires a high range of thinking skills from the learner, including thought about the learning activity, or meta-cognition (Gokool-Ramdoo, 2008). The second factor is the structure of the course, described as the level of the course’s rigidity and flexibility. This factor includes aspects such as the extent to which course goals and objectives are established, and how pedagogical practices are used in teaching the course (i.e., direct vs. indirect instructional method) (Moore & Kearsly, 2005). Structure should help to organize the teachers’ and learners’ reflective practices, enhance student participation (Deschenes & Maltais, 2006) and support teachers and students when negotiating teaching and learning processes. The third factor, autonomy, refers to the sense of both independence and interdependence perceived by learners as they engage in the course. Autonomy is intimately related to a learner’s sense of self-direction and self-determination, which are significantly influenced by course dialogue (Giossos, Koutsouba, Lionarakis, & Skavantzos, 2009). Moore (1972) focused on the concept of the autonomous learner as being responsible for decreasing transactional distance, given their position in the structure and dialogue dichotomy.

According to transactional distance theory, teachers and learners both participate in the shared experience of exploring a common world (Keegan, 1993). Learning happens through mutual sharing and negotiations of meaning between the teacher and learners in a manner that constantly shifts the locus of control from one to others through the feedback process, which Saba (2007) refers to as the “feedback loop” (Gokool-Ramdoo, 2008). A strong locus of control is defined as learners who hold beliefs that the outcome of a situation is contingent on their own behaviors. Those with a strong locus of control appear to have higher rates of task completion than those with less strong locus of control (Parker, 2003). This is seen to be a determinant of learners’ self-efficacy and can have strong links with self-directed learning. Because of the inherent relatedness of transactional distance theory to online learning, this was deemed an appropriate theoretical basis for the examination of undergraduate students’ experiences in an online motor development course.

Method

Research Design

This study adopted a descriptive-qualitative methodology using an explanatory case study design (Yin, 2017). Qualitative studies typically focus in depth on relatively small samples, even a single case (*n*=1), selected purposefully (Patton, 2014). The main principle of the case study method is to better understand complex educational and/or social phenomena while retaining the holistic and meaningful particularities of real-life circumstances (Yin, 2017). Thus, an explanatory case study is appropriate for exploring undergraduate students' experiences in an online kinesiology course. This study may also be considered as action research (teacher research), as a "teacher as researcher" approach was utilized to develop and improve teaching and learning (Reason & Bradbury, 2008).

Participants and Setting

All participants were undergraduate students enrolled in a fully online life span motor development course at a Midwestern University (MU) in the US. This is a mandatory course for several campus programs of study, including physical education teacher education, physical activity and sport performance, exercise science, and athletic coaching. Five to six sections (25 students per section) of this online course are taught by five different online certified faculty members (who received subject matter training) each semester. This online life span motor development course was reviewed by online course designers for quality control purposes. This course focused on motor development across the life span and investigated the parameters of physical growth and development, motor skill acquisition, and correlates of motor development. Some examples of course content included fundamental movement concepts, locomotor skills, object control skills, manipulative skills, physical growth, and health-related fitness. Distance education designers periodically reviewed the online course syllabus, bulletin board assignments, course grades, exams, and other projects for quality control purposes. Typically, approximately 100 to 150 students are enrolled in life span and motor development courses each semester. In this study, participants were recruited from those enrolled in the lead researcher's (one) section of the course (a total of 28 students) during the spring semester of 2017. The study commenced once approval was granted from the lead researcher's Institutional Review Board (IRB). Individuals were contacted via electronic mail (e-mail), sent by the primary researcher, and asked to participate in this study. Potential participants were explicitly notified that participation in the study had neither influence over their course grade or evaluations, nor on the instructor's opinion of students. The lead researcher sought prospective participants who had not taken any previous kinesiology-related online courses. Ten prospective participants were successfully identified. In this study, seven (5 females, 2 males) (Katy, Nicki, Joan, Valerie, Kathleen, Jon, & Chuck) agreed to participate and completed two interview sessions with the lead researcher. All participants provided permission to use data from several assignments (e.g., online assessment project, bulletin board discussion questions) for this study. Further information about the participants can be found in Table 1.

Table 1.

Participants' Demographic Data

Pseudonym	Gender/Age	Status	Major	Previous Online Kinesiology Courses	Online General Required Course
Jon	Female/20	Sophomore	Physical Education	0	0
Chuck	Male/23	Senior	Exercise Science	0	1
Katy	Female/21	Sophomore	Exercise Science	0	2
Nicki	Female/18	Freshman	Exercise or Physical Education	0	0
Joan	Female/22	Senior	Exercise Science	0	6 (before transferring to MU)
Valerie	Female/19	Sophomore	Exercise Science or Physical Education	0	0
Kathleen	Female/22	Senior	Exercise Science and Health	0	2

Note: Pseudonyms were assigned to all participants to ensure anonymity.

Data Collection

Data were collected during the spring semester of 2017. Data collection included face-to-face interviews, bulletin board discussion logs, and an online assessment project. As supplemental material, this study used a demographic questionnaire which included questions pertaining to the participants' personal characteristics (e.g., race, age, gender), current academic progress, and program of study.

Data source 1: Face-to-face open-ended interview. According to Yin (2017), the researcher has two jobs in conducting interviews: (a) to follow the interview case study protocol, and (b) to ask the researcher's actual (conversational) questions. Using a face-to-face interview approach, the lead researcher asked participants factual questions as well as their opinions about online content, technology, learning tools, and academic experiences associated with their perception of the course (Yin, 2017). All interview questions are listed in Figure 1. Two face-to-face interviews were conducted for approximately 60–90 minutes with each participant during midterm and final exam weeks. The specific questions were carefully worded to ensure relevance to the current study (Yin, 2017).

1. As a kinesiology undergraduate student, how does your experience of online education courses compare with traditional course instruction? How do you like or dislike it?
2. In what ways, could online education courses serve your educational needs?
3. As a kinesiology undergraduate student, how do you feel about the communication between yourself and the instructor? Between you and other students?
4. As a kinesiology undergraduate student, do you think your learning outcomes could be achieved through online education courses? Why? How?
5. As a kinesiology undergraduate student, how do you view the feedback from the instructor? Is it in a timely manner? Constructive? Please give some examples.
6. As a student, how do you think the technical support provided from university? Do you receive any other type of support, such as enrolling in online education courses, electric data base, and written information about the kinesiology program? If you have any complain, is there anyone you can address to and solve your problem?
7. How do you view your online education environment (blackboard or flash line)? e.g., quality of graphica, layout, user friendly, and navigation etc?
8. How does the amount of course work in your online education courses compare with traditional in-class instruction?
9. As a student, what could you do to improve the quality of your online education courses?
10. What do you think are the important factors determining the quality of the online instruction you receive?
11. What factors would lead you to choose online educational courses rather than traditional in-class courses?
12. As a student, how would you rate the overall quality of the online education courses you receive? Very good, good, moderate, or not good? Why?

Figure 1. Interview questions

Data source 2: Bulletin board discussion log. Bi-weekly bulletin board discussion logs, which were developed by Yang and Cornelius (2004), Sato et al. (2017a), and Sato & Haegele (2017) and revised to focus on undergraduate student online course experiences, were adopted for this study. Each question included a two-paragraph maximum (100-150 words) and was submitted as a bulletin board discussion post in the course webpage. All participants were also required to post comments and feedback on classmates' posts. Examples of bi-weekly bulletin board discussion log questions included:

1. What types of feedback did you receive from the online course instructor? Did communication through *Blackboard Collaborate* and *Google. Docs* help your learning process? How did you analyze your learning experience?
2. What experiences were rewarding and/or problematic when engaging [collaborating] with peers in the online course? How did it make you feel?

3. What were your challenges when interacting with peers in the online course? Can you describe your experiences with the online bulletin board discussion with other students? Did peers in the course provide feedback, suggestions, or opinions you expected in the discussion?

Data source 3: Online assessment projects. This data source included a purposeful collection of undergraduate student work that demonstrated knowledge and skills of assessment and evaluation using the Test of Gross Motor Development - II (TGMD-II) (Ulrich, 2000). This included observations of a video analysis performance based on pre-specified performance criteria, assessment of student learning, analytical skills, and knowledge of evaluation (Barnstable, 2010). The course instructor used multimedia technology that allowed students to collect and organize artifacts (e.g., testing protocols, scoring rubrics, additional data) with hypermedia links connecting the evidence to the TGMD-II (Ulrich, 2000). The instructor read the reports, provided feedback, and allowed students to revise materials before they uploaded their assessment projects to the blackboard system. The reports of these assessment projects demonstrated students' learning progress during their course experiences.

Data Analysis

A constant comparative method (Boeije, 2010), which allowed themes to emerge, was used to interpret the data. Using this strategy, each potentially meaningful piece of data in the transcripts from the first set of interviews was coded independently by the first and second researcher and differences were discussed. The second set of interviews, as well as data from bulletin board discussion logs and TGMD-II assessment reports, were coded by the lead author and then checked by the second author. The researchers conducted a second round of coding key terms in the transcripts of data sources. Some codes were combined during this process, whereas others were split into subcategories (subthemes). In addition, two peer debriefers reviewed the codes to avoid potential researcher bias. Coded data from each participant were compared to identify similarities and differences. Further, after peer debriefing, the researchers conducted a second round of coding key terms (e.g., independence, self-direction, guided learning, and application) in the transcripts of data sources. Some codes were combined during this process (similar terms such as assessments and measurements), whereas others were split into subcategories (subthemes). Finally, the researchers examined the final codes to organize them into a hierarchical structure using individual and group coding percentage. Then, all data and definitions of key terms were sent back to all participants for a second round of member checking for final confirmation. The researchers grouped the codes into thematic categories, which were then refined into recurring themes (Boeije 2010).

Trustworthiness

After transcribing interview data, trustworthiness in this study was established through triangulation, member checking, and peer debriefing. Triangulation involves the use of multiple perspectives, such as data from interviews, online assessment projects assignments, and bulletin board discussion logs. The intention of triangulation is to evaluate the accuracy of the data, as opposed to seeking universal truth (Merriam, 1998). Member checking was used to reduce the impact of subjective bias (Patton, 2014). The researcher distributed copies of the analyzed themes from the assignments, online discussions, and the transcribed interview data to participants. The participants' acknowledgment of the accuracy of the data and of the researchers' interpretations of the data ensure that trustworthiness will be established (Merriam, 1998). Peer debriefing is a process of exposing oneself to a distinguished peer in a manner that parallels an analytic session, with the purpose of exploring aspects of inquiry that might remain only implicit in the inquirer's mind (Patton, 2014).

Results

Explainable in the logic of the TTD (Moore, 2013), three interrelated themes emerged from the undergraduate students' narratives. The first theme, *rigors and flexibility in online course learning,* exposes the advantages and disadvantages the participants perceived regarding learning experiences while enrolled in the online life span motor development course. The second theme, *peer feedback experiences*, describes participants' experiences with peer feedback in the bulletin board posts in the discussion narratives in the forum. Lastly, the final theme, *video assessment analysis,* describes how the participants demonstrated their knowledge and skills of assessment and evaluation through a child's performance in the video clip in the blackboard system.

Theme I: Rigors and Flexibility in Online Course Learning

Overall, most participants expressed a belief that the instructor should understand what and how students learn and gain skills through rigorous and flexible assignments, lectures, and interactions (e.g., bulletin board assignments). They believed that their instructor needed to be competent in understanding students' interests, academic backgrounds, and habits before preparing rigorous and flexible course materials and assignments to motivate student learning. For example, all participants preferred that the instructor used a variety of assignments (e.g., quizzes, journal writing assignments, projects, exams, and discussion board posts) to evaluate performance rather than midterm and final exam grades only. Jon expressed his appreciation that the instructor spent tremendous effort and time preparing rigorous and flexible course materials, learning sessions, and assignments.

> I really enjoyed this online course. The online course format is different from face to face course. Maybe, I lose some motivation when the course materials are difficult to follow or assignment directions are not clear. In this course, my online course instructor prepared various supplemental materials and additional documents that enhanced my motivation for learning. For example, I liked the weekly and bi-weekly assignments, because they kept me motivated to meet my learning goals and objectives. (Jon, interviews).

Similarly, Katy explained that it was helpful that the level of assignment difficulty was identified in the syllabus at the beginning of the course. Therefore, she was mentally prepared to plan her assignment schedule throughout the semester. Katy said:

> I think when I saw the syllabus, the online course instructor described the level of difficulty of assignments. That was very helpful. He used the term moderate and high intense/time consuming to describe the weekly assignments. I believe online course instructors need to take extra care or attention to help student learning. He wrote weekly reports related to course goals and objectives and how we needed to study for the week. When I had rigorous assignment such as TGMD-II video analysis project, he was supportive. He sent us information on how to score and analyze the performance using Powerpoint, a 5 minutes video (he created), office hours availability, and offered to proofread feedback before submitting the final

> project report. I think that the online course instructor offered various supports that helped our learning (Katy, interview).

As Katy persisted from the beginning to the end of this life span motor development course, she felt that healthy interactions and communication with the instructor enhanced her learning experiences. Another participant, Chuck, mentioned that “when we had weekly assignments, the online course supported us to have good study routines and habits throughout the year. Plus, I think the online course instructor and students communicated better and we received weekly responses from the instructor about how well we did for our assignments.” It was evident from the participants’ narratives that as the semester progressed, their locus of control changed from the instructor to participants (external to internal control) (Deschenes & Maltais, 2006).

Theme II: Peer Feedback Experiences

All participants felt that bulletin board discussions using asynchronous (text-based) learning activities helped to increase social interactions with classmates. However, a number of positive and negative experiences were expressed regarding bulletin board discussion communication. Among the positive experiences, participants reported that learning was maximized through sharing resources and coaching opportunities. Importantly, however, two concerns were also evident. First, many participants struggled to reply to their classmates’ bulletin board posts with critical feedback in a positive manner. Second, each participant could check the number of replies from classmates and compare their replies with those of their classmates’ posts. All participants felt emotionally hurt when only a small number of classmates posted feedback to their posts. They felt that the quality of their posts did not stimulate classmates’ learning interests. For example, Chuck shared his experiences:

> When I had the bulletin board assignment (focusing on stages of movement), I selected kicking…I posted how to kick soccer ball appropriately. I remember I wrote the four steps of movement. I did not mention one step (foot-eye coordination follow through). One of classmates mentioned that this is not how children kick and you need to add ‘keep head down and follow through with kicking foot.’ I know she was passionate about soccer as a part of her life, but I thought her comment was offensive and I did not like it. From my perspective, I thought she meant to be mean. I think we need to learn how to provide corrective feedback in positive manner (Chuck, interview).

Chuck suggested that it would be helpful for instructors to provide samples of feedback, comments, and narratives. He also said that “many undergraduate students tended to use humor to create a more attractive learning environment. In the online course, this could be interpreted as rude comments and feedback.” Similarly, Joan said that she “saw some students become reactive rather than responsive about rude or offensive comments.” Another participant, Nicki, shared her belief that bulletin board discussions unexpectedly created a competitive arena of intelligence among participants. She explained:

> I think the bulletin board discussion seemed to become a competition about who posted good responses. If their bulletin board posts stimulate our classmates’ learning, they received positive comments from others. I remember that I posted my responses of advantages and disadvantages of health-related fitness, but I only had 4 comments and when I checked the others, there were a few students who had more than 15 replies. I felt that I did not do a good job for the assignment. I think the bulletin board discussion

> maximizes our learning experiences, but at the same time, it stimulated pressure and stress of who is doing good jobs (Nicki, interview).

Nicki explained that she was pleased with the many responses from classmates, which helped her feel engaged in the online course discussion. Her sense of engagement blossomed through her personal interaction with other classmates and course contents (Conrad, 2002).

Theme III: Video Assessment Analysis

One assignment required students to assess and evaluate a video of a female student (2nd grader) using the TGMD-II (Ulrich, 2000). Many study participants struggled to complete this assessment project, however, because they found it difficult to score and analyze the data using the performance criteria charts. Many participants repeatedly re-watched (5 to 10 times) and scored each locomotor and object control skill. After they completed data analysis, students were required to write a final report that identified scores given and answered seven questions about their experience with the assignment. All participants explained that they did not have the background experience when they assessed the girl using this assessment tool. Then, they shared concerns about their own biases, recall of performance criteria, and gaps between developmental/chronological age appropriate performance. They were unsure whether they evaluated student performances accurately. Valerie explained that:

> I think this assignment was a great experience for me. If I assessed a child in the gym space, I had only one time for observation and scoring. I think I would miss one or two components of performance criteria. But using the video, I could re-wind the video repeatedly and I could identify whether the girl met performance criteria or not. I reviewed 5-10 times for each skill to make sure I was scoring right. It was difficult, because each trial was completed between 3-10 seconds. I also think that when I scored her object control performance, I unconsciously brought my personal bias or subjective views, because I was softball player in high school, I know throwing and swinging are my expertise. When I scored these skills, I considered level of performance success in addition to presence or absence of performance criteria (Valerie, bulletin board discussion).

Valerie reported the success she felt because the course allowed her to conduct multiple observations and assessments. She stated that she felt she would have had a better understanding of the assessment technique (i.e., how to minimize personal biases) if this assessment project had been conducted in the gym space. However, she felt that the online course had advantages because it offered the opportunity for repeated observations of the same performance through video. Similarly, Katy also said that

> I overanalyzed the TGMD-II assessment scoring. I knew I needed to care about the presence or absence of her locomotor skills. But at the same time, I considered the level of success rates of each performance criteria for the locomotor and object control skills. I thought I scored in hard and tough ways. At the same time, she was 2nd grader. We may need to consider the level of performance success and developmental age appropriateness of her performance. When I checked the bulletin board discussion, I found that many classmates were concerned about this issue (Katy, interview).

Katy believed that when she assessed the child's performance, she should have considered a balance of developmental and chronological age appropriateness of performance, even though the test only required an evaluation of performance criteria. She found that many classmates had various results, rationale, and responses about scoring that were similar to hers. She felt that that was a limitation of online learning, in that it was difficult for all classmates to share understanding about assessment and evaluation process.

Kathleen explained that

> I asked my classmate if we could do our assessment projects together. But, we did not meet face to face. We opened our social media network (Facebook messenger) and once we completed each skill, we discussed our results. Then, there was the TGMD-II assessment project form. We opened the Google.docs system and wrote key points of observation of the locomotor and object control skills. Basically, how the girl met the performance criteria in the video clips. I feel that discussing this with my classmate helped me increase my self-confidence with administering the test in the future. There are a few skills that we disagreed on, but I think this disagreement helped us to open our conversation. Online communication made me feel that I had to be honest and tell what I thought about the assignment (Kathleen, interview).

Kathleen felt that peer evaluation of the assessment project contributed positively to student engagement, since both students were required to provide specific and effective feedback, opinions, and thoughts rather than only general assessment statements. She felt that the instructor should require all students to complete a peer evaluation process, because it was important to learn more about inter-rater reliability as well as new educational technology (e.g., Google.docs system).

Discussion

The purpose of this study was to investigate undergraduate kinesiology students' experiences in an online life span motor development course. The results demonstrated that participants had new learning experiences which helped them store unique knowledge and access online discussion and bulletin board and offered experiential learning that maximized their educational process. The content knowledge acquired during the online course facilitated their shift in orientation from dependent learners (e.g., memorizing motor development terminology) to independent learners (e.g., requesting proofreading checks by the instructor) (Moore, 2013). Although the online course has some limitations, such as the lack of an automatic and intimate connection inherent to physical presence in a classroom and the lack of real-time interactions, students believed that the online course successfully balanced learner-to-instructor, learner-to-content, and learner-to-learner interactions in the online platform. In TTD, Moore (2013) stated that success of distance education should be based on learner's autonomy which helps learners to improve independence and self-management relative to establishing goals, seek support when needed, manage time, implement learning strategies, evaluate course outcomes, and provide appropriate learning materials and opportunity for interaction.

The participants in this study realized that rigorous learning was necessary when course assignments and lecture contents required deep, critical, and inquiry-based learning (Schnee, 2008) and a higher level of quality of both the effort and outcome (Ainsworth, 2011). In this study, the instructor assigned all students to answer bi-weekly discussion board questions (e.g., how do teachers and coaches respect children's' range of motor skills abilities and learning abilities in different rate?) (Robinson, Webster, Logan, Lucas, & Barber, 2012). This was perceived as a rigorous assignment among participants. This was meaningful, as it helped students define what rigorous learning meant to them (Duncan, Range, & Hvidston, 2013).

In addition to rigor, this study also demonstrated the importance of student flexibility in learning experiences. The term *"flexible learning"* means to place students' learning needs and choices at the center of educational decision making. This encourages students to become active participants with deeper approaches to learning (Nikolova & Collis, 1998). This study found that students were intrinsically motivated to learn new academic content through the access and use of web-based supplemental materials (i.e., perceived ease of use in flexibility learning) (Drennan, Kennedy, & Pisarski, 2005). For example, the instructor offered quizzes or short journal writing assignments in a variety of formats (e.g., PDF, Microsoft word documents, and Excel documents) as well as a choice of reading selections (research and practice-based reading). In TTD, the students with a strong locus of control are directly related to course satisfaction. This means that students become more successful in online courses when offered a wide range of materials and learning options for use as they deem suitable (Spector, 1982).

The students in this study viewed the online bulletin board discussion as a way to share ideas and resources with peers, reflect deeply on their academic learning experiences, and expand their thinking through exposure to various perspectives and opinions (Agee & Smith, 2011). Peer feedback helped each participant establish realistic and valid judgments about their own posts (Boud, Lawson, & Thompson, 2015: Sato, Haegele, & Foot, 2017b: Sato & Haegele, 2017). It is important that peer feedback and responses of artifacts using the discussion board provided all students with access to peer feedback and response opportunities for "a second look" and "a second think" about bulletin board discussion practices. All students reflected that this interactive learning experience made them think not only about "how to do it" but also "why it should be done" in the online course (Collett, 2007). However, in this study, students perceived that successful online bulletin board discussion did not seem to be easy because some students provided critical, judgmental, and controversial comments that caused misunderstandings, conflicts, competition, and hurt feelings during text communication (Jahng, Nielsen, & Chan, 2010). When students failed to negotiate meaning, they gave up on more sophisticated debates, the result of which may be that discussions remained at superficial levels and created poor quality of learning experiences (Francescato et al., 2006: Na Ubon & Kimble, 2004). TTD (Moore, 1984) explains that students in online learning environments should be provided an opportunity to decide on interactive learning strategies that best suit them. Therefore, the discussion board should be developed based on three well-rounded or balanced components of instructor-learner interaction, learner-learner interaction, and learner-content interaction. The discussion board should help all students acquire and learn new interactive and academic experiences that allow them to understand, synthesize, analyze, and apply the information they receive with the knowledge they already have (Moore, 1984: Ustati & Hassan, 2013). Online instructors must understand students' different learning styles and develop bulletin board discussions that stimulate students' knowledge and scaffolds students' learning process during the online course.

The students in this study found that the video assessment analysis assignment helped them improve their video-reflective practices and observational skill development. The objective of this practice was for the students to understand why they screen and monitor a child's gross motor skills the way they do, how to shake off motor skill constraints and to produce new perspectives into students' learning experiences (Palloff & Pratt, 1999). All students believed that, as inexperienced in motor skill assessments, they were not confident enough to assess children with only trials of each motor skill in a gym space or playground, because they may not be able to capture performance criterion of locomotor or object control skill. Therefore, the use of video to review, analyze, and discuss critical aspects of locomotor and object control skills facilitated an expansion of professional (coaches, instructors, and therapists) vision and an improvement in instructional reasoning (Lewis, Moore, & Nang, 2015). The students understood that the video assessment analysis was critical in order to evaluate the child's current and future participation in movement-related experiences (Robinson et al., 2012). In addition, early detection of delayed or disordered gross motor development is of high importance and should involve primary medical care (Pusponegoro, Soebadi, & Surya, 2015).

Students also used the video assessment analysis as a useful assignment in facilitating peer feedback and self-reflection. For example, they used a Google.doc system and social media that allowed them to exchange constructive criticism as well as to reflect on their own assessment skills and evaluations. The constructive criticism helped all students explore whether they would reflect as openly if they knew they were going to be critiqued (Lewis et al., 2015). The Google.doc system helped students become motivated, persistent, independent, self-disciplined, self-confident and goal oriented through peer interactions that included the exchange of opinions and suggestions (Sato & Haegele, 2017). Social media (e.g., Facebook, Twitter) is another tool that can act as a communicative tool external to traditional education which can enhance professional learning (Goodyear, Casey, & Kirk 2014). Facebook and Twitter are virtual platforms that allow PE teachers to share and exchange information and assessment discussion related to movement (Goodyear et al. 2014). TTD explained that, in general, many students demonstrate external locus of control behaviors such as disinterest in developing critical thinking skills and lack of intrinsic motivation. Online course instructors must stimulate students' internal locus of control in which learners adopt a deep approach to learning, develop their own intrinsic motivation and curiosity, and reflect what they learn (Rose, Hall, Bolen, & Webster, 1996). Learners who demonstrated internal locus of control prefer learning environments that maximize their degree of control over their online learning (Ishiyama, McClure, Hart, & Amico, 1999).

Study Limitation

This study has two major limitations. First, participants were conveniently selected from one state public university in the Midwest (US) where the lead author received approval and permission to observe and interview his own undergraduate students. Clearly, the relationship between the course instructor and participants in this study may raise a range of bias concerns and the course instructor faced dilemmas such as respect for academic privacy, establishment of honest interaction, and avoiding misrepresentations (Waruszynski, 2002). Statistically speaking, therefore, the findings are not generalizable to all undergraduate students who complete online life span motor development or other kinesiology related course. From a qualitative perspective, however, the reader might consider transferability to the contexts of other online programs in higher education. Second, the number of participants was small and represented rather diverse backgrounds, experiences, and cultures. Nevertheless, qualitative inquiries, including case studies, typically use small samples and, in the logic of criterion sampling, the intent is to capture and describe central themes that represent the phenomena under study for a particular cohort of interest (Patton, 2014). Our intent in using this sampling approach was to uncover common themes in undergraduate students' online course experiences with instructor—student, student—content, and student—student interactions.

Conclusions

The results of this study demonstrated that undergraduate students can have positive and meaningful experiences when enrolled in online life span motor development coursework. However, a number of concerns were raised. Based on those concerns, the following recommendations are intended to enhance the quality of online course experiences for undergraduate students.

First, when designing online bulletin board discussions, instructors need to take into account the characteristics of a student population, such as program focus, age of learners, and amount of prior online experience (Richardson & Newby, 2006). They may need to provide various samples of appropriate discussion feedback, comments, and responses that allow students to be exposed to strategies and motivations through online discussion. This issue becomes important to address, because the nature of the learning environment varies with the nature of social interactions, learning aids and tools, and even motivation (e.g., competitive, collaborative, or cooperative) levels necessary for completion of the course. Online course instructors can monitor student responses as resources and build cognitive engagement among students or interaction between instructors and students (Stoney & Oliver, 1999).

Second, all students received guidance about how to score, assess, and write in the key points after completing the video analysis assessment. However, some students requested further clarification and asked whether they could add supplemental evidence of video assessment (Iedema & Carroll, 2011) which was identified not only the absence or presence of performance criteria, but also discussed critical incidents of child's developmentally appropriate behaviors and demonstration. Through this video assessment analysis, students must experience a sense of professional vision, autonomy, peer feedback, social relatedness, and support from classmates and instructors. This practice potentially enhances depth of reflection, promotes lifelong learning, and develops confidence and self-evaluation in the online course.

Results and subsequent recommendations are intended to improve student online learning. In this study, we learned how course instructors can use their rigorous and flexible instructional format to stimulate students' internal locus of control and enhance teachers' engagement in online learning. The ideal online kinesiology course is centered on the set of student tasks (i.e., lectures, projects, and assignments) that constitute the learning experiences that the students engage in, either independently and collaboratively, in order for them to master the objectives of the course (Carr-Chellman & Duchastel, 2001). Although the suggestions presented in this paper are framed around life span motor development coursework, these recommendations are applicable across kinesiology areas and can be utilized by faculty members across content that design and implement online undergraduate courses.

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The Impact of Program-Wide Discussion Board Grading Rubrics on Students and Faculty Satisfaction

Brinda McKinney
Arkansas State University

Abstract
In addition to learning more about a topic, online discussion activities may be used to develop skills in reflective practice, critical evaluation, and leadership. Faculty members often spend a great amount of time and energy developing discussion assignments that will improve these skills and align with course learning outcomes. Students may feel the online discussion forum assignments lack clarity and are uncertain about how to proceed. Confusion about the assignment occurs when the instructor's expectations about the discussion activity and the students' understanding about the assignment do not align. This article will review a collaborative process used to align instructor expectations and student understanding in order to evaluate online discussion board assignments in a fair and objective manner.

Keywords: Online, discussion board, assignments, students, instructors, grading rubric, expectations, RN-BSN program, faculty

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The Impact of Program-Wide Discussion Board Grading Rubric on Student and Faculty Satisfaction

Online discussion activities are routinely used to engage learners in course content, based on the belief that this type of engagement helps online learners to grasp concepts, improve understanding, and develop skills in reflective practice, critical evaluation, and leadership. To accomplish these goals, discussion assignments must align with course learning outcomes and engage students. The development of such activities can be daunting as educators attempt to facilitate active learning within a group threaded discussion assignment. Once the discussion activity is designed, instructors may believe the most difficult part is behind them. However, for both novice and experienced instructor, facilitation and evaluation of discussion activities can be more overwhelming and time consuming than developing the assignment itself. Faculty members may be disheartened to find that students do not engage in the manner or at the level they had anticipated.

On the other hand, students may feel that the discussion assignment lacks clarity and therefore experience confusion about how to proceed. Perceived ambiguity about the assignment is likely to affect students' ability or willingness to fully understand the value of the threaded discussion as a learning forum.

Confusion occurs when the instructor's expectations about the discussion activities and students' understanding about the assignment do not align (Brokensha & Greyling, 2015). Thus, educating students about exactly what is expected in discussion board assignments is vital to enabling them to engage at the expected level. Likewise, providing specific expectations for the discussion board assignments prompts the instructor to provide growth-producing feedback to students.

The aim of this project was to collaboratively develop an online RN-BSN program-wide discussion activity grading rubric that clearly outlined expectations for student participants and provide clear and consistent guidelines for faculty assessment of discussion assignment activity, as well as to provide a means of specific, meaningful feedback to students.

Review of Related Literature

Online discussion activities are often used to develop skills in reflective practice, critical evaluation, and leadership, as well as to increase knowledge about a given topic (Gillespie, Pritchard, Bankston, Burno, & Glazer, 2016; Nielsen, Lasater, & Stock, 2016; Smith, 2015). Historically, discussion board activities have worked well for concept-focused objectives and the development of problem-solving skills (Schnetter, O'Neal, Lacy, Jones, Bakrim, & Allen, 2014). The use of threaded discussion activities in an online environment can best facilitate active learning in students who are engaged (Jain & Jain, 2015). Faculty members often spend a significant amount of time and energy developing discussion post assignments that align with course learning outcomes (Bedford, 2014) only to discover that the threaded discussion assignment does not engage students in the way the instructor envisioned. Regardless of teaching experience, evaluating online discussion assignments can seem overwhelming and laborious (Curry & Cook, 2014; Gillespie, Pritchard, Bankston, Burno, & Glazer, 2016). The development of discussion activities may seem challenging as educators attempt to facilitate learning within a threaded discussion assignment.

Unfortunately, the development of the assignment is only the beginning. After the tedious work of developing the threaded discussion assignment follows the task of evaluating how well students engaged in the assignment. Complex discussions can be difficult to grade without a well-constructed rubric (Phillippi, Schorn, & Moore-Davis, 2015). Instructors may be disheartened after designing a well-thought-out discussion board activity only to find students do not engage in the manner or at the level the instructor had anticipated.

On the other hand, students may feel the online discussion assignment lacks clarity and be at a loss on how to proceed. This may be due in part to the students' perception of online education activity (Frimming & Bordelon, 2016). Students may not fully understand the value of the threaded discussion as a learning forum (Acolatse, 2016) and view it as merely busy work. Additionally, students often describe ambiguity in regards to various tasks embedded in the assignment, including purpose, depth, and recipient of their writing (Carnegie Mellon University, 2015). O'Brien, Marken, & Petrey (2016) found some key elements for student success with this type of writing assignment. They claim that “students will work to achieve the expected standard for scholarship” if they have “opportunities for repetition and practice” with specific “instructional strategies and explicit instructor feedback” (O'Brien, Marken, & Petrey, 2016, p. 12).

If the discussion forum lacks clarity for either the students or the instructor, problems ensue (Nandi, Hamilton, & Harland, 2012). Without clear directions about the level and type of engagement expected, discussion board forums may not lead to a better understanding of the subject matter (Oh & Steefel, 2016).

Instructor feedback plays a significant role in the quality and values of online discussion forums (Delahunty, Jones, & Verenikina, 2014). Since educators must provide accurate student evaluations, a grading rubric that consistently assesses student performance and provides meaningful feedback is vital (Shipman, Roa, Hooten, & Wang, 2012). Such grading tools have been shown to reduce faculty workload and increase overall student scores (Bishop, Grubesic, & Parrish, 2015). Thus, instructing students on exactly what is expected in online discussion board assignments is vital to enabling the student to deliver the content engagement that is sought while meeting all of the requirements of the assignment.

It is noteworthy that when learning outcomes match clearly outlined expectations, student satisfaction is increased (Schnetter et al., 2014). Additionally, the use of assessment rubrics significantly encouraged student participation and achievement (Wuttikietpaiboon, 2012). Specifically outlining the expectations for the online discussion board assignments can be useful in prompting the instructor to provide growth-producing feedback to students participating in the activity. Both student and faculty input regarding the rubric will significantly contribute to the evolvement of the tool (Wright, Scherb, & Forsyth, 2011).

The aim of this project was to collaboratively develop an online RN-BSN program-wide discussion board activity grading rubric that clearly outlines expectations for student participants and provides clear and consistent guidelines for faculty’s assessment of discussion forum activity, as well as specific, meaningful feedback to students.

Methods

To begin this process, online RN-BSN faculty members met to discuss the need for a program-wide discussion board grading rubric. To better understand the opportunity for improvement, faculty members reviewed student complaints about the wide variety of expectations among instructors within the RN-BSN program. Such variety, students claimed, made comprehension and completion of discussion board expectations very difficult. Students also noted that they often did not understand what they did wrong, making it difficult to improve on future discussion board assignments. With this in mind, faculty members decided that the creation of a program-wide online grading rubric for discussion board activities might address student concerns.

Faculty members first identified the similarities in their discussion board activity assignments. Although applied in slightly different ways, each faculty member had specific expectations for the initial posting, follow-up postings, incorporation of current literature, frequency of postings, and mechanics. After concurring on general categories of (1) Content, (2) Frequency of Postings, (3) Initial Assignment Posting Content, (4) Follow-up Postings Content, (5) References and Support, and (6) Clarity and Mechanics, each category was evaluatively defined.

Faculty members collaborated to determine evaluation criteria for each category. Processes and their rationale related to discussion board activities were shared and considered by the group. Regarding initial postings and frequency of postings, faculty members agreed that initial postings should be required by midnight on Wednesday of each week of a discussion board activity assignment. This would allow for student interaction with follow-up postings during the remainder of the week. Faculty members then discussed the frequency of follow-up postings. After discussion and literature consultation, faculty members determined that a minimum of two (2) follow up postings on at least two (2) different days of the week was sufficient. Over the next six weeks, faculty members met regularly to defined the grading rubric criteria for each of the following areas: (1) Content, (2) Frequency of Postings, (3) Initial Assignment Posting Content, (4) Follow-up Postings Content, (5) References and Support, and (6) Clarity and Mechanics.

For the next step, faculty considered the grade weight of discussion board activities. After significant discussion about the variety of courses in the program, it was determined that a basic point allowance should be used for every discussion activity in the RN-BSN program. It was noted that discussion board activities were more meaningful in some courses than in others. Therefore, each instructor, with the assistance of the program chairperson, would be responsible for determining what percentage of the final course grade would be attributed to discussion board assignments. Additionally, faculty members would consider course content to determine how many discussion board activity assignments were appropriate for their courses.

With the knowledge of the total point allocation for a discussion board assignment, faculty members made a grid with all six criteria and included the points for each criterion for *Excellent* performance. Fewer points were earned for the categories *Proficient*, *Marginal*, and *Unacceptable*. Faculty members worked for several more weeks to describe the specific criteria of each level of performance under each category. Although this was a great deal of work, faculty members viewed the process with a great sense of accomplishment. The final grading rubric (see Table 1) offered an objective and content-valid framework for the evaluation of online discussion board activity that Wright, Scherb, and Forsyth, (2011) claimed would be valuable to both the instructor and to the student.

Table 1.

Discussion Board Rubric

	Excellent 3 (16.67%) points	Proficient 2 (11.11%) points	Marginal 1 (5.56%) points	Unacceptable 0 (0%) points
Content	**Factually correct, reflective, and substantive** contribution which advances discussion. The posting content must be reflective and substantive—not just facts. Note that you will not be able to do this with a few sentences. You will typically need a minimum of ½ page (or around 200 words) to develop a thought reflectively and substantively.	Information is factually correct but lacks full development of concept or thought.	Repeats resources but does not add substantive information to the discussion.	Information is off topic, incorrect, or irrelevant to the discussion.
Frequency	Responds to the discussion question by midnight on Wednesday and posts at least two responses to two different peers on two other days during the week. (Student participates **on three or more days during the week**.) Note: You are required to post on three different days of the week to earn all the frequency points.	Responds to the discussion question by midnight on Wednesday and posts one response to a peer. (Student must participate in the discussion at least 2 different days.)	Responds to the discussion question by Friday and/or only participates on one day of the week.	No evidence of participation or participates after Friday only.
Initial Assignment Posting	Posts **well-developed** assignment that **fully addresses and develops** all aspects of the discussion. This section looks specifically at all parts of the discussion assignment.	Posts an adequately developed assignment that addresses all aspects of the assignment; lacks full development of some concepts/topics.	Posts loosely developed assignment with superficial thought and preparation; doesn't address all aspects of discussion.	No response to discussion question.
Follow-up Postings	**Demonstrates analysis** of other's posts; **extends meaningful discussion** by building on previous posts. Any questions posed to peers are thoughtful and relevant to discussion. **Includes current literature** (peer-reviewed journal article written within the last 5 years) citation/reference. Note: You may agree or disagree but that does not demonstrate analysis or extend meaningful discussion. Tell why and add new information to support your reasoning.	Elaborates on an existing posting with further comment or observation. May ask peer question to clarify and seek further input from peer. Does not include a current literature (peer-reviewed journal article written within the last 5 years) citation/reference.	Posts shallow contribution to discussion (e.g. agrees or disagrees but doesn't elaborate); does not enrich the discussion.	No follow up responses to peers

Table 1. (cont.)

Discussion Board Rubric

References and Support	**Utilizes 2 or more references to current literature** (peer-reviewed nursing journal article written within the last 5 years) **in addition to the assigned course readings to support** comments using **correct APA formatting.** Note: Reference list must match in-text citations and vice versa. Simply making a list of reference at the bottom of the post without citing them in the narrative is not using current literature.	Incorporates one reference from current literature in addition to the assigned course readings or personal experience, using correct APA formatting.	Uses personal experience or reference to course reading but no references to current literature.	No references or supporting evidence is included.
Clarity and Mechanics	Contributes to discussion with clear, concise comments formatted in an easy to read style that is **free of grammatical, punctuation, spelling, or APA format errors.** Suggestion: Write your post in a word document, use spell and grammar check, then copy and paste it into the discussion board. Do not attach a file that must be opened to read.	Contributes valuable information to discussions with minor (1-2) errors in grammar, punctuation, spelling, or APA errors.	Communicates in a friendly courteous manner with some (3-5) errors in grammar, punctuation, spelling, or APA format.	Posts contain multiple (over 5) errors in grammar, punctuation, spelling, or APA format or are long, unorganized, and/or contains rude content. *Inappropriate comments will be removed and the no points for the week will be awarded for discussion board.*

Implementation

Once the program-wide discussion board grading rubric was completed, faculty members piloted the tool. The rubric was loaded into each of the RN-BSN online courses. Inside Blackboard LMS, the rubric was interactive, allowing instructors to simply click the performance level of the student which provided automatic narrative feedback, as well as automatic calculation of student scores. This format also allowed for additional, personalized feedback that instructor could use if so desired.

Students were given a copy of the grading rubric at the beginning of the course and encouraged to seek clarification as needed. Students were instructed to re-read the discussion board grading rubric each week prior to work on their initial discussion board posting or responding to any of their classmates' postings. The grading rubric was posted inside each week's discussion board assignment for ease of access. Each week, students were notified when discussion board activities were graded and told to go to their grade book, review their grading rubric comments, and notify their instructor of any questions.

Evaluation

Prior to implementation of the discussion board grading rubric, faculty members and academic assistants (AAs) were asked to anonymously disclose the average amount of time they allotted to grading discussion board activity. Since this had been a collaborative effort, faculty shared the amount of time they typically spent grading discussion board activities in each of the courses they taught. The sample included all full-time instructors who taught an online RN-BSN course, whether or not they had participated in the collaborative effort to build the discussion board grading rubric. Eight faculty members reported their average time. This provided a baseline measurement of the effect of the discussion board grading rubric on grading time for the faculty. Additionally, student comments about discussion board activity/grading were pulled from previously taught courses and categorized. Data were collected a second time after the discussion board grading rubric was used for a seven-week online course. Faculty members were again asked to anonymously disclose the average amount of time they allotted to grading discussion board activity. After the course closed and student evaluations were submitted, the student evaluation comments were pulled and categorized according to discussion board activity/grading.

Results

Prior to the implementation of the discussion board grading rubric, faculty members reported spending from 15 to 30 minutes per student for weekly discussion board activity grading and feedback which averaged 21 minutes per student. With enrollment in most classes at maximum capacity of 30 students per faculty member, this accounted for 10.5 hours of grading time per week prior to the implementation of the program-wide discussion board grading rubric.

By the end of the seven-week course term in which the rubric was implemented, faculty members reported 8.2 minutes spent per student for discussion board activity grading and feedback. In courses with maximum enrollment of 30 students, faculty members were now spending 4.1 hours (4 hours and 6 minutes) grading discussion activity assignments. Thus, faculty spent 12.8 fewer minutes grading each student's discussion board activity. In a course with 30 nursing students, this was a saving of 6 hours and 24 minutes per faculty member per week in weeks where a required discussion board activity occurred.

This time saving is compounded for the nursing faculty as a whole. Each seven-week interval, at least twelve online RN-BSN courses are taught. Eight of the twelve online nursing courses have an average of three discussion board activities during their seven week duration. Therefore, eight faculty members saved an average of 6 hours and 24 minutes per week, totaling 51.2 hours across all eight faculty members and 153.6 hours when the three weeks of discussion activity are totaled. As a team, the online nursing faculty in the RN-BSN program has regained approximately four weeks of full-time faculty hours over a seven-week term.

In a follow-up survey, faculty members reported a 73% increase in satisfaction with discussion board activity assignments inside their online courses as a result of decreased grading time and student complaints. Several faculty members claimed they felt they actually "provide better feedback to students" since they can click a section of the rubric to make specific comments.

Faculty also noted they "no longer dread the weeks there is a discussion board assignment to grade." Two faculty members noted their plan to add a discussion board assignment to another week in their course.

Students also benefitted from the implementation of the program-wide discussion board grading rubric. Prior to implementation of the rubric, students frequently had many questions about discussion board assignments and their grades on these assignments. Faculty members frequently heard complaints from students regarding discussion board assignments and discussion board activity grades. Typically, more than 50% of students in a course submitted negative comments or complaints about the discussion board activity grading, either to the course instructor or to the program director. The most frequent categories of student complaints about discussion board activity and grading on the course evaluations were "I don't know why the instructor counted points off of my grade," (21%); "This instructor is much stricter on APA format than my last one was," (18%); "This instructor does not grade like my previous nursing course instructor," (17%); "The instructor counts off for spelling/grammar," (12%); "My last instructor gave me until Friday to upload my discussion board posting," (11%); "I don't know what the instructor wants, " (15%); and other miscellaneous complaints accounted for the remaining six percent.

After the implementation of the program-wide discussion board rubric, student complaints during the seven-week course steadily dwindled by 67%. Students were directed back to the grading rubric and to the comments on the grading rubric for almost all inquiries. Over 50% students who received specific feedback from the grading rubric indicated that it was very helpful. On the course evaluation under comments about the course instructor, some students noted that "my instructor provided very specific feedback on the discussion activity that helped me in other weeks." At the end of the first term that utilized the new grading rubric, course evaluations had improved, with 25% fewer negative comments about discussion board activity and grading. At the end of the next seven-week term, student course evaluation comments were again considered. Negative comments about discussion board activity and grading had dropped by another 30%.

Discussion

The intent of online discussion forums is student learning at some level. It is not desirable for the discussion board activity to be confusing or vague to students. Specific and detailed feedback from instructors may increase student learning and decrease student frustration within online discussion forums. However, this level of feedback is time consuming and instructors may repeat comments to multiple students. Programs that develop a standardized online discussion board grading rubric may benefit both instructors and students. Although the initial time investment to create a program-wide grading rubric is substantial, there may be a significant return on the investment including regained time and increased faculty satisfaction with online courses. Students who become familiar with the online grading rubric tool may have a clearer understanding of what level of engagement will be expected of them for online discussion forums. These students will then have the opportunity to match their efforts to the instructor's expectations. Such grading tools provide a means of consistency in grading between courses within an online program of study. The grading rubric may enable instructors to evaluate discussion forum work both quantitatively and qualitatively and offer an array of feedback comments, including but not limited to, content quality, evidence-based practice, frequency, and mechanics, with less time and fewer energy resources.

This activity encourages faculty to consider how they are alike in their course assignment expectations and grading procedures, rather than their differences. Additional research is needed to determine how well this collaborative approach will work in online programs in other disciplines, as well as with other types of course evaluation. A longitudinal study would be beneficial to determine student satisfaction with regards to an entire program of study. The steps of this project are replicable in any educational setting and for programs that includes several courses within a program of study that has similar assignment types. This process can be duplicated at other schools/universities, in online program other than nursing, and with assignment types other than discussion board activities. This project was limited to one university in the mid-south. It was designed specifically for an online RN-BSN program and was designed to address student and faculty concerns about discussion board activities. It has not been used with other programs on campus. Additionally, the project did not control for any other outside variables that might affect student discussion board grades.

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Book Review
Transactional Distance and Adaptive Learning: Planning for the Future of Higher Education

Susan S. Ko
OLJ Editorial Board

Saba, Farhad and Shearer, Rick (2018). *Transactional Distance and Adaptive Learning: Planning for the Future of Higher Education.* 212 pages. Paperback: New York: Routledge.

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Keywords: book review, transactional distance, Michael Moore, adaptive learning

Michael Moore's theory of transactional distance (TDT) is a fundamental pedagogical theory and systematic way to analyze the practice of distance education. First articulated under that name nearly 40 years ago, TDT has by now attained the status of an essential distance learning theory, one that will not be unfamiliar to most working today in the field of online education. This new book demonstrates how this deceptively simple and elegant theory continues to hold currency in the midst of the disruptive and sometimes confusing changes we are witnessing in higher education.

The authors of this book, Farhad Saba and Rick Shearer, are well-known and respected figures in online education, and they bring rich experience and a depth of perspective that allows them to both measure the distance we have come in technology-mediated education and, at the same time, to demonstrate a heightened awareness of the perils and potential benefits of new communication and technology tools.

To provide a very rough summary for the purpose of this review, TDT rests on three essential but relative variables: structure, dialogue, and learner autonomy. *Structure* is concerned with the instructional design of a course and the elements potentially responsive to the individual learner; *dialogue* indicates the instructional dialogue between instructor and learner or between learners as a group as managed by the instructor; and *learning autonomy* is the degree to which individual learners are able to determine or control the path of their learning. Michael Moore himself provides a delightful preface to this book, succinctly explaining the theory, and neatly framing its history.

The authors have reintroduced TDT with startlingly fresh relevancy for some of the issues of greatest concern today. In short, the authors define the dilemma we face as the continued use of industrial educational methods in a postindustrial world and, through reference to TDT, attempt to indicate some pathways to transforming higher education for the better.

The strength of TDT as the authors see it is that it is a dynamic system, that it can be objectively measured, and that it is learner focused, with an eye to empowering the individual learner. The authors convincingly transport us from the theoretical basis of TDT to demonstrating that its systems dynamics approach could be applied on several different levels in higher education planning.

After providing an overview of TDT concepts and the broader context for the theory in Chapters 1 and 2, the authors have organized subsequent chapters based on a hierarchical model of technology-based higher education systems—starting with such matters as hardware, software, and adaptive learning; subsequently focusing on instructional systems and instructional design models; and then tackling complex areas of curricular, management, societal, and global systems in light of TDT.

Saba and Shearer consider structural changes in higher education and the ways these have combined with technological trends to pose both opportunities and complex problems. Using case studies at hypothetical institutions, they focus on situations as varied as cascading institutional changes resulting from a switch to the centralized use of one LMS; disappointing outcomes after moving a large enrollment general education class online; attempts to dramatically alter the curriculum of a school of professional studies; and meeting the challenge of globalization. These case studies serve to highlight and help contextualize the issues in each chapter.

The book is crisply organized, with introductory material and concluding summaries for most chapters, elucidating for the reader how each chapter's ideas build on the preceding ones. Topping out at under 200 pages of main text, with references at the end of each chapter, along with a helpful appendix selectively highlighting some key research, it is an enjoyable read, with the authors managing to bring clarity to even the most complex aspects of TDT's application.

Those completely new to distance learning theory will find in this book an easy-to-digest introduction to TDT concepts, while those with more experience with teaching and learning with technology will find the applications of TDT to current problems compelling and well argued. The last chapter provides a brief for strategic planning using systems dynamics modeling.

While adaptive learning is highlighted in the book's title, there is only one chapter dedicated to adaptive learning, but it is a hefty and in-depth section of some 37 pages, and it would appear that the reader is meant to find a more pervasive connection between adaptive learning and TDT throughout the book in regard to the potential of systems for dynamically responding to the needs of the individual learner.

Chapter 5 does an excellent job of defining adaptive systems technologies, explaining how they use data to dynamically respond to individual learners, and succinctly describing the various approaches and measures and the progress made in developing software to accomplish these ends. It examines the manifestations of such technologies as they range from intelligent tutoring systems to sophisticated simulations and games. The authors briefly discuss how such adaptive systems, some now available through software and textbook publishers, have begun to be adopted in higher education, and they present a realistic view of both the promise and limitations of such adaptive learning tools in what really is still an early stage in their development.

The authors make a point of associating TDT with what they term "postindustrial" and "postmodern" ideas. While the postindustrial system is characterized by the authors as providing a greater degree of autonomy on the part of the learner, one might quibble with the authors' rather elastic use of the term *postmodern* to define what they call "an increasingly dynamic and non-linear system." But once defined, their terminology works well enough in that it is applied in a consistent manner throughout the book.

Saba and Shearer provide some fresh thinking on how data on learning could be more effectively analyzed to provide insights for practical improvements. They make a persuasive argument for focusing more on individual student variation than drawing conclusions only from research of students as a group. In Chapters 7 and 8, concerning instructional systems and instructional design models, they urge the reader to avoid the tendency to assign bifurcated and diametrically opposed categories, such as learner centered versus instructor centered, constructivist versus behaviorist, and individual versus collaborative—the authors view these pairs, rather, as "two ends of a spectrum" (p. 100). They point out that TDT acknowledges the dynamic nature of instructional variables; therefore, "the primary issue is what serves the learner best in a moment of instruction" (p. 126).

Given TDT's emphasis on the important role played by faculty in regard to dialogue with the individual learner, I had hoped to see more attention to faculty roles in the use of technology to enhance teaching and learning and as part of the discussion of the future of higher education. Perhaps the authors assumed that readers would intuit the important role and specific actions played by faculty in each issue discussed.

Faculty do appear as characters in the case studies, representing various points of view, but in their otherwise probing commentary on the changes in the higher education landscape, it seemed a missed opportunity that the authors did not directly address such issues as the diminished role of faculty with the growth of nontenured, part-time faculty (a trend we have seen growing for at least as long as TDT). They only lightly touch on the fact that the increasing disaggregation of roles in online education can sometimes render faculty peripheral to planning, course development, or student support efforts, or that technology is viewed by some within and outside of the academy as a way to replace, at least in part, those inconsistent and sometimes intractable, all-too-human faculty. The authors perhaps missed an opportunity to press the point that faculty are viewed too often as an obstacle rather than an essential part of the transformation and enhancement of education through the introduction of technology.

TDT as a profoundly humanistic approach would suggest that the opposite should occur and that the faculty–student dialogue, a key measure of transactional distance, could and should be supported by technology. The majority of students still value and want faculty directly involved in their education, even in instructional models where learner autonomy is high.

The book is a valuable reminder of the simplicity, elasticity, and strength of TDT to inform our understanding of teaching and learning with technology.

Overall, this is a book by authors who care deeply about the future of higher education, and the analysis, conclusions, and recommendations offered here are therefore ones that readers can take to heart.