Introduction to *Online Learning* Volume 23, Issue 2

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Our second issue of *Online Learning* for 2019 brings readers a diverse collection of papers on topics related to faculty development, student issues, pedagogy, tools, and support. This edition concludes with a book review.

The first paper is "The Effectiveness of Professional Development in Overcoming Obstacles to Effective Online Instruction in a College of Education" by Jered Borup and Anna Evmenova of George Mason University. The growth of online learning has led to greater demand for better prepared instructors at all levels of education. This may be most important at the university level in schools of education that are increasingly tasked with preparing online teachers at the K-12 level. The authors of this study investigate a program designed to improve faculty members' knowledge, skills, and dispositions for teaching online courses. Using a qualitative case study design, they analyzed interview, survey, and posting data of 18 faculty in the professional development course. They conclude that modeling strong pedagogy in the online course had the greatest impact on participants.

The next study in the current issue begins a section on lessons from the field. These papers reflect systematic case study efforts to gain insight into approaches that improve practice. The title of the initial paper is "Putting Theory Into Practice: Incorporating a Community Engagement Model Into Online Pre-Professional Courses in Legal Studies and Human Resources Management" by Antoinette France-Harris, Christine Burton, and Mara Mooney of Clayton State University. The authors used community engagement projects, a pedagogical tool that combines classroom learning goals with targeted community service, to understand whether these projects create an environment that supports forms of productive interaction and generally enhance course quality. They found that while students learn the basics of their profession in the classroom, the human side can be difficult to replicate; but this deficiency was resolved in the community engagement projects.

The next paper is "Promoting a Sense of Belonging in Online Learning Communities of Inquiry in Accredited Courses" by Susi Peacock of Queen Margaret University, Scotland, (now at the University of the West of England) and John Cowan of Edinburgh Napier University, Scotland. The authors focus on the topic of creating a sense of learner belonging in online education through a discussion of a revised version of Community of Inquiry (CoI) framework. This revision of the well-known framework emphasizes the overlapping intersections of the three presences, defining these overlaps as *trusting*, *meaning-making*, and *deepening understandings*. Suggestions are provided for each of these concepts, leading to particular examples that highlight the advancement of a sense of belonging as an important aspect of the online instructor's teaching activities.

The third paper in this section is "Open Video Repositories for College Instruction: A Guide to the Social Sciences" by Michael Miller of University of Texas at San Antonio and A. S. CohenMiller of Nazarbayev University, Kazakhstan. This paper documents the quantity and quality of open educational resources, specifically video for instructional materials, in the social sciences. Video content for instruction on these sites ranges from economics, psychology, political science, sociology, anthropology, and history. Some multidisciplinary sites exist as well. This guide will prove useful for faculty and instructional designers looking to enhance their instruction with free or low-cost instructional resources.

The next section of the journal investigates a set of common themes around students, pedagogy, tools, and support. The first paper, which might be a companion to the previous paper, is "Designing and Developing Videos for Online Learning: A Seven-Principle Model" by Chaohua Ou, David Joyner, and Ashok Goel of the Georgia Institute of Technology. In this study the authors used seven principles from instructional design theories to guide the design and development of video lessons for an online graduate course. The authors integrated instructional presentation with instructional methods and sequencing. They assessed the effectiveness of this model through student surveys for eight semesters. This paper presents findings as well as the instructors' experience of designing and developing the video lessons. Implications of the findings for instructional design and future research are also discussed.

The next paper is "Student Engagement as Predictor of xMOOC Completion: An Analysis From Five Courses on Energy Sustainability" by Brenda Edith Guajardo Leal and Jaime Ricardo Valenzuela González of Tecnologico de Monterrey, Mexico, and John Scott, University of California, Berkeley. This study seeks to understand causes of dropout in Massive Open Online Courses (MOOCs). The authors used two samples—one of all participants and one of a sample of participants who completed a survey. Results suggest that, overall, the more frequent the individual's participation in the forum and the higher their level of educational attainment, the more likely it was that the participant would complete the course. It is difficult to determine the direction of causality—were those participants who were more engaged more likely to contribute to the forum, or did forum participation increase engagement and therefore persistence in the course? Other consistent findings were that older participants were more likely to complete the course (though the age difference between completers and noncompleters was very small). This study thus raises as many questions as it answers, which may be useful for future researchers.

The seventh paper in this issue is "The Efficacy of an Online Cognitive Assessment Tool for Enhancing and Improving Student Academic Outcomes" by Lindsay Shaw, Janet MacIsaac, and Jill Singleton-Jackson of the University of Windsor, Canada. In this paper the authors used an online application to compare students' level of engagement and test performance to their final, multiple-choice classroom-based exam grade to assess the effectiveness of the application in promoting improved learning outcomes. The study controlled for a variety of other factors, such as learning orientation, grade orientation, and test anxiety. The results suggest that learners performed well on the online assessment despite their limited engagement in the cognitive learning features of the application. It appears that students did not utilize the built-in cognitive learning strategies embedded in the application and chose instead to move directly to the multiple-choice assessments, which were graded. The results highlight the challenges associated with engaging students with formative online assessment environments, and they may prove useful to future researchers who seek to improve on these results.

The next paper is "Learner Engagement in Blended Learning Environments: A Conceptual Framework" by Lisa Halverson and Charles Graham of Brigham Young University. The study reviews the literature related to harnessing learners' cognitive and emotional resources to accomplish learning tasks to create a model that describes and explains learner engagement when some educational activity is carried out in classrooms and some occurs online. This review of the literature helps us overcome the imprecise ways in which engagement is discussed, provides specific guidance for further research, and focuses on an increasingly relevant context in higher education—blended learning.

The ninth study in this issue is “Posting Patterns of Students’ Social Presence, Cognitive Presence, and Teaching Presence in Online Learning” by Selcan Kilis of Giresun University and Zahide Yıldırım of Middle East Technical University, Turkey. This case study examines asynchronous online discussions using the well-known indicators of teaching, social, and cognitive presence described in the CoI framework. The authors make a case that students exhibit higher levels of social and teaching presence when discussions are structured to elicit them. Of particular concern, past research has indicated that students do not reach high levels of cognitive presence through online discussion activities, which are common in online education. In this study, the topics for discussion were chosen based on real-life situations to motivate brainstorming and critical thinking and to increase the use of students’ life experiences. The authors suggest that this purposeful design holds promise in developing more productive communities of inquiry in online settings.

The next study is “A Structural Equation Model of Predictors of Online Learners’ Engagement and Satisfaction” by Sevda Kucuk of Istanbul University-Cerrahpasa and Jennifer Richardson of Purdue University. This study presents a different research perspective on the CoI framework than the previous paper, employing alternative analytic approaches with a larger sample of students and correlating the indicators with measures of satisfaction. The authors also investigate other measures of engagement, including emotional, behavioral, cognitive, and agentive indicators, and they develop hypotheses correlating these with CoI indicators to predict the outcome measure of satisfaction and explore relationships between CoI and engagement indicators. The paper uses structural equation modeling of survey results to develop a predictive model. Regarding the predictors of engagement, the authors conclude that cognitive presence is the primary predictor of emotional, cognitive, and behavioral engagement and that it had an indirect effect on agentic engagement. The path analysis further indicates that the prevailing determinant of satisfaction was teaching presence, which showed direct and indirect effects on satisfaction. They conclude that the model could serve as a foundation for pedagogical improvement of both satisfaction and engagement in online learning environments.

The next paper is “Scribe Hero: An Online Teaching and Learning Approach for the Development of Writing Skills in the Undergraduate Classroom” by Kimberly Francis, Jodie Salter, Lucia Costanzo, and Serge Desmarais of the University of Guelph; Meagan Troop of Sheridan College; and Rosheeka Parahoo of Western University, Canada. This mixed-methods paper describes and assesses an online environment created to help students learn academic writing skills (planning, writing, citation, and grammar) and designed to reinforce what previous research has identified as three key features of motivating online experiences: interactivity, agency, and engagement. Quantitative results of the study suggest that students’ acquisition of writing skills was enhanced following their interaction with the online learning modules developed for the study. For those students who completed all four modules, there was consistent improvement in posttest scores. When used with full functionality, including feedback and badges, the intervention was even more effective. Qualitative results indicate that many students appreciated and enjoyed the flexibility and format of online learning as a means for developing writing skills. This study will be useful for other researchers and practitioners seeking to investigate online instruction in the service of improving academic writing.

The final paper in this issue is a review of the book *Blended Learning in Action: A Practical Guide Toward Sustainable Change*. The authors of the book are Catlin Tucker, Tiffany Wycoff, and Jason Green. The review is by Heidi Rowland of Boise State University. This book is a guide for integrating blended learning into K-12 environments, and the review provides excellent insights that will assist those interested in learning more (including many in higher education).

We invite you to read, share, and cite articles in this issue and to consider submitting your own original work to *Online Learning*.

The Effectiveness of Professional Development in Overcoming Obstacles to Effective Online Instruction in a College of Education

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Abstract
Growth of online learning has placed increased pressure on K-12 schools and universities to provide students at all levels with qualified instructors. It is especially important that colleges of education provide pre- and in-service teachers with skilled online instructors so that they can experience the benefit of quality online instruction firsthand as students. This case study examined the effectiveness of a 6- to 7-week professional development course designed to improve faculty members' knowledge, skills, and dispositions—all required to teach online effectively in a college of education. Faculty participants were also given the opportunity to earn up to seven digital badges for demonstrating specific skills during the professional development course. Analysis of 18 faculty interviews, surveys, and discussion board comments found that course content and assignments improved faculty members' knowledge and skills, but the ways the course was delivered and the online teaching methods modeled by the course instructor appeared to have a larger impact on perceptions and attitudes towards online learning. As a result, online teaching professional development may have its greatest impact when it models the types of online courses the college would like faculty themselves to design and facilitate. Faculty appeared to be more motivated to earn digital badges than they had originally anticipated, but were confused about what to do with the badges once they were earned.

Keywords: online learning, online teaching, instructor modeling, professional development

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The Effectiveness of Professional Development in Overcoming Obstacles to Effective Online Instruction in a College of Education

Online learning has grown dramatically over the past 20 years in both K-12 and higher education settings (Allen & Seaman, 2017; Gemin & Pape, 2017). This has created a high demand for quality online teachers at both levels. Research has found that teaching online requires different competencies, and skilled face-to-face teachers do not necessarily make quality online teachers (Barbour, 2012). Unfortunately, teacher preparation programs in colleges of education have been slow to respond to this growing need, and few preservice teachers take coursework that helps them gain the skills required to teach online (McAllister & Graham, 2016). As a result, the only experience that many pre- and in-service teachers have with online learning is as online students themselves. Research has found that pre- and in-service teachers can gain insights into online teaching strategies by observing their own online teachers (Norton & Hathaway, 2015). However, colleges of education have struggled to prepare quality instructors for their online courses, and their online teachers do not always model the most effective online teaching practices to their pre- and in-service teachers (Myer & Murrell, 2014). As a result, it is especially important that colleges of education ensure that their online instructors not only can teach online course content effectively but also are able to model optimum online teaching practices that can help their students envision online learning's potential.

What are considered online teaching best practices have also evolved with the available communication technology. Anderson (2009) stated, "technologies have developed, distance education has evolved in parallel to support new forms of interaction, pedagogy and support services" (p. 111). The Internet has caused the most dramatic evolution in distance education. Prior to the Internet, distance education focused on learner independence and learner–content interactions. Faster Internet speeds have enabled more collaborative and constructivist learning (Garrison, 2009). However, these new possibilities do not guarantee a change in practice, and many instructors simply use the Internet to transmit information and assess students' understanding of that material. Similarly, a national review of K-12 online charter schools found that the majority rely primarily or exclusively on an independent study model that focuses on students' interaction with the content and teacher—not other learners (Woodworth et al., 2015). Garrison (2009) argued that, instead, online courses should be "less about bridging distances and more about engaging learners in discourse and collaborative learning activities" (p. 94).

Moore (1989) was one of the first researchers to identify learner–learner interaction as a primary component of distance education, stating that it is "sometimes an extremely valuable resource for learning, and is sometimes even essential" (p. 4). Garrison, Anderson, and Archer's (2000) Community of Inquiry (CoI) framework helped to explain why learner–learner interactions are a critical component of students' learning online. The framework was founded in principles established by John Dewey and viewed learner–learner interaction as the means by which students collaboratively construct knowledge of course content. Swan, Garrison, and Richardson (2009) explained, "Higher education has traditionally emphasized constructivist approaches to learning in the sense of individual students taking responsibility for making sense of their educational experiences. What is less common is the collaborative construction of knowledge in a community of learners" (p. 43). While *distance education* and *online learning* are commonly used interchangeably, Garrison (2009) saw courses that prioritized independence and flexibility as *distance education* and defined courses that prioritized a collaborative constructivist view as *online learning*. While not everyone accepted this distinction, most notably Anderson (2009), it does provide a helpful definition for online learning, one that we accepted for this research. This shift from independent study to collaborative constructivist ways of learning requires faculty not only to develop technological and pedagogical skills unique to collaborative online learning environments but also to believe that a shift to more interactive and collaborative online learning would be beneficial to their students.

In this case study, we analyzed faculty surveys, discussion board comments, and interviews to examine the effectiveness of a 6- or 7-week professional development course designed to prepare faculty members to teach online courses. More specifically, we addressed the following questions:

- What perceived impact did the professional development have on participants' knowledge and skills required to teach online?
- What perceived impact did the professional development have on participants' perceptions and attitudes toward online learning?

Review of Literature

In this section, we will first discuss barriers to online teacher professional development that need to be overcome to create a meaningful impact on faculty members' ability to design and teach online courses. We will then review the research examining faculty professional development initiatives.

Barriers to Change

Ertmer (1999) identified and defined first-order and second-order barriers to change. While Ertmer originally focused on classroom teachers' use of technology, we argue that this framework should also be considered when designing online teacher professional development initiatives. In this section we will discuss both types of barriers in relation to online teaching.

First-order barriers. First-order barriers are external to the instructor and include access to technology, time constraints, and professional development opportunities to improve knowledge and skills. For the purposes of this article, we focused on the latter.

In order to provide professional development, universities must first identify the knowledge and skills required to effectively teach online. Shulman (1986) was one of the first researchers to categorize the types of knowledge needed for teaching. Shulman believed that teachers' content knowledge (CK) and pedagogical knowledge (PK) were not mutually exclusive domains and that CK and PK were interrelated. Shulman (1986) explained that teachers are required to have an understanding of the content that extends beyond "the dimension of subject matter knowledge *for teaching*" (p. 9). Similarly, teachers develop knowledge of general pedagogies that are effective regardless of the content being taught, as well as content-specific pedagogies. As a result, Shulman introduced the concept of pedagogical content knowledge (PCK) to describe the areas where teachers' PK and CK intersected.

Mishra and Koehler (2006) added technological knowledge (TK) to Shulman's framework and explained how TK interplayed with PK, CK, and PCK. By adding TK, Mishra and Koehler (2006) actually added four types of knowledge to the framework:

- *Technological knowledge (TK)*: "Knowledge about standard technologies, such as books, chalk and blackboard, and more advanced technologies, such as the Internet and digital video" (p. 1027).
- *Technological content knowledge (TCK)*: "Knowledge about the manner in which technology and content are reciprocally related" (p. 1028).
- *Technological pedagogical knowledge (TPK)*: "Knowledge of the existence, components, and capabilities of various technologies as they are used in teaching and learning settings, and conversely, knowing how teaching might change as the result of using particular technologies" (p. 1028).

- *Technological pedagogical content knowledge (TPACK)*: "[A]n understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students' prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge and to develop new epistemologies or strengthen old ones" (p. 1028–9).

While Shulman's (1986) PCK framework already addressed teachers' understanding of instructional materials, such as "software, programs, visual materials, single concept films" (p. 10), Mishra and Koehler's (2006) TPACK framework placed a greater emphasis on educational technology and was warmly welcomed by the educational technology community. However, in practice it has proved difficult to distinguish between elements such as TPK and TPACK, which has caused some to question the validity and utility of the framework (Graham, Borup, & Smith, 2012; Archambault & Barnett, 2010; Graham, 2011).

The TPACK authors also emphasized that specific types of knowledge are "context bound" and dependent on variables, such as the content taught, student background, and level taught (Mishra & Koehler, 2006, p. 1032). By its nature, the online learning environment changes the types of required pedagogical and technological knowledge and skills. For instance, Mishra and Koehler (2006) explained that asynchronous online environments "force an online instructor to develop other ways to represent content and thus impact pedagogy" (p. 1030). Similarly, the online environment can change how instructors interact with students, foster a sense of community, motivate student engagement, provide feedback on course projects, and facilitate learner–learner discussions and collaboration (Baran, Correia, & Thompson, 2011; Bigatel, Ragan, Kennan, May, & Redmond, 2012; Park, Johnson, Vath, Kubitskey, & Fishman, 2013). Because the "skills to teach in an online environment cannot be assumed to transfer automatically from skills in teaching a face-to-face classroom," instructors should be provided with professional development that prepares them for the specific challenges they will face online (Barbour, 2012, p. 504).

Second-order barriers. Second-order barriers are internal to the instructor and include beliefs about teaching and learning, attitudes toward change, and self-efficacy. Ertmer (1999) explained that whereas first-order barriers are relatively easy to identify and overcome once resources are secured, second-order barriers are difficult to identify and overcome because "they are more personal and more deeply ingrained" (p. 51). In fact, they may not even be known to the instructors themselves.

One way to change instructors' attitudes towards online teaching and learning is to engage them in online professional development experiences that effectively model the benefits and possibilities available in the online learning environment (Elliott, Rhoades, Jackson, & Mandernach, 2015). Following Bandura's (1986) social cognitive theory, instructors can learn new behaviors by observing someone else perform those behaviors and then imitating them. The effectiveness of social models in changing others' behaviors, beliefs, and attitudes is based on both observations of models and social interactions (Bandura, 1997; Gachago, Morkel, Hitge, van Zyl, & Ivala, 2017). As a result, professional development is most effective when participants are provided opportunities to exhibit the behaviors they have observed. These hands-on application experiences make them relevant and authentic to their own teaching (Gosselin et al., 2016; Johnson, Wismiewski, Kuhlemeyer, Isaacs, & Krzykowski, 2012). They also provide secure space to explore the technology and experience satisfaction with its affordances, while observing best practices implemented by the instructor (Walters, Grover, Turner, & Alexander, 2017). The combination of observation and active process of doing is an important component when preparing online instructors and advocates (Gachago et al., 2017). In addition to the instructor models, Bandura and Kupers' (1964) seminal research found that peer modeling can impact others' motivations and behaviors. As a result, professional development that facilitates learner–learner interactions may be particularly effective at changing participants' attitudes and perceptions of online learning.

Professional Development Approaches and Outcomes

While the topic of preparing faculty for online teaching is popular in the literature, many studies focus on what to teach rather than how to teach it. Faculty professional development can occur in both synchronous and asynchronous online courses (Dyjur & Lindstrom, 2017; Ginzburg, Chepya, & Demers, 2010; Rienties, Brouwer, & Lygo-Baker, 2013; Schrum, Burbank, Engle, Chambers, & Glassett, 2005) that establish online learning communities or focus more on independent, flexible learning (Brooks, 2010; Reilly et al., 2012). Professional development can also be provided as boot camps, seminar series, minicourses, webinars, hands-on workshops, peer training, or meetings with experts (Gosselin et al., 2016; Johnson et al., 2012; Meyer & Murrell, 2014; Reilly, Vandenhouten, Gallagher-Lepak, & Berg, 2012; Roby, Ashe, Singh, & Clark, 2013; Signer, 2008; Wang, 2007). These professional development opportunities can be more meaningful if they are designed based on the content that participants find applicable and useful (Walters et al., 2017). Some researchers also support the idea of individualized and customized training (McQuiggan, 2012; Rhode, Richter, & Miller, 2017; Wingo, Peters, Ivankova, & Gurley, 2016), while others emphasize the importance of regularly scheduled, standardized trainings (Meyer & Murrell, 2014).

However, only a few existing studies relied on modeling best practices for online teaching and learning through the delivery of online professional development. This is consistent with the overwhelming prevalence of face-to-face delivery of online teacher professional development as described in a national study of 39 higher education institutions (Meyer & Murrell, 2014).

While it might take some instructors longer to adopt online teaching (e.g., McQuiggan, 2012), the aforementioned studies reported that online professional development increased knowledge and improved faculty perceptions. For instance, Ginzburg, Chepya, and Demers (2010) reported that the majority of faculty felt confident in their ability to develop and teach in an online environment after an 8-week online cohort program. In their study, cohorts consisting of 8–14 faculty members participated in the course led by staff from the Office of Instructional Technology. The authors attributed positive learning outcomes to the fact that faculty were able to experience online learning from the perspective of a student. Rienties, Brouwer, and Lygo-Baker's (2013) analysis of pre- and posttests found that, in addition to increased confidence, the 33 participants demonstrated significant increases in TPACK knowledge following completion of four online modules designed to improve faculty's ability to teach online. The modules were designed to last 8–12 weeks, allowing flexibility and autonomy for instructors to complete the work and reflect on their progress. Similar improvements in TPACK as well as increased satisfaction were found in another study by Rienties et al. (2013). As online learning technology continues to develop, little information exists on the effectiveness and preference of an online format to foster interactive professional development for instructors preparing to teach online (Elliott et al., 2015; Norton & Hathaway, 2015).

Methods

Merriam (1998) explained, "Qualitative researchers are interested in understanding the meaning people have constructed, that is, how they make sense of their world and the experiences they have in the world" (p. 6). Stake (2010) added that qualitative researchers seek understanding and then work to improve "how things work" (p. 14). Merriam (1998) distinguished case studies from other types of qualitative research because case studies focus on a single, bounded unit or system. However, it is important to note that case studies are not simple and are what Wolcott (1994) called "complex specificness" (p. 107). For this case study, we set our boundaries of inquiry around a new online teaching initiative at a single college of education.

Context and Setting

This case study was conducted at a large mid-Atlantic university's college of education. Guided by Quality Matters rubric standards, the college developed the Online Teaching Initiative (OTI) course to help prepare faculty to teach online courses that are primarily delivered asynchronously with learner–learner interactions and collaboration. The OTI course was delivered asynchronously with weekly assignment deadlines. The first module oriented participants to the course design and calendar as well as to general trends in online learning. The orientation module also required participants to sign up for a Google Drive account, download a screencasting tool to be used in later modules, and access their learning management system (LMS) course sandbox they would later use to demonstrate competency of certain skills. Participants were also introduced to the OTI digital badges used to certify their competency in various areas of online teaching. Once students earned all six digital badges, they were awarded the Online Teaching Essentials badge (see Figure 1).

Figure 1. Image showing the digital badges that were available for participants to earn. The university name has been removed.

Following the introductory module, the remaining modules addressed the following topics concerning online instruction: (1) course design and development, (2) assessment and feedback, (3) student collaboration, (4) discussions, and (5) presence and support. Each module contained lessons and workshops designed to help faculty develop new knowledge and skills required to teach interactive online courses. Lessons commonly had examples from online faculty and students. Where possible, the examples came from teachers and students within the college of education.

To earn the accompanying digital badge, participants needed to submit learning artifacts. If mastery was not demonstrated, they received feedback from the instructor that they could apply to their project until they demonstrated mastery. Participants could test out of the workshops if they had mastered and demonstrated a given skill previously while teaching an online course. The majority of the workshops required participants to perform tasks within their LMS course sandbox, but the OTI course also required them to use tools external to the LMS.

Participants were organized into small learning groups, each containing four to five people. They then interacted regularly with their group members in discussion board activities where they shared beliefs about and perceptions of what was being taught. Participants also engaged in peer-reviews of the learning objects created as part of the workshops. They worked in collaborative teams to complete one of the workshops using Google Drive. In an attempt to establish a trusting learning community, participants engaged in an icebreaker discussion board activity that required them to create and post a video introduction and then view and reply to their fellow group members' video comments.

Data Collection and Analysis

The OTI course was originally offered during a summer semester as a 7-week course and was then offered the next year during the summer and fall semesters as a 6-week course to better accommodate faculty members' schedules. The course content and design remained consistent across all course offerings. Each course offering had eight completers, for a total of 24 completers. In total, seven participants started the initiative by posting at least one comment in the icebreaker discussion but did not finish the initiative and were excluded from this research.

Data were collected using surveys, conducting interviews, and collecting discussion board comments. Specifically, pre- and postcourse surveys were used to measure changes in participants' knowledge and skill development. Discussion board comments and interviews were used to better understand their experiences and perceptions.

Participants' knowledge and skill development was measured using Archambault and Crippen's (2009) survey instrument designed to measure the "skills that online teachers should know and be able to do" (p. 75). The survey items were based on the TPACK framework and used a six-point response scale (from 1 = *strongly disagree* through 6 = *strongly agree*). However, only the items related to TK, TCK, TPK, and TPACK were used for this research. All OTI participants were invited to take a survey before they actually began the course and again when they finished. All course completers were also asked to participate in a 30–45 minute interview.

Survey responses were analyzed using descriptive statistics. Interview transcripts were analyzed using elements of constant comparative coding methods (Glaser, 1965). Following Glaser's (1995) recommendation, the primary author coded faculty interview statements into as many categories as possible while comparing each statement to previous coding categories. Categories were then combined into larger themes guided by Ertmer's (1999) first- and second-order barriers of change. The coding was then reviewed by the second author, and any disagreements were discussed until resolved. Lastly, participants' discussion board comments in response to their final discussion prompt were analyzed using the same process. The discussion prompt asked participants to reflect on what they had learned and to share any previous misconceptions regarding online learning, if any.

Results

Of the 24 participants who completed the initiative, 21 completed the pre- and postcourse survey, and 18 (16 female) participated in an interview. Of the 18 interview participants, half were adjunct instructors. Five of the adjuncts had earned a PhD, and four had earned a master's degree. Of the nine full-time employees, three were associate professors, and six were assistant professors. Participants were split evenly between those with online teaching experience and those who had never taught online. Of the nine participants with online teaching experience, one had only taught online "many years ago," and three had only taught synchronous online courses.

Although the small sample size prevented inferential statistics from being used, descriptive statistics of survey responses showed increases in participants' TPACK (+1.23, *SD* = 0.69), TPK (+1.07, *SD* = 0.77), and TCK (+0.85, *SD* = 0.73). Participants' TK also increased on average, but the change did not appear to be as meaningful (+0.19, *SD* = 0.72; see Figure 2). The average change in TK also has a standard deviation higher than the mean increase, indicating a large variance across participants.

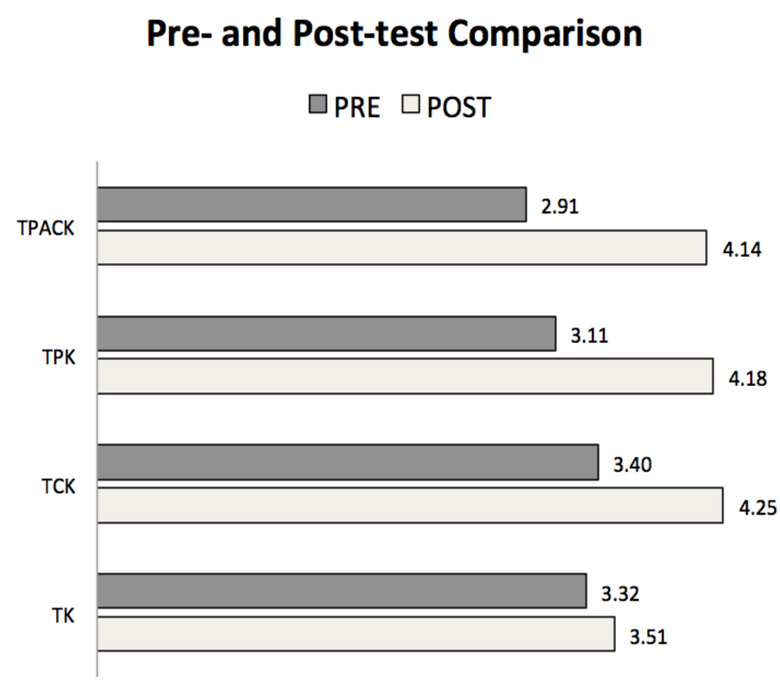

Figure 2. Comparisons between participants' pre- and postcourse surveys reported levels of their TPACK, TPK, TCK, and TK. Survey items used a six-point scale (from 1 = *strongly disagree* through 6 = *strongly agree*).

The remainder of the section will discuss results from the interview and discussion board analysis. First, we will present the findings related to how the OTI course impacted participants' pedagogical knowledge and technological knowledge. Following, we will share the findings related to participants' motivation to engage in learning activities and describe how that engagement impacted their perceptions of online learning.

Impact on Pedagogical Knowledge

Similar to their survey responses, analysis of participants' interviews and discussion board comments found that the course helped improve their online pedagogical knowledge (PK). Participants most commonly attributed their increase in PK to the online lessons that contained various examples as well as to their discussions with peers.

Interview participants commonly explained that the instructor and student examples embedded in the online lessons were especially valuable because they "opened up to [them] different online options." Participant 4 stated, "It made more sense seeing a finished product, or what it would look like from a student. I thought that was very helpful. … It was too abstract without them. It was helpful to see specifics." Participant 8 added that the multiple student and instructor examples were "very helpful so you got to see other ways to do it. Something I would not thought of probably." For instance, Participant 3 recalled her reaction to viewing a video feedback comment an instructor had created for her students, "Woah, you can give feedback like that? That is so cool! Yeah, all of those examples were incredibly good. … I loved his examples." Participant 12 explained that the student and teacher examples distinguished the OTI course from previous professional development "mini classes" that the university offered to faculty:

> I did one or two of those [mini classes offered by the university] and they were helpful, but not in the way that the OTI class was, just really hands-on and lots of different ideas and actually showing you examples. I thought that was helpful.

Participants also found that their discussions with peers allowed them to expand their PK. Participant 11 stated that "[my group members] were designing rubrics differently. That's just interesting, just to see how they do it over in [their content areas]." Participant 5 found that his group members would "approach [tasks] completely differently" and appreciated the "opportunity to absorb other people's ideas." Participant 15 also explained that discussions with her peers allowed her and others to "get more ideas to use in the future for your toolbox." Participant 7 added that opinions from peers were especially helpful "instead of an expert's [opinion]" because "they were all colleagues and so they all kind of knew what we were going through."

Impact on Technological Knowledge

While the lessons and discussions helped to increase participants' online PK, the weekly workshops tended to improve participants TK because they required participants to use technological tools to put into practice some of what they had learned in the lessons. Similar to the survey findings, the interview analysis found that participants varied in their incoming abilities. On the survey and in his interview, Participant 12 reported a high level of technological knowledge. He also shared that prior to the course he was comfortable using the same tools "over and over again" but found that the course "just went a little deeper." He summarized, "That's basically the whole class. There might be one way that you're comfortable with right now but there are two other ways that you can do it that may be more effective." Participant 11 added that before the course she "found it very easy" to perform some online instructional activities, but she was still "learning new things for the first time."

Those with lower incoming technological skills found that "the learning curve was huge." Participant 4 explained that the workshops "kind of stressed [her] out" because she "didn't have a lot of skills." Participant 15 shared the following:

> [The workshops] made me stand on a cliff and look down and have to jump, on the edge going, "Oh, shoot! I haven't done this before." … It just challenged me. It pushed my boundaries. It pushed me to do things I hadn't done on the computer before. So yeah, every week it was frustrating but I felt good afterwards.

Interview participants also explained that the course "opened [their] eyes" to new tools that made them realize they had more to learn than they originally thought. This unexpected exposure to new technologies may help explain why there was only a slight increase in participants' TK as indicated on the survey. For instance, Participant 13 stated that before the course she "thought [she] knew some things," but after the course she realized that she was "just scratching the surface." Similarly, some participants admitted that it was difficult to adequately rank their technological abilities because they "still don't know what [they] don't know."

While interview participants all believed that the OTI had helped prepare them to teach online, they also commonly expressed a need for additional support. Participant 4 added that while her TK had increased during the course, she remained uncomfortable using some of the technologies: "I think I have the knowledge. I think for me it's just about building confidence and efficiency, so that it doesn't take me forever to build a module or a workshop." Participant 11 also shared, "I need to practice a lot. Doing it once is great but I do not feel like I've mastered the skill without applying it again and again." As a result, interview participants commonly explained that they were happy that the course remained open for them to access after the course had ended. Participant 17 shared, "I've referred back to [the course]. I'm so glad I still have access to it because I go back to it quite a bit." At the time of her interview, Participant 13 had not returned to the course but anticipated that she would most likely return to it when she was actually teaching online or, as she put it, "going from the sandbox to real life." Another participant suggested that more advanced courses should be offered to those who have finished the OTI course.

Participants' discussion board comments mirrored those shared in interviews. The most common realization that participants shared was the number of technologies outside of the LMS that could be integrated into their online course. One participant who had no previous online teaching experience commented, "The breadth of online resources/tools can be overwhelming.... After week 2, I thought I had learned so much ... but after week 5 - wow!" Even a participant who had "been teaching online for a while" appreciated being shown new technologies. She stated, "I love that this course exposed me to new tools, and moreover, made me play with them. I am now much better equipped to use a variety of tools that will definitely increase student engagement." Similar to their interview comments, several indicated on the discussion board that they would be "returning to the course for reference in the future, again and again." Although the course remained open, one discussion participant was "a little worried about forgetting some of the options." Another participant then suggested creating a "chart which lists the options, programs, etc." Following that suggestion, participants actually created a table and shared with it others in the course.

Impact on Participant Confidence and Motivation

Participants' confidence and motivation increased following successful experiences in the course. For instance, in her interview Participant 21, who found that "everything was new" in the workshops, stated, "Every time I finished something I would go 'Wow, look at what I learned to do. I've never known how to do that before.' For me that was a little fabulous." Similarly, in the discussion board one participant stated the following:

> [I] didn't really believe that I would learn enough in only 6 weeks to make me feel confident enough to design my own courses. I know that there is a tremendous amount still to learn, but do feel like I know enough to get off to a good start.

A discussion board participant who stated that she was not a "techie sort of person," found it "very satisfying" when she completed workshop activities, which resulted in "improved confidence." Another summarized that she was "much more prepared and enthusiastic" to teach online after completing the workshops.

Just as the workshops improved student confidence and motivation to teach online, participants identified factors that motivated them as students to complete the OTI, which, in turn, helped them to better understand how to motivate their future online students. First, their interactions with the instructor motivated them to complete the OTI course. For instance, Participant 16 stated that she "loved interacting with the instructor," and Participant 15 explained that her interactions with and feedback from her instructor were "very inspirational" because "he has a great personality, and he made it fun." Participant 8 added that instructor-created tutorials "were a little more personal" than Blackboard provided tutorials, and she "related to that more." A discussion board participant added that her interactions with the instructor were helpful because "he always sounded so excited and upbeat."

Learner–learner interactions had a similar motivational effect. Participant 10 believed the course "would have been pretty boring" without learner–learner interactions, and Participant 15 went as far as saying that without her interactions with peers, she "probably would have fallen out" and "appreciated that there were others that we had to interact with." Participant 7 found that she became more motivated to learn the content when she perceived "the enthusiasm of the other individuals within [her] group as they were learning something for the first time." One discussion board participant found that it "was really fun being in a group" and was "excited to try [student collaboration and discussions] in [her] own class." Another participant replied that previous to taking the OTI course she "didn't really see the value in discussions boards" and "had stopped using them." However, after participating in discussion boards as a student, she was "thinking about how [she] can apply some of what we have learned to [her] fall course load."

However, there were some drawbacks to discussions and collaboration. Participant 11 felt frustrated during the collaborative workshop because she was "dependent on someone else's time" and did not enjoy "the regular annoyances that you have with the group work." Participant 21 acknowledged similar drawbacks to collaborative projects in the course but also stated that "when it went well, it was kind of fun." Participant 12 also understood that online discussions and collaboration could be frustrating but admitted that he "didn't really have the frustration because [he] was able to look through the discussion boards and see that everyone had their own issues, or own questions, or own level of understanding."

The majority of participants were also motivated to earn the digital badges that were awarded to those who successfully completed all of the workshop criteria. Participant 10 explained, "I'm competitive and I want to do well so I certainly wanted to make sure I earned [the badges]." Participant 13 added, "I was very motivated to earn the badges. … It was sort of like when we were younger and we were Scouts or Campfire Girls or whatever, and you earned your badges and you were really proud of displaying it." Participant 16 was "surprisingly excited at having badges" but, similar to others in the course, was confused at what to do with them once they were earned: "I don't understand where to put them. [The instructor] talked about putting it on some sort of backpack sort of thing. I didn't know that I had one of those yet." Similarly, Participant 21 described the badges as a "grownup token economy" and was highly motivated to earn them, but "afterwards when it's over, I don't know how they serve me." Participant 8 summarized, "I can't believe this but yes I was [motivated to earn the badges]. I haven't done anything with them but I got them all."

Impact on Perceptions and Teaching

In general participants agreed "the class itself really changed [their] perspective of online learning" because it provided them with "a student's perspective." Participant 18 appreciated the opportunity to "feel like how it was to be a student in that class with other peers," and Participant 17 found that being an online student allowed her to know "how long it is going to take" her students to complete learning activities. Participant 3 added that being a student helped her recognize features that were not provided in the course but would have been helpful: "Having a [task] checklist, I think, would be really helpful." Similarly, in the discussion board activity, one participant found that taking an online course changed the way she would design her online courses: "Because of this, as I design my course, I am constantly thinking about it from a student perspective."

Analysis of interview responses found that the course provided "a good model for a good course instruction and good design" that was especially impactful on changing participants' perceptions and attitudes towards online learning. Participant 16 explained,

> There was really the close alignment of what we read with what was modeled and what we were expected to do. And I think that's the best kind of learning. It's not, "Do what I say, not what I do." But as we were learning a particular topic, then it would be modeled, demonstrated.

For instance, Participant 21 found that the course layout "taught us as students how to implement some of those ways to make [our courses] a little more creative," and Participant 23 "basically kind of mimicked a lot of how [the OTI] course was set up in Blackboard."

Participant 16 shared that participating in the course as a student "reprogramed" her when she realized that "online learning doesn't need to be a replication of classroom learning." A discussion board participant explained that prior to taking the OTI course she viewed online learning as primarily narrated presentation slides and quizzes. However, the OTI course was designed in a way that showed her that online learning could be "fun" and "was vastly different from what [she] had been accustomed to." Another discussion board comment read, "Taking this course has exposed me to how [online learning] could be: engaging and interactive." A different discussion board participant who had online teaching experience explained it this way:

> I probably would have naturally stuck to the typical way I've been facilitating my online courses, if I hadn't been pushed to try/see new things through this initiative. Now, that I have, I feel it was very worthwhile, and I have a lot of new good ideas.

Another participant agreed that the OTI course had "really opened [her] eyes to the possibilities of online learning" and believed that online learning could be "more engaging than the traditional types of learning activities that often take place in face-to-face classes."

In the discussion board activities, students commonly shared that they were surprised at how difficult it was to learn online. For instance, one participant who had "many years of teaching online classes … still had one main misconception: that [she] could sign up for this additional course and it would not increase [her] workload very much because it is 'just an online class.'" Another discussion board comment stated, "Prior to taking the OTI, I thought [online learning] was an easy way out for lazy students" but came to realize that learning online required hard work and dedication. The rigor they experienced as online students also appeared to help them realize that teaching online would be just as rigorous as teaching face-to-face courses—if not more so. One participant admitted wanting to teach online so that she could reduce her teaching workload but came to realize that "online classes are very demanding" and "would even argue that online courses are more demanding [than face-to-face courses]."

The instructors also appeared to model effective online instructional practices and presence in ways that helped participants expand their vision of what their responsibilities would be as online instructors. Participant 1 stated in her interview, "[The instructor's] personality, his knowledge—all of that helped to change my views around online learning." When watching her instructors' weekly orientation videos, Participant 11 recalled thinking, "Oh, I could totally do this. I should do this more." Instructor-created videos also modeled to Participant 14 that "it's okay to make mistakes on videos. It's okay to play. It's okay to be goofy and seem more human." Similarly, many discussion board participants expressed discomfort when creating videos that showed their faces, but their experiences in the course helped them realize that "it is an important part of building trust and community with the students."

Receiving video feedback from their instructor appeared to be particularly "transformative" and "changed the way [participants] looked at providing feedback to students." Participant 13 stated, "Video feedback … opened a whole new world of working with student learners in an online setting. … I totally view [feedback] differently." In fact, at the time of her interview, Participant 13 had already begun to provide her students with video feedback:

> It's so much faster! That was sort of a duh moment, you know. You should have thought about that before because I can talk faster than I can write it and my feedback was much more explicit and the students came back and said, "Oh thank you! Now I see exactly what you mean."

Participants were also surprised at the level of community they were able to form with the instructor and other course participants. Participant 3 explained in her interview that she recently completed a different online training that was "very dry" and simply required participants to read materials and take quizzes. As a result, that was her "perception of what online learning was." She explained that her interactions with others in the course changed her perceptions of online learning: "We developed a community that I didn't think, honestly, was possible through online [learning]." Similarly, Participant 11 had a prior misconception that there "was a lack of interaction, getting to know people, students, or the instructor" in online courses but found that developing a sense of community was "pretty intuitive once you're shown and told how you can foster that."

Discussion board comments reflected similar sentiments. One read, "The fact that an online version of a class is not just a narrated [presentation] made a big impact on how I rated the quality of my courses." Another added that she was surprised that there were "so many ways that allow students and instructors to show who they are." Similarly, one discussion board participant stated, "[The instructor] did a fabulous job of building a sense of community among our little group in such a short time. I really want to be able to do that with my students too." Several recalled feeling uncomfortable or even “scared” to create a webcam video for the icebreaker activity but quickly became more comfortable. One discussion board participant wrote, “I can’t say that I’m totally comfortable, however watching [the instructor] be ‘natural’ with his videos for this class, hearing and seeing other teachers do their videos has been very relieving and rewarding.” Another previously believed that learning online was “primarily an individual endeavor” but came to realize “online course environment can be a richer avenue for peer collaboration than in the classroom.”

Discussion

In this case study, we collected and analyzed survey responses, discussion board comments, and end-of-course interviews to better understand how a 5- to 6-week online teaching initiative impacted faculty participants’ knowledge and skills to teach online and their perceptions towards online learning. In this section, we discuss our findings in the context of previous research and highlight practical implications for those interested in preparing faculty to teach online.

Improvements to Participants’ Knowledge and Skills

The improvements in participants’ TPACK on the pre- and postcourse survey were consistent with previous research (Rienties, Brouwer, & Lygo-Baker, 2013; Rienties et al., 2013). While TK scores did not change as much, this result could be attributed to the large variability of scores within a small sample size. Those participants who came with advanced TK reported that the OTI course helped them delve deeper and expand their tool menus. Regardless of their TK levels, the participants had the largest increases in overall TPACK scores, demonstrating improvements in their general confidence to teach online (Rienties, Brouwer, & Lygo-Baker, 2013). Overall, this finding supports the need for adequate professional development programs in higher education institutions, especially for those who are less experienced in online teaching (Gachago et al., 2017; Meyer & Murrell, 2014).

While the OTI course appeared largely successful in improving participants’ readiness to teach online, some important limitations to the course should be addressed. For those with limited technological experiences, the learning curve was steep and, at times, overwhelming, an observation which is consistent with previous research (Reilly et al., 2012). Gee (2004) argued,

> Learning works best when new challenges are pleasantly frustrating in the sense of being felt by learners to be at the outer edge of, but within, their “regime of competence.” That is, these challenges feel hard, but doable. (p. 19)

While professional development should prove challenging and even perhaps frustrating at times, facilitators should work to ensure that participants are not overwhelmed. More research is needed to examine how learning activities and projects can be adapted based on participants’ ability levels. For some in the OTI course, it felt overwhelming to remember all the tools and resources shared in the course. In fact, in one section students requested and then created a resource table. Similarly, some course completers did not feel fully prepared to teach online and requested additional professional development materials and courses. Just as professional development course facilitators work to onboard participants and develop a learning community, they should also extend resources and opportunities when the course ends.

It also appeared especially important that the OTI course modeled best online teaching practices that allowed faculty to experience quality online learning from a student’s perspective (Elliott et al., 2015; Ginzburg et al., 2010). It demonstrates to faculty that online teaching can be engaging, interactive, and student centered (Garrison, 2009). In addition to improving knowledge and skills, professional development in an online format can improve faculty confidence and self-efficacy to teach online (Brooks, 2010; Ginzburg et al., 2010; Rienties, Brouwer, & Lygo-Baker, 2013; Reilly et al., 2012). This was apparent in our study. Participants attributed their perceived improvements in knowledge, skills, and perceptions to exemplars and models provided in the OTI course, as well as to peer interactions.

Once again, the important ingredient is not putting professional development materials online; rather, it is modeling best practices. As one participant in this study noticed, online modules with limited interaction might result in instructors' perception that online learning is all about posting materials and setting up quizzes. Thus, it is essential for facilitators to "practice what they preach" (Elliott et al., 2015) and model the alignment between learning objectives, activities, and assessments. Based on the findings in this study, learning from observation as well as from social interactions seems to transform instructors' beliefs and attitudes (Bandura, 1997; Gachago et al., 2017), which, in turn, may result in increased long-term effectiveness in online teaching and ability to model best practices to pre- and in-service teachers (Ertmer, 2005).

Given the importance of modeling, the large prevalence of face-to-face professional development for online teaching is surprising (Meyer & Murrell, 2014). An additional benefit of online professional development is its availability. An online, especially asynchronous, format allows flexible (although structured) scheduling and increases instructors' participation. It also makes these training opportunities available to adjunct instructors, who might not have easy access to face-to-face training on campus (Elliott et al., 2015).

Practical Implications

Online professional development programs that model high-quality online teaching and learning offer an effective and efficient environment for instructors to update their skills and beliefs (Gachago et al., 2017; Walters et al., 2017). Based on our findings, it is important to design a program that matches the learning formats, topics, and technological resources available to those who will enroll. It might be beneficial to conduct the basic needs assessment before developing an online training program (Ginzburg et al., 2010). While some research indicates that a flexible timeline gives participants autonomy to finish the work at their convenience (Rienties, Brouwer, & Lygo-Baker, 2013), our study suggested that deadlines were important for maintaining an adequate learning pace similar to that which students typically experience. Perhaps more importantly, the weekly deadlines allow participants to engage in meaningful discussions and collaboration, which appeared to be an important aspect of the course.

It has also been beneficial for our participants to keep course materials available even after the program has ended, so they can continue to practice and revisit the information when teaching actual online courses. During the program, it is essential to provide exemplars; encourage exploration or "play" time with various technologies; model best practices of online teaching; promote collaboration between homogeneous cohorts (from similar fields at the same level of technological and teaching expertise) or heterogeneous cohorts (from different disciplines or from more experienced or beginner groupings); and encourage reflection and self-assessment.

Similar to earlier research (Jones, Hope, & Adams, 2018), we found that faculty were motivated by the digital badges they earned in the course. Other studies have also described professional development that motivated instructors to complete the work using micro credentialing in the form of digital badges (Dyjur & Lindstrom, 2017). As a result, when designing extended professional development where attrition may be an issue, digital badges may motivate some faculty to persist and finish a course. Consistent with previous research (Dyjur & Lindstrom, 2017), we found that more explicit explanations of what to do with those badges are needed. It is also important that if badges are offered, they are earned, not simply given for attendance. Research has found that employers value badges awarded for demonstrated skills more than participation-based badges (Carey & Stefaniak, 2018). In fact, West and Randall (2016) argued that the biggest threat to the badging community is that badges are too often awarded simply for attendance, and if more badges are not linked to rigorous assessments, the movement will simply be a fun diversion that has no meaningful impact.

Conclusion

As online learning grows in K-12 and higher education, the need to prepare quality online instructors increases. The need for quality online instructors is especially important in colleges of education because preservice and in-service teachers require online instructor models to help them learn what is possible in the online environment. However, preparing college of education faculty requires developing their online teaching skills and knowledge (first-order barriers to change) and nurturing positive attitudes and dispositions (second-order barriers to change). This case study found that a 6- or 7-week professional development online course focused on teaching online was effective at overcoming first- and second-order barriers to change. More specifically, the course content and assignments proved effective at increasing faculty members' knowledge and skills, but it was the course delivery and the opportunity to learn as an online student that appeared to most impact faculty members' attitudes and perceptions of what was possible in online learning environments. In other words, the method was just as important as the message. When designing professional development courses, universities not only need to consider *what* will be learned but *how* it will be learned. If courses do not model effective online instruction, they run the risk of increasing faculty members' skills without improving their practice.

Recommendations for Future Research

This study included a small set of participants; thus, while insightful, the findings cannot be generalized and should be considered only within the context of this research. One major limitation involves the reliance on self-reported measures of instructors' knowledge and attitudes. It is unclear whether the changes in online teaching knowledge and skills we found were perceived or actual. This is consistent with previous research that focused on satisfaction rather than observable changes (Rienties et al., 2013). Future studies might incorporate some observational measures to determine how much newly acquired knowledge instructors actually transfer to their online learning environments. Longitudinal studies of instructors' online teaching practices after completing an online professional development program could also be helpful in understanding its long-term effects. Finally, this study focused only on the instructors. Future research may benefit from including student measures (when appropriate) to see if changes in instructors' knowledge, skills, attitudes, and perceptions actually resulted in improved student outcomes. Seeing measurable benefits for students would likely further inspire instructors to shift their beliefs and seek opportunities for high-quality professional development. While challenging, this expanded research could provide important insights colleges of education better prepare faculty to teach online. In turn, modeling effective online teaching practices has been shown to help preservice teachers expand their understanding of what is possible in online courses.

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Putting Theory Into Practice: Incorporating a Community Engagement Model Into Online Pre-Professional Courses in Legal Studies and Human Resources Management

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Abstract
Scholars widely agree that community-engaged learning can significantly improve the learning experience for students while simultaneously having a positive impact on the community. This paper explores student perceptions in online pre-professional undergraduate courses in the legal studies and human resources management fields in which community-engaged learning projects were utilized. Students were paired with community members in instructor-focused activities linked to their academic curricula. Using reflective discussions, a survey, and focus groups, the instructors attempted to gather important data related to student perceptions of the community-engaged learning experience that builds upon prior research. While specific themes emerged in each course, the most significant findings common to both groups were the following: (1) students recognized the powerful impact of their profession, (2) students realized the increasing importance of soft skills to their success, and (3) students appreciated the growth in their own personal attitudes and professional skills. The student perceptions from these classes should lead to a deeper understanding of the benefits and challenges of community-engaged online classrooms and give guidance for developing future projects.

Keywords: community engagement; service learning; experiential learning; student perceptions; legal studies; paralegal studies; human resources; human resources management

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Putting Theory Into Practice: Incorporating a Community Engagement Model Into Online Pre-Professional Courses in Legal Studies and Human Resources Management

Student enrollment in online courses continues in an upward trend, with over six million learners, or over 30% of all undergraduate students, taking at least one distance education course during their studies (Seaman, Allen, & Seaman, 2018). As institutions pursue online formats to attract more students and increase capacity, instructors are encouraged to increasingly enhance their online classrooms but may find it daunting to incorporate certain engagement strategies, such as community engagement activities. While there is a growing body of research related to community engagement health care and science-related fields in online education, community engagement has not been adopted commonly in online formats or widely across most disciplines. We took on the challenge of incorporating community engagement into their online courses and will share data that enhances the body of research by showing that community-engaged learning facilitates greater student–student, student–content, and student–instructor engagement in online courses in the disciplines of business and law. This project will therefore assist other instructors in their pursuit to transform their online courses with a community engagement strategy.

Community engagement has a long history as a pedagogical tool that combines classroom learning goals with targeted community service projects to enrich the academic experience and strengthen civic awareness (Brail, 2013). Community-engaged learning expands the classroom into a social context far broader than four walls or assigned readings and can be successfully utilized in in-person and online classes (Carnegie Foundation, 2008; Sheafer, 2014). In shifting focus from lecture or other teacher-centric instructional activities, students in community-engaged classes work with community partners to put their theoretical learning to practical use (Behar-Horenstein et al., 2016). Knowledge is absorbed in a more active environment and translates into better retention of the material. In a study by Brail (2016), after two weeks, students remembered 20% of what was said in a lecture versus 90% of what the students actively put to use on the topic. Connecting with course material on a deeper level can also lead to higher retention and graduation rates (Quaye & Harper, 2015). In its ideal form, community-engaged learning promotes partnerships between a university and the outside world, forging relationships that are mutually beneficial and that produce graduates with a strong sense of social awareness (Bringle, Hatcher, & Jones, 2011; Sapp & Crabtree, 2002).

Because of these perceived values of community-engaged learning, we decided to gather data from the student perspective in their online community engagement classes. In this paper, we begin with a discussion of the existing body of research in this area. Then, we describe the specific community engagement projects for each class and the methodology used to gather data. Next, we analyze the data and outline the results and limitations of the study. We end with conclusions that can be drawn from our study and lessons learned.

Review of Literature

We were particularly interested in exploring students' perceptions of a community-engaged learning experience and in ascertaining the rewards and challenges associated with this pedagogical tool, particularly when utilized in an online setting. For example, it has been found that community-engaged learning can enhance students' understanding and interest in the subject matter being studied and may result in enhanced participation in the classroom and improved social and economic benefits in the community (McGorry, 2012). Additionally, as higher education offers more courses online (McNiff & Aicher, 2017), the incorporation of community-engaged learning into online courses presents opportunities for higher education to integrate community engagement into all levels of the curriculum. And, while few students are currently exposed to it in their online coursework, it has been found that community-engaged learning must become part of the online learning experience to remain relevant and transformative (Waldner, McGorry, & Widener, 2012). Other potential benefits of community-engaged learning are an increased pre-professional identity developed in students and benefits to the larger community (Jackson, 2016a). The literature also reveals the importance of assessing student perceptions and the utility of incorporating these findings into future studies. Finally, as will be discussed more fully below, the literature reveals challenges across stakeholders associated with incorporating community engagement into the classroom.

As noted by Chickering and Reiser (1993), learning is "not a spectator sport," and a traditional teacher-centered atmosphere often fails to bridge the gap between subject matter and a student's meaningful construction of that knowledge, skill, and value (Moore, Boyd, & Dooley, 2010). Further, as students in today's college classrooms come from highly diverse backgrounds, faculty and administrators should seek ways to actively engage students in meaningful activities linked to the larger cultural landscape around them (Pelco, Ball, & Lockerman, 2014). Kuh, Kinzie, Buckley, Bridges, and Hayek (2007) argued that meaningful student engagement encompasses "educationally purposeful activities" and the level of support and engagement opportunities provided by an institution to induce students to participate in these activities. Institutions of higher education are increasingly concerned with program learning outcomes and the extent to which courses meet these stated objectives through activities and student performance. Community engagement has been found to be a predictor of students' increased attainment of learning outcomes for a program of study (Prentice & Robinson, 2010). Assignments that immerse online students in the larger community also give students practice in grappling with the complexity of their personal values despite not occurring in a traditional classroom (Bourelle, 2014; Kelly & Miller, 2008; Nielsen, 2016). Other potential benefits include the development of stronger democratic values and civic responsibility, critical thinking growth, and an enrichment of the scholarship and creative activities of faculty (Feen-Calligan & Matthews, 2016; Miles, Reed, Brown, & Allen, 2009). Although research has revealed that community engagement activities are associated with positive student perceptions, additional research is needed to determine the factors that account for this increase (Furze, Black, Peck, & Jensen, 2011; Hoppes, Bender, & DeGrace, 2003).

As members of the faculty have become more aware of the potential pedagogical and social benefits from community-engaged learning, a movement to incorporate these types of experiences into online classrooms is growing (Hervani, Helms, Rutti, LaBonte, & Sarkarat, 2015). Particularly in Web-based classrooms, being involved in the larger community as part of an online course may also help to alleviate learner concerns about a perceived lack of community that can sometimes exist in an online setting (Bernier & Cheryl, 2016; Sadera, Robertson, Song, & Midon, 2009; Song, Singleton, Hill, & Koh, 2004). Community engagement can facilitate intraclass interaction and increase online social presence as students share their experiences with the class while working on projects with community partners (Rovai, 2002). Studies have shown that in online classes, this type of civic engagement will create a sense of community and purpose that is critical to student success (Sadera et al., 2009). Butchey's (2016) AT-EASE model for an online community-engaged class is broken into six Cs: connections, coordination, conversations, confidence, choices, and competence. These six stages begin when a learner is first acquainted with a subject matter, and they extend to those steps during which the student works to coordinate the community-engaged learning activity through conversations with other students, the faculty, and the community partner. As students begin to apply their knowledge and to solve community problems while working directly with clients, they develop the confidence to ask probing questions that ultimately facilitate decision-making and their capacity to recommended solutions. This type of embedded community-engaged learning reinforces the curriculum and promotes a deeper level of competence and empowerment in students while translating into a more robust experience for the community partner.

Additionally, the experiential skills and perceptions developed by students in a community-engaged model can contribute to the emergence of a student's pre-professional identity, which is an early connection to an intended profession that can bolster a student's development and success (Jackson, 2016a). A second study by Jackson (2016b) found that pre-professional identity is an underexplored concept that can influence one's academic success, well-being, and productivity in the classroom and beyond. Further, she found that having students appraise and reflect on their experiences in a community engagement project is critical for each student to reach a deeper understanding, to "question and make sense" for themselves, of what they have observed and learned (Jackson, 2016b). A 2017 study by Zhao and Zhang explored the development of pre-professional identity in teacher education students. Utilizing a mixed methods research approach that included student reflections, the study indicated that fieldwork in a practice-specific setting is linked to students developing their belief in the value of the teaching profession and promoting the students' professional commitment. In a study of pre-professional wildlife management students, Stevenson and Peterson (2015) found that students who participated in career-related community-engaged learning were exposed to soft skills that broadened their perspectives and opened their eyes to a variety of employment options. As students actively participate in real-world activities, these experiences can translate into some of the most meaningful and impactful moments, lasting long after a diploma has been awarded and bridging gaps between academia and the employment sector (Barker, 2004; Felton & Clayton, 2011; Smith, Smith, Taylor-Smith, & Fotheringham, 2017).

A common theme in much of the literature is the importance of assessing students' perceptions of their community engagement experience, and several methods, such as interviews, focus groups, journal assignment analysis, and analysis of videotaped interactions, exist to assess students' social learning and to identify areas for improvement (Brown, 2001; Cooks & Scharrer, 2006; Schindler, 2014; Sheafer, 2014). Jenkins and Sheehey (2012) argued that student reflection pieces seem to be the most frequently used form of assessment. Student participation in community engagement projects combined with structured reflection has been found to provide meaningful insight into the participants' personal beliefs and self-awareness (Furze, Black, Peck, & Jensen, 2011). The incorporation of student reflection into a course also dovetails nicely with the use of nonlinear paths of learning (Bourelle, 2014). In nonlinear environments, particularly those online platforms that engage in community projects, students gain new perspectives and solve problems more adequately because learning is integrated and not separated into discreet, linear "boxes," which mimics more closely the "unscripted nature" of the real world (Dailey-Hebert & Donnelli, 2010).

Analysis of embedded assignments, such as written reflections and surveys, suggests that community-engaged learning facilitates growth in personal attitudes and professional skills considered important to preparation for the work world (Feen-Calligan & Matthews, 2016; Moore, Boyd, & Dooley, 2010). According to Murray, Plante, Cox, and Owens (2015), more studies are needed that focus on the effectiveness of community-engaged learning projects, with a special focus on how individual students are impacted by the experience. By soliciting student feedback along the way, this information can help shape and reshape the projects. Additionally, the implementation of a carefully considered community-engaged learning project that includes reflection and surveys in online environments serves as a method to improve teaching, motivate student writing, promote teamwork, and create virtual collaborative presentations (Helms, Rutti, Hervani, LaBonte, & Sarkarat, 2015). A study by Lehman and Conceicao (2010) found that self-reflection is critical to success in online learning because it enables students to transcend the online environment by becoming intimate with the project itself and the individuals involved.

While scholars and practitioners largely agree on the positive attributes of community engagement, several challenges exist, particularly in the online context. For example, since many students ostensibly enroll in online classes because of the flexibility afforded, when a professor requires time working in the community, this flexibility may be limited and the class less appealing to students with busy outside work and home lives (Bossaller, 2016; Song, Singleton, Hill, & Koh, 2004). Also, when students work collaboratively, the variable of group composition can undercut the experience for some students if not all group members are contributing in a meaningful way.

Despite these challenges, community engagement seems to be worth the undertaking, particularly for students studying in pre-professional fields who have the unique advantage of receiving feedback from clients, customers, and/or community partners on the efficacy of the student's efforts within their anticipated field. This feedback is a valuable tool as students reflect inward and evaluate their degree of fit within a profession. These experiences will also help students to more realistically calibrate their expectations of a profession and identify any gaps in their qualifications and their preparedness to enter the field. In reviewing the literature, we found consistency in the findings that community-engaged learning promotes a deeper understanding of course objectives, fosters pre-professional identity, and bolsters community relations. However, in answering the call for more research to assess how students are impacted by community-engaged learning, we sought to explore students' perceptions of their community engagement experience, to draw conclusions about what worked well and what was not as successful, and to replicate the courses in future semesters using these lessons learned. The main questions we sought to answer with our research were the following:

- Does community-engaged learning in online paraprofessional classes create an environment for greater student–student, student–content, and student–instructor engagement?
- Is community-engaged learning an effective pedagogical tool that can enhance the quality of online courses from a student perspective?

Methods

This project was part of a university-wide initiative to support and facilitate community engagement and was one of a small contingent that adopted community engagement in an online setting (six out of 51 courses). To support the university-wide initiative and to foster student involvement, instructors in legal studies and human resources management each redeveloped one of their online courses to incorporate a community engagement project. Students in the legal studies course prepared powers of attorney, advance directives for health care, and wills for members of a Habitat for Humanity community under the direction of their instructor, a licensed attorney. The human resources management students evaluated the effectiveness of the training and hiring functions of local organizations. We will present lessons learned and best practices, with special emphasis on students' reflections, surveys, and interviews.

The legal studies and human resources management disciplines are competency-based, and students benefit when they can practice the skills they learn in real-world, low-stakes environments. For this reason, a community engagement assignment was well-suited for these courses and took advantage of what Gruenwald (2005) and Lysne et al. (2013) noted as critical for 21st-century students—that is, understanding the notion of *place*. Rather than learning being relegated to inside the four walls of an institution, learning can happen everywhere, and different places teach us about how the world works and how our lives fit into the spaces we occupy.

Data Collection

In this qualitative study, students participated in an assigned community engagement project that they could complete either individually or in a group. Approval from the university's Institutional Review Board was received, and students were invited to include their project data in a study titled Community Engagement in Online Classes. A total of 41 students consented to participate (23 out of 26 in the legal studies course and 18 out of 22 in the human resources management course). The respondents to the legal studies survey were 74% minority, 78% female, and 48% part-time. Data from the human resources management class came from students who were 82% minority, 67% female, and 84% part-time. In both courses, student reflections were collected using the Desire2Learn (D2L) learning management system.

Reflection questions were selected as a data collection method because of the advantages they offer. They (1) are student-centered measures that allow participants to complete them at times that best fit their progress and schedules and (2) allow students opportunity to revisit questions, spending time with the questions that were particularly meaningful or thought-provoking. Both factors aided in the construction of knowledge and enable students to recognize their own growth while providing information to the researchers about students' perceptions of their community engagement experiences.

The instructors developed reflection questions that students would find straightforward and accessible, so that students would more easily be able to contemplate and reveal their experiences as they engaged in the project. Posing simple questions is a good way to "promote participants' self-disclosure through the creation of a permissive environment" (Marshall & Rossman, p. 84, 1995). The legal studies reflective questions are listed on Table 1, while Table 2 outlines those from the human resources management course.

In addition to the reflection questions about the nature of student experiences, each instructor wanted to evaluate the process to identify areas for improvement that would help with designing future community engagement courses. Because of its efficiency in both collection and analysis, the legal studies instructor created and administered a 15-item survey that is shown in Table 3. Alternatively, the human resource management instructor assigned a focus group interview in her class (see Table 2) with the goal of building upon the information already collected through self-reflections. Students were asked to participate in one of three virtual WebEx meetings after final projects were submitted.

Table 1.
Legal Studies Questions

Reflection 1	After watching the video in this folder which includes information about the value of service-learning projects to students, faculty, schools and the community and reading the article regarding the importance of pro bono legal work for attorneys and paralegals, please share your thoughts, including details about any previous experience with volunteer or pro bono work, how you feel about this aspect of the course, and what you expect to gain from the experience.

Reflection 2	How were the concepts you are currently learning about in class reflected in your recent client visit? What are the similarities and differences between the concepts and reality? What useful skills did you discover during your client meeting? How might you apply these newly discovered skills to other situations? Did you use a skill that you didn't think you would need or use? Why?
Reflection 3	Describe a significant event that occurred as a part of the service-learning experience this semester. Why was this significant to you? What underlying issues (societal, interpersonal, professional) surfaced because of this experience? How will this incident influence your future behavior?

Table 2.
Human Resources Management Questions

Reflection 1	How were the concepts you are currently learning about in class reflected in your visit to your organization? What are the similarities and differences between the concepts and reality? What useful skills did you discover during your client meeting? How might you apply these newly discovered skills to other situations? Did you use a skill that you didn't think you would need or use? Why?
Reflection 2	What was the best thing that happened and what was the most challenging in your community engagement experience?
Focus group interview questions	What did you enjoy about this project? What surprises did you have during the process of working on this project? What tips or advice would you give to other students who will work on this project, either in the preparation or execution of the phase? What suggestions do you have to improve this experience for future students?

Legal studies. The legal studies project was offered in the instructor's online Wills, Trusts, and Probate Law class. Students worked in groups to draft estate planning documents for low-income individuals in the campus's surrounding community. Students were aware of the community engagement component of the class before they registered, and the syllabus clearly outlined the semester-long project and objectives related to a community-engaged learning course. Initially, the instructor explained the importance of pro bono work in the legal field and offered students the opportunity to reflect on service and their expectations of the experience. After a month of instruction, the instructor and her students met with their clients for the first time. She conducted an information session, distributed literature, and advised the clients of the importance of estate planning. Then, her students conducted client interviews utilizing a questionnaire. Thereafter, using an online discussion board, the instructor had the students reflect on the client meeting. Subsequently, the students began drafting the necessary documents and submitting them to the instructor for her review. After they finalized the documents, the instructor and each group had a conference call with each client to review the details prior to the execution of the documents. At the second and final meeting with the clients, the students and instructor explained the documents again and had them signed and notarized. Upon completion of the project, the instructor provided the final opportunity for students to reflect on their community engagement experience on another online discussion board.

In addition to the discussion boards referenced above, the instructor created and conducted an anonymous student survey at the end of the semester. She asked the students 15 questions to gather formal data regarding their perceptions of the project's effectiveness. Twenty-three of the 26 students enrolled in that class (88.5%) responded to the survey. The questions and student responses, including the scale of possible responses, are recorded on Table 3.

Table 3.
Survey of Student Perceptions in Legal Studies Course

Questions	Responses	
1. Would you take another community engagement class if offered the opportunity?	21 = Yes	2 = No
2. Do you believe that the community engagement component of this online class added positively to the course?	23 = Yes	0 = No
3. Did you enjoy the community engagement component of this online course?	20 = Yes	3 = No
4. Has the community engagement component of this online course encouraged you to do more pro bono work in the future?	22 = Yes	1 = No
5. Have you taken online courses before or during this semester?	22 = Yes	1 = No
6. Compared to other online courses you have taken, the quality of interaction with other students in this class:	15 = Increased 6 = Stayed the same 2 = Decreased	
7. Compared to other online courses you have taken, the amount of interaction with other students in this class:	17 = Increased 4 = Stayed the same 1 = Decreased	
8. Compared to other online courses you have taken, the amount of interaction with the instructor in this class:	17 = Increased 5 = Stayed the same 1 = Decreased	
9. Compared to other online courses you have taken, the quality of interaction with the instructor in this class:	16 = Increased 6 = Stayed the same 1 = Decreased	
10. Compared to other online courses you have taken, the quantity of your learning experience in this class:	15 = Increased 7 = Stayed the same 1 = Decreased	
11. Compared to other online courses you have taken, the quality of your learning experience in this class:	14 = Increased 7 = Stayed the same 1 = Decreased	
12. Compared to other online courses you have taken, my motivation to participate in class activities in this class:	11 = Increased 11 = Stayed the same 1 = Decreased	

Table 3. (Cont.)
Survey of Student Perceptions in Legal Studies Course

13. Do you believe that the community engagement project helped to foster the instructor-to-student interaction in this class?	12 = Definitely yes 10 = Probably yes 0 = Might or might not 0 = Probably not 0 = Definitely not
14. Do you believe that the community engagement project helped to foster the student-to-student interaction in this class?	9 = Definitely yes 12 = Probably yes 2 = Might or might not 0 = Probably not 0 = Definitely Not
15. Do you believe that the community engagement project strengthened your grasp of the course material?	15 = Definitely yes 5 = Probably yes 1 = Might or might not 2 = Probably not 0 = Definitely not

Note. Number of responses (*n = 23*)

Human resources management. The other community engagement project was assigned to 22 students in an online human resources management course. Using concepts learned in the course, students acted as consultants of training or personnel selection and collected information on the mission, goals, programs, and organizational structure in either a local business or nonprofit organization. Working individually or in groups, they provided analysis and recommendations that highlighted areas of exemplary behavior and opportunities for improvement. Students met with their client organizations as needed and delivered a final report of their findings at the conclusion. At various stages in the project, students submitted an agency selection form, completed two discussion posts that prompted personal reflection on the project, and participated in an after-action focus group interview. In the six-week human resources management project, Reflection 1 was to be completed sometime during Weeks 1–3, after initial contact with the client. Reflection 2 was to be completed sometime during Weeks 4–6, when students would have had additional contact with their clients and more time to process their experiences.

An additional data collection measure, an after-action review focus group, was included in the human resources management course to glean lessons learned and provide closure for the project. Students were asked to participate in one of three virtual WebEx meetings after final projects were submitted. Interaction in a focus group enables participants to further develop and refine their views, enhances data quality, and, in the case of computer-mediated forums (such as discussion boards), has the added benefit of reducing anxiety since participants and moderator are physically separated (Patton, 2002).

Data Analysis

This study used content analysis to evaluate students' perceptions and descriptive statistics for the survey. Analysis was performed to understand how students perceived their experiences in each course, and data was then evaluated to see how the two courses compared.

The first step in our analysis was to read all the responses to get an overall sense of the general ideas and tone that participants were communicating (Tesch, 1990). During this process, we reflected on the participants' comments to understand their meaning, making notes regarding the direction the responses seemed to be headed to sort through the raw data. It was essential that we continually referred to the main purpose of our research, which was to explore students' perceptions of their community engagement experience to uncover the essential meaning of the students' comments. Frequently referring to our focus grounded our analysis so that the responses were continually viewed as connected rather than disparate statements, guarding against the danger of being overwhelmed with so many individual comments (Miles & Huberman, 1994).

The second step in our analysis was to organize the data by finding common themes or categories among all the students' responses. Boyatzis (1998) calls these *data driven codes* because they consist of the words and phrases the researcher finds compelling, rather than labels created a priori from theory or prior research. We read and reread each of the comments along with their category heading several times to determine whether students' comments were correctly placed, and then we analyzed each response separately to determine its interconnection with other themes. At this stage, we looked for saturation of categories—that is, the degree to which new comments minimally altered the dimensions of the category, as well as the regularity with which similar meanings were expressed. Lincoln and Guba (1985) note that this process helps to ensure that the breadth and depth of participants' intended meanings are accurately represented. Themes related to student perceptions of the community-engaged learning experience emerged in both classes; they are more fully described below.

Results

In keeping with the purpose of exploring students' perception of their community engagement learning experience, the following themes emerged among legal studies students: (1) appreciation for the legal profession and philanthropic opportunities therein, (2) development of professional identity, (3) dissatisfaction with group processes, and (4) development of personal advocacy.

Legal profession and philanthropy. In their reflection assignments, students expressed great excitement about offering a much-needed service to the community. For many, it was the first time they had interacted with a real-life client or participated in any type of community service. They confided that this experience encouraged them to continue to provide future pro bono legal assistance to those in need. It also excited them about their future careers in the legal field. The instructor encouraged her students to include this invaluable experience on their résumés and to speak about it in interviews with potential legal employers.

Professional identity. The students commented that in most of their other legal studies classes, they had used only hypothetical fact patterns to illustrate legal concepts they had learned; however, the community engagement project afforded them the opportunity to do valuable work outside of the classroom to assist actual clients in immediate need. Students expressed that they were more invested in the project because the outcome was of utmost importance to their client. Moreover, the students employed many of the legal ethics they had been taught in previous classes as they worked towards their goal, including confidentiality, competent representation, and due diligence.

Group processes. Some students indicated that they were not fond of working in groups. As is typical, there were reports of students within the group who did not do their fair share. The remaining group members would then have to pick up the slack for the irresponsible student(s) to complete the project successfully. In addition, there were personality conflicts in a couple of groups. Sometimes, there were group members who did not get along because they had different learning styles, work ethics, or ideas about how and when a task should be completed. The instructor tried to encourage group members to resolve their personal differences internally, if possible, and to remember the primary focus of addressing their clients' needs. Finally, some students expressed frustration related to poor communication among group members or with their clients. Because it was an online class and students had various work and personal schedules, it was often difficult to coordinate times for conference calls or meetings that were convenient for all group members and their client. Despite these issues, overall, in their final reflections, the students indicated that the community engagement component of the class was something they treasured. The students appreciated even the negative project experiences, as they were also able to glean valuable lessons about themselves and teamwork from those experiences.

Personal advocacy. Finally, in their reflections, many students pointed out that the project made them more self-aware with regard to issues surrounding death and dying and the importance of estate planning for their families. Students learned of the various reasons people avoid estate planning in the textbook and directly from their clients. Common reasons include procrastination, lack of money, and lack of knowledge about the necessity of estate planning. After completing the project, some students stated that they would soon prepare their own estate planning documents. Others mentioned that they were now educating and encouraging family members to have them prepared. Still others shared stories about turmoil that had resulted after family members had died without these documents in place, and they cautioned classmates against this lack of preparation.

These reflection observations were confirmed in the results of the anonymous end-of-semester survey, which is fully outlined in Table 3. All the respondents indicated that the project added positively to the course. An overwhelming majority (96%) of the respondents stated that it encouraged them to engage in future service to the community. Finally, the survey confirmed that compared to other online classes they have taken, students believed that the community-engaged learning class offered greater student–instructor, student–student, and student–content engagement.

Human Resources Management

Similarly, in analyzing students' reflection comments in the human resources management course, several themes emerged. For Reflection 1, the comments fell into two topics related to (1) reinforced course concepts and (2) skill development in professional practice. For Reflection 2, the comments sorted between (1) encountering positive experiences and (2) encountering challenging experiences. These themes and comments are presented below, and a selection of especially poignant student comments relative to these concepts appears in Table 4.

Table 4.
Select Student Reflection Comments From Human Resources Management Course

Professional practice	"I have to be careful what I ask. The founder of the organization didn't answer my questions in full, so I had to find another way to get the information I needed."
	"Non-profits tend to be a lot more reserved when sharing information about their organizations. The level of privacy and unwillingness to allow outside guidance makes me a little skeptical."
	"I had a list of questions prepared for my interview but when I got there it wasn't that easy. I had to go back the next day to follow up."
	"The most useful skill I found was listening and analyzing. I reviewed my notes and then decided how to proceed."
Positive experiences	"The best thing is that I have been interested in this organization since I was a little girl. It was heart-warming to see what they offer the community."
	"The best thing was realizing that I could transition from military to corporate. I have never worked in in the corporate world, and it felt good to look into a company to see where my degree applies and how I can make a difference."
	"My project gave the business owner a chance to do a real introspective to see where it needed to improve."
	"The best part was that it gave me the opportunity to share valuable knowledge with an organization to whom it would be beneficial. The organization does not have a formal HR staff; therefore, they can benefit from the tools and resources provided in my presentation. It was rewarding to share the fruits of my education with others."
	"The best thing that came from this project was a job offer in the HR department. After completing the project, I submitted it to the director of operations, and they loved it. They will be using my PPT for training. It was challenging to determine the best way to give my suggestions, and it turns out that something as simple as a visual representation for upper-level management enabled them to be more open to other thoughts and opinions. The company made me feel like a partner."
Challenging experiences	"My biggest challenge was confidence. Although I had the resources (books, Internet) and the owner was willing to help me, I was constantly concerned that I was not knowledgeable enough to complete it satisfactorily. I had a plan but was unsure if it was appropriate. I felt the owner had high expectations on the proposal and the results might not be in line with what she really needed."
	"My most challenging issue was communication—at times I found myself stumbling over my words and speaking lower than I normally do."
	"Working within the schedules of the client made communicating difficult."
	"It's very challenging to find a company that wants to work with you."
	"Narrowing the scope of the assignment into a usable form was hard. There was lots of information and I had to figure out what was important and how to put it into the right format, filter it down and apply it to the topics from the course."

Course concepts. Students learned that organizations vary in their use and adherence to established human resources standards and practices. Students were surprised that their community partner either did not follow any of these standards or that they complied with most of them. Many of the students found that the organization selected the practices that worked for it and then adapted them according to its needs. This helped students discover that classroom concepts will provide a foundation and starting point, but their professional judgment will determine how best to apply that knowledge in a real-world environment.

In addition, students learned that use of human resources standards varied depending on the organization's size, sector, and purpose. Students found that larger, for-profit organizations often followed established practices because they could afford the necessary staff and training. Smaller enterprises were more constrained by their limitations and required the owner or manager to wear multiple hats. An exception to this was nonprofit organizations with a governing board that provided direction and funding.

Professional practice. Students learned that communication skills, emotional intelligence, and resourcefulness are competencies that improve with practice and are complements to their technical knowledge that they will bring to their jobs. Students discussed difficulties obtaining the information needed during an interview. Common reasons were (1) the contact was uncooperative, (2) the student was not asking the right questions, or (3) there were restrictions placed on what would be divulged. This required students to try different ways of building trust, listen for what was not said, rephrase questions, and manage their emotions and expectations.

Positive experiences. The most frequent positive perceptions cited were (1) students enjoyed working with people or organizations they admired, (2) students were treated as knowledgeable professionals, and (3) students realized that they fulfilled a real need.

Because students in the human resources management course could choose their community partner, many of them chose organizations that they were either familiar with or interested in. When students chose their church or a social service agency, they commented that it was rewarding to interact with the leaders who made a positive impact. In some cases, students worked with small proprietors with whom they shared a mutual connection, and often these enterprises were short on staff and resources. These client contacts saw the value in what our students offered and treated them with respect and professional courtesy. Because the organization often had limited access to human resources training, the students could identify gaps in their operations that the client had not seen before, and this gave students great satisfaction.

Challenging experiences. The most frequent challenging perceptions cited were (1) students found it hard to gain access to an organization, and then it was slow-going once inside; (2) students feared that they were personally inadequate; and (3) students struggled with time pressures. Almost all students stated that they either were worried about finding a community partner or had actual trouble finding one. Some of the comments reflected that they felt anxiety beforehand when trying to locate partners while others had to employ the help of friends to get access, and still others tried a couple of different organizations before finding the right one.

Many students expressed low confidence in their knowledge and ability to evaluate and present the information they collected, both to the organization and to the instructor. The real-world context added another layer of accountability, and most students did not possess prior experience interacting with upper management to draw upon. Dealing with the time constraints of their contact and their personal limitations also made some students feel as if they were often behind schedule. These themes were important discoveries because students learned that resilience in a difficult work situation and persistence produce progress and success.

The instructor planned to revisit students' perceptions and obtain suggestions for improving the assignment by holding focus group interviews at the end of the project. Accordingly, the questions prepared for the interview were simple starting points to prompt free-flowing discussion. Although several time slots were offered, only three students signed up, and there was not enough participation to hold the group interviews, unfortunately.

Discussion

In comparing students' perceptions in the legal studies and human resources management courses, there were several clear themes that consistently emerged. First, students were pleasantly surprised about the power of their professions. Although students in each course delivered distinctly different services to their respective clients, those differences did not obscure the positive human impact that was achieved. While students learn the nuts and bolts of their profession in the classroom, the human side can be difficult to replicate. However, this deficiency was resolved in the community engagement project. At the project's end, when students saw that their clients' estates were legally protected and that small businesses had solved their internal dysfunctions, students realized that their work can change people's lives for the better. Smith et al. (2017) noted that this kind of professional identity making greatly improves student employability and bridges the gaps between academic and the employment sector.

Secondly, students in both groups learned that good communication and interpersonal skills are essential, and increasingly important, ingredients of success. At different times during the project, legal studies students expressed frustration with some of their group members, as did the human resources management students with some of their clients. Students often think that the difficulties they experience when working with others on school projects will magically disappear once they graduate and get in the real world, not yet realizing that frustrations with colleagues can be a catalyst in problem-solving when common goals are shared. The community engagement project gave students a realistic preview of how human relations function, consistent with Stevenson and Peterson's (2015) findings on the importance of identifying appropriate workplace soft skills.

Lastly, students noted their personal growth while working on their projects. Some students in both classes said they felt inadequate to advise their clients since they were still students. However, this feeling began to change when their clients were impressed with their work or implemented their suggestions. Moreover, when the legal studies students received appreciation from their clients for help with a sensitive matter, they learned that they could navigate the emotional side of the process and were further encouraged to tackle legal planning for themselves and family members who expressed reluctance. Past research has shown that this kind of growth in personal attitudes and professional skills is important preparation for the work world (Feen-Calligan & Matthews, 2016; Moore, Boyd, & Dooley, 2010).

Limitations

If we were to run a subsequent model of this study, we would try to secure a larger data pool (although having students in two different disciplines served as a good intracomparison for the study at hand). Perhaps, we would also survey the community partners to assess their experiences, but since we had a student-centric focus we did not survey outside participants. Similarly, further research might focus on the lessons learned for instructors and suggestions for effective community engagement course design. For example, although the human resources management focus group interviews were unsuccessful, a lesson learned from its failure is that adding an additional requirement at the end of an already stressful and time-consuming project was too taxing and perhaps better placed earlier in the project timeline. Students may also have seen this group activity as incongruent with their expectation of maximum flexibility in an online course and chose to opt out. Finally, as noted by Sheafer (2014), student reflections alone may not be the most reliable measure. Using student evaluations as source data is limiting, since self-reporting is subjective and through the lens of one audience. However, in the Sheafer study, as in our study, the students' perceptions of the service learning project as a powerful tool helps to shape students' satisfaction with the experience and to increase reinforcement of the material.

Conclusion

The results of this study strengthen the outcomes of previous studies in which community-engaged learning was found to reinforce classroom material and to provide students with valuable hands-on life experiences in the community. This study further adds to the growing body of research on community-engaged learning because it provides insight into pre-professional disciplines interwoven into online classes in a traditional university setting, particularly highlighting the power of community-engagement to develop professional identity and acumen in students as they make their transition into the workforce. The results of the study are consistent with the findings of previous studies that community-engaged learning is both enlightening and educationally satisfying. It also provides a helpful blueprint for other online instructors interested in incorporating community engagement into their classrooms. As research in this area continues to grow, whatever challenges arise in the context of community-engaged learning and pre-professional courses should be outweighed by the untapped potential of community-engaged learning as a powerful tool in higher education.

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Open Video Repositories for College Instruction: A Guide to the Social Sciences

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Abstract
Key features of open video repositories (OVRs) are outlined, followed by brief descriptions of specific websites relevant to the social sciences. Although most were created by instructors over the past 10 years to facilitate teaching and learning, significant variation in kind, quality, and number per discipline were discovered. Economics and psychology have the most extensive sets of repositories, while political science has the least development. Among original-content websites, economics has the strongest collection in terms of production values, given substantial support from wealthy donors to advance political and economic agendas. Economics also provides virtually all edited-content OVRs. Sociology stands out in having the most developed website in which found video is applied to teaching and learning. Numerous multidisciplinary sites of quality have also emerged in recent years.

Keywords: video, open, online, YouTube, social sciences, college teaching

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Open Video Repositories for College Instruction: A Guide to the Social Sciences

> The current moment is unique for teaching. … Innovations in information technologies and the massive distribution of online content have called forth video to join textbook and lecture as a regular component of course instruction (Andrist, Chepp, Dean, & Miller, 2014, p. 203).

Websites that direct free online videos to instructors and students, what we call open video repositories (OVRs), have proliferated over the past decade.[1] OVRs have the potential to significantly augment course content by aggregating video relevant to teaching and learning, thus

[1] We hesitate to use the phrase *open education video repositories*, as it may suggest that we are referring to content that qualify under common definitions of *open education resources* (e.g., resources that "reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions" (UNESCO, 2018). We prefer to use the phrase *open video repositories* to denote that we are simply centering on websites that offer free videos that can be used in courses.

permitting instructors to use such media without cost and without having to expend effort searching the Internet. Quality sites, moreover, add further value by offering practical assistance on how videos can be employed in instruction. However, OVRs have yet to be systematically addressed in the literature with regard to either the availability of free teaching resources relevant to higher education (e.g., Coiffe, 2014; Palmer & Schueths, 2014) or the use of video in college instruction (e.g., Alpert, 2016; Andrist, Chepp, Dean, & Miller, 2014; Berk, 2010; Daniels, 2012; Kaufman, 2007; Miller, 2011; Sherer & Shea, 2011; Snelson, 2011; Streeter, 2011).

Innumerable websites contain videos that could be used for teaching and learning purposes, but we address here only those that have freely accessible content relevant to college-level courses within the social sciences. Paid-subscription sites (e.g., Films on Demand, SAGE Video) are therefore excluded, as are publishing platforms for developers, such as YouTube, and sites featuring video appropriate only to precollege students. Not examined either are websites that include videos potentially relevant for college courses but largely directed to general audiences, such as newspapers (e.g., *The New York Times*), magazines (e.g., *The Atlantic*), television program (e.g., National Geographic) collections, intelligent interview sites (e.g., Big Think), and general documentary sites comprised of either original (e.g., Vice) or found (e.g., Snagfilms) content. Likewise not considered are speech or lecture websites (e.g., Jordan B. Peterson's YouTube channel), online college courses (e.g., Academic Earth), tutorial sites (e.g., Khan Academy), massive open online course (MOOC) sites (e.g., Coursera), and those collections with significant educational value but with subject matter too narrow to represent a discipline or major subfield within a discipline.

OVRs are introduced here as a growing and valuable free teaching resource. We describe their key features and variable nature across the social sciences and, in doing so, recognize specific OVRs for the creativity and effort expended by their developers. By pointing instructors to free curated media appropriate to their interests, we hope to motivate further investigation of such resources for employment in their teaching. Moreover, OVRs are especially relevant at present in light of the prominence of online learning. OVR content can be easily integrated into Internet courses to supplement text-based materials. Finally, we encourage instructors to not only use OVRs but also make them—particularly in disciplines where they are underdeveloped. Given that instructors are commonly walled within disciplinary silos, we encourage prospective curators to become acquainted with the significant range of OVRs found across the social sciences to facilitate that end.

Methods and Descriptive Framework

In performing this review, we first identified relevant websites, and then distilled general features. Sites were located through search and discovery engines, video aggregators, Twitter, and posts in Dan Colman's excellent educational multimedia website Open Culture (e.g., Marshall, 2014). We searched MERLOT, the largest online collection of peer-reviewed free higher education teaching resources, and likewise examined articles available about specific sites (e.g., Caldeira & Ferrante, 2012; Macfarlane, Harrison, & Turin, 2005). We also employed the Internet Archive's Wayback Machine to examine websites no longer online, although those that are archived do not exactly mirror their former live versions (Brugger, 2009). Finally, we contacted many OVR developers by email to resolve questions we had about their websites.

In describing OVRs, we consider *website background*, *video characteristics*, and *website features*. Relevant to background, we provide a hypertext link to the repository and identify the developer(s). We tried to determine motives for site creation and source of financial support. We also specify date of site initiation and indicate whether the site continues to upload new video materials. For all but recently initiated sites, the last full year (2018) was the benchmark in terms of persistence of activity. The last year in which content was added is specified for developers who did not augment content during 2018. We should also note that all hypertext links appearing in the article were live as of January 15, 2019.[2]

Video characteristics relate to the quantity of videos at the site (*N*), type of video content provided, and a link to a sample video from the repository. Identifying the source of the content is also important, given the distinction between *original* videos (those created by developers themselves to present a didactic message), *edited* videos (those edited by developers from DVDs or existing online videos, typically copied from popular television series or movies), and *found* videos (those produced by others that are already available on the Internet, either linked directly to source origin or embedded within the OVR). These preparation forms stand in contrast to *referral*, the dominant way copyrighted film content was treated on the Web before the rise of streaming technology and OVRs.[3]

We should note that types of content source are treated differently under copyright law. Although website developers who make their videos are not restricted, those working with found or edited content should be mindful of legal constraints if such content is used without permission of owner. Found video can be legitimately distributed by OVRs without permission if made available to users via hypertext link to source. However, under fair use, legitimate employment of edited copyrighted content comes with standards related to purpose, length, and other considerations (see Jaszi & Aufderheide, 2008).

Pairing clips with instructional applications is important for using video in the classroom, especially for sites employing found or edited content. Whereas original-content sites are typically populated with *explainer* videos, in which teaching points are explicitly incorporated, such points generally do not reside within found and edited media. That is, while a scene from a TV show or movie illustrates a concept in the developer's mind, it may not be apparent to others. Commenting on the value of using found and edited video in sociology, Andrist et al. (2014) write, "Our own experience suggests that students generally find those *not* explicitly created for teaching sociology more compelling. In a similar way that archeologists can better engage students by using real artifacts discovered in situ, video taken from the 'real world' can be used by sociologists to imaginatively demonstrate sociological ideas. Yet, without their content being framed … such videos are likely to remain untapped" (p. 203). Consequently, we address website characteristics in terms of the extent to which teaching and learning suggestions are applied to video content either within the clip itself or through text commentary. Also we determine whether OVRs help users locate videos within the site, facilitate user sharing with followers, and encourage user interaction or user participation in site development. Recognition of OVRs in the broader literature, including awards received, is likewise noted.

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[2] Should a link subsequently break, readers may copy and paste its URL to the Wayback Machine (archive.org/web/) search engine to derive a facsimile of the inactive website.

[3] With referral, video is not available for play online. Rather, sources of clips, such as a given DVD or certain locations on a DVD, are specified, and users then must procure resources on their own (for current examples of referral, see Al-Bahrani & Patel, 2015; Ghent, Mateer, & Stone, 2011). Another option, offering downloadable clips on the website, is no longer common, given the superiority of streaming.

OVRs by Discipline

OVRs were categorized in terms of primary social science disciplines (anthropology, economics, history, political science, psychology, and sociology). Sites having major bodies of content relevant to two or more social sciences were deemed *multidiscipline* OVRs. In this section, we address disciplines sequentially in terms of the number and size of OVRs offered in each and then review those that are multidisciplinary in nature.

Economics. Although economics clearly stands out by having the greatest quantity of instructionally relevant teaching OVRs, we found the discipline to have two substantially different types. The first consists of those that are largely applied in nature that center on the influence of public policy on the economy. They tend to be sponsored by conservative organizations espousing free-market arguments and are professionally produced. The second set is more politically neutral, primarily focused on standard economic principles and concepts, and are exclusively developed by economics instructors.

In our opinion, the most creative OVR videos to emerge in the past decade are those in EconStories (econstories.tv/, 2010–present, *N* > 35), initiated by John Papola (former MTV producer and founder of Emergent Order) and Russell Roberts (former George Mason University professor, now fellow at Stanford's Hoover Institute). Offering original dramatic comedy, the OVR's first videos, *Fear the Boom and Bust* (Papola & Roberts, 2010) and its sequel *Fight of the Century* (Papola & Roberts, 2011), are heated rap battles between actors playing John Maynard Keynes and Friedrich Hayek that center on Austrian school criticisms of mainstream liberal economic policy. *Fear the Boom and Bust* won the 2010 Sammies, and the two videos together have received over 10 million hits on their YouTube companion site. In 2014, Papola added EconPop, a series of popular movie remixes starring comedian Andrew Heaton that illustrate the harmful effects of government intrusion (see Dallas Buyers Club, Papola, 2014). And in 2017, the site started distributing Share Wars, a remix series, created by Papola's Emergent Order in collaboration with Artists 4 America, parodying attempts to regulate the new sharing economy using satirical voice-overs across edited scenes from the *Star Wars* franchise. His interest in warning youth about the dangers of government overreach is again evident in the comedic web TV series Love Gov (independent.org/lovegov/, 2015 and 2018), which has received several awards from libertarian film festivals ("*Love Gov* in the News," 2017). Papola's work has been funded by various conservative organizations, including the Searle Freedom Trust and the Robert and Marie Hansen Foundation.

The standard approach to teaching libertarianism nevertheless has been a bit more mundane. The first coherent set of videos and ancillaries were offered online through television news personality John Stossel. Stossel has long criticized dominant liberal policies and practices through a libertarian lens in his work at ABC and later at Fox News. The initial version of his teaching package began almost 20 years ago as a for-purchase set of DVDs and learning applications aimed at high school and college instructors based mostly on segments from the ABC series *20/20*. During his Fox tenure, he consistently added original and found videos to its present incarnation, Stossel in the Classroom (stosselintheclassroom.org/), where he typically transcends purely economic concerns in addressing what he sees as irrational impediments imposed by government (e.g., "Eye Test Innovators," Stossel, 2017a). Videos, which can also be procured at no cost in DVD form, are accompanied by teaching guides, discussion questions, and external resources. The OVR is funded by The Center for Independent Thought, initiated by noted libertarian movement leaders Howard and Andrea Rich (Zaitchik, 2013). New content is now available as well on Stossel on Reason, a weekly column started in 2017 on Reason.com that he says allows him to address important issues free of corporate television constraints (see "Launch of Stossel TV," Stossel, 2017b).

Several other OVRs provide original content supported by market-based foundations that could be used in either high school or intro-level university courses. PolicyEd (policyed.org/series, 2016–present), sponsored by Stanford's Hoover Institute, offers a set of 14 modules with multiple videos and discussion leads, exam questions, and user comments. Two of the best in our opinion are contributions from the aforementioned Russell Roberts, which range from the empirical ("The Numbers Game," 2017b, to the poetic "It's a Wonderful Loaf," 2017a). The Foundation for Economic Education (FEE; fee.org/), which started in 1946, has long worked through high schools and colleges to influence economic reasoning and loyalties but only recently shifted from relying on print to digital materials (see "A new FEE for the 21st Century," FEE, 2017). New collections there dispense free-market thought through such topics as individual liberty, common sense, and female entrepreneurs. Students may find the *Out of Frame* series to be especially appealing, as it employs remixed pop-culture media to address various moral issues (e.g., "The Anti-Authoritarian Politics of Harry Potter," FEE, 2018). The latest film with full ancillaries from Thor Halvorssen's Moving Picture Institute (thempi.org/, 2006–present) is 2081, a dystopian drama about government efforts to erase inequalities of condition based on a popular Kurt Vonnegut book. Along with a number of other dramatic films, the MPI also offers the animated series *FI$H: How an Economy Grows*, directed to younger students.

However, the most extensive conservative agenda centered specifically on college audiences is being pursued by Learn Liberty (learnliberty.org/, 2011–present) at George Mason University (GMU). The website is sponsored by the university's Institute for Humane Studies (HIS), an entity in turn largely supported through contributions from antiregulation industrialist Charles Koch (Barakat, 2016; SourceWatch, 2016; Young, 2014; for a larger analysis of the role of Koch money at GMU and other universities, see Mayer, 2016). Learn Liberty is a key part of Koch's vision to not only bring student masses to his way of thinking but also create a "talent pipeline" through which affiliated students ultimately become academicians and economic and political leaders who will support conservative activism (Gibson, 2017; Kotch, 2017). The website provides over 300 original-content videos accompanied by summaries, transcripts, and references. Many combine narration by economics professors from GMU and elsewhere with slick graphics and animations (e.g., "Economics: Is Raising Minimum Wage a Bad Idea?" Learn Liberty, 2016). Although primarily centered on economics, the site also tackles a range of social and political issues—often by employing themes drawn from popular movies (e.g., "Is Katniss a Modern-Day Spartacus?" Learn Liberty, 2013) and edgy television series (see "Frank Underwood's Top Three Lessons for the Voting Public: *House of Cards* Review," Learn Liberty, 2014a)—as well as focusing on timely social controversies (e.g., "I Can't Breathe: How to Reduce Police Brutality," Learn Liberty, 2015a). Each video is accompanied by an interpretive essay, linked readings, and downloadable MP3 file. In addition to using popular culture, Learn Liberty has tried to generate further interest through student video responses to intriguing questions (see its "#keepaskingwhy" feature, e.g., "Should You Be Allowed to Sell Your Kidneys?" Learn Liberty, 2015b) and an "On Demand Program of the Week" consisting of videos coupled with related learning resources on provocative themes (e.g., "Sexonomics: The Economics of Love and Dating," Learn Liberty, 2014b). Finally, the site offers opportunities for deeper student engagement with such libertarian ideals through career guides, summer seminars, internships, and jobs.

In contrast to original-content conservative sites, we found little in the way of applied OVRs offering ideological alternatives. We the Economy (wetheeconomy.com/, 2014–2015), produced by the late Paul G. Allen (liberal activist and co-founder of Microsoft) and Morgan Spurlock (documentary producer and cofounder of Cinelan), consists of 23 short documentaries, musicals, and cartoons. Created by filmmakers at the top of their craft (e.g., Ramin Bahrani and Albert Hughes), videos employ professional actors, dancers, and comedians to address basic connections between the economy, government, globalization, and inequality. Allen and Spurlock state that their intent is "to demystify a complicated topic while empowering the public to take control of their own economic futures" (2014a). Videos are accompanied by synopses, director notes, and comprehension questions (e.g., "Lemonade War," Bahrani, 2014), and downloadable resources are available as well (see Allen & Spurlock, 2014b). The OVR won the 2015 Webby for the Best News & Politics Series.

Inequality Media (inequalitymedia.org/, 2014–present, N > 70) also presents a philosophically progressive alternative but is narrower in scope than *We the Economy*. Nevertheless, this collection challenges conservative assumptions about inequality and also has relevance for political science and sociology courses. Here, Robert Reich, UC Berkeley economist and former Secretary of Labor, along with filmmaker, Jacob Kornbluth, have created video shorts that identify problems associated with economic maldistribution, criticize attempts to heighten inequalities, and suggest policies to generate greater equality (e.g., "The Failure of Trickle Down Economics," Reich, 2017).

In terms of OVRs directed to concepts and principles, we should first note the work of Jacob Clifford, a high school teacher from Escondido, California. While the foregoing OVRs generally incorporate highly polished media, Clifford has developed extensive content covering basic economics through talking-head, image-illustrated clips at ACDC Leadership (youtube.com/user/ACDCLeadership, 2007–present, N > 400). (Teaching ancillaries are available behind a paywall.) Aimed at AP students, Clifford's work transcends other tutorial sites by blending popular culture with economics through EconMovies, an edited-video series identifying key disciplinary concepts illustrated in blockbuster movies (see "Capitalism and The Hunger Games," Clifford, 2015), as well as through clips covering contemporary controversies (e.g., "The Economics of Trump," Clifford, 2017). Several years ago, Clifford and *Marketplace* reporter Adrienne Hill joined John and Hank Green's YouTube megaseries to produce Crash Course Economics, integrating new clips with earlier tutorial media.

The largest collection of original videos centering on academic economics is Marginal Revolution University (mruniversity.com/, 2012–present) sponsored by the Mercatus Center, a market-oriented think tank on the campus of George Mason University. MRU was developed by GMU professors Alex Tabarrock and Tyler Cowen, current center director. The site includes free online courses related to such areas as the history of economic thought, macroeconomics, and microeconomics, employing over 800 original videos created to convey course content. We consider the site to be an important OVR, given the breadth and quality of videos, and the fact that its developers strongly encourage instructors located elsewhere to freely use their videos, teaching applications, and related resources. Instructors who want to start with a more a limited set of teaching videos covering basic economic concepts should consult the Economic Lowdown Video Series (2012–2018) produced by the Federal Reserve of St. Louis.

College instructors deserve special recognition, especially for their work in creating low-budget OVRs on their own. In our opinion, the strongest advocate for using video in the economics classroom is Dirk Mateer, lecturer at the University of Arizona. His website, Econ 1-0-What? (dirkmateer.com/, 2011–present, $N > 400$), organized into teaching ideas and media relevant to key concepts, provides clips from his lectures and found popular media (see "Gangs of New York," Mateer, n.d.). Mateer also has published significant scholarship on media integration (e.g., Ferrarini & Mateer, 2014; Mateer, O'Roark, & Holder, 2016; Mateer & Stephenson, 2011), contributed to a useful website on that topic (see Mateer, Ghent, Porter, & Purdom, 2014), and most recently, collaborated on several edited-content OVRs (see below).

The involvement of professors in independent site development is clearly evident in those OVRs employing scenes curated from popular television comedies to illustrate discipline concepts. Linda Ghent (Eastern Illinois University), Alan Grant (Baker University), and George Lesica (software engineer) started this genre with The Economics of Seinfeld (yadayadayadaecon.com/, 2010), which provides over 70 clips from the *Seinfeld* series, organized by 120 concepts, ranging from "absolute advantage" to "zero-sum game." Each clip has a brief summary and links to a glossary (see Ghent, Grant, & Lesica, 2010). Similarly, The Economics of The Office (economicsoftheoffice.com/, 2013) developed by Kansas State University professor Dan Kuester, graduate student Chris Youderian, and Dirk Mateer, provides 30 scenes from *The Office*, with brief synopses and applications (e.g., "Write That Down," Kuester & Youderian, 2013). Bazinganomics (bazinganomics.com/, 2015–present, $N > 85$), created by James Tierney (Penn State), Wayne Geerling (University of Arizona), Jadrian Wooten (Penn State), Dirk Mateer, and Ben Smith (University of Nebraska, Omaha), also employs clips from a popular comedy series indexed by key concepts, in this case *The Big Bang Theory*. However, it went beyond other edited-content sites at the time in offering lesson plans for concepts undergraduates often find troubling (e.g., "Causation vs. Correlation," Tierney, Geerling, Wooten, Mateer, & Smith, n.d.). Three additional edited-content OVRs using television programs have recently gone online: The Economics of Shark Tank (econshark.com/, 2017–present) by Charity-Joy Acchiardo (University of Arizona), Abdullah Al-Bahrani (Northern Kentucky University), Darshak Patel (University of Kentucky), and Brandon Sheridan (Elon University); Economics of Parks and Recreation (economicsofparksandrec.com/ 2017–present) developed by Jadrian Wooten (Penn State); and Economics of Modern Family (modernfamilyecon.com/, 2018–present) developed by Jadrian Wooten, Kalina Staub (University of Toronto Mississauga), and Susan Reilly (Florida State College). Both of the latter appear unique to edited-content OVRs by encouraging clip and teaching application suggestions from instructors and students.

Although economists have long-discussed the relevance of employing feature-length films as a classroom teaching medium (e.g., Leet & Houser, 2002), we could find only three collections built from specific movies, movie series, or movie genres. Broadway Economics (broadwayeconomics.com/, 2015–present, $N > 50$), developed by Matthew S. Rousu (Susquehanna University), offers a series of clips edited from various musical theater videos with extensive teaching ancillaries; University of Chicago economist Steven D. Leavitt and writer Stephen Dubner created a YouTube playlist of 29 clips from their 2010 feature film, *Freakonomics*; and as noted, John Papola created Share Wars.

Two found-video OVRs by instructors have also recently emerged. Economics Media Library (videoecon.wordpress.com, 2017–present) created by Jadrian Wooten has already amassed a large set of clips from movies, television programs, news stories, and commercials, augmented with brief summaries and links to related materials (e.g., "Daily Show: Ugly People Discrimination," Wooten, 2017). And Mark Melichar (Tennessee Tech University), through

EconGoneCountry (econgonecountry.com, 2017–present), is working to establish that economics can be well-illustrated through country music lyrics. Each entry links to a music video and discusses at length concepts raised in it (see “Red, White, Pink Slip Blues,” Melichar, 2017).

Finally, student involvement in creating music videos is being actively encouraged by Abdulla Al-Baharani of Northern Kentucky University and Kim Holder of the University of West Georgia. Al-Baharani created Econ Beats as a model for instructors interested in incorporating such media into course assignments (for an excellent example, see Al-Baharani, Libis, Drabick, & Gibson, 2017), whereas Holder developed and directs an annual nationwide contest, Rockonomix, which has stimulated significant student engagement (see Holder, 2015, for an overview of the project).

Psychology. Among original-content psychology OVRs, four sites that are clearly different stand out: The Psych Files, goCognitive, BrainCraft, and Psych2Go. The Psych Files (thepsychfiles.com/, 2007–present), produced by Marist University instructor Michael Britt, is centered on audio podcasts (e.g., Britt, 2017) but also includes brief videos on diverse psychology topics. Most have summaries, as well as links to related content (Britt’s YouTube channel The Psych Files conveniently aggregates over a hundred videos). Although geared to helping students learn psychology content, most are without an obvious lecture tone. Rather, Britt typically uses a humorous soft sell to convey core concepts (e.g., “If Freud Worked Tech Support,” Britt, 2014). Supported through ads for tech products he has tested (personal communication with Britt, November 27, 2017), his teaching with media has received popular recognition (e.g., Lee, 2016) and various awards (including MERLOT’s 2014 Classic Award).

The second large original-content site, goCognitive (gocognitive.net/, 2008–present), includes almost 200 clips from interviews with researchers about neuroscience theory, methods, and findings. Curated by University of Idaho psychology professor Steffen Werner, the site provides summaries for each clip (see “Can Synesthesia be Acquired,” Werner, n.d.-a) and offers interactive learning demonstrations to illustrate key concepts (see “Monsters and Globes Problems,” Werner, n.d.-b). The OVR also encourages student involvement in site development and offers National Science Foundation grants of $1,100 to conduct interviews. The site has been well funded by the NSF and the Idaho State Board of Education.

The third original-content website of significance is BrainCraft (pbs.org/show/braincraft/, 2013–present, $N > 100$), consisting largely of stop-motion, paper-animation videos covering intriguing yet practical questions about human behavior addressed through psychological and neuroscience research (e.g., “The Bizarre Ways Your Name Affects Your Behavior,” Hill, 2016). Created and narrated by Vanessa Hill, an Australian science media specialist, the collection has been produced by PBS Digital Studios since 2014 and has received numerous positive reviews (e.g., Lanning, 2014; Weisberger, 2016). Her YouTube channel currently has almost 400,000 subscribers.

The fourth original-content OVR warranting special attention is Psych2Go (psych2go.net/, 2014–present, $N > 200$), a site created by Tai Khuong, who was at the time of inception a University of British Columbia psychology major wanting to make the discipline more intellectually accessible to undergraduates. Psych2Go videos address key concepts, new research findings, interviews with psychologists, and, increasingly, self-help questions. The website also sells a quarterly magazine with each issue focused on a common theme. Unique among social-science sites in the sense of being student-operated, Psych2Go relies on user contributions for content, actively recruiting from a membership of about 4,000 to write articles and create videos (see "10 Signs an Introvert Likes You," Psych2Go, 2017). Participation in the process also entails mentoring from Khuong and staff editors (personal communication, Khuong, July 6, 2017).

Several smaller original-content OVRs suggest promise, as well. On the site Be a People Expert (2015–present, $N > 60$), Andrew Luttrell, an assistant professor at Ball State University, includes talking-head clips on various social psychology concepts and questions. Each video at his YouTube site comes with a rich discussion and suggestions for further reading on his blog (e.g., "A Crash Course on Cognitive Dissonance," Luttrell, 2016). Bo Bennett's Socially Psyched (2016) website includes more than 15 talking-head videos with learning applications centered thus far on classic studies in the discipline (see his treatment of compliance tactics in "Xerox Mindfulness Experiment," Bennett, 2016b) and useful teaching instructions about designing curation exercises for students (see Bennett, 2016a). Instructors may also find value in original-content sites too narrow to serve as discipline OVRs: for example, *Pop Psych!* (2015), a small collection of entertaining psychiatric diagnoses of pop-fiction icons from Wisecrack, would be relevant to any treatment of abnormal psychology. Although teaching applications are not provided, each cartoon injects clinical concepts relevant to the character. Finally, Psyfile (2012–2013, $N = 7$), despite its small number of videos and brief duration of output, should also be noted because it is Brady Haran's only attempt to build a social-science collection. Haran has had phenomenal success in creating a bundle of science, math, and humanities OVRs through interviews with UK professors (e.g., Periodic Videos).

Three other original-content sites suggest the utility of using research findings to inform self-help videos. Bite Size Psych (2015–2017, $N = 37$) offers a collection of short animations dealing with psychology-related conundrums and misconceptions (see "Debunking the 4 Most Dangerous Self-Help Myths," Bite Size Psych, 2015). The unidentified developer often provides interesting learning applications in the comments section in responses to users. However, The Science of Us (2015–2017, $N = 27$), distributed by *New York Magazine*, is a bit more problematic. Its collection of animated shorts commonly seeks to explain self-help research in lay terms, although often without providing the identity of highlighted studies (e.g., "Is Casual Sex Unhealthy?" *New York Magazine*, 2016). Finally, as a spinoff of the popular Green brothers' SciShow and Crash Course Psychology, Hank Green recently started SciShow Psych (2017–present, $N > 190$). This OVR employs empirical research to address intriguing questions about the brain and human behavior (e.g., "Are Violent Video Games Bad for You?" Green, 2017).

Found-content videos are available at three OVRs. Personality Pedagogy (2006–2014), developed by Arcadia University instructor Marianne Miserandino, was the first psychology site to appear online. Funded by the Association of Psychological Science, it provides video links and other teaching resources of general interest to the discipline. PsychoTube (2008–present), developed by an anonymous Turkish psychologist, mainly posts found video from YouTube with video transcripts or Wikipedia commentary (e.g., "How Human Brains Compare to Other Animals," PsychoTube, n.d.). Clips for Class (2009–present), maintained by textbook publisher Cengage, also offers a large number of clips on a range of topics organized by subfield. Brief summaries and questions to ponder provide learning applications (e.g., "Dealing with the Office Bully," Clips for Class, 2016).

Finally, psychology has one edited-content OVR. Inspired by The Economics of *Seinfeld*, The Psychology of Seinfeld (2012–2013, $N = 32$) includes clips edited from the television series, along with summaries and interpretations organized by tags (e.g., "Morality According to Kohlberg," Psynfeld, 2012). The developer of this site chooses to remain anonymous.

History. History has far less OVR presence than economics or psychology. The largest collection of original-content video, HipHughes History (hiphugheshistory.weebly.com/, 2008–present), produced by Keith Hughes, former Buffalo, New York, high school history teacher, includes more than 300 rapidly-paced, talking-head, animated lectures (10–20 minutes in length) on such diverse topics as civilizations and presidential elections (see Hughes, 2012–2016). Hughes recently added a series on religions in global history and has a growing list of HipHughes Quickies, which distill events and historical figures into one-minute video overviews. In all, this OVR is a complete package—complemented with an active discussion board, a tech toolbox, and an extensive list of teacher tips—all of which should well serve instructors looking for assistance in introductory-level college courses. Hughes received YouTube's Next EDU Guru Award in 2012 and has appeared on the History Channel's *United Stuff of America*.

Although we classify the Big History Project (bighistoryproject.com/home, 2014) as a history OVR, it aspires to *interdisciplinarity*, ambitiously seeking to unpack "13.8 billion years of history" by using findings from diverse physical and social sciences to explain everything from the big bang to the present in a six-hour course. The website was developed by Macquarie University history professor David Christian (see his TED talk overviewing the inception of the project, Christian, 2011) and funded largely by Bill Gates (Sorkin, 2014). Topics organized as chapters are "The Universe," "Our Solar System & Earth, Life, Humans," and "The Modern Revolution and the Future"; video collections in the latter three chapters are especially relevant for anthropology and sociology as well as conventional history instruction. Initially intended for high school students, the site likewise has become integrated into a successful Coursera MOOC. Partnerships for creating media curriculum materials have added to the value of the project, including those with Christian's International Big History Association, *Khan Academy Big History Project* (with extensive applications), the YouTube site Big History, and the Crash Course series of Big History videos produced by the Green brothers for the project. The site received MERLOT's 2014 Classic Award for History. Much of the material provided at the Big History Project has been integrated into Christian's book *Origin Story* (2018). We should also note that among history OVR developers mentioned in this paper, Christian is the only one who actually teaches at the college level.

YouTube hosts many historically related sites, but we could not find any that distribute offerings that could be used in courses across the discipline. It's History (youtube.com/user/BlastfromthePast, 2015–present, $N > 110$), developed by Florian Wittig and Daniel Czepelczauer, German digital media consultants, is perhaps the most promising for use in survey history courses. Working with MediaKraft Networks, they have produced a large collection of talking-head, photo-story-type videos, primarily centered on histories of military actions, the Industrial Revolution, the Cold War, and sexual behavior (e.g., "The Dark Ages of Sex: All Pleasure is Sin," Kiddey & Czepelczauer, 2015).

Several other original-content sites with unorthodox yet imaginative takes on historical events may also pique student interest. Cody Franklin's AlternateHistoryHub (2012–present, $N > 150$) distributes animated shorts to address such questions as "What If the United States Lost the Revolution?" (Franklin, 2014) and is one of the most popular alternative history sites, with well over one million subscribers. Two others apply music to history. Historyteachers (2008–2014, $N = 58$), developed by Hawaii high school teachers Amy Burvall and Herb Mahelona, weds historically relevant lyrics to popular rock tunes sung by Amy in period costume (e.g., "French Revolution," set to Lady GaGa's "Bad Romance," Burvall & Mahelona, 2010). Epic Rap Battles of History (2006–present, *N* > 65) is a slick collection developed by Peter Shukoff and Lloyd Ahlquist. The site, which has won numerous awards over the past few years, pairs famous figures in edgy rap contests and allows viewers to vote for winners. Its YouTube channel, ERB, as of January 2019 had over 14 million subscribers (videos should be previewed before using in light of strong language; e.g., Shukoff & Ahlquist, 2013). Finally, instructors who discuss blockbuster films on historical themes in class should find use for Cynical Cypher's The Cynical Historian (2013–present, *N* > 145) and Rick Hodges' History Buffs (2015–present, *N* > 55). Although neither was apparently developed for instructional purposes, both make for informative viewing by examining the historical accuracy of popular movies.

Despite the plethora of archival films now online (e.g., British Pathé and Internet Archive), only one OVR built around found video could be located. Have Fun with History (havefunwithhistory.com/index.html, 2009–present), developed by Maryland graphic designer Chris Grahl, provides a large collection of clips from news stories, documentaries, and popular films, with brief descriptions of content to assist U.S. history teachers. The site seems geared to younger students, but college instructors would likely find use for some (among those in the Cold War section, see "Duck and Cover," Grahl, n.d.).

Sociology. Considering social-science OVRs employing found video, one in particular, The Sociological Cinema (TSC), stands out in terms of content diversity, quality of teaching applications, and clip volume (thesociologicalcinema.com/, 2010–present, *N* > 600). Developers Lester Andrist (University of Maryland), Valerie Chepp (Hamline University), and Paul Dean (Ohio Wesleyan University) were PhD candidates at the University of Maryland when they started TSC in 2010 after concluding that a website of clips tagged by theme would be invaluable to instructors interested in finding video for course use. Clips are derived from news stories, documentaries, movies, television programs and commercials, webisodes, and music videos relevant to concepts and issues. Every post includes a link to a clip, a clip summary, and a pedagogical application (e.g., "Youth Scrutinize the Hidden Curriculum, Why Don't Adults?" Grier & Chepp, 2016). Additional materials include blog posts about popular media (e.g., "The Civilizing Habitus of the Walking Dead," Andrist, 2016), assignment outlines for media analysis, Pinterest pages for images, user discussions on the site's highly active Facebook page, and scholarly research on employing the site to foster professor–student research collaboration (see Chepp, 2017). TSC also provides instructions for posting to encourage submissions from instructors and students. The site has been favorably reviewed in *Teaching Sociology* (see Caldiera & Ferrante, 2012) and received the MERLOT Classic Award for Sociology in 2012. Nevertheless, we should note that the rate of video curation at the site has significantly slowed of late, reflecting time constraints imposed by the priorities of full-time academic employment (personal communications with Andrist and Chepp, February 19, 2017).

Relevant found video is also available at several other sites. Jessie Daniels (Hunter College and CUNY) provides links to online documentaries categorized by subfield at her wiki Sociology Through Documentary Film (2009–present). Although not all of the films listed at this site are free, many titles are accompanied by "video worksheets," which link documentaries to assigned readings. DJ Academe (2012–present) developed by Laurie Chancey, sociology instructor at Asnuntuck Community College, tags every video clip by key terms but does not include teaching applications. Modestly noting at her YouTube site that she is an instructor "who collects videos to use in class," the collection is nonetheless extensive (e.g., about 60 videos apply just to "research ethics"). Finally, those who have struggled to convey modern theory to students should find entertaining help through Critical-Theory (2013–2015) a blog developed by Eugene Wolters (aka Slavoj Zizek), which includes found videos relevant to Marcuse, Foucault, and Chomsky, among others (e.g., "Watch: Franz Kafka Airport Named Most Alienating" Wolters, 2014).

Two other found-video sites use art to teach sociology. SocioPoetix (2013–present, $N >$ 30) focuses on poetry as an instructional tool. Developed by San Bernardino Valley College sociology instructor Anthony Blacksher (aka Ant Black), the OVR includes spoken-word videos on varied topics. Each video is accompanied by summary, key lines, transcript, analysis, and follow-up resources (e.g., "Rekia Boyd," Olayiwola & Blacksher, 2015). SociologySounds (2012–2014), developed by Jason Eastman (Coastal Carolina University) and Nathan Palmer (Georgia Southern University), employed found music video, but it is no longer online (see Wayback Machine, 2012c). According to Eastman (2013), there is a strong case for the teaching utility of contemporary music, and they plan to revive the repository as time permits (personal communication, August 30, 2017).

Several collections of original-content video may also interest instructors. Norton Sociology (2010–present, $N > 115$) provides interviews with sociologists and brief treatments of concepts and issues. Strange Fruit Sociology (2014–present, $N > 45$), created by MiraCosta College professor Bruce Hoskins in collaboration with Ant Black (aka Anthony Blacksher), addresses current events and popular culture from a sociological perspective through mostly relaxed, humorous conversations between the two (see "Deviant White Characters on TV," Hoskins & Black, 2015). An animated cartoon series, Sociology Live! (2015, $N = 11$), initiated by Cindy Hager, with support through her Minnesota community college employer, suggests the promise of addressing basic concepts through brief explainer videos (e.g., "White Privilege!" Hager, 2015). Finally, instructors interested in affective learning development should consider FUTURESTATES, an ITVS series consisting of short dystopian documentaries that project possible futures in light of present issues with health care, immigration, technology, and the like. The original site, which includes interactives and learning applications for early videos, can be accessed through the Wayback Machine (2013), and all five seasons (2010–2014, $N = 42$) are available on its YouTube companion. The series has been favorably reviewed by MERLOT.

Anthropology. Anthropology has two major OVRs: The Archaeology Channel and Archaeosoup. The former (archaeologychannel.org/, 2000–present, $N > 110$), the oldest discipline-related OVR we could locate, was created by Richard Pettigrew under the auspices of the Archaeological Legacy Institute. The site provides both original and found content, ranging from short clips to full-length documentaries on archaeology and social anthropology subjects. Brief video summaries are included, as well as links to resource materials for further reference. The site invites interaction with content creators via email and Facebook, and solicits suggestions regarding future programs. A recent addition, "Strata: Portraits of Humanity," is a monthly series of short videos about diverse topics (e.g., the November 2017 episode featured an original documentary on Villanovan culture; Archaeological Legacy Institute, 2017). Pettigrew's work, supported by visitor–members, government agencies, and corporate donors, received the 2006 Excellence in Public Education Award from the Society for American Archaeology.

At Archaeosoup (archaeosoup.com/, 2010–present, $N > 680$), developer Marc Barkman-Astles offers original-content talking-head narratives, interviews, and photo-story videos appropriate to high school and introductory-level college students, while also promoting workshops in UK schools. This OVR should spark interest in the discipline by offering informative esoterica (e.g., how ancient recipes can be cooked today, in “Ancient Greece: Honey-Glazed Prawns,” Barkman-Astles, 2012b), but it also includes more complex treatments (e.g., “Cognitive Archaeology,” Barkman-Astles, 2012a).

In addition, three other sites may prove helpful for teaching anthropology. The Global Oneness Project (globalonenessproject.org/, 2006–present, *N* > 270), founded by Emmanuel Vaughan-Lee and supported by the Kalliopeia Foundation, has a growing list of original-content videos and lesson applications primarily related to cultural anthropology. One of the site’s most compelling series, *Vanishing Cultures*, examines threatened indigenous societies around the world through video and photo essays (see “Marie’s Dictionary,” Vaughn-Lee, 2014). Alan Macfarlane, a retired Cambridge University professor, has curated a massive volume of film clips over his career, much of which is available at his personal website and his YouTube channel, Ayabaya (2006–present, *N* > 1,200). These collections highlight lectures and talks he has given, and provide over 220 interviews conducted with anthropologists and other scholars (for description about creating this archive, see Macfarlane, Harrison, & Turin, 2005). Also relevant to social anthropology is Houston Community College instructor Carol Laman’s Free Online Anthropology Video (2009–2010, *N* > 100), housed on Rice University’s open-access platform Open Stax CNX. It includes self-produced lectures and found videos relevant to discipline concepts, although without summaries or learning applications.

Political science. Despite the great number of websites providing videos on political news stories, political science has the least OVR visibility. In fact, the dearth of video collections in political science has been recognized as a shortcoming by discipline leaders. A recent American Political Science Association Task Force report on the field’s public image, for example, calls for an association-created video library that would “either speak directly to improving teaching effectiveness or include actual materials prepared for classroom use” (Lupia & Aldrich, 2014, p. 13). In terms of open-access resources, nonetheless, political science today appears to be limited to addressing questions about the instructional efficacy of free textbooks (e.g., Brandle, 2018).

We could locate only one website dedicated to the discipline as a whole: Satirical Resource Repository (rebeccaglazier.net/satirical-resource-repository, 2009–2015, *N* > 60) created by Rebecca Glazier, a University of Arkansas at Little Rock professor. The site consists of links to assorted text, image, and videos related to political science subfields (e.g., comparative politics and political theory), organized by media type, concept, and so on. Clips are largely pulled from standard political humor sources, such as *The Daily Show* and *The Onion*. While Glazier only includes a brief summary for each video, her scholarly article about using satirical content in the classroom is a major contribution to the teaching with media literature (see Glazier, 2014).

Instructors who wish to employ free media in their courses can derive materials from more limited sites within the discipline, such as The Living Room Candidate and *We the Voters*, a set of 20 videos with extensive ancillaries created by Paul G. Allen’s Vulcan Productions and distributed by PBS for the 2016 election season. Content could also be borrowed from previously cited collections in other disciplines, such as the HipHughes History playlist of 125 videos under the U.S. Government and Politics rubric, and from several multidiscipline OVRs to be discussed in the next section. Instructors could likewise employ politically relevant content intended for general audiences (such as explainer videos relevant to political science acquired from Ezra Klein’s Vox website). For those interested in creating political science OVRs, they might draw inspiration for developing content from these resources, from OVRs in other social-science disciplines, and from political science media accessible with textbook adoption (for a nonrepresentative sample, see "Too Late to Apologize," Soomo Publishing, 2010).

Multidiscipline sites. Although numerous sites provide video collections cutting across two or more social-science fields, several original-content sites stand out above all others. Instructors in the United States should first consider the oldest and largest trove of original documentary films—those available through PBS.[4] Major series were generally initiated before the Internet, but PBS has made progressively greater amounts of content available to users at no cost since the early 2000s. Program websites typically link streaming access to films and documentaries, and often provide transcripts, clips, and associated learning materials. Several series, all produced by PBS-affiliate WGBH (Boston), seem most relevant to instructors in the social sciences. Although primarily directed to the physical sciences, *NOVA* (pbs.org/wgbh/nova/) includes extensive media for varied anthropology topics (see examples about evolution, WGBH, n.d.). Instructors in other social-science fields will find a rich lode in *Frontline* (pbs.org/wgbh/frontline/, $N > 180$), an investigative reporting series focusing on timely social and political issues. History and political science instructors can also secure solid content at *American Experience* (pbs.org/wgbh/americanexperience/films/), which offers documentaries and clips on themes commonly covered in discipline curriculum (although access to some is now behind a paywall). Finally, the role played by PBS member stations in advancing media integration is important. For example, KQED (San Francisco), like WGBH, produces excellent original videos but also maintains ongoing efforts to make these resources teachable through lesson guides (see KQED Learn).

Hank and John Green's Crash Course (thecrashcourse.com/, 2011–present) likewise is an exceptional original-content repository. The Greens have had a strong YouTube presence almost from the inception of the platform, beginning with vlogbrothers in 2006 and extending to Crash Course, currently with almost 9 million subscribers. Social-science treatments at Crash Course began in 2012 with World History (2012–2014, $N = 42$), and were then successively amended by playlists on U.S. History (2013–2017, $N = 48$), Psychology (2014–2015; $N = 40$), World History 2 (2014–2017, $N = 30$), Big History (2014–2017, $N = 16$), Economics (2015–2016, $N = 35$), U.S. Government and Politics (2015–2016, $N = 50$), and Sociology (2017–2018, $N = 45$). Crash Course videos can be viewed individually or together in a holistic course. In all, they are fast-paced talking-head mini-lectures laced with campy humor, photos, and graphics, accompanied by short descriptions, often written in a similarly casual vein. New uploads can garner thousands of views within a few hours. Interest in Crash Course has expanded to include a partnership with PBS Digital Studios, the marketing of Crash Course merchandise, and the Greens' efforts to supplement YouTube advertising revenues for themselves and other creators through the subscription service, Subbable, later acquired by crowdfund vehicle Patreon.

Also at the top of original-content sites are TED and its offshoot, TED-Ed. The popular TED project (ted.com/, 2006–present, $N > 2{,}900$), curated by former magazine publisher Chris Anderson, provides a massive load of filmed conference speeches delivered by scientists, writers, entrepreneurs, entertainment celebrities, and so on. Instructors should have no trouble finding relevant media for students to view outside of class. However, the concise materials offered

[4] BBC predates PBS in providing rich content appropriate for instructional purposes. However, such programming (e.g., *Horizon*) is restricted to only those with a UK IP address, just as PBS resources are available only to those within the United States.

through TED-Ed (ed.ted.com/, 2011–present, *N* > 1,000) are even better for teaching and learning, in our opinion. Its objectives are ambitious, seeking to globally inspire, educate, and empower students through engaging videos and learning applications. The project provides opportunities for videos to be flipped—edited from portions of original TED presentations and other found clips. However, much of the collection consists of original animated videos, so-called TED-Ed Originals, conceptually inspired by content experts, instructors, and students that are in turn professionally animated. Each lesson forms a coherent learning package by the inclusion of multiple applications for key ideas and additional resources to consult (relevant to economics, see the explainer video "The Paradox of Value," Argawal, 2016; psychology and sociology, see "Should You Trust Unanimous Decisions?" Abbott, 2016; for history, see "The Atlantic Slave Trade: What Too Few Textbooks Ever Told You," Hazard, 2016). TED-Ed is largely funded by publisher Chris Anderson's Sapling Foundation.

Retro Report (retroreport.org/, 2013–present, *N* > 175), an independent nonprofit news organization, also provides quality videos relevant to most of the social sciences. The series concept, developed by television editor Christopher Buck, is simple: Take a significant news story from the past and then revisit it in light of interim developments. Thus, Roane and Weiser (2015) recount the furor generated in the early 1970s with the publication of Paul Ehrlich's *Population Bomb*, and then they examine evidence from subsequent years, finding that not only did the destructive scenarios fail to materialize but also that population *decline* actually became problematical in affluent nations. Each video constitutes a succinct case study in social change and is accompanied by a summary and related references and multimedia. The website has received significant public recognition, including the 2018 Webby for Best News and Politics Series, the Gerald Loeb Award, and numerous Murrow Awards from the RTDNA.

Gapminder (gapminder.org/, 2007–present, *N* > 50), developed by the late Hans Rosling, provides a rich collection on global development that has broad relevance for teaching across disciplines. Dedicated to curing mass ignorance with empirical evidence, Rosling employed an interactive data visualization program in his videos to draw international comparisons of life quality over historical time through real-time analysis of demographic, economic, and health variables (e.g., "Let My Data Set Change Your Mindset," Rosling, 2009). The site likewise provides numerous free downloads of teaching materials, including the analysis software and data sets. Rosling generated significant public acclaim through his Gapminder work, and the website has received substantial support through individual donors and the Swedish International Development Cooperation Agency.

Big questions addressed in brief videos are the focus of several UK multidiscipline original-content sites. These include The RSA (youtube.com/user/theRSAorg/featured) and its whiteboard-writing animated series, RSA Animate (RSA, 2010–present), with narration excerpted from speeches given to organization members (e.g., "Changing Education Paradigms," Robinson, 2010), and RSA Shorts (RSA, 2012–present), a more recent series in which cartoon animations illustrate talks about complex concepts (e.g., "Brené Brown on Blame," RSA, 2015). OpenLearn (open.edu/openlearn/, 2008–present), also provides a collection of short but engaging animated introductions, including "60 Second Adventures in Economics" (iTunes U Team, 2012) and "60 Second Adventures in Religion" (iTunes U Team, 2012); likewise see Open University's collaboration with BBC Radio4, A History of Ideas (2014–2015, *N* = 48). Instructors with a humanist bent should be sure to examine the rapidly expanding collection at The School of Life (theschooloflife.com/, 2014–present, *N* > 500) created by philosopher Alain de Botton and art curator Sophie Howarth. Key to this site is The Book of Life, offering instruction on presumably how one can derive “emotional intelligence” in an increasingly materialist, competitive world. The Book includes “The Curriculum” providing text, image, and video on topics such as capitalism, work, and relationships. Various philosophers, theorists, literary figures, and the like are also explored here (e.g., “Karl Marx,” The School of Life, n.d.). Access to content is facilitated through its The School of Life YouTube channel (over 4 million subscribers). Finally, Macat Analysis Videos (2015–present, *N* > 130), developed by Salah Khalil, provides 3- to 4-minute animated book synopses categorized by social-science discipline (e.g., “An Introduction to Gordon Allport’s ‘The Nature of Prejudice’ – A Macat Psychology Analysis,” Macat, 2015).

In contrast to the above-mentioned OVRs, which generally attempt to broaden student thinking, PragerU (prageru.com/, 2013–present, *N* > 300), developed by California radio talk-show host Dennis Prager, offers nonaccredited “courses” consisting of brief original-content videos presenting arguments for nationalist, free market, and anti-environmentalist views. PragerU’s stated purpose is “to influence culture through digital content that advances Americanism” (PragerU, n.d.-b). Moreover, PragerU attempts to actively oppose left-leaning forces in higher education perceived as being dominant and threatening by offering teaching materials and a student-activist vehicle (PragerU, n.d.-a). Its YouTube companion site identifies over 100 videos for Political Science, more than 50 for Economics, and over 40 for History. Race Relations, consisting of seven videos, is treated as a course in itself (see “Are the Police Racist?” PragerU, 2016). The site uses a range of personalities to narrate videos, including mainstream conservatives like George Will, as well as younger speakers, such as Adam Corolla and Ben Shapiro, who appear to especially resonate with the young subscribers the site is trying to reach (Oppenheimer, 2018). The website solicits private donations and also is generously supported by Texas petroleum fracking industry billionaires Dan and Farris Wilks (Shea, 2015). Its YouTube channel presently has about 2 million regular viewers, although YouTube has placed 28 of its videos on restricted access since fall 2016 (Roberts, 2016).

Finally, developers working alone to produce well-crafted interdisciplinary content should be recognized. C.G.P. Grey, Evan Puschak, and Jonathon McIntosh are three of the best in our opinion. Grey distributes his videos with social-science themes at CGP Grey (2010–present, *N* > 115, see “The Rules for Rulers,” Grey, 2016) and has also built a scaffold for learning through ongoing discussion with followers on his blog and at Reddit). Puschak, aka The Nerdwriter (2011–present, *N* > 115) works to “cultivate worldview” by producing 5- to 10-minute video essays across diverse topics, including a growing number relating to social behavior (see “Essays about the Social Sciences,” Puschak, 2012–2016). Puschak publishes three or four videos monthly, for which he is crowdfunded through Patreon. McIntosh employs critical social analysis through his Popular Culture Detective Agency blog (2016–present). Each video is accompanied by a synopsis, links to sources, recommended readings, and full transcript (e.g., “Military Recruitment and Science Fiction Movies,” McIntosh, 2016). McIntosh has been active over the past decade in examining the intersection of media, gender, and subversive video, and his YouTube site provides easy access to current and previous works. He likewise seeks crowdfunded support through Patreon.

In contrast to original-content websites, found-content OVRs have had far less success, typically experiencing slow or no growth. The Open Video Project (open-video.org/) was initiated in 1998 at the Interaction Design Lab, University of North Carolina, Chapel Hill “to collect and make available a repository of digitized video content for the digital video, multimedia retrieval, digital library, and other research communities" (Open Video Project, n.d.). The project apparently has more relevance for conducting technical research on video storage and distribution than building a viable collection: Most were added in the early 2000s, many of those with social-science relevance are from the Internet Archive, and all are in the form of downloadable files. HippoCampus.org (hippocampus.org/, 2003) bills itself as "a free, core academic web site that delivers rich multimedia content—videos, animations, and simulations—on general education subjects to middle-school and high-school teachers and college professors, and their students, free of charge." Sponsored by the Monterey Institute for Technology, it has received substantial support through the Gates and Hewlett foundations. Videos for economics, government, history, and sociology are available, but curated collections have grown little since the inception of the site. Moreover, they tend to be derived from only a limited set of primary collections (e.g., all 15 sociology clips were culled from one Dallas Learning Solutions film).

In fact, found-content multidiscipline sites have often not survived. Mindgate Media (2008–2012), arguably the best multidiscipline OVR employing found video, is no longer online (see Wayback Machine, 2012a). Created by Lisa Lewin, former textbook publishing executive, the website offered creative and technical services to those wishing to integrate video into products, but the core was its on-demand feature, showcasing an impressive collection of found clips and lesson applications across the entire curriculum (see Wayback Machine, 2012b). Content, largely contributed by college instructors, included summaries, class-usage suggestions, related readings, comments, and user ratings. However, the website, intended to be for-profit, closed in 2012 as its on-demand service never could be monetized. The UK's premier found-video content site, government-supported JISC Digital Media (2009–2016) also closed as part of a larger reorganization effort (see archived version at UK Web Archive). The original site provided over 300 found-video clips with brief summaries relevant to social-science disciplines, but the collection is now available only behind a paywall at Alexander Street. Likewise, Resourcd, a UK crowd-sourced site offering found clips across multiple disciplines since 2007, appeared to go offline last year (see Wayback Machine, 2019).

Conversely, Critical Commons (criticalcommons.org/, 2009–present), housed at the University of Southern California and developed by Steve Anderson, media professor now at UCLA, is a massive found-content site that continues to grow. This OVR, which has received ongoing support from the MacArthur and the Mellon foundations, as well as the NEH, was initiated as an online space for establishing fair use for scholars who employ copyrighted content in transformative works. Included with each embedded clip is commentary making it relevant to teaching and learning, and necessary to meet the fair use standard and distribution on the site (e.g., "Disrupting Sexism in the Workplace," Sarkeesian, n.d.). The site includes individual collections and serves as a storehouse for edited clips in turn employed in other OVRs. Its holdings are vast (N > 7,500) and have been augmented particularly through contributions from economics instructors, who have submitted more than 1,000 clips (see Critical Commons, 2019).

Discussion

Subsequent to our review of social-science OVRs, four generalizations seem relevant: (1) recent emergence and sustained development, (2) extensive differences in forms and features, (3) major cross-disciplinary distinctions, and (4) varied motives and support. Findings also imply suggestions about possible directions for future OVR development.

Recent emergence and sustained development. Consistent with the explosion of online video in general, OVRs have emerged only recently in significant numbers, a function to some extent of technological innovations that made streaming an efficient mode of transmission. Of the more than 70 repositories described in this paper, just one (Online Video Project) started before 2000; virtually all others were created in the past 15 years. Importantly, most have continued to augment content since inception. Well over 50 repositories distributed video on relevant platforms through 2018. We could determine that only several had gone offline altogether. The emergence of many over the last several years indicates that interest in OVR development remains strong and that few older sites appear to be slowing down in terms of video curation.

Differences in forms and features. As shown, OVRs range markedly in terms of complexity, design sophistication, video type, video production values, collection size, and learning applications. Some have diverse functional features with massive amounts of curated video and ancillaries. Conversely, a few are little more than PDFs with links to videos and limited or no commentary.

One important difference lies in source of video content. Overall, about three times as many OVRs employ original content in comparison to found content. Edited-content sites are virtually nonexistent outside economics. As suggested, applications can be important, particularly with found and edited content. Most provide tags and/or clip summaries at the very least, but some also go well beyond by providing practical information about integrating videos with teaching.

In addition to categorizing videos by topic or tags, several other features are common across OVRs. Almost all make use of social media, enabling users to communicate about site content. Most encourage users to give specific comments about clips. User involvement is particularly critical for sites that rely on found video, and some give instructions to encourage quality user input. An active Facebook presence also can generate significant user interaction that might not transpire otherwise. Many original-content OVRs have a YouTube companion, which can facilitate interaction, as well as enhance visibility, user access, and advertising revenue.

Major cross-disciplinary distinctions. OVR development has been markedly uneven across disciplines. As shown, economics and psychology have over 30 between them; at the other end, political science has one.

Economics websites make significant use of popular culture. Many are populated by professionally produced content, with several employing well-developed satirical storylines and skilled performers. Economics likewise has numerous sites dedicated to given ideological perspectives, including Learn Liberty, a site whose developers are single-mindedly fixed on aiming provocative content at particular students and recruiting them into organization programs. Economics also is unique in having all but one of the many edited-content sites.

Psychology is exceptional in terms of website diversity. Many of its OVRs are professor made, while other sites encourage students to interview professors. Psychology is the only discipline in which some developers choose to withhold their identities, is the only discipline for which a book publisher provides a collection of found clips, and has the only one created and maintained by undergraduates.

Other disciplines are noteworthy for more limited reasons. History has the most extensive collection developed by a single instructor (HipHughes), the only site which tries to explain everything (Big History Project), and several which employ entertaining vehicles to reach students.

Sociology has the exemplar in found video, The Sociological Cinema, a huge OVR built around crowdsourced materials. Anthropology has the oldest discipline-focused site (The Archaeology Channel). And political science is remarkable for its lack of OVR development.

Multidiscipline OVRs consisting of original materials are plentiful and have a rapidly expanding base of content (witness the rapid growth of Crash Course, TED-Ed, The School of Life, and PragerU). Such sites are by nature large projects that require substantial funding and relate to broad subject matter across the social sciences. In contrast, multidiscipline sites using found content generally have not fared well. With the exception of Critical Commons, they have been less productive and shorter lived than original-content repositories.

Varied motives and support. The OVR environment is diverse relative to developer motives and funding. Some OVRs have been driven by interests outside academia, although few were apparently initiated to become for-profit sites. Many economics websites were created for the clear purpose of promoting ideological perspectives, but most discipline-specific sites were developed by high school and college instructors seemingly committed to nothing more than the advancement of teaching and learning.

OVR financial support likewise significantly varies. Some appear to be exceptionally well funded, particularly those receiving contributions from wealthy donors with political agendas. Some instructors have received or continue to get financial or service assistance from college employers, but many others appear to be without institutional support. For such developers, crowdfunding and YouTube advertising revenue have become prominent. Moreover, many OVRs were developed by instructors who seem neither motivated by money nor in need of large amounts of it to do their online work. They thus represent an important counterforce to what has been termed "the marketization of higher education" (Palmer & Schueths, 2013). Consequently, favorable recognition from employers for capably doing so—and perhaps the greater discipline—might go a long way in encouraging others to become involved in OVR development.

Future research. Most immediately relevant to us are questions emerging from our findings, such as why OVRs diverge so widely across disciplines and why original-content sites are far more common than those employing found or edited video. OVR quality should also be addressed. Do extant videos and applications meet essential pedagogical standards? MERLOT provides guidance for determining content and website adequacy and, as shown, has already reviewed some of the OVRs considered here. However, evaluation efforts should be extended to include all major websites, especially those appearing to be ideologically driven. Research might also be directed to OVR employment, as we are not aware of the extent to which they are integrated in practice into teaching. Such research should also seek to identify obstacles to use. Finally, we encourage research about OVRs in other fields. Examination of those in the physical and life sciences, math, business, and the humanities would be helpful for bringing resources to the surface for broader instructional use and assessment, as well as for understanding the larger OVR universe specific to higher education.

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Promoting Sense of Belonging in Online Learning Communities of Inquiry in Accredited Courses

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Abstract
A sense of belonging (SoB) is a valued concept in campus-based learning, being firmly linked with improved student attainment, increased learner satisfaction, and reduced attrition rates. Some researchers, echoing the work of Maslow (1962), even assert that learners cannot fulfill the goals of higher education without acquiring SoB. This study recognizes that SoB can help promote and consolidate online learning and seeks to suggest how tutors may nurture online learners' SoB. An adapted version of the Community of Inquiry framework (CoIF) is used to frame specific suggestions for action in accredited courses. This revision of the well-known framework focuses on the overlapping intersections of the three presences, which are also known as *influences*: *trusting*, *meaning-making*, and *deepening understandings*. Guidance illustrated with examples is provided for each influence, leading to particular suggestions that concentrate on the promotion of a sense of belonging as an important aspect of the online tutor's facilitative activities.

Keywords: sense of belonging, online learning, Community of Inquiry framework, influences

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Importance to Learners of Having Sense of Belonging

Many published definitions can be found on the concept of sense of belonging (SoB), in an educational context. One cited frequently, and to which we subscribe, is provided by Goodenow (1993a, p. 25), who considers SoB to comprise feelings of

> being accepted, valued, included, and encouraged by others (teachers and peers) in the academic classroom and of feeling oneself to be an important part of the life

> and activity of the class. More than simple perceived liking or warmth, it also involves support and respect for personal autonomy and for the student as an individual.

For learners, SoB comprises two key attributes. First, it involves feelings of being accepted, needed, and valued. Second, it includes feelings of fitting in and being connected to a group, class, subject, institution, or all of these (Goodenow 1993b; Tovar & Simon, 2010; Vaccaro, Daly-Cano, & Newman, 2015).

Educational researchers state that "the need for belonging is one of the most important needs for all students to function well *in all types of learning environment* [emphasis added]" (Jackson, Cashmore, & Scott, 2010). From as early as 1962, Maslow noted in his psychological hierarchy that the need to belong was more important that the requirement for knowledge and understanding (Maslow, 1962). "Love and belongingness needs" are in the middle of his motivational hierarchy and will not emerge until basic needs, such as food and safety, are satisfied. According to Maslow (1962), belonginess will take precedence over esteem and self-actualization. Thus, learners, whether face-to-face or online, will want to feel comfortable and safe in their learning environments and respected by both peers and tutors before they can attend to their studies.

Having, or not having, SoB clearly will make a significant impact on learners, who we hope can flourish in online educational spaces. Having a connection and significant relationships with tutors and peers while developing their confidence, self-efficacy and self-esteem will certainly encourage them to develop and fulfill their personal and professional goals. However, all too often such learners report feelings of loneliness and anxiety in what they perceive to be an alien online learning space and are underconfident about their skills and capabilities to cope when studying online (Baxter, 2012). For instance, many learners find the thought of posting on an online discussion forum to be daunting and view online group work as threatening (Baxter, 2012; Khan, Egbue, Palkie, & Madden, 2017; Whittaker, 2015). Such feelings, if dominant, certainly can inhibit a learner's SoB, which will then impact their ability to succeed.

Definitions of Key Terms Used Throughout the Paper

Two terms/concepts feature prominently in this paper. We are conscious that usage and practice may differ internationally, so we define below the terms that we have used in this study, as they are important to the argument that we are advancing.

Tutor A *tutor* is a staff member appointed to both support the creative planning of a course before learning activities commence, and in the facilitation of learning during the course (Peacock & Cowan, 2016). This student-centered facilitation may take the form of comments, suggestions, prompts, feedback, or feedforward; this approach to supporting learning is neither directive nor didactic but firmly rooted in the principles of transformative learning (Mezirow, 2009). Critically, the tutor helps learners to engage in the tasks that are required of them but does not direct the specific actions taken by the learners. The tutor's role is to support learners in developing the skills and abilities required to fulfill the task but not to lead or interfere with the execution of the task.

Feedforward is a concept and term in common use for over 20 years to describe the provision of constructive commentary to learners, derived from their recent activities or work. It complements or replaces feedback centered on judgments of past activity and concentrates on advice for future activity (Baker & Zuvela, 2013; Nicol, 2010; Walker & Hobson, 2014).

Sense of Belonging in Online Learning

Garrison (2017), writing as an established authority on online communities of inquiry, explicitly defines such learning as "a collaborative experience, which includes a sense of belonging and acceptance in a group with common interests" (p. 35). For tertiary learners, the importance of having a strong SoB to their institutions, courses, teachers, and peer groups has been rated as a "key to academic success and persistence" (Vaccaro et al., 2015, p. 670). The link between SoB and improved academic engagement and achievement, heightened self-confidence, and self-efficacy has been reported frequently (Freeman, Anderman, & Jensen, 2007; Ostermann, 2000; Thomas, 2012). Some researchers, resonating with the work of Maslow (1962), have even asserted that SoB is essential if higher order outcomes, such as understanding and self-actualization, are to be fulfilled (Strayhorn, 2012).

A limited amount of research has had a particular focus on online learning and SoB. Most notable have been Thomas et al. (2014) who helpfully provide an informed overview of tutor and learner perspectives of online learning and SoB. This work emphasizes the importance of SoB for all learners, which could lead to greater learner satisfaction. The authors stress the importance of peer collaboration and active engagement while acknowledging that lack of community building may limit SoB and even increase attrition rates. Tutors report difficulty in creating and maintaining a community, especially through online discussions. Critical was curriculum design to promote SoB, including embedding collaboration into assessment, which led to social interactions and SoB.

As Laurillard (2012) reminds her readers, the imperative for learning in this digital era is still to develop students' personal knowledge and capabilities. She forcefully points out that our understanding of basic learning as an iterative and interactive process "still references the work of Dewey, Piaget and Vygotsky, nearly a century later *and remains unchanged!* [emphasis added]" (Laurillard, 2012, p. 1). Nevertheless, she notes, in an equally forceful way, that what *has* changed with online teaching is how formal learning is enabled and how students are motivated. That change is particularly apparent in tutor–learner relationships, which are considered in this paper to promote online learners' SoB.

Thus, we respond here to the current sectoral interest in SoB by seeking to identify specifically how tutors can act to promote SoB on the part of their online learners. We also write with a keen awareness that obtaining evaluative data identifying the causes and impacts of SoB online has yet to be attempted in extant research. Therefore, the intended audience for this paper is scholars, practitioners, researchers, administrators, and policy makers involved with online education—that is, those who value generating SoB in learners.

Influences on Online Learning Experience in a Community of Inquiry

Our suggestions here, framed around the approach to collaborative online learning, were published in 2016 as an adaptation of the well-known Community of Inquiry framework (CoIF; see Figure 1). This revision purely affects nomenclature—that is, the framework still comprises the three original overlapping areas, or presences, termed social, cognitive, and tutoring (see Table 1). The last title replaces Garrison's *teaching* to encompass learner-directed learning. As discussed in previous work (Peacock & Cowan, 2016), we have departed from *teaching presence* to *tutoring presence*, which is more compatible with student-centered learning, to which much of our work is committed. We also believe that this term aligns more closely with Lipman's ideas about the "teacher" in a community of inquiry; Lipman's work was heavily influential in the original conceptualization of the CoIF (Dron & Anderson, 2004). We accept that this term is more attuned with our background in the European higher education sector, which has moved toward the well-established concepts and practices referred to as *tutoring* and *facilitation* and away from more authoritarian, instructional approaches to teaching.

In our presentation of the adapted version (Peacock & Cowan, 2016), we focused on amplifying how the intersections between the presences can make important contributions to learners' educational experiences in an online community of learning. We suggest that pedagogical emphasis on activity in these three aspects of the established model strengthens their potential to be effective for learning. We call these overlapping areas *influences*, crediting them with having a major impact on eventual educational experiences at the heart of the model. We name these influences *trusting*, *meaning-making*, and *deepening understandings*, and we explain the rationale for each in our paper. Each influence in learner-directed learning depends significantly on the exercise of the tutor's facilitative role; and each contributes to the development of SoB. This contribution is explored here through illustrative examples that lead to specific suggestions, concentrating for our present purpose on the promotion of SoB as an important aspect of the tutor's activities.

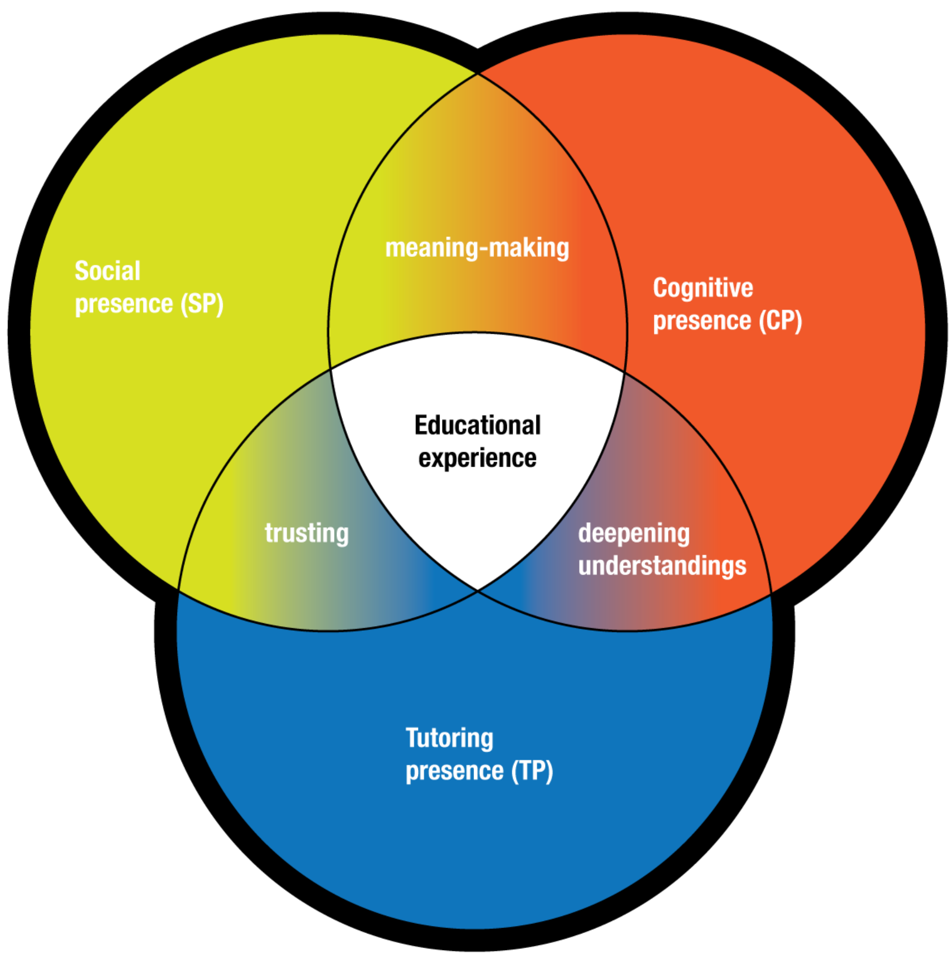

Figure 1. An adapted version of the Community of Inquiry framework by Peacock and Cowan (2016). Reproduced with permission from the *International Review of Research in Open and Distributed Learning*. This version was developed from Garrison (2011) and reproduced with permission from Routledge.

Table 1

Summary of the Three Presences in the Community of Inquiry Framework

Social presence	Social presence focuses on developing open, meaningful communications between learners and with tutors, so that they gain a sense of being connected to and engaging with other sentient beings who have a history and a genuine concern for the community (Kehrwald, 2008; Oztok & Brett, 2011). Collaborative online learners need to feel that they relate, as real people, to those with whom they interact online to develop feelings of trust, being valued, and mattering (Garrison, 2017; Palloff & Pratt, 2010; Rudestam & Schoenholtz-Read, 2010).
Cognitive presence	Cognitive presence encompasses the activities through which participants in communities of inquiry can make meanings and deepen their understandings through constructive individual and group dialogues, including peer and tutor feedback, individual and group reflections, and the use of resources (Garrison, 2017).
Tutoring presence	Tutoring presence refers to the ever-present facilitative role provided by a caring, trusting, and engaged tutor. Tutors will be involved in the design and planning of program activities to help learners achieve learning objectives. The tutor will also facilitate learning during the course, leading to individual and group meaning making and deepening of understandings (Garrison, 2017). Hence, a tutor in the CoIF should strive to establish "interpersonal relationships and a sense of belonging which are important to an academic endeavor" (Garrison 2017, p. 37) through the design and facilitation of both social and cognitive presences (Akyol & Garrison, 2011).

In this framework and context, SoB contributes to a sense of community, and, consequently, features significantly within social presence.

Our Perspectives in This Paper

This paper originates from our belief that it is highly desirable in any online learning program to nurture SoB on the part of learners to promote and consolidate their learning experiences. We claim here that the impact of collegially supportive and facilitative tutor–learner relationships can make a powerful contribution to achieving this desirable outcome (Laurillard, 2012; Rudestam & Schoenholtz-Read, 2010; Cowan, 2014; Sutton & Basiel, 2014). Much of the recent research into SoB stresses the importance that learners place on their relationships with a caring tutor who knows them and is enthusiastic, friendly, encouraging, helpful, and, most importantly, can be trusted (Freeman et al., 2007; Hoffman, Richmond, Morrow, & Salomone, 2002–2003; Hurtado, Alvarado, & Guillermo-Wann, 2012; Strayhorn, 2012; Whitten, James, & Roberts, 2017). Such facilitation will concentrate on nudging learners toward exercising and developing potential as yet unleashed, thereby advancing them into their zones of proximal development (Vygotsky, 1978). For example, Cowan recalls the case of a tutor/counsellor in the UK's Open University who sustained online learners with an exceptionally high retention rate, first in the sparsely populated Western Isles of Scotland and then later in the busier south of Scotland. On concluding their studies, many of this tutor's students wrote appreciatively to management, emphasizing that her meaningful, caring contacts, especially occurring around critical dates in the academic calendar, exerted a powerful impact on their progress. She cared about their difficulties, and they trusted her to advise and encourage them to be the best that she knew they could be. She encapsulated for them their powerful SoB in the online courses of which they were members, using a style that we hope readers will emulate.

Setting for Our Illustrative Examples

We have collaborated in this paper by integrating two distinct, and we hope useful and complementary, experiences. Peacock contributes, as a senior academic in an educational development unit in a niche university in Scotland, wherein she also tutors online in accredited courses. Consequently, her standpoint is informed by awareness of the potential, challenges and constraints of current efforts to develop effective online learning. Cowan has been tutoring online for 30 years in accredited courses, during which he has been also been enrolled somewhere annually as a genuine online learner to further his own professional development, occasionally on a MOOC. He contributes here both as a facilitative online tutor in accredited courses and, for our final example, as an active online learner, nowadays on massive open online courses (MOOCs). Together, we address the tutor's role in relation to each influence in turn.

Promoting Learners' Sense of Belonging Through the Trusting Influence

We have labeled the overlap between social presence and tutoring presence as the *trusting influence*, as "communities of inquiry are highly dependent upon establishing trust" (Garrison, 2017, p. 22). Trust originates in, and then is sustained by, SoB, echoing the work of Maslow (1962). We have found that trust among peers and with their tutors is the acknowledged foundation for effective online learning communities (Peacock & Cowan, 2016). In such settings, Garrison maintains that his teaching presence (our tutoring presence) should first and foremost set out to establish a "sense of belonging and security" (Garrison, 2017, p. 114). He emphasizes planning for the creation of open communications and trust, asserting that "students must feel they belong if they are to form a cohesive community of inquiry" (Garrison, 2017, p. 115). The nature, type, and tones of tutor communications with a community can greatly help to create a trusting, caring, and encouraging environment.

Illustrative Examples in Accredited Online Courses

Cowan tries, as an online tutor, to be the first to visit any shared online learning space. He informally leaves a short, welcoming greeting and quickly departs. This corresponds with and amplifies Wildflower's advice (2010, p. 393) to check in on online realms frequently, if only briefly. In recent program reviews, learners have acknowledged appreciation of his slight, but clearly significant, efforts, such as in this comment: "You cared enough to come to meet us (online) before we arrived. That set the tone for my course experience." A Chinese student newly studying in Europe noted, "I was scared about how the course expected me to plan my skills development. Your very first email convinced me I could trust you to help, if I confessed my very basic needs." Thus, SoB is a natural precursor to developing trusting relationships.

As a module leader of postgraduate studies by over 40 students, Peacock provides a short introductory video outlining her course and ensuring that learners know who she is, what she looks like, and how she can be contacted. Her language is informal and friendly; she concentrates on establishing a welcoming tone from the outset. She then launches an icebreaker activity within the online discussions area, wherein learners frankly share their current learning experiences pertaining to the subject and their apprehensions in relation to forthcoming tasks. Soon, they can build their confidence in online discussions, establish meaningful connections with peers, and develop personal relationships. As Garrison (2017) states, "The more we know about other members of the community, the more trustful and responsive we become in terms of academic discourse" (p. 45). Subsequently, Peacock contributes short, friendly video or audio responses to confirm that posts by learners, who are identified by name, have been read, and she genuinely offers reasoned praise when peers have responded to each other constructively and have moved discussions forward. From time to time, she gently challenges learners, asking them to revisit their ideas, role modelling the type of responses to each other that should be hoped for within a constructively interactive community. Ultimately, it is her objective that her learners should grow to feel a strong SoB to and identification with a collaborative educational community that is respectful, in which dialogic debates can occur free of intimidation (Garrison, 2013, p. 3). Analysis of her learners' discussion posts reveals that they feel that they do, indeed, matter and that they feel accepted, respected, and valued in a group whose opening activities have been planned and facilitated with that objective in mind.

Cowan facilitatively tutored 35–40 Taiwanese undergraduate students each year online on English as a foreign language, the objective of which was to enhance their critical thinking skills (Chiu & Cowan, 2012). Initially, he simply identified and praised examples of sound reasoning among the discussion board posts, explaining which features were commendable. His impact on the quality of discussions and the reasoning contained therein was discernible but slight. He changed tactics and devoted most of his allotted time to individual emails, as noted by Palloff and Pratt (2010, p. 372). When he sensed that a student writer might have sound reasoning to contribute to the discussions, he would send a short email message expressing genuine confidence in that learner's ability. He empathized with the learner's apprehension and lack of confidence and set out to bolster the learner's self-confidence in his or her thinking and ability to share thoughts effectively. Using an assortment of prompting styles and soft scaffolding (An, 2014, pp. 42–44), he actively but gently nudged learners to venture into their zones of proximal development (Vygotsky, 1978). The discussion board activity then changed radically. Posts containing deeply reasoned thinking appeared, and polite but firmly reasoned disagreements led to genuine debate. Two students joined Cowan in writing up this transformation, using comparative data drawn from discussion board posts (Chen, Chou & Cowan, 2014). They were individually clear that the burgeoning of creative thinking and active discussion had arisen as a consequence of tutor–learner relationships in which the learners' affective needs were given explicit priority, with emphasis placed on promoting self-efficacy through personal feedforward (Cowan, 2015). They concluded that the progression of learning in a collaborative and interactive online community can be established and maintained, while boosting performance (Laurillard, 2012, pp. 31–33), by sustaining a keen SoB associated with personally valued and valid self-efficacy beliefs.

General Suggestions for Promotion of SoB in the Trusting Influence

The facilitative tutor's role in promoting trusting, open, and meaningful interactions, together with a steadily developing SoB into a community of inquiry, contributes markedly to the emerging learning experience. Learners need to develop strong feelings of being welcomed, accepted, needed, and valued. For example, this can be elicited by the tutor initiating contacts in the early stages of the community's formation, and by anticipating and then engaging with affective needs before they emerge or are declared. The tutor also may commend valuable individual contributions in detail and by name, and subsequently promote their qualities by modeling and establishing frank and helpful interactions as a norm within the community (Garrison, 2017).

Promoting Learners' Sense of Belonging Through the Meaning-Making Influence

The overlap of social presence and cognitive presence is principally concerned with the meaning making on which the efforts of communities of inquiry should be concentrated. Such communities are based upon the premise that "learning in an educational context is a social enterprise" that is socially worthwhile and personally meaningful (Garrison, 2013, p. 2). Contributing collaboratively to the meaning-making process promotes learners' sense of self-worth, encourages feelings of mattering and connection with the community, and promotes SoB. In this context, meaning making is a joint responsibility that is dependent on learners working interdependently. It will be stimulated by opportunities for relevant and collaborative interactions and the use of effective loops that enable constructive peer feedforward.

As indicated by Table 1, the tutor's presence is not directly involved in this influence, other than to advise, suggest, and facilitate relevant skills. Therefore, this section mainly is concerned with the tutor's role in aiding the community throughout this influence by facilitating the development and exercise of higher level capabilities involved in engaging with demand for meaning making.

Illustrative Examples in Accredited Online Courses

Peacock asks postgraduate learners in one course of 25 students studying an introduction to learning technologies to work in groups to develop an artifact pertaining to the subject of specialism—which is learning and technologies. Learners work collaboratively over a period of 10 weeks, exploring topics such as blended learning, MOOCs, the flipped classroom, and online learning. The activity is structured to nurture and harness SoB. Learners are provided with only minimum guidance, such as the maximum length of the artifact and the date for submission, together with some signposting to resource materials. The group may request support from the tutor.

Learners engage in shared, open, and constructive discussions, within which their SoB develops as they collaboratively plan to select and use a variety of technologies. Building on their social presence created through the icebreaker activities, they offer honest and constructive feedback to each other, informing and shaping the development of the artifact. The outcome of the collaborative endeavor is mutual meaning making—a guide for academics presented in a range of technologies, including Prezi, Pinterest, PiktoChart, and Pixton. Analysis of individual reflective assessments has indicated that learners believe that, during this activity, they have developed higher level cognitive understandings; interpersonal capabilities, such as teamwork; self-confidence as online learners; and feelings of self-worth, connectedness, and SoB.

General Suggestions for Promotion of SoB in the Meaning-Making Influence

Meaning-making in learner-directed collaborations depends upon the exercise of higher level cognitive and interpersonal capabilities. Generally, considerable scope exists for further development of these abilities among most learners, whether undergraduate or postgraduate. Learner engagement in group activities can support this development and meaning making for both the individual and the group, leading to a sense of worth and mattering, and further promoting the SoB. Making that development purposeful and significant depends, to a great extent, on constructive and timely feedforward, as well as effective group work, nurturing a meaningful SoB in a community supported by a facilitating tutor. This is where feelings of fitting in and being connected to the group, subject, and even the institution effectively contribute to collaborative learning.

Promoting Learners' SoB Through the Deepening Understandings Influence

This final influence, combining tutoring and cognitive presences, embodies the tutors' design for and facilitation of individual and group dialogues, their provision of opportunities for tutor and peer feedback and, thus, encouragement of reflections to deepen understandings. Such engagements can strengthen the attendant SoB to the community responsible for accruing emergent understandings and echoing Garrison's belief (cited above, 2013, p. 2) that collaborative learning is both socially and individually worthwhile. In this section, we address three features that could help deepen learner understandings and SoB in communities of inquiry.

First, tutors should ensure that learners can source and engage with appropriate resources. Course teams may wish to develop well-designed cognitive maps, informing self-directed navigation of materials and provisions. Thus, from the outset, they can render the online learning spaces a friendly place with which learners can develop a connection without feeling marginalized or ineffective. Effective maps help learners find out what they need to know about their programs. They certainly will make straightforward queries initially (e.g., "What do I have to do to pass?" or "What am I expected to read?") and will do so at their convenience rather than follow a tutor's direction. They soon will progress to considering such questions as "What is the current thinking on topic *x*?" or "What reservations have been expressed about *y*?" and will look for data to answer such questions. The maps should be constructed carefully so that, during interactions with them, learners will feel SoB within the mapped area of activities. An important element of such a map for online learners will be an induction space in which they can register any concerns they may have regarding online learning, especially concerning their abilities to study successfully in what they may view as an alien environment, generating emotional issues with which they must cope (Cleveland-Innes & Campbell, 2012).

Second, it also will be necessary for tutors to plan reflective activities that will prompt learners to engage metacognitively in consolidating their meaning making and deepening understandings. Reflections at this level should go beyond the simple recall of experiences and the formulation of subjective judgements of learning progress that are adequate at lower levels. They should entail discursive debate among the group, in which members consequently will feel a growing SoB, seeking answers to questions about processes and supported wherever possible by relevant data relating to the shared learning experience. Such curiosity probably will entail the need for conceptualization following from reflection to be tested out and confirmed or revised through active experimentation (Dewey, 1933). All of this should stem from and be related to learners' engagements with the activities under cognitive presence, as facilitated by tutors.

Third, regular tutor-generated feedforward that helps learners improve their performance and understandings should be clear, meaningful, and timely. Garrison (2017), writing of communities in which his tutors are directive, advises that formative assessment "motivates and guides learners in an effective and efficient manner" by providing feedback about their "progress toward attaining educational intended objectives" (p. 131).

Illustrative Examples in Accredited Online Courses

Peacock, tutoring an online class of 40 postgraduate students, uses video and audio to provide feedforward in the form of guidance regarding where and how learners can improve their ongoing work. For example, following a group activity to create posters about different types of assessments, she interspersed short informal video feedback with screenshots of each of the posters and shared these with the community. This reassured learners of their progress to date and indicated that tutors and the community valued these contributions, strengthening learners' SoB. The feedback videos also provided gentle pointers about where posters could have been strengthened. Such feedforward activity deepens individual learners' and the community's understanding of the different types of assessment, as well as criteria for judging such presentations. The videos contained short but pointed questions about the displayed work, prompting learners to return to their posters and those of others. Learners later reported that the video feedback encouraged them to revisit both the thoughts expressed in their own work and that in the associated online discussion posts, as well as in posters generated by the other groups.

In Peacock's course, online learners are asked to reflect on their learning framed according to Cowan's reflective model (Cowan & Peacock, 2017). Learners structure this submission by building upon their initial posts, in which they outlined their personal objectives for the module, which have been shared with the community for collegial feedback. In this initial "reflection-for-action" posting, they discussed not only their desires for increased understanding—for example, how to promote social presence in online environments—but also considered the development of capabilities, such as improved interpersonal skills in working in online groups—skills that they would need for success. Learners also record reflections during the course (reflection-in-action) and can call upon them as evidence to support their review of their learning (reflection-on-action). In most cases, their submissions discuss the importance of their group work in wrestling with key issues, and how this engagement has promoted feelings of a sense of connection, of mattering. Finally, they offer plans for their future practice, often entailing how they will support their own learners to feel SoB, whether in online or blended learning environments.

We continue to seek a readily available digitized system that will map resources related to particular courses in an institution's online educational realm. Lacking this, Peacock has extended her online induction by offering short videos recorded by learners who are further along on their online learning journeys. These students report and discuss coping mechanisms for working within online realms. They offer hints and tips about how to navigate and source suitable materials, and describe help-seeking mechanisms that they have developed. They offer advice from their experiences about the type, amount, and level of support available for learners, as well as provide essential contact details for such support services as information technology and the library. They signpost short video clips developed by support services, such as "how to use electronic databases" and "how to reference." The emphasis throughout is on supporting and encouraging hesitant learners to believe that they matter to the institution and to make them aware of the support mechanisms available to them.

General Suggestions for the Promotion of SoB in the Deepening Understanding Influence

SoB has been credited with being key to academic success, in which deepening understandings is featured naturally (Vaccaro et al., 2015). In this third influence, the tutor's facilitative role is crucial in helping learners deepen their understanding significantly and in increasing SoB in supporting learner development. Resources that may be of possible value to learners should be mapped carefully with clear signposting to avoid students becoming lost, disoriented, alienated, or swamped by the availability of overmuch provision. Induction can help prepare learners to study in their online learning environments and offer mechanisms for help seeking, ensuring they know that they matter to the course and the institution. Careful program design for meaningful, open communication is critical, as is informed tutor feedback that shows genuine interest and concern, offers constructive comments, and will again reinforce the connection between the learner and the tutor. Such engagements can strengthen an attendant SoB to the community that is responsible for accruing the emergent understandings.

Evaluation of Causes and Impact of SoB

A SoB essentially is a personal matter; thus, it is difficult to identify its origins and even more difficult to identify its impact on the learning experience and the learning. We are encouraged by our students' strong endorsement of their SoB in routine questionnaires or even focus groups; but we also are persuaded more strongly by particular examples that often emerge naturally in reflective reviews or in volunteered and appreciative feedback. Therefore, we currently are engaged in developing a practicable research methodology through two projects that will involve interviewing student volunteers to enable them to assist in action-research analyses of positive and negative examples of impact from SoB on their learning and learning experience.

Combining the Three Influences to Promote Learners' Sense of Belonging

The previous sections have addressed tutoring presence in promoting social and cognitive presences in pairs to generate SoB, but in most cases the presences should be viewed as interlocking in a trio or necklace of influences that together generate the full, central educational experience through their combination (Peacock & Cowan, 2016). As Xin (2012) reminds us, the presences are an analytic abstraction of the parts of the real "thing," similar to a rainbow:

> The frequencies of the light in a rainbow are on a continuum; any attempt to name specific colors of the light misrepresents … the thing. That being said, the colors have their function. They provide a way of describing the rainbow and locating different areas within it. In online forums, the social, teaching and cognitive aspects are mingled together in a continuous flow (Xin, 2012).

Final Illustrative Example From a Nonaccredited Course in a MOOC

The following example features a research lecturer facilitating both social and cognitive presences through his tutoring, while empowering his learners' SoB.

Recently, Cowan studied a MOOC that covered the period when Islam was dominant in Spain. The lecturer was an enthusiast who loved the subject and conveyed that passion effectively in short, chatty inputs that introduced each week of study. These remarks clearly showed that he had informed himself of highlights and issues in the extensive class-discussion posts from the previous week. His interest in his learners' learning was strikingly apparent. Around Week 5, he reported that he had gained confidential access to some precious historical documents from the period and had been permitted to photocopy them and allow his students to work with them by converting the documents' calligraphy into digital text. Whether the students were Spanish speakers or not, he taught them to decipher the photocopied words and, thus, to engage in meaning making by producing short excerpts of allocated selections as digital text, which his software then would link together and analyze.

A few weeks later, the lecturer enthusiastically informed his students that he had described their involvement to admiring colleagues at an academic conference. This did not feel to Cowan like a lecturer's report to his entire class. It felt to him as if this now familiar figure, sitting at ease in his study, were reporting back individually and personally to Cowan describing the reaction of erudite colleagues to what this lecturer and his students were doing together, and deepening Cowan's understandings of what was going on, of which he was a valued part. The lecturer's enthusiasm was utterly infectious. Cowan, like his collaborating peers, pressed on enthusiastically with that week's humdrum task of identifying words that often held little immediate meaning for him, knowing that he and the lecturer were doing something valuable together.

This lecturer demonstrated the powerful impact on learners' SoB that can be derived from an enthusiastic online teacher who devotes effort to addressing what every member of a class of many thousands views as personal remarks. This led to an immense and trusting response in terms of learners' proclaimed enthusiasm and motivation for the program, to which they had a keen SoB. Truly, "motivation is enhanced when social presence is addressed through trust, open communication, and a sense of belonging" (Garrison, 2017, p. 65).

Closing Suggestion for Facilitative Tutors

Throughout the authors' experience with online learning, we have found that to promote learners' SoB, it is essential to enthuse and, consequently, to infect learners with enthusiasm to learn. Tutors should converse enthusiastically with learners, as with individuals, about what they are doing, and in doing so, they will emerge as people with whom learners can identify and trust, and in whose programs they can feel a powerful SoB.

Conclusion and Limitations

Of course, limitations exist as to the feasibility of the approaches we have suggested. The following are particularly important:

- All our examples entailed learners who were interested and motivated to learn.
- Our examples depended on tutors who were committed in their practice to Rogers' three central principles—empathy, congruence, and unconditional positive regard.
- Our examples were set in courses in which the development of higher level cognitive and interpersonal abilities was a priority and need accepted by both tutors and learners.

Beyond these conditions, we imagine that promotion of SoB would be much more demanding and uncertain.

Self-confidence, self-efficacy, and self-esteem increase when learners have significant trusting relationships with tutors and their peers. Educational research suggests that students who feel accepted and valued, that they are important to the life and activity of the class, develop a strong SoB, which is important for all since, as Garrison (2017) asserts, "there is a general need to belong and collaborate that has been the central feature of human achievement" (p. 12). In this paper, we developed the influences to inform the tutor's facilitative role in promoting an online learner's SoB in accredited courses. We hope we have prompted other facilitative tutors to explore how they can nurture SoB within their communities of inquiry, while addressing many of the well-documented challenges that our learners' experience.

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Designing and Developing Video Lessons for Online Learning: A Seven-Principle Model

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Abstract
Despite the ubiquitous use of instructional videos in both formal and informal learning settings, questions remain largely unanswered on how to design and develop video lessons that are often used as the primary method for delivering instruction in online courses. In this study, we experimented with a model of seven principles drawn from instructional design theories for designing and developing video lessons for an online graduate course. Feedback was collected from students through surveys on their perceptions of the effectiveness of the video lessons and the overall course quality for eight semesters. This paper shares the instructors' experience on the design and development of the video lessons as well as the survey findings. Implications of the findings for instructional design and future research are also discussed.

Keywords: artificial intelligence, instructional videos, online learning

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Designing and Developing Video Lessons for Online Learning: A Seven-Principle Model

Online education provided underserved students with increased access to education, and enrollments in online courses increased for the 14th straight year in 2016 (Seaman, Allen, & Seaman, 2018). The rapid growth of online education has resulted in increasing interest in research on learning with instructional video (Poquet, Lim, Mirriahi, & Dawson, 2018). In online courses, especially massive open online courses (MOOCs), video is often the primary method for delivering instruction (Hansch et al., 2015; Hollands & Tirthali, 2014; Means, Toyama, Murphy, Bakia, & Jones, 2009). Therefore, instructional video plays a significant role in online learners' learning experiences.

The widespread use of video in education during the past decade was made possible by the ready-to-use camera available in mobile devices, free streaming media hosting and sharing platforms, and recording studios available on many campuses. The rapid advancement of video technologies has made available a large variety of design options. According to Hansch et al. (2015), there are nine types of instructional videos, when defined by their affordances of learning, and there are 18 video production styles. Since courses vary greatly regarding subject matter, learning goals and objectives, and students, instructors have to make deliberate decisions on selecting and leveraging the most appropriate available technologies and resources to create videos that help students achieve desired learning outcomes. Hence, there is a growing need to develop research-based principles for designing instructional videos to support learning (De Koning, Hoogerheide, & Boucheix, 2018; Hansch et al., 2015; Kay, 2012; Poquet et al., 2018).

Many of the research studies on instructional video draw heavily on instructional design theories, such as the cognitive theory of multimedia learning (Mayer, 2009) and cognitive load theory (Sweller, 1988), as a general framework for design considerations (Fiorella & Mayer, 2018; Poquet et al., 2018). These studies have primarily focused on examining how information should be presented in a video and how learning from instructional video could be supported by engaging learners with exercises or other learning tasks (De Koning et al., 2018; Poquet et al., 2018). The findings of the studies have established several evidence-based principles for the effective design of instructional video regarding how to present visual and verbal information for optimal learning—for example, the segmenting principle, pacing principle, and signaling principle (De Koning et al., 2018; Fiorella & Mayer, 2018). On the other hand, researchers are urged to investigate novel principles for designing instructional video because the "traditional" principles identified do not necessarily suffice as technological advancement enables new design possibilities and instructional video is used in new educational contexts (De Koning et al., 2018).

These established principles have been applied and tested in short-format instructional videos that mostly teach a procedure skill (e.g., how to carry out a medical procedure, conduct a software operation, or solve a math problem). They can stand alone or be part of a larger video lesson (Fiorella & Mayer, 2018). In online courses that are structured by course topics, a short video is often used as part of a video lesson, as the course topic covered in the lesson does not necessarily demonstrate a how-to procedure and may require different types of instruction. Also, these video lessons often incorporate in-video quizzes or self-assessment questions to engage learners and help reinforce their learning (Hansch et al., 2015; Hollands & Tirthali, 2014; Poquet et al., 2018). Therefore, the video lesson for online courses involves more than presenting content through a short video demo. It is a video-based learning module designed to achieve the learning objectives through sequenced content instructions and learning activities. Hence, there is a need to move beyond the existing design principles for multimedia presentations for procedural learning and explore new principles for the design and development of video lessons for online learning.

In this study, we applied seven principles drawn from instructional design theories to the design and development of video lessons for an online graduate course, integrating instructional presentation with instructional methods and sequencing. We examined the effectiveness of this model through the end-of-course student survey for eight semesters. This paper shares the survey findings as well as the instructors' experience of designing and developing the video lessons. Implications of the findings for instructional design and future research are also discussed.

Review of Literature

Several reviews have been conducted to synthesize and summarize the status, trend, and gap of the research on video-based learning (Fiorella & Mayer, 2018; Hansch et al., 2015; Kay, 2012; Poquet et al., 2018).

Kay (2012) did a comprehensive review of 53 studies published between 2002 and 2011. The review indicates that, despite some challenges, students generally had positive affective and cognitive attitudes toward the use of videos to support learning. There was also evidence supporting the positive impact of videos on students' study habits and learning performance.

Nonetheless, the author noted that the studies reviewed rarely described the details of the videos used—for example, the number of the videos, the length of the videos, and the content presentation in the videos. Without such information, it is impossible to generate a set of proven guidelines for designing effective instructional videos. Therefore, the author called for further research on pedagogical strategies for using videos and how the quality and design of videos affects learning.

The proliferation of MOOCs in recent years and the use of video as the primary means for delivering instruction has generated interest in using large-scale learning analytics from MOOCs to explore how students interact with videos (Chen et al., 2016; Guo, Kim, & Rubin, 2014; Kim et al., 2014a; Kim et al., 2014b; Li, Kidzinski, Jermann, & Dillenbourg, 2015; Sinha, Jermann, Li, & Dillenbourg, 2014). The researchers examined students' video interaction patterns and explored how to leverage the patterns to provide insights for designing videos for better student engagement. However, their findings are not completely transferable to general use, as the limitations of their studies point out that

- video interaction cannot accurately represent learners' real behavior (e.g., they may play a video but not watch it);
- video interaction might depend on other pedagogical methods in the courses, such as online discussions, assignments, and quizzes; and
- MOOC learners have different learning goals, which affect their learning behavior, and they might not be representative of students who take other types of online courses.

Researchers also argued that measuring student engagement through analyzing clickstream data and viewing statistics may not be an effective proxy for measuring learning, because engagement should not be conflated with learning (Hansch et al., 2015). On the other hand, the review conducted by Poquet et al. (2018) indicates that very few of the video interaction studies in MOOC contexts were grounded in educational or psychological theory. There is a need to bridge the gap between the video interaction analysis and the use of established psychological measures to strengthen insights on the impact of video interaction on learning.

Hansch et al. (2015) examined how videos were designed, produced, and used in MOOCs, specifically concerning pedagogy and cost, through observing 20 MOOCs and interviewing 12 practitioners in the field of educational video production. Their findings include the following:

- video is used mainly for content delivery in nearly all MOOCs, even though there is little research on the effectiveness of video as a pedagogical tool for online learning; and
- expensive production techniques are often used in video production despite a lack of evidence that a high production style leads to better learning outcomes.

The authors recommended that, when making design decisions, practitioners should do the following:

- think carefully about whether video is the most appropriate medium for instruction,
- make the best of video as a medium by selecting a video production style that is appropriate for stated objectives and outcomes, and
- consider both lightweight and DIY approaches to video production.

Finally, the authors called for more research on the pedagogical effectiveness of video as well as new and better metrics that measure how people learn from video. They encouraged practitioners to share their experiences concerning creative approaches to video production and use.

Poquet et al. (2018) reviewed 178 empirical studies published from 2007–2017. The results of the review provide a preliminary overview of the effects of videos on diverse learning outcomes, including the effect of manipulating video presentation, learning tasks, and the way content is structured and communicated. The review also offers a high-level overview of the trends and patterns of manipulation in the research studies, indicating that they draw heavily on the cognitive theory of multimedia learning (Mayer, 2009) and cognitive load theory (Sweller, 1988) as general frameworks for design considerations. However, the authors do not come to any clear and substantial conclusion indicating what works and what doesn't. The diversity of video formats, purposes, and contexts in the studies makes it a challenge to offer any concise recommendations for practice. Consequently, they support the first two recommendations mentioned above from Hansch et al. (2015), in addition to offering a few very general suggestions, such as presenting content that can challenge prior knowledge, presenting problem-solving activities, conducting immediate quizzing, and engaging learners with active learning tasks. In the end, the authors call for more research on learning analytics, multimodal analytics, and collaborative tasks for video viewing to advance understanding of video-based learning and refine existing theories.

Fiorella and Mayer (2018) identified what works and what does not work with instructional video based on previous research findings. Two techniques can improve learning outcomes with instructional video: (1) *segmenting*—that is, breaking a video into smaller and meaningful segments with learner control—and (2) *mixed perspective*—that is, filming from a mix of first-person and third-person perspective. Features that do not work with instructional video include matching the gender of the instructor to the gender of the learner, showing the instructor's face on the screen, inserting pauses in the video, and adding practice without feedback. Built on this established knowledge base, current research on video-based learning is moving in three directions (De Koning et al., 2018): (1) extending "traditional" design principles; (2) exploring novel design principles; and (3) investigating the role of personal attributes in learning with instructional video.

The need to explore novel design principles arises because rapid technological advancement enables new possibilities for creating instructional videos, and they are being used in an increasing number of subject domains or contexts that have not been studied in previous research. The established design principles mainly focus on how to present information effectively in video to optimize procedural learning. However, they do not necessarily apply to the design of video lessons in online courses, as they may cover more diverse course topics that teach different skills and often integrate content with learning activities to help students achieve learning outcomes. As more and more students are taking online courses nowadays and relying heavily on video lessons for their learning, it is necessary to explore and identify new design principles for effective video-based learning in this context.

A Seven-Principle Model for Designing and Developing Video Lessons

The recommendations for moving beyond the existing design principles involve "moving toward better aligning instructional methods, learning materials, process measures, and learning outcome measures" (Fiorella & Mayer, 2018, p. 469). In this study, we explored the design and development of video lessons for an online graduate course by integrating instructional presentation with instructional methods and instructional sequence. *Instructional methods* are ways to support and facilitate human learning or development (Reigeluth, 1999), and *instructional sequence* refers to the order of presentation of instruction (Van Patten, Chao, & Reigeluth, 1986).

Both are major components of instructional design—decisions need to be made on which methods should be used to teach under given conditions and in what order the instruction should be given (Morrison, Ross, Kemp, & Kalman, 2012; Reigeluth, 1999; Van Patten, Chao, & Reigeluth, 1986). Two authors of this paper, Goel and Joyner, employed seven principles drawn from instructional design theories as the guidelines for designing and developing video lessons for an online course on artificial intelligence. This seven-principle model is comprised of four instructional methods, two principles for instructional presentation, and one principle for instructional sequence (Figure 1).

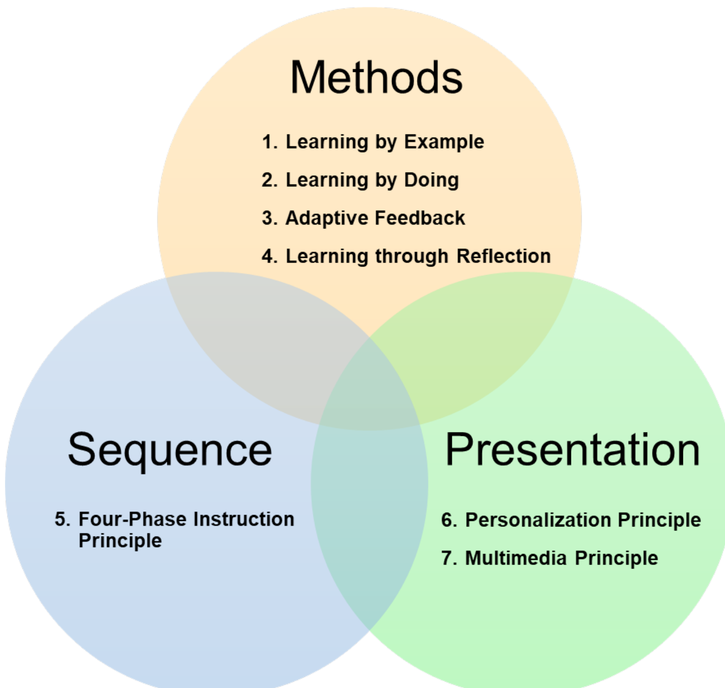

Figure 1. A seven-principle for designing and developing video lessons.

Methods

The course, Knowledge-Based Artificial Intelligence (KBAI), is a foundational course in artificial intelligence and part of an online master of science program in computer science at the Georgia Institute of Technology. The goals of the class were to understand the tasks that KBAI addresses, the methods it employs to address those tasks, the systems that comprise those methods and tasks, and the relationship between creating those systems and understanding human cognition. To demonstrate mastery of these learning goals, students build systems that address complex problems, and then they reflect on the relationship between those systems and human cognition (Goel & Joyner, 2016, 2017). The following four instructional methods are used to facilitate students' learning with the video lessons and help students achieve the learning goals:

- *Learning by example*: Learning occurs when learners actively construct their knowledge by interpreting their experiences. Therefore, instruction should consist of experiences that facilitate knowledge construction. Presenting examples (related cases) supports learning by providing a representation of experiences that learners have not had (Jonassen, 1999). Video is an excellent medium for presenting examples, as they can be demonstrated on the screen through visuals, animations, and video recordings, accompanied by audio.

- *Learning by doing*: Research studies consistently suggest that using active learning activities in teaching leads to better student attitudes and better learning outcomes when compared to teaching with traditional lecture approaches (Prince, 2004). Active learning engages students in two ways: doing things and thinking about the things they are doing (Bonwell & Eison, 1991). Interleaving sequences of videos with interactive exercises gives students opportunities to interact with the content materials.
- *Adaptive feedback*: Many video lessons in online courses encourage active learning by offering exercises for students to practice. Research indicates that practice without feedback does not help students learn (Fiorella & Mayer, 2018). Students usually get feedback on whether their answer is correct or incorrect once they submit it. They may be given opportunities to retry if they do not get it right. Although this automated feedback works well with questions that have standardized answers, it still lacks the just-in-time feedback and guidance that instructors in the classroom can provide. Adaptive feedback could be a good solution for providing feedback in an asynchronous online learning environment, as it not only verifies the correctness of an answer but also provides different information for different answers (Bimba et al., 2017; Dempsey & Sales, 1993; Le, 2016).
- *Learning through reflection*: Reflection, according to Dewey (1993), is an "active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it, and further conclusions to which it tends" (p. 9). Reflection is related to learning in that it encourages metacognition and enables learning from representing learning (Moon, 1999). Various reflection activities can be integrated into the curriculum: for example, learning journals, logs, diaries, peer and self-assessments, and portfolios.

Sequence

Generally speaking, course instruction is sequenced at macro and micro levels. Macro sequencing structures the teaching of some different but related content ideas, such as topics for a course. Micro sequencing structures the order of presenting the generalities, examples, and practices for teaching a particular course topic. Different micro sequencing may result in different learning outcomes (Reigeluth & Keller, 2009; Van Patten et al., 1986). While sequencing depends on many variables, such as content, learner, and outcome, many instructional models suggest that the most effective learning products or environments are those that are problem centered and include four phases of instruction: (1) activation of prior experience, (2) demonstration of skills, (3) application of skills, and (4) integration of these skills into real-world activities (Merrill, 2002, 2007). This four-phase instruction principle is adopted and applied for sequencing the video lessons, creating a coherent and dynamic structure that guides students through the learning process.

Presentation

It is very important to select a video production that is appropriate for learning objectives and content presentation (Hansch et al., 2015; Poquet et al., 2018). The production style of instructional videos varies widely, and researchers have tried to identify and classify different types of production style (Chorianopoulos, 2018; Hansch et al., 2015; Santos-Espino, Afonso-Suárez, & Guerra-Artal, 2016). These studies illustrate many different options for visual presentation of course content through videos. More importantly, they define the two dimensions of classification scheme: human embodiment (e.g., talking head, voice-over, animated human, digital avatar, robot) and instructional media (e.g., slides, handwriting, graphics, animation, screencast). The instructors extended the following two multimedia learning principles regarding the human embodiment and instructional media for instructional presentation:

- *Personalization principle*: The personalization principle of multimedia learning suggests three instructional approaches to promote learning: using conversational rather than formal style, using effective on-screen coaches, and making the author (instructor) visible (Clark & Mayer, 2016; Mayer, 2014). The psychological reason for these approaches is to prime a social presence in the learners that encourages them to engage with the on-screen coach/author/instructor as a social conversational partner, resulting in deeper cognitive processing during learning (Clark & Mayer, 2016; Mayer, 2009, 2014). While displaying an instructor's talking head is one of the common practices to apply the personalization principle in instructional videos, research findings indicate that having the instructor's face on the screen is not an effective practice in instructional video (Fiorella & Mayer, 2018). The instructors decided to experiment with a more conversational and interactive teaching style: team teaching. Both of the instructors appeared on the screen and discussed the course topics in some of the videos. They were hoping that the interactive conversation/discussion format of teaching would help build a connection between the instructors and the students, stimulating their interest and engaging them as well.
- *Multimedia principle*: Many instructional videos, such as those hosted on Khan Academy (khanacademy.org) or Udacity (udacity.com), display instructors writing and gesturing on a digital whiteboard. The video produced from this type of tablet capture, along with the instructor's voice-over, has recreated natural features of an in-person classroom, where instructors would use a physical whiteboard or a computer projector for presentation. The instructors made a major change to this style by using prepared visuals instead of live-drawn text. There are three main reasons for doing this. (1) Using visuals, such as graphics, charts, or animation, is a strategic application of the multimedia principle and modality principle: People learn better when content is presented with both words and graphics rather than words alone, and words should be presented as audio narration rather than on-screen text (Clark & Mayer, 2016; Mayer, 2009, 2014). (2) Using prepared visuals gives more time for iteration and refinement of visuals. The instructor and course developer went through numerous iterations scripting course content, discussing optimal visualizations, and prototyping them before recording, thus improving the finished product beyond what could be generated live while recording. (3) It reduces cognitive load during the recording process. Instructors may focus all their cognitive resources on narrating the course content to students rather than attending live to the visual layout of the screen, the selection of pen colors for certain types of content, or the legibility of handwriting.

Context of the Study

The online KBAI course comprises 26 video lessons, with the first lesson giving students an overview of the course and the second lesson introducing students to KBAI. Each of the next 23 lessons covers a KBAI topic. The last lesson is a course wrap-up. Each of the video lessons lasts approximately 60 minutes. However, the lesson is broken into video clips to fit the individual topics of the lesson, with the length ranging from 1 to 5 minutes. These sequences of video clips are interwoven with interactive exercises, and the exercises are equipped with a set of intelligent tutors that give students adaptive feedback when they submit their responses to the exercises (Goel & Joyner, 2016, 2017).

Table 1 summarizes how the video lessons are designed by incorporating the four instructional methods and how they are sequenced based on the principle of four-phase instruction, followed by detailed descriptions of each phase.

Table 1.
The Integrated Design of Video Lessons in KBAI

Instructional phase	**Component of video lesson**	**Instructional methods**	**Video example**
Activation	Preview of the lesson	Learning through reflection	bit.ly/kbai-preview
Demonstration	Presentation and discussion of lesson topics	Learning by example	bit.ly/kbai-presentation bit.ly/kbai-discussion
Application	Exercises Exercise solutions Assignments	Learning by doing Adaptive feedback	bit.ly/kbai-exercise bit.ly/kbai-solution bit.ly/kbai-assignment
Integration	Wrap-up The cognitive connection Reflection	Learning through reflection	bit.ly/kbai-wrapup bit.ly/kbai-connection bit.ly/kbai-reflection

1. *Activation*: The instructors started each lesson with a preview, which introduced students to the topics to be discussed. They also directed students to recall and relate their prior knowledge and relevant experience that can be used as a foundation for the new knowledge.
2. *Demonstration*: The instructors demonstrated KBAI methods, tasks, and applications by using various real-life examples, presented with visuals such as graphics, tablet capture, illustration, animation, and simulation.
3. *Application*: Interactive exercises were embedded in the video lessons so that students could practice and reinforce what they learned from the demonstrations. Figure 2 is a screenshot of an example of the exercises in which students are asked to fill 24 boxes to represent the possible next state of a problem in accordance with rules provided. The exercise is provided with adaptive feedback from intelligent tutors. The tutor operates first by examining whether the input to the problem even makes sense. If not, the tutor supplies feedback on the type of input it will understand, guiding students along to the closed input set that it can process. Then, once it understands the input, it examines whether that input is valid. If the input is valid according to the rules of the exercise, it moves on to checking

correctness. For some exercises, the tutor also checks to see if the answer is the best answer. Figure 3 shows two pieces of feedback a student may receive from the tutor based on his or her input. The instructors also discussed how the new knowledge could be applied in the real world. They got students involved by asking students to answer questions after the discussion. The instructors then gave students an assignment on how to apply what they learned to solve a problem.

4. *Integration*: The instructors wrapped up the lesson by giving a recap of the topics discussed and connected them with the topics to be covered in the next lesson. Then, they examined the relationship between the topics and human cognition. Finally, they brought the lesson to closure by asking students to reflect and write down what they learned from the lesson.

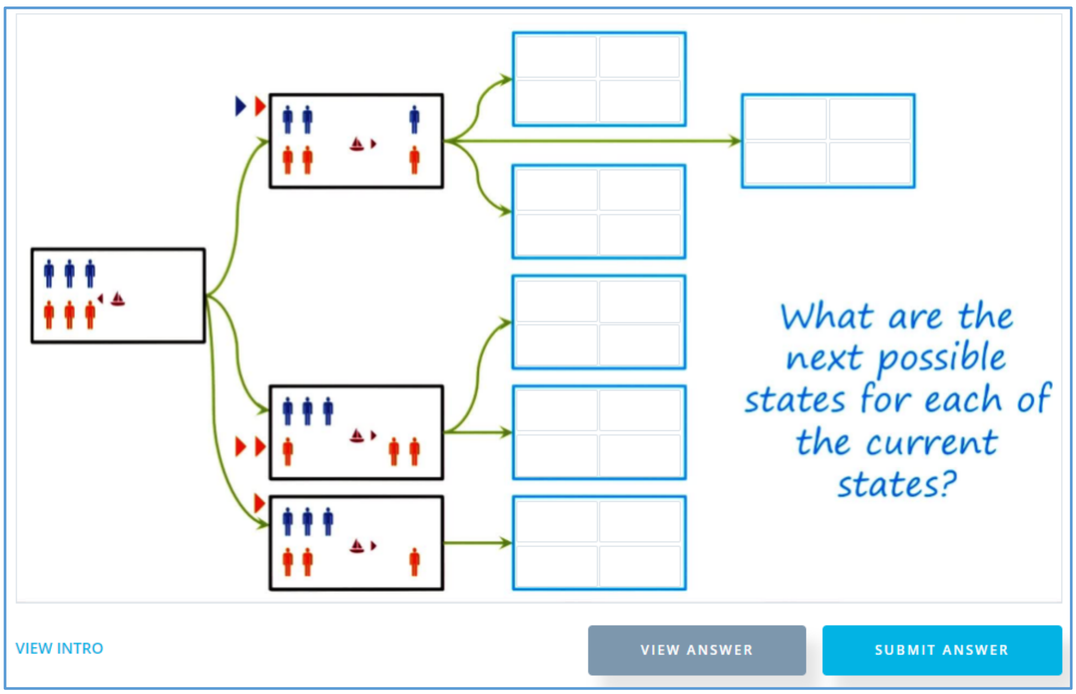

Figure 2. An example of exercises in the video lessons (Goel & Joyner, 2017).

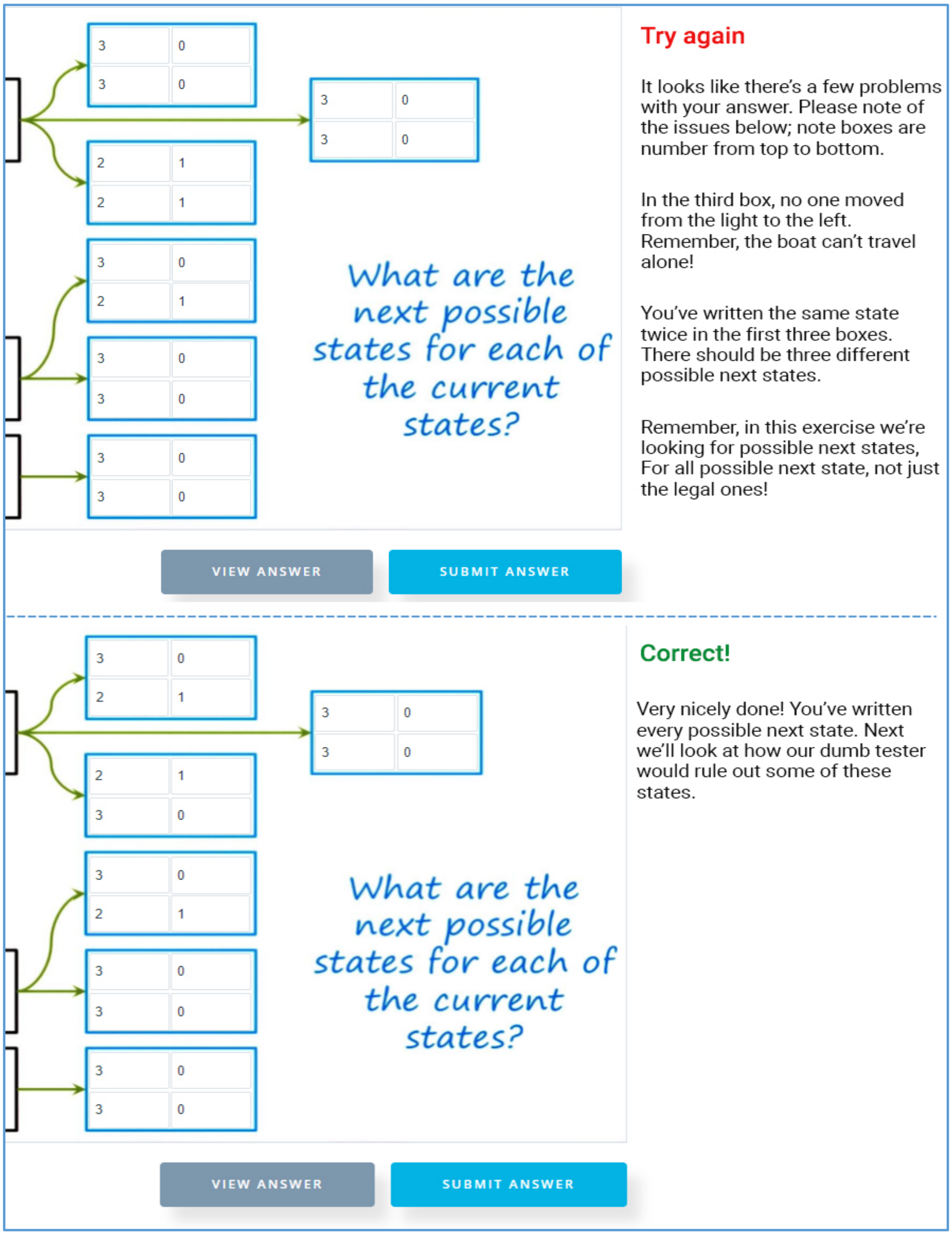

Figure 3. An example of feedback provided by the intelligent tutor (Goel & Joyner, 2017).

Methods

This study was designed to address the following two research questions, and survey research was the primary method for collecting and analyzing data to address them:

- What are student perceptions of the video lessons developed with a seven-principle model?
- To what extent are student perceptions of the video lessons related to their perceptions of the course effectiveness?

Students were invited to take two surveys: (1) a start-of-course survey, which was conducted at the beginning of the semester to help the instructors get to know the students, and (2) an end-of-course survey, which was conducted at the end of the semester to gauge students' opinions on course progress and feedback on various course elements. Both surveys were administered through the learning management system used at the university. Although students were required to log in with their university user account and password, the survey was anonymous. The instructors encouraged the students to participate in the survey by communicating to them through the course syllabus and emails that their feedback would help improve the course and the new online program. Participation was voluntary, and no incentives were offered for taking part in the research study.

Survey Instrument

Data on student perceptions of the effectiveness of the video lesson and the course was collected through the end-of-course survey. The survey included questions asking students for feedback on course progress and various course elements, such as the video lessons, online discussions, peer feedback, assignments, projects, and so on. Only the questions on the effectiveness of the video lessons and the course are reported in this study. Questions on other course elements are not included.

We have not yet found any tested survey instrument specifically for assessing the effectiveness of instructional video. While there are established student survey instruments assessing the effectiveness of instruction in traditional classroom teaching settings (e.g., Aleamoni, 1978; Marsh, 1982), the extent to which they can be transplanted to the new context of online instruction is questionable, as the instruments were developed when online learning environments were almost nonexistent (Theall & Feldman, 2007). On the other hand, the instrument developed specifically for online teaching (e.g., Bangert, 2006) was intended to assess multiple instructional dimensions. Thus, its use is limited for measuring the effectiveness of video lessons specifically. Nevertheless, various factors or dimensions representing characteristics of effective instruction have been identified in research on student ratings of instructional effectiveness (Bangert, 2006; Cohen, 1981; Feldman, 2007; Marsh, 1991). The factors concerning instructional presentation, learning exercises, and feedback, which are core components of the video lessons, were selected and used to guide the development of a set of four questions for assessing the effectiveness of the video lessons. The selected factors are (1) clarity and understandableness, (2) active learning, (3) feedback, and (4) learning/value.

Students were asked to rate their agreement with the following four statements regarding the video lessons, using a seven-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*):

1. The lectures are informative and easy to understand.
2. The exercises provided during the lectures kept me engaged.
3. The feedback I received from the exercises enhanced my understanding of the lesson.
4. Overall, the video lessons were valuable in helping me learn.

A reliability analysis (Cortina, 1993; Cronbach, 1988) was carried out by using all responses to these four statements from the students who completed the survey (*N* = 1,242) to measure the internal consistency of the four-item scale on the effectiveness of the video lessons. Cronbach's alpha showed that the scale reaches a high level of internal consistency, α = .828. All four items appeared to be worthy of retention. Deleting any of them would result in a decrease in the alpha (see Table 2). As such, all items are included in the scale for the measurement.

Students were also asked to rate the overall quality of the course, using a seven-point Likert scale ranging from 1 (*bad*) to 7 (*excellent*), for the purpose of examining whether the students' perceived effectiveness of the video lessons will predict their perceptions of the course effectiveness.

In addition to the quantitative data, qualitative data were collected to get deeper insights into student perceptions: what they like about the video lessons and what changes they would like to see made to the video lessons. The rationale for this approach is that the collection and analysis of both quantitative and qualitative data can address the research questions with sufficient breadth and depth (Morgan, 2014; Teddlie & Tashakkori, 2009).

Table 2.

Reliability Analysis of the Four-Item Scale Measuring the Effectiveness of Video Lessons

	N	Mean	Variance	*SD*
Statistics for scale	4	23.56	15.04	3.88

	Mean	Min	Max	Range	Max/min	Variance
Item means	5.890	5.528	6.170	.642	1.116	.084
Item variances	1.424	1.218	1.761	.543	1.446	.067
Inter-item correlations	.555	.418	.690	.272	1.651	.009

Item total statistics	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Squared multiple correlation	Alpha if item deleted
Item 1	17.49	9.360	.660	.519	.782
Item 2	17.77	8.480	.710	.507	.757
Item 3	18.03	8.772	.573	.369	.827
Item 4	17.09	9.160	.695	.542	.767

Reliability coefficient	Alpha	Standardized item alpha
	.828	.833

Participants

The participants of the study were the 1,913 students who took the KBAI online course during the eight semesters from fall 2014 to spring 2017. A total of 1,670 completed the start-of-course survey for a response rate of 87%. The survey asked demographic questions, including their age, gender, country of residence, and education. Students also reported their prior programming experience as a proxy for their existing programming skill. Students' programming experience seemed to be extensive but varied (see Table 3). These results indicate that more than half of the students were between the ages of 25 and 34. Almost 90% of them were male, and almost 90% lived in the United States. Almost a quarter of students reported they are not native English speakers. All students had at least a bachelor's degree (as this is required for admission into the program), but 20% had other graduate degrees, including master's or doctoral degrees.

Table 3.
Online KBAI Students' Demographics

Demographics		*N*	%
Age	18 to 24	234	14.0
	25 to 34	908	54.4
	35 to 44	379	22.7
	45 and above	148	8.9
	Total	1,669	100.0
Gender	Female	206	12.4
	Male	1,454	87.1
	Other	4	0.2
	Total	1,664	100.0
Country of residence	United States (U.S.)	1,468	88.1
	Outside of U.S.	199	11.9
	Total	1,667	100
First language	English	1,266	76.3
	Other languages	393	23.7
	Total	1,659	100.0
Highest prior education	Bachelor's degree	1,311	78.7
	Master's degree	272	16.3
	Doctoral degree	81	4.9
	Other	2	0.1
	Total	1,663	100.0
Years of programming experience	0	28	1.7
	1–2	328	19.8
	3–5	352	21.2
	6–10	434	26.1
	11–15	263	15.8
	More than 15	255	15.3
	Total	1,660	100.0

Data Analysis

Data collected from the Likert-scale questions were analyzed using descriptive and deferential statistics in SPSS. The descriptive statistics provide insights into students' perceptions of video effectiveness and course effectiveness. Regression analysis was performed to see how students' perceptions of the video lessons could predict their perceptions of course effectiveness.

Data collected from the open-ended questions were coded using thematic analysis (Braun & Clark, 2006; Guest, MacQueen, & Namey, 2011). The primary author and an independent rater coded the data by following the six steps below:

1. *Familiarization with data*: The data were imported into an Excel spreadsheet, and the researchers read and familiarized themselves with the data. Then they identified and labeled those that were not relevant. They were excluded from coding. Finally, the researchers worked together to identify and segment each response into different meaningful units.
2. *Generating initial code*: The researchers first coded a small set of responses together to get a mutual understanding of the coding. Then they coded another small set of data individually and got together to compare, discuss, and clarify the differences in their coding. They went back to code the rest of the data. The codes were recorded in separate columns, and percentage agreement between the two raters was calculated. The results indicate that interrater reliability was 89%. After discussions, they reached an agreement and developed a list of codes across the data set.
3. *Searching for themes*: The researchers sorted and collated coded data extracts into themes.
4. *Reviewing themes*: The researchers reviewed the coded data extracts and revised inadequacies in the coding and themes.
5. *Defining and naming themes*: The researchers established and defined the themes.
6. *Producing the report*: The researchers put together the final analysis and write-up of the themes.

Results

Student Perceptions of the Video Lessons: Effectiveness

A total of 1,242 students completed the end-of-course survey for a response rate of 65%. The results indicate students' ratings of the four statements on the video lessons were consistently high (see Table 4). More than 90% of the students—those who chose *strongly agree*, *agree*, or *agree slightly*—agreed that the video lectures were informative and easy to understand and that the video lessons were valuable in helping them learn. As for the in-lesson exercises, more than 80% of the students agreed that the exercises kept them engaged and that the exercise feedback they received enhanced their understanding of the lessons.

Table 4
Students' Ratings of the Four Statements on the Video Lessons

Statement	Percentage								
	1	2	3	4	5	6	7	*M*	*SD*
	(1= *strongly disagree*; 7 = *strongly agree*)								
1. The lectures are informative and easy to understand.	.9	1.0	2.1	3.5	10.9	41.4	40.0	6.08	1.10
2. The exercises provided during the lectures kept me engaged.	.9	1.5	4.3	5.6	16.0	42.0	29.7	5.79	1.22
3. The feedback I received from the exercises enhanced my understanding of the lesson.	.6	3.2	5.6	9.6	18.8	38.6	23.5	5.53	1.33
4. Overall, the video lessons were valuable in helping me learn.	.8	1.6	1.3	2.3	10.8	36.5	46.8	6.17	1.10

Student Perceptions of the Video Lessons: Likes and Changes

A total of 906 students responded to the question about what course elements they would like to see in other online courses. Among them, 173 (19%) recommended the video lessons among various course elements. While some students said they liked the overall quality of the video lessons, other students state which elements of the video lesson they particularly liked. The coding results indicate that students liked the video lessons because of five major elements (see Table 5).

Table 5

What Students Liked About the Video Lessons: Code, Explanation, and Illustrative Note

Code	Frequency	Explanation	Illustrative note
Video lectures	41	Video lectures are interactive, easy-to-understand, interesting, and relevant.	I liked the interactive lessons and the basic examples that really helped understand the concepts so they could be applied later.
Exercises and feedback	40	Exercises and feedback are interactive and reinforce learning.	KBAI had pretty decent mid-lesson quizzes. I've found that most classes other than a select few have had very poor examples of these quizzes, with some classes almost never using them. I find them to be a huge improvement in lecture quality as it not only keeps the student engaged in an otherwise watch and listen only environment, but enforces the material during the lesson.
Overall quality	31	Video production and course content were excellent.	The quality of teaching in the class videos is the best I have seen so far (I have taken 3 other classes). I hope all classes are like this.
Instructional structure	29	The instructional structure guides learning.	I enjoyed the pragmatic order of each of the series. Each has a preview, (content), then a wrap-up, cognitive connection, then final feedback. I am glad this was done. It gave order to the chaos.
Team teaching	27	Team teaching makes lectures conversational and interesting and provides multiple perspectives.	I really do like having two instructors in the lesson. It helps to hold my interest and seems more like a conversation than a lecture.

A total of 568 students responded to the questions on what changes they would recommend being made to the video lessons. Among them, 209 (37%) responded by saying the video lessons were excellent and that no changes were needed. Responses from 16 students were not relevant to the question. As a result, the remaining 343 responses were coded. Table 6 summarizes the three major changes students suggested be made.

Table 6

What Changes Students Suggested Be Made: Code, Explanation, and Illustrative Note

Code	Frequency	Explanation	Illustrative note
More application examples	56	Provide more examples of how concepts can be applied and implemented.	I would like to see more applied examples of the topics in regards to solving RPM problems. I think it would have been nice to get more guidance on how to apply these AI learning concepts to our project.
More exercises	40	Provide more exercises, especially more challenging exercises, and programming exercises.	The exercises are really helpful for understanding the lecture. I think it will be better if you can add more these "hands-on" exercises.
More depth in content	36	Include more details about the course topics in the video lectures.	Video lectures should contain more information about concepts and more examples to solidify the concept. I would guess only a slightly more to avoid them getting lengthier and taxing.

The Relationship Between Student Perceptions of the Video Lessons and the Course

Simple linear regression was carried out to investigate the relationship between students' perceived effectiveness of the video lessons and the course. The effectiveness of the video lessons is measured by students' average rating of the four statements on the video lessons (M = 5.90, SD = .96). Their rating of the course effectiveness ranges from 1 (*bad*) to 7 (*excellent*) (M = 6.00, SD = 1.04). The result revealed that their perceived effectiveness of the video lessons explained a significant portion of the variance in their perceived course effectiveness, R^2 = .401, F(1, 1209) = 809.76, p < .001. It was also found that the students' rating of the video lessons significantly predicted their rating of the course effectiveness, β_1 = .683, p < .001. The regression equation was as follows: course effectiveness = 1.977 + .683 video effectiveness.

Discussion

The results of this study indicate that the video lessons designed with the seven-principle model in the online KBAI course were highly rated by students on the video lectures, the interactive exercises, the adaptive feedback from the intelligent tutors, and their overall value in helping students learn. Students' comments on the question regarding what they liked about the video lessons provide profound insights into their perceptions. The five major elements that students liked about the videos—video lectures, exercises and adaptive feedback, instructional structure, team teaching, and overall quality—have enabled us to attribute the perceived effectiveness to all the principles incorporated in the design model except the principle of learning through reflection. At the end of each video lesson, students were asked to reflect on and write down what they learned from the lesson. However, students did not always do it, as it was optional and was at the end of the video lesson. Students could easily exit the video lesson after studying it for an hour. However, those who did the exercise valued it, as one commented, "I took the Final Quiz of each lesson very seriously. Being able to articulate back the information in the lesson helped me to better retain that knowledge." To encourage students to do this exercise, instructors might take a few actions, such as communicating to the students the purpose and value of this exercise or providing certain incentives for completing it.

It is worth noting that the two practices that the instructors experimented with, team teaching and adaptive feedback, worked very well in this case. The team teaching not only makes the video lectures conversational and engaging but also provides multiple perspectives on the concepts and information presented. One student liked video lessons because "conversations and multiple perspectives in the videos were helpful. Also, the teaching style was great because the audience was asked quite a few questions throughout the lecture." This aligns with the suggestion that mixing first-person and third-person perspectives in instructional video may allow learners to be more engaged and improve learning (Boucheix, Gauthier, Fontaine, & Jaffeux, 2018; Fiorella, van Gog, Hoogerheide, & Mayer, 2017). The adaptive feedback was very well received by the students too. A student commented on it as follows: "Very good exercises in videos with useful feedback for incorrect answers. OMG this was so helpful because it often addressed why I would choose an incorrect answer." While it may take time and effort to develop adaptive feedback, it should be a good investment, as it has been proven that any practices without feedback would not help with learning (Fiorella & Mayer, 2018), and adaptive feedback is particularly useful when learners need more than a correct/incorrect response (Johnson & Priest, 2014).

The finding that students' perceptions of video effectiveness significantly predicted how they perceived the overall effectiveness of the course indicates that video lessons are vital to the success of an online course. This finding confirms what was found from a smaller scale study by Scagnoli, Choo, and Tian (2017), in which 94 graduate students participated in a survey, and the results indicate that their satisfaction with the course videos had a strong relationship with a positive overall learning experience. Although good course videos alone cannot guarantee the success of a course, courses that use videos with bad design and poor quality will more likely get poor ratings from students on the course as a whole. Therefore, to ensure learner satisfaction and enhance the online learning experience, it is vital that the instructional design and video production team be guided by established principles to create and produce effective videos. While there is no one-size-fits-all model, we hope the seven-principle model helps establish that the three core components, instructional methods, presentation, and sequence, should be integrated for designing and developing video lessons for online learning. When adopting this model, some principles could be modified as needed, because the selection of instructional methods depends on many factors, including subject matter, learning objectives, students, available technology resources, and so on.

While the feedback from the students on the video lessons was very positive, they also suggested some changes be made to the video lessons. We believe the suggestions result from students' different academic background and prior knowledge and skills. As the results of the demographic survey show, their programming experience was quite varied, which resulted in different learning needs, especially when they were working on assignments and projects that involved the application of skills. It may be feasible to add more examples, details, and exercises to the video lessons; however, we have to avoid—as students themselves pointed out—making the video lessons too "lengthy" or "taxing" by trying to cover everything and eventually losing the interest of those students who do not want any change. A strategy to achieve a balance while accommodating different needs is to provide resources outside of the video lessons for students who need them. Additional course supplement readings could help students explore related topics in more depth. Optional exercises could allow students to practice more. Case studies and project examples would enable students to get a clearer idea of how concepts are applied to real-world problems. The instructors have adopted some of these recommendations and added more learning materials to supplement the video lessons in more recent offerings of the online KBAI course.

Limitations and Future Research

There are a few limitations to this study. First, the study investigated student perceptions of the effectiveness of the videos lessons designed and developed based on a seven-principle model. The researchers in this study developed the model by integrating established principles of instructional design theories, and they evaluated it by gathering feedback from students enrolled in an online graduate class in computer science. They also informally discussed the model with colleagues at the university. However, the model has not been evaluated by experts outside of the university. Secondly, survey research was the primary method for the study. While survey is one of the commonly used methods to examine students' perceptions, it is worth noting that some research has cast doubt on the usefulness of course evaluations to assess course quality and learning outcomes (Uttl, White, & Gonzalez, 2017), although earlier research found otherwise (Cohen, 1981). The large number of participants across eight semesters, high survey-response rate, and both quantitative and qualitative data may have raised the likelihood that the student evaluations are a useful outcome variable in this study. Nonetheless, the significant doubts raised regarding the reliability of student surveys in general imply that alternate evaluation measures ought to corroborate the findings of this study. Finally, we have not yet explored how students' use of the videos lessons affects their learning performance. Future research studies can be conducted in this area by leveraging learning analytics on students' use of the video lessons. Studies on the effectiveness of this design model can also be expanded to disciplines other than computer science.

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Student Engagement as a Predictor of xMOOC Completion: An Analysis from Five Courses on Energy Sustainability

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Abstract
MOOCs are characterized as being courses to which a large number of students enroll, but only a small fraction completes them. An understanding of students' engagement construct is essential to minimize dropout rates. This research is of a quantitative design and exploratory in nature and investigates the interaction between contextual factors (demographic characteristics), student engagement types (academic, behavioral, cognitive and affective), and learning outcomes, with the objective of identifying the factors that are associated with completion of massive and open online courses. Two logistic models were adjusted in two samples, general and secondary, with the binary dependent variable defined as completes the course yes/no. The results in the general sample (15% completion rate) showed that the probabilities of a participant completing the course are positively and significantly related to participation in the forum and the participant educational level, and negatively related to gender (female) and age. The results in the secondary sample (87% completion rate) showed that the probabilities of a participant completing the course are positively and significantly related to participation in the forum, gender (female), and the motivation and satisfaction indexes, and negatively related to age, having previous experience in other MOOCs, and self-efficacy and task strategies indexes. The results lead to ideas on how these variables can be used to support students to persist in these learning environments.

Keywords: engagement, learning analytics, xMOOC, self-regulated learning, completion

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Student Engagement as a Predictor of xMOOC Completion: An Analysis from Five Courses on Energy Sustainability

In education, the student engagement construct has grown popularity in recent decades as a result of a greater understanding of the role that certain cognitive, emotional, behavioral and social factors play in the process of learning and social development (Appleton, Christenson, & Furlong , 2008). In addition to the fact that the construct is considered one of the best predictors of learning and personal development, the attitude of engagement also adds to the development of essential skills to live a productive and satisfying life (Pekrun & Linnenbrink, 2012).

In massive, open, online learning courses (MOOCs) student engagement research is recent and challenging (Guajardo-Leal, Navarro-Corona & Valenzuela, 2019). MOOCs have gained reputation among academics for their impressive enrollment numbers but have also come under criticism for their poor completion rates. Research in recent years has tried to better understand these challenges around student retention in MOOCs, and what trainers and course designers could do to stop or minimize student dropout (de Barba, Kennedy, & Ainley, 2016; Halawa, Greene, & Mitchell, 2014; Guajardo-Leal & Valenzuela, 2017). Given that dropout is not an instantaneous event, but rather a gradual process that occurs over time (Appleton et al., 2008), researchers and educators in MOOC perceive student engagement as the main theoretical model to understand behavior, as its study is the basis for the design of interventions related to school desertion, attrition and success (Reschly & Christenson, 2012).

This research aims to investigate the interaction between contextual factors (demographic characteristics), student engagement (academic, behavioral, cognitive and affective), and learning outcomes, on five xMOOCs developed by the Binational Laboratory for the Intelligent Management of Energy Sustainability and Technological Training project, in order to understand the factors associated with the completion of these courses.

Student Engagement

Student engagement has been studied by professors and researchers for decades; however, there is no single definition or form of measurement. Some scholars define the concept as the beliefs and values that a subject has about the importance of learning; others state it as the effort to learn, and some more in terms of cognitive and self-regulatory strategies (Fredricks & Mccolskey, 2012). Newmann, Wehlage and Lamborn (1992) define engagement as the psychological inversion in which the student invests energy by making cognitive effort to understand something. Meanwhile, York, Gibson and Rankin (2015) indicate that engagement is a term generally used to refer to the student's psychological investment, his willingness to invest time in educational behaviors, or to a general reference of student involvement in educational activities.

A rather accepted framework is that of Reschly and Christenson (2012) who define student engagement as a process and a learning outcome that encompasses four domains: academic, behavioral, cognitive and affective. Academic and behavioral mastery implies easily observed behaviors and results in the teaching-learning process (e.g., time devoted to activities, participation in class, completion and delivery of tasks, activities or exercises, qualification in partial exams, and persistence in the course). In contrast, cognitive and affective engagement are internal domains that can hardly be observed; however, according to the authors, these domains can be accurately informed by the student (e.g., self-regulatory strategies, interest, effort, self-efficacy, belonging, and relationships with companions).

Student Engagement in MOOC

Student engagement can be conceptualized in a similar way in face-to-face education and in MOOCs; however, its operationalization in terms of the forms and processes of data collection, is totally different. Joksimović et al. (2018), based on the multidimensional model of Reschly and Christenson (2012), developed a re-operationalization of the student engagement model to explain learning in MOOCs, through an analysis of the constructs related to learning used in the prediction and measurement of student engagement (see model in Figure 1). The authors state that academic engagement in MOOCs consists of time spent on course activities, for example, participation in tests and exams, time spent in videos, participation in exercises and assignments and the completion rate (e.g., Kizilcec, Pérez-Sanagustín, & Maldonado, 2017). Behavioral engagement includes voluntary participation in academic, social or extracurricular activities; demonstrations of the behavioral dimension in MOOCs are participation in discussion forums and participation in groups and social networks (e.g., Joksimović, Gašević, Kovanović, Riecke, & Hatala, 2015). Cognitive engagement refers to students' motivational objectives and self-regulated learning skills (Reschly & Christenson, 2012); in the context of MOOCs, cognitive engagement is expressed in artifacts that students generate during the learning process, specifically in the production of texts, and it is measured with linguistic indicators of discourse, narration, cohesion and coherence (e.g., Joksimović et al., 2015). Finally, affective engagement is related to the reactions of the participants, school identification, appraisal of learning, sense of belonging, satisfaction, self-consciousness of the feelings, emotional regulation, and the abilities of resolution of conflicts (Reschly & Christenson, 2012); to measure it, Joksimović et al. (2015) rely on positive or negative language analysis.

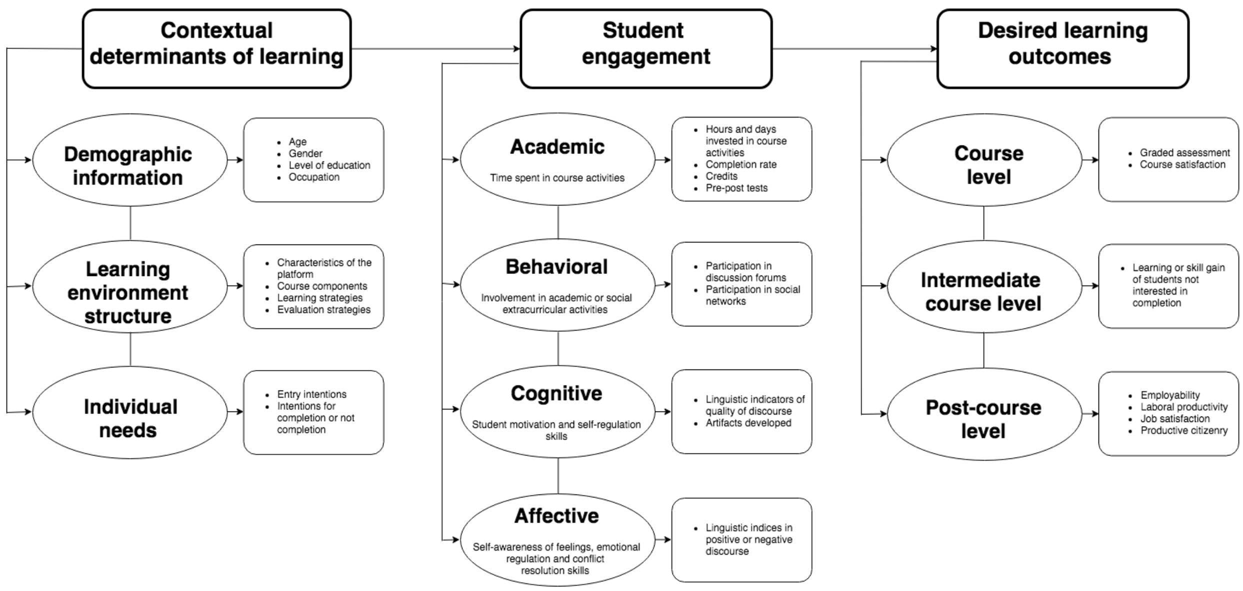

Figure 1. Student engagement model in MOOC (Adapted from Joksimović et al., 2018).

Factors Associated with MOOC Completion

Demographic variables have been commonly used to understand the factors that influence learning and / or completion in MOOC. Age, gender and level of education have been considered in several studies as predictors for student persistence or achievement, however, results differ across studies. For example, Goldberg et al. (2015) as well as Heutte et al. (2014) did not find significant differences in the probability of completing a course based on a student's level of education, while Greene, Oswald, and Pomerantz (2015) and Kizilcec and Halawa (2015) showed that more educated students are more likely to persist in a course and achieve better grades.

Pursel, Zhang, Jablokow, Choi, and Velegol (2016) examined student demographics, entry intentions, and course interactions to better understand the variables that are indicative of MOOC completion. Among their results they found that the previous online learning experience had no impact on completion; this result appears in contrast with findings from Yukselturk and Bulut (2007), who observed positive relationships between the past online learning experience and the performance in online learning environments. In addition, Pursel et al. (2016) found that the students who completed the MOOC had higher education levels, and also found that the number of times a participant watched a video and the number of posts in the forum were significant predictors of MOOC completion.

The motivation of the participants has also been studied because of its association with course completion. There is a consensus among research on the positive role of intrinsic motivation and persistence and / or achievement in MOOC (e.g., de Barba et al., 2016; Greene et al., 2015; Kizilcec & Halawa, 2015). For example, de Barba et al. (2016) performed a structural equation modelling to investigate the relationship between intrinsic motivation, participation, situational interest and performance in a sample of students that persisted until the end of a MOOC. Their results showed that motivation and participation are related to performance both directly and indirectly; motivation (value beliefs and domain focus) is mediated by participation, while participation (in videoconferences and activities) is mediated by motivation (situational interest).

The interaction and participation of students with the course materials and with their peers are also aspects that are strongly studied in MOOC research. Crossley, Dascalu, McNamara, Baker, and Trausan-Matu (2017) for example, conducted a network cohesion analysis to identify patterns related to the completion of a MOOC. Their findings showed that students who produce more quality publications in the forum are more likely to complete the course. These results are consistent with subsequent research by Engle, Mankoff and Carbrey (2015) and Goldberg et al. (2015) who demonstrated that students who collaborate most in the forum are more likely to complete the course.

Jiang, Williams, Schenke, Warschauer, and Dowd (2014) used a combination of student performance in Week 1, social interaction, and the role of external incentives to predict final performance in a MOOC. Using logistic regression as a classifier, they predicted the probability that students would obtain certificates in general, and certificates with or without distinction. Among their results they found that the average scores of the tests in the first unit strongly predict whether the students obtain the certificate; the activity of the students in the forum was not statistically significant in the predictive model. In a second model (certificate with or without distinction) they found that for each unitary increase in the number of evaluations between pairs (collaboration), the probabilities of obtaining a certificate with distinction were more than seven times greater.

xMOOCs on Energy Sustainability

The Binational Laboratory for the Intelligent Management of Energy Sustainability and Technological Training is a project financed by the energy sustainability fund of CONACYT-SENER and joined by the efforts of five higher education institutions: Tecnologico de Monterrey, National Technological Institute of Mexico (SEP), Electrical Research Institute, Arizona State University, and the University of California at Berkeley. Among the objectives of the Laboratory is the training of specialized talent in the electricity sector. To cover the training needs, a set of courses based on xMOOCs technology were developed. Five of the xMOOCs developed in this project were chosen as the scenario for the present investigation.

Courses Description

The courses are xMOOCs hosted on the MexicoX platform. Course design is a teacher-centered model focused on the delivery of high-quality content, computer-based evaluation mainly for student feedback purposes, and automation of all key transactions between participants and the learning platform, meaning all the activities and evaluations are self-contained and self-directed. Although in general terms xMOOCs are based on behavioral and cognitive learning theories, constructivist and andragogy theories were also promoted in the activities, for example, by designing a real-world challenge in energy sustainability that participants might solve.

The courses are designed for participants over the age of 17 with minimal high school studies. Each xMOOC is composed of four elements: (1) resources, (2) activities, (3) networking, and (4) evaluation. The resources available to the xMOOCs are videos (storytelling, problematization), PDFs (readings, articles, tables, processes, maps, definitions), HTML, infographics, and open resources. The course evaluation system comprises four types of assessments: (1) diagnostic, (2) progressive, (3) summative, and (4) subsequent to learning self-evaluation. The summative evaluation ranges from 0 to 100 points with a minimum pass of 60% of activities completed. A total of 10 weighted activities are evaluated: (1) six-grades in partial evaluations (quizzes), 30 points; (2) participation in the exercises, 2 points; (4) participation in a challenge, 20 points; participation in the practices with peer evaluation, 20 points; and (4) one-grade in the final exam, 28 points.

Purpose of the Study and Research Question

This study explores one central research question: What factors are associated with the completion of the energy xMOOCs? Specifically, the study attempts to understand the association between contextual factors (demographic characteristics), student engagement (academic, behavioral, cognitive, and affective), and learning outcomes at the course level, with the objective of identifying which factors are indicative xMOOCs completion. Although other investigations have taken into account demographic characteristics to predict an expected learning outcome in MOOC (e.g., de Barba et al., 2016; Greene et al., 2015; Halawa et al., 2014; Kizilcec & Halawa, 2015; Kizilcec et al., 2017), this research includes dimensions of student engagement and self-regulated learning, aspects that until now have been little used in research in the area (Joksimović et al., 2018).

Although the majority of the analysis is exploratory in nature, some specific hypotheses were considered: (1) students who exhibit higher social participation patterns, (in terms of the number of times they participated in discussion forums and practices with their peers), will be more likely to finish the course; (2) students with higher levels of education will be more likely to complete a course than those with lower levels of education; (3) students who have previous experience in a MOOC will be more likely to complete a course; (4) students who define the goal of completing the course, with or without obtaining the certificate, will be more likely to complete the course; and (5) students with high levels of self-regulation, measured in terms of self-report of self-motivation, self-efficacy, use of strategies for carrying out activities or tasks, satisfaction, and self-reaction, will be more likely to finish the course.

In the design of this study we used the student's engagement framework of Reschly and Christenson (2012) as the main conceptual base, as well as two additional frameworks: (1) the conceptual model of engagement in massive and open online learning environments of Joksimović et al. (2018), and (2) theories of self-regulated learning associated with the student engagement framework of Cleary and Zimmerman (2012). The operationalized theoretical framework used in this research can be consulted in Figure 2. An important adaptation to the model is the use of the self-regulated learning theories of Cleary and Zimmerman (2012) to operationalize the cognitive and affective dimensions of student engagement through self-reports before and during the course. The shaded parts of the model correspond to aspects to be taken into account in future research reports.

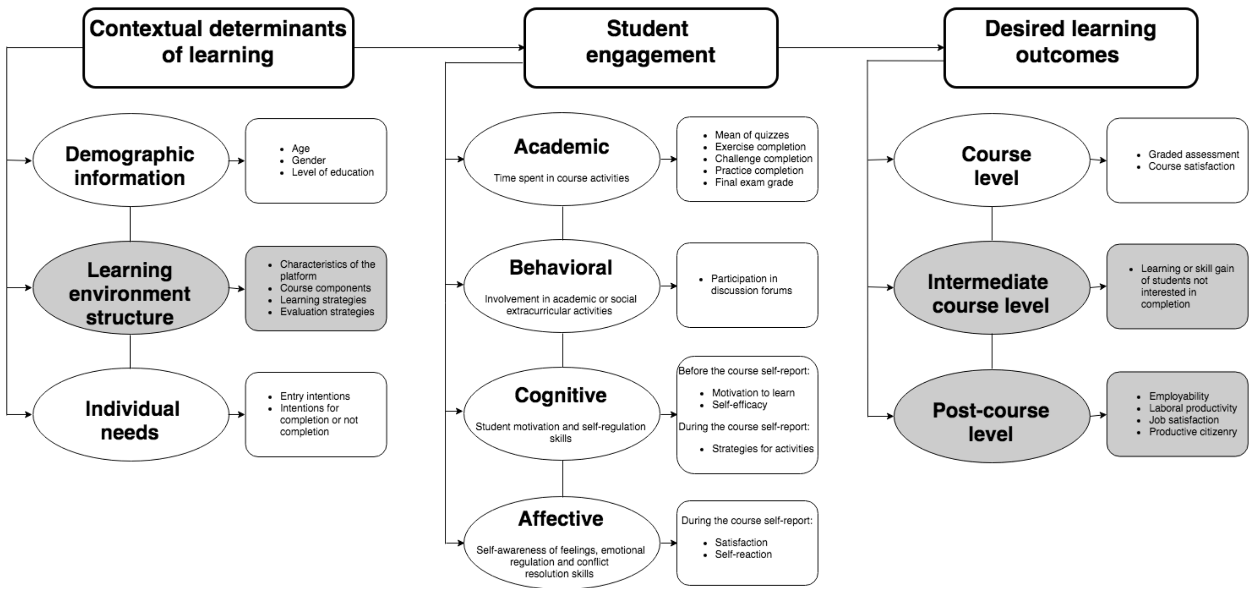

Figure 2. Operationalized model of engagement in xMOOCs for this study.

Methods

The present study is of a quantitative nature and has an explanatory approach. It uses the Binary Logistic Regression technique to address the degree to which a group of independent or explanatory variables contributes to the explained variance of a dependent dichotomous variable (French, Immekus & Yen, 2013). The dichotomous variable was defined as 1 = completed the course, and 0 = did not complete the course; in this research it is recognized that finalizing an xMOOC is not synonymous with "success" or "performance" (Breslow et al., 2013), however, the focus of this study provides an approach towards the understanding of the factors that may be associated with behavior of students who commit and complete this type of learning environments.

Participants

The main sample consisted of 50,244 participants in five xMOOCs offered by one institution, two to three times each, during August 2016 and December 2017. The secondary sample, corresponding to those of the main sample that answered two voluntary surveys, one at the beginning and one during the course, was composed of 808 participants. The breakdown of participants per course can be found in Table 1.

Table 1
Participants per Course

ID	Num. times offered	General sample	%	Secondary sample	%
xMOOC-1	2	10,746	21.4	237	29.3
xMOOC-2	3	9,475	18.9	196	24.3
xMOOC-3	3	13,657	27.2	174	21.3
xMOOC-4	3	6,343	12.6	47	5.8
xMOOC-5	3	10,023	19.9	155	19.1
Total	14	50,244	100.0	808	100.0

Instruments

Two surveys were developed: (1) The *Pre-course survey*, and (2) the *Cognitive and affective engagement of MOOC participants survey*. The *Pre-course survey* objective was to collect demographic questions (e.g., gender, age, level of studies, previous experience, and the plan to finish or just review some material and / or do some activities). The objective of the *Cognitive and affective engagement survey* was to know the level of cognitive and affective engagement of the student to plan, execute and evaluate activities with academic objectives. This second survey comprised the three phases of the engagement process in the self-regulation learning framework stated by Cleary and Zimmerman (2012): *forecast*, *monitoring*, and *self-reflection*. In each phase, some strategies that students select and use consciously to achieve their academic goals were chosen. It is important to mention that the *self-reflection phase* was carried out at the same time as the *monitoring phase* so as not to bias the results by only considering participants that completed the course.

The process of designing the items for the second survey was carried out through a review of theoretical and empirical research. From the literature, five studies related to the measurement of cognitive and affective engagement were selected: Kizilcec et al. (2017); Greene (2015); Christenson et al. (2008); Miller, Greene, Montalvo, Ravindran, and Nichols (1996); and Pintrich and DeGroot (1990). With the instruments of these sources, items that coincided with the constructs to be measured in this investigation were collected, after which they were translated and adapted to Spanish as statements in present tense. The scale of measurement was designed with values between zero and three, where a response of zero means the statement is not representative of the participant's attitude or behavior and three means the statement is very representative. The range zero-to-three was considered as a measure of the student's level of engagement on a continuum in which lower values of cognitive and affective participation indicate a superficial level of engagement, and high values indicate a deep level of engagement (Greene, 2015). The final instrument was composed of 33 items.

Before the course, the *forecast phase* of the instrument was implemented; it consisted of 14 items that measured the motivation to learn from the participants (beliefs of self-efficacy and interest [eight items] and motivation [five items]). During the course, the *monitoring and self-reflection phase* were implemented. The *monitoring phase* consisted of six items that measured cognitive and metacognitive strategies (self-instructions, image creation / self-registration, control of the work environment, search for help and cognitive monitoring). Finally, the *self-reflection* phase was composed of 13 items (self-satisfaction and satisfaction with the course [seven items], and adaptive and reactive inferences [six items]).

Content validity for the scales was established by a panel of six experts, three reviewers and three other independent experts. Then, exploratory factor analysis was performed using the principal component method and Varimax rotation. Kaiser-Meyer-Olkin (KMO) measure verified the sampling adequacy for the analysis; the result was .92, well above the acceptable limit of .5 (Kaiser, 1974). Bartlett's test of sphericity, χ^2 = 9688.705, p < .00, indicated that correlations between items were large enough for executing an exploratory factor analysis procedure. With this procedure the instrument was simplified by deleting complex items with loadings in more than two factors. After that, another factor analysis was run using a principal axis factoring method, in order to determine the underlined factor structure; Varimax was chosen as the rotation method. This time, the Kaiser-Meyer-Olkin (KMO) measure also verified the sampling adequacy for the analysis (.915), and Bartlett's test of sphericity, χ^2 = 8328.053, p < .00, was large enough for executing an exploratory factor analysis procedure. Results, with only the remaining items from the rotated factor matrix can be seen in Table 2.

It is worth noticing that two factors (task strategies; adaptive and reactive inferences) had variables with low loadings (MG_M_ET4 y MG_E_AD6). Theoretically speaking, they were considered important by the experts and retained. Future usage of the instrument will need to re-check the items in both factors. Overall, the instrument proved to have high internal consistency α = .905, Cronbach alphas for each scale were as follows: Self-efficacy and interest, five items, α = .879; Motivation, five items, α = .851; Task strategies, five items, α = .656; Satisfaction, six items, α = .843; and Adaptive and reactive inferences, five items, α = .638.

Table 2

Rotated Factor Matrix Results

Scale	*Variable*	*Factor 1*	*Factor 2*	*Factor 3*	*Factor 4*	*Factor 5*
Self-efficacy and interest	MG_P_AE4	.794				
	MG_P_AE5	.789				
	MG_P_AE3	.770				
	MG_P_AE2	.661				
	MG_P_AE1	.484				
Motivation	MG_P_Mot2		.748			
	MG_P_Mot3		.728			
	MG_P_Mot4		.669			
	MG_P_Mot5		.643			
	MG_P_Mot1		.594			
Task strategies	MG_M_ET5			.608		
	MG_M_ET3			.547		
	MG_M_ET2			.495		
	MG_M_ET1			.448		
	MG_M_ET4			.391		

Table 2 (Continued)

Rotated Factor Matrix Results

Scale	*Variable*	*Factor 1*	*Factor 2*	*Factor 3*	*Factor 4*	*Factor 5*
Satisfaction	MG_E_S2				.791	
	MG_E_S1				.777	
	MG_E_S4				.742	
	MG_E_S6				.631	
	MG_E_S5				.545	
	MG_E_S3				.486	
Adaptive and reactive inferences	MG_E_AD2					.466
	MG_E_AD1					.391
	MG_E_AD6					.126

Note. Extraction method: Principal axis factoring; rotation method: Varimax with Kaiser normalization; six iterations.

Procedures

As a part of the instructions for each instrument, all participants were asked to complete a consent form regarding the use of data for research purposes. Responses to the instruments were organized across three databases, (1) pre-course results, (2) cognitive and affective engagement self-report results, and (3) student's profile and the interaction with the content and the course evaluations (academic and behavioral engagement). Data sources were combined using a numerical identifier and through the email of the participants. After the merging process, participants were only represented by the numerical identifier to respect confidentiality.

From the general sample (n = 50,244) the following data were obtained: Gender, educational level, country, final grade, average of partial grades (quizzes), performance of exercise, practice and challenge, final exam grade, number of times participated in the forum, whether or not the course was completed. It is important to notice that the variable *country* was collected; however, 98% of the sample belonged to a single country, for this reason the variable was discarded from the analysis. Likewise, the variable *type of course* was initially considered for inclusion in the analysis; however, after a thorough content analysis of the five courses, and after confirming our analysis with two interviews with the course developers, we found out that the five courses contained exactly the same instructional design structure: teaching strategies, type of evaluation, and the same video structure. The developers explained that the courses were developed with specific institutional templates. For this reason, we considered that there were not enough differences among the courses to consider them in the logistic models.

The secondary sample was totally voluntary, and thus only a small fraction completed both parts of the survey (n = 808). Data recovered from this sample were the following: previous experience in xMOOCs, reasons for enrollment, whether the participant planned to finish the course or not, and the motivation, self-efficacy, strategies for activities, satisfaction, self-reaction indexes. The last index of self-regulated learning was integrated with the five previous indexes. The descriptive statistics of the variables in the general and secondary samples can be found in Table 3.

Table 3
Descriptive Statistics of the Variables in the General and Secondary Samples

Name of the variable	General sample		Secondary sample	
	N	M (SD)	N	M (SD)
Completed the course	50,244	.15 (.36)	808	.87
Female	18,101	.36	270	.33
Bachelor's degree or above	31,418	.62	558	.70
Number of posts	50,244	.37 (1.58)	808	2.73 (3.67)
Participated in the challenge	50,244	.14	808	.78
Final grade	50,244	.14 (.30)	808	.80 (.23)
Mean of quizzes	50,244	.20 (.35)	808	.92 (.19)
Exercise grade	50,244	.20 (.40)	808	.90 (.29)
Practice grade	50,244	.04 (.20)	808	.46 (.49)
Final exam grade	50,244	.15 (.35)	808	.79 (.23)
With previous experience in MOOC			807	.43
Intention to finish the MOOC			798	.97
Motivation index			808	20.10 (3.13)
Self-efficacy index			808	13.09 (2.10)
Task strategies index			808	13.16 (2.62)
Satisfaction index			808	18.04 (2.42)
Self-reaction index			808	13.80 (2.65)
Self-regulated learning index			808	78.05 (10.00)

Note. For dummy variables, the averages reflect the proportions of those categories (e.g., 15% of the general sample completed the course).

Table 3 indicates very different completion rates between the general and secondary samples. In the general sample, only 15% finished the course, while in the secondary sample 87% finished the course, suggesting a great bias in the selection of the participants in the secondary sample. This may be explained because at the point of taking the second survey, about 50% of the course had passed, at which point participants were more likely to complete the course compared to those participants who only completed the entry survey. The differences between the samples are not only reflected in the rate of completion, but also in the participation of students in the forum, practices, evaluations, and exercises.

In general, correlations between most predictors were quite weak; however, there were moderate correlations between self-efficacy and motivation indexes ($r = -.46$, $p<.05$), and self-reaction and task strategies indexes ($r = -.54$, $p<.05$). This result was not surprising given the indexes measure the self-regulated learning dimensions and the cognitive and affective engagement of the student. The indexes were evaluated to verify multicollinearity with the Variance Inflation Factor (VIF); the results did not indicate multicollinearity problems.

Results

Description of the Samples

In the general sample, the completion rate was 15%. The sample comprised 64% men and 36% women. Of the men, 4% completed the course; 2% of women did likewise (see Figure 3). 62% of the participants reported having a university level education or comparable, the remainder of participants reported their education at preparatory level or lower. Half of the participants in this sample reported having had previous experience in MOOCs; thus this experience was the first one for 50%. The vast majority of participants (98%) reported having intentions or plans to complete the course in its entirety, with or without interest in obtaining the certificate. On average, participation in the discussion forum for this sample was .37 times.

The average age for those who completed the course was 31.24 years and 30.47 for those who did not. Regarding the trend in the completion of the course by age of the participants, the population enrolled in the courses is quite young; both, those who completed the course (N = 7,653; M = 31.24; SD = 11.47) and those who did not (N = 42,591; M = 30.47; SD = 9.97).

Since the participation in the pre-course survey and the survey during the course was completely voluntary, it is not surprising that the secondary sample is very different from the general sample; in the secondary sample, the completion rate was much higher (88%) than the result in the general sample. In the secondary sample, 67% are men and 33% are women. The trend in gender is similar to the general sample, 60% of men finished the course compared to 31% of women, however, the percentage of women who did not finish the course is much lower (2.2%). Seventy percent of the secondary sample have studies of bachelor education or above, the rest is at the preparatory level or below. Forty-three percent of the participants in this sample report having previous experience with other MOOCs. As in the general sample, the vast majority in this sample (97%) report having intentions or plans to complete the course in its entirety, with or without interest in obtaining the certificate. On average, participation in the discussion forum for this sample was 2.73 times, a result far greater than that of the general sample.

In the secondary sample, the results by age show the same trend as in the general sample regarding the participants who completed (N= 708; M=31.49; SD=11.70 and did not complete the course (N=99; M=33.31; SD=12.50).

Binary Logistic Regression Analysis

The variable "culmination of the course" was coded as binary (1 = yes, 0 = no) based on the weighting of the students' participation in course activities: (1) average of partial grades (quizzes), (2) participation in exercises, (3) participation in practices, (4) participation in challenges and (5) qualification in the final exam. A range of 0 to 1 was used in which the cut was defined as follows: "culminated course, yes"> = .6, “culminated course, no” <.6. Since the response variable is dichotomous, the logistic regression technique was chosen for the analysis of the variables in both samples, the general (n = 50,244) and the secondary (n = 808). It is important to emphasize that the variables used for the conformation of the dichotomous dependent variable were not used in the regressions to avoid multicollinearity. The results for the general sample are reported first.

As an initial step, participants with standardized residuals greater than 2 standard deviations (outliers) as well as those with missing data were eliminated, thus, in this first analysis, 44,881 participants were considered. A logistic model of four predictors was then fitted to test the hypothesis regarding the relationship between the probability of a participant completing a xMOOC and their gender, age, educational level and participation in the discussion forum. The logistic regression analysis was carried out by the Binary Logistic Regression procedure in SPSS version 23.

On the general evaluation of the model, the logistic model provided a better fit to the data by demonstrating an improvement over the null model (p<.001, χ^2 = 8937.995, 4) and a pseudo R^2 Nagelkerke =.544. The Goodness-of-fit test by Hosmer & Lemeshow was significant, however, studies report that the result of this test is not useful when dealing with large samples.

The results in this sample showed that the chances of a participant completing the course are positively related to forum participation and educational level (p <.001), and negatively related to gender (women) and age (p <.001, Table 4). In other words, the higher the participation in the forum and the higher the educational level of the participant, the more likely it is that the participant will complete the course. On the other hand, the odds of a woman completing the course are lower; this statement is confirmed by the negative coefficient associated with the gender predictor. In addition, for each increase in the participant's age, there is a .971 less chance of completing the course.

Table 4
Logistic Regression Analysis of 44,881 Participants to Complete a xMOOC in SPSS (Version 23)

Predictor	B (S.E.)	Wald	Exp (B)
Forum participation	1.071 (0.02)***	4454.684	2.917
Bachelor’s or above	0.269 (0.07)***	14.338	1.308
Female	-0.342 (0.07)***	25.889	0.71
Age	-0.03 (0.00)***	75.237	0.971
Constant	-3.455 (0.10)***	1162.527	0.032

Note. ***significance p<.001

In the secondary sample, we first searched for patterns in the missing data of the participants. Failing to find them, we performed the multiple imputation process with five iterations in SPSS. Thanks to the use of multiple imputation, the analysis was performed with the total sample without losing participants who lacked data (n = 808). The first step in the analysis consisted of an exploration for the identification of outliers; the sample was reduced to n = 774. With this last sample, a logistic model was adjusted with the Binary Logistic Regression procedure in SPSS version 23, with the intention of testing the hypothesis with respect to the relationship between the probability that a participant completes an xMOOC and their gender, age, educational level, participation in the forum, previous experience in xMOOCs, if they intend to finalize it or not, and the indexes of motivation, self-efficacy, strategies for tasks, satisfaction, and self-reaction.

The logistic model provided a better fit to the data by demonstrating an improvement over the null model ($p < .001$, $\chi^2 = 186.703$, 10, pseudo R^2 Nagelkerke = .490). The Hosmer-Lemeshow (HL) inferential goodness of fit test was not significant ($p > 0.05$, $\chi^2 = 5.836$, 8) suggesting that the model fit the data well, in other words, the null hypothesis of a good model adjusted to the data was sustainable.

The results of the secondary sample (Table 5) showed that the probabilities of a participant completing the course are positively and significantly related to participation in the forum, gender, motivation index and satisfaction index ($p < .05$). As in the general sample, the higher the participation in the forum, the more likely it is that the participant completes the course. In contrast or disagreement with the results of the general sample, the probabilities that a woman finished the course in this sample were greater than the probabilities for a man; this result should be interpreted with caution since trends for the gender variable in both samples is different.

Other variables positively and significantly related to the completion of a course were the motivation index and the satisfaction index. For each point of increase in the motivation and satisfaction indexes, the probabilities that a participant completes the course are higher. Results also showed that the odds of a participant completing the course are negatively related to age, the self-efficacy index, the task strategy index and previous experience in other xMOOCs ($p < .05$).The educational level and the self-reaction index did not have significant results in this regression ($p > .05$).

Table 5

Logistic Regression Analysis of 774 Participants to Complete an xMOOC in SPSS (v. 23)

Predictor	B	Wald	Exp (B)
Age	-0.042 (0.02)**	7.251	0.958
Bachelor's or above	0.573 (0.40)	1.975	1.774
Female	0.941 (0.40)**	5.81	2.564
Forum participation	0.427 (0.10)***	18.27	1.532
Previous experience in MOOC	-0.861 (0.34)**	6.212	0.423

Table 5 (Continued)

Logistic Regression Analysis of 774 Participants to Complete an xMOOC in SPSS (v. 23)

Motivation index	0.136 (0.07)**	3.873	1.146
Self-efficacy index	-0.441 (0.11)***	15.72	0.643
Task strategies index	-0.474 (0.10)***	21.99	0.623
Satisfaction index	0.733 (0.09)***	70.61	2.082
Self-reaction index	0.053 (0.09)	0.364	1.055
Constant	-0.618 (1.60)	0.169	0.539

Note. **significance p<.05; ***significance p<.001

It is important to explain that within the models, the cohort effect, defined as the effect that time, region, or life experiences may have on the development or perceptions of a particular group (Glen, 2005), was not taken into consideration for two reasons. First, the experiences lived by the group do not change significantly from one delivery to another; xMOOCs are self-contained courses that privilege the individual work of the participants. Second, the delivery of the courses was eight weeks long, and those that were given more frequently, were offered in a period of 16 months. In that sense, it was not considered a sufficiently long period of time for including the cohort variable in the models

Discussion

Before discussing the results obtained it is important to highlight some limitations of this study. One of the most important problems faced in this research was the bias identified in the selection of the secondary sample which includes a higher proportion of students who completed the course compared to the general sample. Unfortunately, and because the participation in the surveys was voluntary, it was not possible to solve this bias. In this way, the results of the secondary sample can only be generalized to the participants who answered them. A second limitation of the study is the applicability of the results to other types of MOOCs, such as a cMOOC with a more collaborative learning design compared with the content delivery design of the xMOOCs in this study.

In the general sample and in the secondary sample, the number of times the students participated in the discussion forum stands out as a predictive factor for the completion of an xMOOC when the rest of the variables remain constant. These results coincide with the existing literature (de Barba et al., 2016; Goldberg et al., 2015; Engle et al., 2015; Jiang, et al., 2014) and also support past research about a student's behavior in online environments, specifically emphasizing that peer interactions are an important component to support engagement (Kizilcec, Piech, & Schneider, 2013). These findings have important implications for how student interactions, in reference to collaboration and social integration, can be used to predict and encourage the completion of an xMOOC. It is necessary to rethink the way in which both—the collaboration and the social integration—are being promoted in xMOOCs. A plausible educative intervention would be to match the data of the platform with a social network at the student level; having these data merged could reveal richer results in three types of engagement: behavioral, cognitive and affective, allowing stakeholders and researchers to reference frequency and rigor of the participants' communicative discourse. Although this finding does not actually mean that by participating in the forum a student learns more, it does imply that higher achieving students engage more in social aspects of the course, including discussions. The learning intervention of this result could be focused on generating more opportunities for collaboration and social interaction.

The age variable maintained negative coefficients in both samples when the rest of the variables remained constant. In the models it was possible to show that for each year of increase in age, participants are less likely to finish the xMOOCs. This contrasts with the research of Greene et al. (2015) and Kizilcec and Halawa (2015) who showed that older students were more likely to persist in a MOOC. Again, the type of course (specific characteristics of the design and typology of the MOOC in question) could be a determining factor in the discord in results; this research only supports the behavior of xMOOCs participants.

A student with a high educational level (bachelor's degree, comparable or higher) was more likely to finish an xMOOC. This same pattern was shown in the investigations of Greene et al. (2015), Kizilcec and Halawa (2015) and Pursel et al. (2016), but not so for the Goldberg et al. (2015) and Heutte et al. studies (2014). It is important to mention that the interpretation of this result must be taken with caution, since the definition of "higher levels" can vary from study to study, making it difficult to compare results.

In the results of the general sample, a woman is less likely to finish an xMOOC, when the rest of the variables remain constant. This interpretation must be considered in depth since the five xMOOCs analyzed are related to electrical energy, a field which for decades men more than women were inclined to study. In fact, more men than women signed up for this course In the years to come, it would be worth investigating whether the gender gap persists.

The secondary sample suggests that most of the students who completed the course also completed the surveys (87%). Therefore, the results of the regression in this sample were somewhat different from the general sample in the educational level variable, which was not significant ($p > .05$) and in the gender variable, since women are more likely to finish the xMOOC ($= e^{2.564}$). The age in this sample however continued to have negative effects, whereas participation in the forum had positive effects in the completion of an xMOOCs.

In the secondary sample, having previous experience with other MOOCs had a negative effect, that is, those who reported that it was their first experience were more likely to finish an xMOOC. This result coincides with the research of Pursel et al. (2016) who found that the previous online learning experience had no impact on the completion of a MOOC.

Regarding the types of engagement, it is important to note that if there is a deep engagement towards the value of activities in the course and self-motivation (motivation index) before the course, there is a higher probability of finishing an xMOOC, and if during the course the satisfaction with the course itself and with the participant efforts is consistently high (satisfaction index), participants are more likely to finish the xMOOC. This indicates that the motivation and satisfaction that students bring and sustain before and during the course influence their engagement in activities. Although this is not new in educational literature (de Barba et al., 2016; Greene et al., 2015; Kizilcec & Halawa, 2015), this finding is new for xMOOCs.

On the other hand, when there are higher self-efficacy indexes and strategies for activities, the probabilities of finishing the course are lower. The negative coefficients in this regression imply that a participant who self-reports having a deep engagement in task strategies (elaboration of conceptual maps, use of tables, taking notes, use of diagrams, change of environment when it is required, among others), and that is over-confident in terms of the skills and competencies required to complete the course (for example, technological skills, search and analysis of information, study, use of social networks, among others), is less likely to finish an xMOOC. Research studies have shown that overconfidence is characteristic of humans because we tend to remember positive personality traits more easily than negative ones, or, we tend to overestimate abilities that we have to carry out an activity (Pajares, 1996). If also in xMOOC environments the confidence of a person in their performance in some activity is statistically and significantly higher than their performance in the activity, an appropriate thesis in the educational intervention for xMOOCs would be the induction of reinforcements or feedback during the course activities to return the balance to students who report overconfidence.

In sum, the results of this study provide information on some variables that show positive and negative relationships with the completion of an xMOOC. Although the results of the secondary sample may not be generalizable to other xMOOCs, the study of participant engagement demonstrated important behavior patterns that can support the design methods to keep students more involved in these types of learning environments. In a future study, the distal or post-course learning outcomes of both those who finished and those who did not finish the xMOOCs, as well as the characteristics of the learning environment that enhance such outcomes (see shaded parts of Figure 2) will be reviewed and contrasted with these results.

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The Efficacy of an Online Cognitive Assessment Tool for Enhancing and Improving Student Academic Outcomes

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Abstract
With technology at the fingertips of most undergraduate students, it has been difficult for instructors to fully engage students in the classroom, which has resulted in the creation of several innovative online cognitive assessment tools. These tools often integrate several cognitive learning strategies within an assessment, with the goal of actually enhancing learning, as opposed to just measuring it. In the current study, students' level of engagement and test performance using a recently developed online application were compared to their final multiple-choice paper-and-pencil exam mark to determine the efficacy of the new online application in achieving improved learning outcomes. Results indicated that students had high test scores using the online tool despite their limited engagement in the cognitive learning features, calling into question the online cognitive assessment tool's facilitation of long-term learning. Implications and recommendations for future online cognitive assessment application implementation in educational environments are discussed.

Keywords: online assessment, student engagement with online tools, online learning

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The Efficacy of an Online Cognitive Assessment Tool for Enhancing and Improving Student Academic Outcomes

A new challenge educators face in university classrooms is student distractibility due to the influence of technology and social media. Nevertheless, students are most engaged during the assessment component of education, which provides a unique opportunity for educators to enhance learning outcomes, and not just assess student knowledge. Traditionally, to assess student knowledge, we examine a student's ability to recall information (e.g., short-answer questions, essays) or recognize information (e.g., multiple-choice questions). The latter creates an issue with the assessment process because if we are actually interested in measuring students' understanding of a concept, recognition-based assessment methods make it difficult to accurately assess their knowledge. In other words, are we interested in a student's understanding and mastery of content or their ability to recognize a correct response? In fact, students have been identified as "passive actors" rather than "active learners" when it comes to such assessment practices (Chappuis, Stiggins, Arter, & Chappuis, 2004). Thus, there may be a clear disconnect between the goals of assessment and what is actually occurring.

Factors Impacting the Assessment Process

Several student characteristics can impact the assessment process. First, students may vary in their academic orientations, which are broadly distinguished by learning-oriented (LO) and grade-oriented (GO) behaviors. A student that is high in LO places greater importance on actually learning the material, whereas a student high in GO places greater importance on receiving a higher grade. Many studies measure LO and GO as dichotomies with the expectation of students being high in one and low in the other (Beck, Rorrer-Woody, & Pierce, 1991; Frymier & Weser, 2001; Lawrence & Frymier, 2002; Williams & Frymier, 2007). However, researchers have found that it is possible to score high in both and low in both. Therefore, instead of having two distinct groups (high LO/low GO, high GO/low LO), there are four (high LO/low GO, high GO/low LO, high GO/high LO, low GO/low LO). The latter group, low GO/low LO, is very rare in an academic setting, as these individuals have little to no motivation for learning and are more likely in school for external reasons, such as parental expectation or socialization practices inculcating the importance of higher education to ensure success (Eison, Pollio, & Milton, 1986; Roedel, Schraw, & Plake, 1994). A student that is high in both LO and GO has the desire to learn with an expectation of receiving a high grade as a result of their engagement in the learning process (Marsden, Caroll, & Neill, 2005). Ultimately, less is known about the distinctive academic characteristics of these two groups, which has led researchers to explore students within the two dichotomies as opposed to the four categorizations.

Two other student characteristics can also impact the assessment process: academic entitlement (AE) and test anxiety (TA). An academically entitled student is an individual who demands higher grades for reasons independent of their performance (Kopp, Zinn, Finney, & Jurich, 2011). For instance, a student exhibiting high levels of AE may demand a high grade simply because they attend every class or do every reading. Of interest, students higher in AE have reported higher academic demands from their parental figures, which in turn creates more anxiety about grades. This shifts their focus away from learning and mastering the course content and toward greater grade achievement (Greenberger, Lessard, Chen, & Farruggia, 2008). This suggests that students higher in AE may experience more anxiety about their grades, which may lead them to adapt more of a GO than a long-term learning approach. Although the research on AE has been fairly recent, researchers have found several characteristics related to AE populations: higher levels of work avoidance, frustration/negative attitudes, and less motivation and responsibility for actions (Cain, Romanelli, & Smith, 2012).

Students with high GO tend to report higher levels of TA (Eison et al., 1986), whereas those with high AE tend to have more anxiety about their grades (Greenberger et al., 2008). This is particularly important in terms of assessment, as those with high TA have more trouble encoding and storing information (Everson, Smodlaka, & Tobias, 1995; Thomas, Cassady, & Heller, 2017), and are less efficient in cue-utilization strategies (Cassady & Johnson, 2002). Researchers have suggested that these poorly implemented learning strategies are a result of poor studying habits, such as procrastination (Kalechstein, Hocevar, Zimmer, & Kalechstein, 1989) or avoidant coping strategies, such as mental disengagement (Stoeber, 2004; Thomas, Cassady, & Heller, 2017; Zeidner & Matthews, 2005). However, students experiencing high TA may know the material just as well as their less anxious peers but have trouble utilizing the appropriate cognitive learning strategies to retrieve that information during assessment. This anxiety can be especially heightened in a testing environment that has time pressures (Plass & Hill, 1986), which is a characteristic of most assessments in higher education. Consequently, students with high TA often perform worse on assessments than their peers with lower TA (Decaro et al., 2011; Thomas, Cassady, & Heller, 2017; Zeidner & Matthews, 2005) and attribute their failure to external sources (Cassady, 2004). This cycle of external attribution continues into future assessments and creates a negative perception of assessment, in turn creating a cycle of avoidant behaviors. If students can control their anxiety during assessments, their performance may increase, along with their perceptions of the assessment process.

Engagement and Performance

More positive attitudes about assessment are important, as negative perceptions are rooted in students' understanding of learning. As such, students have unique perspectives on their preference for assessment and how they approach taking tests (Struyven, Dochy, & Janssens, 2005). For instance, multiple-choice pen-and-paper (or MCPP) tests have had a long history of students' utilizing a surface approach to learning (SAL), triggering more positive attitudes toward that assessment type in comparison to open-ended/essay formats (Furnham, Batey, & Martin, 2011; Scouller, 1998; Scouller & Prosser, 1994). This finding was particularly relevant for students with higher TA, suggesting that the underlying reason for this preference was not the increased learning associated with MCPP practices but rather that students found it easier to prepare for and take MCPP tests (Traub & McRury, 1990; Birenbaum & Feldman, 1998).

Since SAL contradicts the overall goal of assessments, various other assessment types have been implemented in postsecondary institutions, such as peer assessments, self-assessments, and online cognitive assessment tools (OCATs), such as MyPsychLab, all of which encompass the same goal of learning but in different forms. OCATs have benefits and drawbacks for both instructors and students. For instructors, the use of an OCAT allows easy distribution and marking of tests, which is especially important for large introductory courses. Yet becoming familiar with these online platforms can be challenging and result in a time-consuming learning curve. This latter drawback can also be applied to students who have never used an OCAT, which can heighten the stress and anxiety of tests even more (Özden, Ertürk, & Sanli, 2004). However, there is evidence to support the idea that heightened anxiety has decreased as online activities have become everyday practice (Dermo, 2009; Walker, Topping, & Rodriques, 2008). OCATs can also be convenient because they can be used at a place and time suitable for the student. This adaptability can also contribute to reductions in anxiety. Additionally, the OCATs can provide quick and comprehensive feedback to students, allowing students to self-regulate their knowledge of tested content (Miller, 2009). The benefits of such assessments must outweigh the drawbacks, as students have reported positive attitudes toward the introduction of online assessments within their educational environments (Miller, 2009; Smith & Caruso, 2010).

With this in mind, there is a need for assessment tools that foster greater long-term learning for students. One newly developed OCAT has been created in an attempt to fill this gap in higher education (Pare & Joordens, 2009). The OCAT being assessed in the present study uses several different cognitive learning strategies to optimize the learning process. What makes this tool interesting is the approach it takes to enhancing the multiple-choice format. For the OCAT being assessed, the multiple-choice format begins with free recall and ends with immediate feedback, embedding retrieval cues and second opportunities to answer questions for fewer marks. Figure 1 displays this pattern for each multiple-choice question that students encounter.

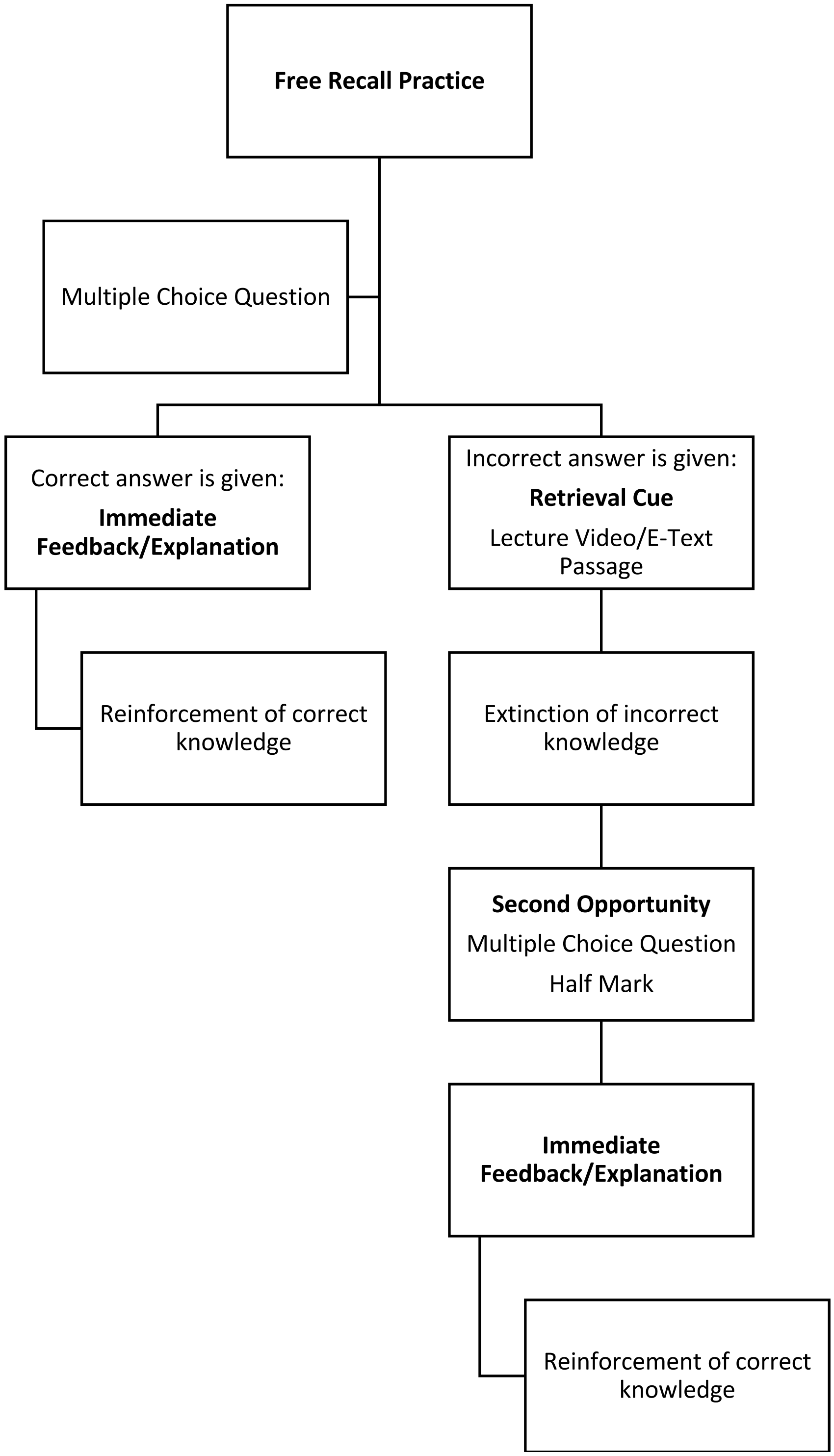

Figure 1. OCAT process with cognitive learning strategies.

Retrieval to free recall. These cognitive learning strategies enhance information retention and can strengthen long-term learning through testing, which is referred to as the *testing effect* (Carpenter & DeLosh, 2006). The strength of the testing effect is dependent on the type of retrieval and the underlying mechanisms required for that retrieval. Retrieval is the process of accessing knowledge, often from our stored memory with the help of environmental retrieval cues (Karpicke, 2012). Retrieval is essential for our learning because it not only helps us access knowledge, but it also helps enhance knowledge, making it easier to retrieve in the future (Roediger & Karpicke, 2006; Karpicke & Roediger, 2007, 2008; Karpicke & Zaromb, 2010). Recall tests (e.g., short answer, essay) strengthen long-term learning because the retrieval process is needed for success in recall but not for success in recognition (Carpenter & DeLosh, 2006). As students continue to practice recalling information, the retrieval routes that transfer the knowledge are strengthened (McDaniel & Masson, 1985). During the OCAT assessment, the first feature of each multiple-choice question requires students to engage in free recall, where they can type as much information as they want in the dialogue box. This acts as a shortened essay format where students can experience deep approach learning (DAL) and prime associations. The more they engage in the free recall feature, the more their retrieval routes are being used and hopefully strengthened.

Unsuccessful retrieval attempts and immediate feedback. If the retrieval route is already strengthened from previous practice, successful retrieval attempts (i.e., getting the correct answer) are more likely to be made. Yet unsuccessful retrieval attempts are less understood, specifically in how they benefit learning. Often, students write MCPP examinations, receive their marks weeks later, and rarely identify which items they got right and which they got wrong. This increases the likelihood of students learning erroneous concepts, impacting their performance on subsequent examinations (Marsh, Roediger, Bjork, & Bjork, 2007). However, unsuccessful retrieval can be counteracted if immediate feedback is provided (Kornell et al., 2009). In the OCAT assessment, students are given immediate feedback (i.e., explanations) for every question regardless of successful or unsuccessful attempts, which ultimately reinforces the correct concepts.

Second chances and retrieval cues. Retrieval is often cue dependent (Tulving, 1974). Students might fail to recall the information because of ineffective retrieval cues. These retrieval cues can come from the external or internal environment. If the cue helps the student further understand the concept, they can use that cue for studying practices and future examinations. In the OCAT assessment, an incorrect response to a multiple-choice question is followed by a retrieval cue (i.e., a hint) in the form of a brief video lecture or e-text passage. Students then have a second attempt to answer the same question for half the mark. Additional benefits of including multiple attempts within examinations include eliminating student anxiety and emphasizing the importance of student development, not just academic outcomes (Baleni, 2015).

OCAT Research

The theoretical foundation of the OCAT being assessed has been well established, as the aforementioned cognitive learning strategies are shown to increase learning in various educational contexts. Yet no published research exists on this assessment tool despite its use in postsecondary institutions. However, Holbrook, Dupont, Power, and Joordens (2015) did conduct a pilot project that compared the OCAT to an online learning management system called LEARN using a multiple-choice format experiment, with students preferring the OCAT over LEARN—particularly enjoying the immediate feedback feature. LEARN, used at the University of Waterloo, is similar to other online learning management systems used in university settings, such as Blackboard or Moodle. Although this pilot study provides some insight into students' attitudes and test performance with the OCAT, there are several gaps that still need further exploring. For instance, it is important to understand how students engage in the cognitive learning features of the OCAT, as this should be, in theory, an important indicator of their performance on the assessments.

Present Research

The current study was initially carried out as part of a larger research project for a master's thesis.[1] However, the focus of this article is on one aspect of that project. We are reporting on our findings about students' level of engagement with the cognitive learning features, specifically in students with varying LO and GO, levels of AE, and TA. The research question we report on is this: Will students' combination of LO and GO, AE, and TA predict their level of engagement during each cognitive learning strategy (i.e., free recall, second attempt, immediate feedback, retrieval cue)?

Hypothesis. Student engagement was explored within each cognitive learning strategy. We hypothesized that students with higher levels of GO, TA, and AE would report lower levels of engagement in free recall and immediate feedback and higher levels of engagement in the second attempts feature and retrieval cues. The opposite was expected in students with higher LO.

Methods

All students were recruited from the university's research pool, and they were treated in accordance with TCPS-2 ethical guidelines. The study was approved by the institutional research ethics board. Both introduction to psychology courses were taught by the same instructor, using the same content and the same evaluations, ensuring consistency across the sample.

Measures

Participants completed two sets of online surveys (a presurvey and postsurvey) and were given a unique ID code, which was used to match participants over the survey sessions and semesters. These ID codes ensured that students would remain anonymous to the instructor in the course. Participants also provided additional demographic information, specifically their gender, age, ethnicity, program, and year of study. Performance was measured using students' final grades on the MCPP exam, their final grades in the course, and their final OCAT midterm grades. The lead researcher had access to the grades because of her role as the OCAT administrator and graduate assistant for the course but had no contact with the students in the course.

LOGO-II. Learning and grade orientations were assessed using the LOGO-II scale developed by Eison, Pollio, and Milton (1983). This scale had two sections, the first with 16 items regarding specific attitudes (e.g., "I dislike extra assignments that are not graded") on a 5-point Likert-type scale (1 = *strongly disagree* to 5 = *strongly agree*). The second section had 16 items regarding behaviors (e.g., "I cut classes when confident that lecture material will not be on the exam") on a 5-point Likert-type scale (1 = *never* to 5 = *always*). Recommended cutoffs from previous studies were then used to categorize students in their high/low dichotomies. The reliability of this 32-item scale ($\alpha = .72$) was consistent with prior reliability ($\alpha = .70$) analyses (Levine, 2003; Purcell, 2010).

[1] The interested reader can contact the researchers for a copy of the original thesis.

Cognitive Test Anxiety scale. The Cognitive Test Anxiety scale (CTA), which has 27 items, was used to measure students' TA (Cassady & Johnson, 2002). An example item was "I lose sleep over worrying about examinations," which was measured on a 4-point Likert-type scale (1 = *not at all typical of me* to 4 = *very typical of me*). Scores ranged from 27 to 108, with higher scores indicating higher TA. A cutoff point of 69 was used to dichotomize low and high levels. The reliability of this scale (α = .83) was lower than prior reliability (α = .91–93) analyses (Cassady, 2004; Furlan, Cassady, & Perez, 2009).

Academic Entitlement Questionnaire. AE was assessed using the 8-item Academic Entitlement Questionnaire (AEQ), which is a smaller, theoretically constructed measure from the original that had 26 items (Kopp et al., 2011). It is measured using a 5-point Likert-type scale (1 = *strongly disagree* to 5 = *strongly agree*). As such, students' scores can range from 8 to 40, with a cutoff point of 24. Scoring above that cutoff point would result in high AE; scoring below that cutoff point would result in low AE. The reliability of this 8-item scale was higher (α = .83) than that found in previous studies (α = .80; Kopp et al., 2011).

Engagement scale. An engagement scale was created to assess engagement with the OCAT's built-in cognitive learning strategies. Three items were adapted from the National Survey of Student Engagement (NSSE) scale, which measures the quality of engagement of students across universities in the United States and Canada, producing an overall internal reliability of .8 (Tendhar, Culver, & Burge, 2013). All other items were developed based on the theoretical understanding of the engagement construct, which has been defined as the amount of time students devote to a desired outcome (Kuh, 2001) as well as their level of collaboration and communication with staff and peers (Coates, 2007). Therefore, the scale contained eight items, four of which measured how often students engaged in each cognitive learning strategy and the other four measuring their level of engagement with their peers and professor, with an example item being "During the current OCAT midterm, generally how often did you read the feedback given after each multiple-choice question?" The items were measured on a 5-point Likert-type scale (from 1 = *never* to 5 = *all the time*). The combined items produced a low reliability score (α = .64). Therefore, the items were used individually for all subsequent analyses.

Procedure

The study ran from October 2016 until May 2017, covering two academic semesters. Depending on students' program and interest in the introductory psychology course, students could have been enrolled in both semesters or just one. For example, a student could enroll in just the fall semester, meaning they would complete the study protocol during that semester. Another student could enroll in just the winter semester, meaning they would complete the following protocol in that semester. Finally, participants could have signed up for both semesters, in which case they would complete the presurvey in the first semester and then complete the postsurvey in the second semester. The present report is focused solely on the engagement with the OCAT's built-in cognitive learning strategies. As such, the study flow allowed participants to first gain exposure to the platform while simultaneously measuring relevant student characteristics (e.g., LO, GO, TA, and AE) and student performance (OCAT midterm results, final MCPP grade, and final course grade) to compare against the postsurvey responses for engagement with the cognitive learning strategies.

Thus, participants in the study completed the following protocol: Each semester, eligible participants completed the presurvey containing the questionnaires focused on learning approach

(LOGO-II), test anxiety (CTA), and academic entitlement (AEQ). The presurvey was available for the duration of the study to accommodate participants across the semesters if they hadn't already completed the presurvey (e.g., a student signs up for just the second semester course). Then, during each semester, participants would complete three midterms using the OCAT instead of the traditional MCPP midterms used in the course, followed by a final MCPP exam. Prior to the first OCAT midterm in each semester, students were provided with instructions that would assist them in using the OCAT during the midterm assessment process.[2] The instructor also gave detailed instructions on what the assessment was, the importance of the assessment, and how it was graded, during a lecture at the beginning of each semester. Finally, participants completed the postsurvey in either December 2016 or May 2017 depending on whether they enrolled in one semester or both semesters. During the postsurvey, participants were asked about their engagement with the OCAT's learning features over the course of the semester. For both semesters, participants' responses on the presurvey and postsurvey, their OCAT midterm grades, their final MCPP grade, and their final course grade were used to examine the research hypothesis.

Sample Description

In total, 410 participants enrolled in a traditional, on-campus first-year introduction to psychology course at medium-sized university campus in southern Ontario completed the presurvey. Unfortunately, the study had drastic attrition, as only 155 students completed the postsurvey, which qualifies our final analysis. Nevertheless, this smaller sample mirrored much of the presurvey sample, as the majority identified as Caucasian/European (69.1%) women (77.1%) in their first year of study ($M_{\text{Age}} = 19.46$, $SD_{\text{Age}} = 2.12$) in the arts, humanities, and social sciences departments (59.2%). Yet many of the groupings for the student orientations changed, with the majority having high LO (62.6%) and high GO (54.8%). Given the predictive and exploratory nature of the research questions, all results pertaining to those questions will use this postsurvey sample. Although, in hindsight, there could have been strategies put in place to eliminate the amount of attrition. As such, there were various consequences to this procedure, which are discussed later in the limitations section. See Table 1 and Table 2 for the postsurvey sample description. See Table 3 for student learning characteristic means and standard deviations.

[2] Please contact the researchers for a copy of the instructions.

Table 1
Postsurvey Sample Characteristics

	Frequency	Percentage of Sample
Ethnic Background*		
Caucasian/European	103	69.1
Middle Eastern	16	10.7
Asian	9	6.0
African American	9	6.0
East Indian	6	4.0
Mixed	5	3.4
Hispanic	1	0.7
Discipline**		
Arts, humanities, social sciences	90	59.2
Science	31	20.4
Business	14	9.2
Human kinetics	7	4.6
Double major	7	4.6
Nursing	3	2.0

Note. *(n = 149) as six participants chose not to specify their ethnicity. **(n = 152) as three participants chose not to specify their academic major.

Table 2
Student Orientations (Postsurvey)

Student Orientation	Designation	Frequency	Percentage of Sample
AE*	High	25	16.7
	Low	125	83.3
GO	High	85	54.8
	Low	70	45.2
LO	High	97	62.6
	Low	58	37.4
TA**	High	53	37.1
	Low	90	62.9

Note. *(n = 150) as five participants chose not to complete the survey. ** (n = 143) as 12 participants chose not to complete the survey.

Table 3
Descriptive Statistics for Student Characteristics

Student Characteristics	n	Minimum	Maximum	Mean (SD)
TA	143	38	86	64.50 (10.64)
AE	150	8	34	18.49 (5.37)
GO	151	24	72	46.15 (7.60)
LO	151	28	72	46.66 (6.33)

Results

Overview

All data sources were analyzed using SPSS software. Assumptions were checked for each test, and unless otherwise stated, these assumptions were met. Outliers and influential observations were assessed using standardized residual scores (± 2.5), leverage scores, and Cooks distance (< 1). Our findings are presented in three parts. First, we report on participants' self-reported engagement with the OCAT. Second, a series of multiple regressions were carried out to examine how participants' TA, AE, LO, and GO predicted engagement with the OCAT cognitive strategies. Finally, we report on the difference between the OCAT grades and final MCPP exam grade.

Research Question

Engagement. The first engagement construct measured the amount of time students devoted to each cognitive learning strategy on a 5-point Likert-type scale. Students "only sometimes" engaged in the cognitive learning features, specifically the immediate feedback (M = 3.28, SD = 1.15), retrieval cues (M = 2.95, SD = 1.35), and the free recall (M = 2.59, SD = 1.26). The limited engagement in the latter cognitive learning feature aligns closely with students' attitudes, as only 5.8% preferred this feature over the others. Yet the highest engagement for students was the second opportunity feature, where they used it almost every time (M = 3.98, SD = 1.22). Similarly, this engagement aligns closely with student attitudes, as the second opportunity feature was preferred most by the students.

Additional questions also explored students' amount of collaboration and communication with staff and peers. Before the assessment, students indicated that they "almost never" provided help to their peers (M = 2.43, SD = 1.13), sought help from their peers (M = 2.14, SD = 1.12), or sought help from the professor about the OCAT (M = 1.85, SD = 1.03). Interestingly, this lack of communication and collaboration extended into the assessment process, with students indicating that they "almost never" worked with their peers during the OCAT assessment (M = 2.08, SD = 1.36). However, it is important to note that these results came from students' self-reports, and students are instructed to not collaborate on tests. Therefore, the validity of the assessment of the collaborative aspect is questionable and may not resemble how the students actually worked during the assessment process.

Predicting engagement in immediate feedback. Four outliers were identified, but running the analysis with and without them did not make any significant changes to the model or R^2 value. This, paired with the smaller sample size, resulted in all outliers being kept in the analysis.

The model, which contained the four predictor variables, was statistically significant, $F(4, 137) = 3.34$, $p < 0.05$, $R^2 = 0.09$, $R^2_{\text{Adjusted}} = 0.06$, accounting for only 9% of the variance in the model. However, LO (M = 46.65, SD = 6.38) was the only statistically significant predictor, b = 0.04 (SE = 0.02), $\beta = .21$, 95% CI [0.01, 0.07], $t(141) = 2.53$, $p < .05$. This indicates that an increase in LO would result in heightened engagement in the immediate feedback feature. In contrast, AE, GO, and TA did not predict engagement in the immediate feedback feature. This provides partial support of the initial hypothesis of LO students having higher engagement in the immediate feedback feature while students with high TA, GO, and AE would have less engagement in the feature.

Predicting engagement in retrieval cues. Four outliers were identified, but running the analysis with and without them did not make any significant changes to the model or R^2 value. Therefore, the outliers were kept in the analysis.

The model, which contained the four predictor variables, was statistically significant $F(4, 137) = 5.86$, $p < 0.001$, $R^2 = 0.15$, $R^2_{\text{Adjusted}} = 0.12$, though only 15% of variance was accounted for. There were two statistically significant predictors (see Table 4 for results). The two predictor variables had differing directional relationships. An increase in LO led to an increase in the retrieval cue engagement, whereas an increase in GO led to a decrease in the retrieval cue engagement. However, AE did not predict engagement in the retrieval cue feature. Though it is important to note that TA was approaching statistical significance. It was initially hypothesized that students with high TA, GO, and AE would have more engagement in the retrieval cue feature, as it contributes to a higher grade. Additionally, it was hypothesized that students with high LO would engage less in the retrieval cue. However, the opposite occurred for both LO and GO students.

Table 4
Regression Model for Engagement in Retrieval Cues

Predictors	*b*	*SE*	β	*t*	*p*	*R*	R^2	Adjusted R^2
AE	.00	.02	.01	.02	.98	.38	.15	.12
GO	-.06	.02	-.33	-3.62	< .01			
LO	.04	.02	.20	2.39	< .05			
TA	.02	.01	.15	1.87	.06			

Predicting engagement in second chance feature. In assessing the assumptions, all were satisfied. The model, which contained the four predictor variables, was not statistically significant, $F(4, 136) = 1.33$, $p > 0.05$. With that, students' AE, GO, LO, and TA did not predict their level of engagement in the second chance feature not supporting the initial hypothesis. It was hypothesized that students with higher AE, GO, and TA would engage more in the second attempt feature because it helps contribute to a higher grade. The opposite was expected for students with high LO, as they would have been more academically prepared and would not need to use this feature as often as their peers.

Predicting engagement in free recall. A total of five outliers were identified. Running the analysis with and without them did not make any significant changes to the model or R^2 value. Therefore, all outliers were kept in the analysis.

The model, which contained the four predictor variables, was statistically significant $F(4, 137) = 6.80$, $p < 0.001$, $R^2 = 0.17$, $R^2_{\text{Adjusted}} = 0.14$, though it only accounted for 17% of the variance. Additionally, all four predictors were statistically significant (see Table 5 for results). The latter two predictor variables had a negative relationship, indicating that an increase in GO and TA led to a decrease in engagement in the free recall feature. In contrast, LO and AE had a positive relationship, indicating that an increase in LO and AE led to an increase in engagement in the free recall feature. This partially supported the initial hypothesis. It was initially hypothesized that students with high LO would have more engagement in free recall and that GO, TA, and AE would engage less in this feature.

Table 5
Regression Model for Engagement in Free Recall

Predictors	*b*	*SE*	β	*t*	*p*	*R*	R^2	Adjusted R^2
AE	.05	.02	.20	2.29	<.05	.41	.17	.14
GO	-.03	.02	-.19	-2.11	<.05			
LO	.07	.02	.33	4.12	<.01			
TA	-.02	.01	-.18	-2.20	<.05			

Performance. Although the sample was typical of most university classrooms, the final grades were higher (M = 79.79, SD = 9.30), which was likely because of extremely high OCAT grades (M = 90.60, SD = 8.91) balanced with average MCPP final exam scores (M = 65.40, SD = 13.00). A paired samples *t*-test was used to identify whether the difference between the final MCPP grades and final OCAT grades was statistically significant. A boxplot inspection revealed four outliers and two influential observations. The outliers and influential observations were present on the OCAT grades variable, except for one outlier on the final MCPP variable. The data were analyzed both with and without the outliers and influential observations. Although both analyses produce similar results, the removal of the outliers and influential observations fixed some of the normality issues. Therefore, the outliers and influential observations were Winsorized to meet the second highest data point. A positive skew was still present through visual and statistical inspections. Since the test is typically robust to normality violations and the integrity of the data wanted to be kept, the data was not transformed. As expected, the difference between the two assessment practices was statistically significant, $t(121) = 21.51, p < 0.001$, 95% CI [23.06, 27.73], and had a large-sized effect, $d = .88$. Thus, students performed significantly better on the OCAT assessments (M = 90.83, SD = 7.88) than on the MCPP assessment (M = 65.44, SD = 12.89).

Discussion

Technology, often literally at the fingertips of most young adults, can help students decrease their reliance on memorization and equip them with the necessary cognitive learning strategies to succeed in the classroom. As such, the OCAT, like most new innovative assessments, was specifically developed to meet the growing needs of this incoming generation by steering them away from the passive nature of traditional MCPP assessments while moving them toward being more active, responsible learners. Although the OCAT was built on a strong theoretical background that supports learning, it was important to identify whether different academically oriented students actually engaged in the assessment and whether they actually learned from the assessment. Explorations into student characteristics was also important to pursue in the hope that it would, in part, fill in the various gaps within the current literature.

Engagement

Engagement was low for the students, in their communication and collaboration with the professor and peers. However, students were instructed not to work with one another during the assessment, which potentially explains why peer collaboration during assessment was low. However, this study did rely heavily on self-reports, which doesn't rule out peer collaboration from taking place. Additionally, the ease of navigating through the OCAT may have reduced students' need to seek advice from their professor and peers. The more striking findings were students' limited engagement in the four cognitive learning features.

Always prompted: Free recall and immediate feedback. The OCAT is structured such that each student is given the opportunity to engage in free recall and immediate feedback for every multiple-choice question. Thus, if students were utilizing the cognitive learning strategies optimally, then they would have identified that they used these two features “all of the time.” Instead, the majority “only sometimes” used these features. This suggests that students were, at times, quickly skipping the free recall, which was their first prompt, and quickly skipping the immediate feedback, which was their last prompt. Skipping the free recall feature was likely a function of three things. First, the free recall feature was the most strenuous task for the students during the assessment. Perhaps the students did not want to put in the extra effort to engage in it. Second, they may not have understood the importance of their engagement on the learning process. And third, they may not have understood what to do with the box in the first place, especially since there were no explicit directions on the OCAT assessment.

In fact, as students’ level of GO and TA increased, their level of engagement in free recall decreased. Students with a higher GO are known to engage in more SAL strategies (Tippin, Lafreniere, & Page, 2012). Since free recall relies more on DAL strategies, it makes sense that students with high GO are more inclined to skip this feature. Additionally, time constraints are a very significant contributor to students’ TA (Plass & Hill, 1986). The OCAT displays a 2-minute countdown clock with each new section, instead of the total 3-hour time limit. This time constraint may have made high-TA students more likely to skip sections in the OCAT assessment. While engagement in free recall decreased for those two constructs, it increased with greater levels of LO. Since high-LO students have more motivation and are more focused on mastering content through DAL, it makes sense that they are more engaged in free recall, compared to their lower LO counterparts. Students with higher LO also had higher levels of engagement in the immediate feedback feature. Therefore, these students actually took advantage of the explanations given to them and likely utilized the information to get a deeper understanding of the material. This engagement in DAL is typical of high-LO students (Race, 2005).

Not always prompted: Second opportunity and retrieval cues. Although free recall and immediate feedback are present for each multiple-choice question, the retrieval cue and second opportunity feature are not always prompted. They are prompted only when students get their first attempt at the question wrong. Thus, students may never actually engage in these two cognitive learning features. Having lower levels of self-reported engagement in these features would not be as problematic as the lack of engagement in free recall and immediate feedback. However, the second opportunity feature had the highest level of engagement, as students used it “almost every time.” Once students answered a question incorrectly the first time, they tried again for fewer marks. The student characteristics did not predict student engagement in the second opportunity feature, suggesting that they all engaged in it equally. It is understandable that students took advantage of this cognitive learning feature regardless of their orientation because they could still receive partial marks toward their final grade. Although this feature has grade-related benefits, it also has learning benefits that some students may have valued. For instance, the repetitiveness and ongoing retrieval needed in this feature help strengthen student knowledge and future retrieval processes. Therefore, the second opportunity feature can appeal to all students regardless of their academic orientation.

Since the second opportunity feature is paired with a retrieval cue, students also should have engaged in this feature “almost every time.” Instead, students indicated that they read or watched the hint that was prompted after the incorrect answer “only sometimes.” This suggests that at times students are getting the answer wrong, skipping the retrieval cue, and answering the question again. In these cases, students may have been struggling between two multiple-choice options that had partial relevance. Once they realized that the first option was incorrect, they knew that their second option was the right answer, eliminating the need for a hint. Using a different assessment tool, Merrel, Cirillo, Schwartz, and Webb (2015) found similar results, with students continuously getting their second attempt correct. They concluded that students actually learned from their mistakes and were mastering the material. However, the retrieval cues provided in the OCAT are quite comprehensive and can help the students further understand the concept. Relearning the concept through the retrieval cues and immediate feedback can help strengthen students' future retrieval. Therefore, it was important for the students, regardless if they knew the right answer the second time, to actually take the effort to learn more about the concept.

Such avoidance of the retrieval cue was found in students with high GO. As students' level of GO increased, their level of engagement in the retrieval cue decreased. It was initially hypothesized that students high in GO would engage more in the retrieval cue because it acts as a hint, and therefore it can contribute to a higher grade. However, the retrieval cue requires students to take the time to read a portion of their textbook or watch a small video lecture. Such tasks are easy to avoid for GO students, who have more work avoidance and little motivation (Eison et al., 1986). In contrast, as students' level of LO increased, so did their engagement in the retrieval cues. Students with high LO are taking advantage of the retrieval cue and using it to get a deeper understanding of the material.

Potential confounds to engagement. Although student characteristics can act as an indicator for the limited engagement with the cognitive learning features, there are likely other factors. For instance, students may have already known the answer to the multiple-choice question and, in turn, found it counterproductive to engage in some of the cognitive learning strategies like free recall and immediate feedback. Additionally, students may be unaware of the educational and cognitive benefits of going through each of the features, which is a flaw for all assessment practices. Students perceive the grade as that final marker of success as opposed to the final marker being learning and the learning process. This again, demonstrates the disconnect the goal of the assessment (i.e., active engagement) and what is actually occurring (i.e., passive recognition). Finally, the students knew that they only received points for correct multiple-choice responses, regardless of engagement with the recall learning strategies. In other words, students did not receive any marks for answering the free recall portion of each question. Thus, students may have felt no incentive to engage with the other learning features because it had no immediate impact on their assessment grade. Students may have simply adapted their study strategies to meet the task demands. Thus, instead of reflecting a general lack of engagement, the findings could be the result of how students' study when they know they are only tested through multiple-choice instead of a mixture of recall and recognition questions. Nevertheless, bypassing the cognitive learning strategies in order to simply answer the question for a correct or incorrect response is not molding students into the active learners that they should be, which is the goal of this OCAT. In either situation, students did not appear to engage with the cognitive learning strategies implemented within the OCAT as originally intended by its developers.

Performance

Students did extremely well on their OCAT exams, with an average of 90.6%, which differed significantly from the MCPP final exam average of 65.4%. Students' high marks on the OCAT assessment likely inhibited them from asking for help, providing help, or seeking advice from their peers or professor. It may have created a false sense of security, but this was illusory, as no deep processing was occurring because they were skipping many of the cognitive learning features. This suggests that students need to engage with the cognitive learning features used in the OCAT to maximize their learning. Working through these problems in this way should be strengthening the learning process through DAL as opposed to simply memorizing and then recognizing, which is typical of MCPP tests. Additionally, if students were actually engaging in the cognitive learning strategies, that too should have contributed to mastery of the content. However, the problem is that if students were truly engaging in DAL, then that learning should have been translated into higher grades in the MCPP final exam, but it did not. For instance, Smith (2007) found that the students who frequently read their feedback on midterm assessments actually performed better on the summative assessment than their peers who never took the time to read it. Unfortunately, many of the students in the current study fell within that latter group, "only sometimes" reading the immediate feedback. As such, their final grades on the MCPP assessment suffered.

Limitations & Future Research

There were several limitations to the current study, many of which were flaws in the methodological approach. First and foremost, attrition was extremely high from the presurvey to the postsurvey. This, in part, was a function of the distinct population of students who were at that time enrolled in the introduction to psychology course that was using the OCAT. Since only one instructor was implementing the assessment tool, the number of participants that could be recruited was limited. One reason why the presurvey–postsurvey design was initially chosen was that students needed to have enough exposure to the OCAT to answer the engagement questions. A larger sample size would have increased the statistical power in some of the regression analyses, ensuring greater confidence in the conclusions that were made and potentially uncover more statistically significant findings (Cohen, Cohen, West, & Aiken, 2003).

Additionally, engagement could have been measured more comprehensively, relying less on self-reports and more on the detailed diagnostic output from the OCAT. Not only does this detailed report indicate when the students start and finish each question, but it also provides reaction times for each cognitive learning feature. Also, all content that the students write in the free recall textbox can be viewed. In future research, free recall word counts and reaction times can be used as additional forms of engagement. Similarly, a program evaluation model, with researchers actually viewing students taking the assessment would also provide a more comprehensive look at this engagement process when using the OCAT. Having this comprehensive view would provide further and stronger evidence to the relationships that were found. Further, the regression models accounted for a limited amount of variance, suggesting that other factors are important in the predictive relationship for the outcomes of student engagement and performance. For instance, constructs such as student motivation, self-efficacy, and interest in course content should be included in future studies given their expected relationship.

Despite the aforementioned limitations, the current research still has very important implications, especially for the future implementation of the assessment tool. The most striking finding was the high OCAT grades, despite the limited engagement in the cognitive learning strategies. It calls into question whether students actually learned using the tool, especially since they performed significantly worse on their MCPP final exam. This may have resulted from their limited engagement with the OCAT. Students quickly become accustomed to the type of learning needed for success in classroom environments, recognizing that surface approach learning strategies can be adequate for success in university. Implementing a new innovative assessment tool that integrates more deep approach learning strategies can be a difficult adjustment for students. This current study demonstrated that it is much easier for students to resist the change, resist the engagement, and resist the learning and instead find an easier, quicker way to receive a high grade. In the case of the OCAT being assessed, that meant skipping the built-in cognitive learning strategies, like free recall and immediate feedback, just to get to the multiple-choice options. Thus, because participants knew that they were only marked for correct multiple-choice options, we are unable to rule out that the students simply adapted their study strategies with this in mind.

Recommendation 1: Educate Students on the Cognitive Learning Strategies

Cognitive learning strategies are there for a reason. Free recall, repetitive attempts, retrieval cues, and immediate feedback all have a strong theoretical background in enhancing long-term learning. If OCATs are being implemented in future academic classrooms, it is recommended that instructors or support staff alike educate the students on the built-in cognitive learning strategies for the tool. Communicating this educational piece about the OCAT and its corresponding cognitive learning features, would be an easy transition into the content that students already learn in their lectures on cognition. Additionally, the real-life application of this content can further motivate student learning (Gikandi, Morrow, & Davis, 2011; Kember, Ho, & Hong, 2008), and even enhance performance.

Recommendation 2: Use OCATs as a Studying Tool, Not Just Formal Assessment

The high OCAT grades can, in part, be attributed to the second opportunity cognitive learning feature, which, when prompted, rewarded students with half a mark for a correct answer. These midterm averages increased the final course marks, despite the grades not being congruent with the final MCPP grades. This is a problematic indicator of student learning and can also pose problems for instructors meeting the institutional requirement of class averages for their course. As an alternative, instructors can provide OCAT as a studying tool for students, as opposed to a graded assessment. Despite the long-term learning benefits from practicing the cognitive learning strategies, students rarely have a formalized outlet for doing so. Instead, students are responsible for developing their own studying methods, which can be a grueling task for first year students who are not accustomed to assessments in higher education. Even further, it can help students with high GO and TA who are known to have greater difficulty in fostering strong and effective studying methods (Cassady & Johnson, 2002; Eison et al., 1986; Everson et al., 1995; Thomas, Cassady, & Heller, 2017).

Recommendation 3: Utilize Diagnostic Output to Mold Student Development

Unlike other forms of assessment, the OCAT provides a very detailed diagnostic output for each individual student. Instructors have access to the students' grades, how many items they got correct on the first attempt, how many items they got correct on the second attempt, and how many items they got wrong. Even further, instructors can not only see the times when students started and finished the assessment, but also the times when they started and finished each individual question. Yet the most descriptive piece of information is students' reaction times to each stage of the assessment. These reaction times can provide insight to specific items that students had difficulty understanding, which can help mold student development in different content areas.

Conclusion

Despite lack of student engagement with the OCAT, these tools should not be completely removed from an instructor's pedagogical toolbox. It was particularly beneficial for students with high LO and high TA, providing an outlet that harnessed their strengths and improved upon their weaknesses. However, the cognitive learning features are only meaningful when students actually take the time to use them to optimize their learning. As such, the OCAT assessed may have fallen victim to a cohort of students who are too focused on achieving that final grade and willing to bypass learning features that will help them get there. More research is needed to identify whether this type of behavior exists in other forms of online assessment. And if so, interventions on the importance of learning and cognition should be available to students.

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Learner Engagement in Blended Learning Environments: A Conceptual Framework

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Abstract

Learner engagement correlates with important educational outcomes, including academic achievement and satisfaction. Although research is already exploring learner engagement in blended contexts, no theoretical framework guides inquiry or practice, and little consistency or specificity exists in engagement definitions and operationalizations. Developing definitions, models, and measures of the factors that indicate learner engagement is important to establishing whether changes in instructional methods (facilitators) result in improved engagement (measured via indicators). This article reviews the existing literature on learner engagement and identifies constructs most relevant to learning in general and blended learning in particular. The authors present a possible conceptual framework for engagement that includes cognitive and emotional indicators, offering examples of research measuring these engagement indicators in technology-mediated learning contexts. The authors suggest future studies to test the framework, which they believe will support advances in blended learning engagement research that is increasingly real time, minimally intrusive, and maximally generalizable across subject matter contexts.

Keywords: learner engagement, cognitive engagement, emotional engagement, blended learning, theory

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Learner Engagement in Blended Learning Environments: A Conceptual Framework

Learner engagement, defined as the involvement of the student's cognitive and emotional energy to accomplish a learning task (Astin, 1984; Schunk & Mullen, 2012), has been found to correlate with important educational outcomes, including academic achievement, persistence, satisfaction, and sense of community (Conrad, 2010; Filak & Sheldon, 2008; Hughes, Luo, Kwok,

& Loyd, 2008; Kuh, Cruce, Shoup, Kinzie, Gonyea, & Gonyea, 2008; Ladd & Dinella, 2009; Wang & Degol, 2014). Such correlations have prompted scholars to refer to learner engagement as "an educational bottom line" (Coates, 2006, p. 36) and "the holy grail of learning" (Sinatra, Heddy, & Lombardi, 2015, p. 1). Yet many students are not engaged in their own education, resulting in high attrition and in low interest, motivation, and academic outcomes (Chapman, Laird, & Kewalramani, 2011; Rumberger & Rotermund, 2012).

As educators search for ways to increase learner engagement, some have hoped that blended learning—the thoughtful integration of face-to-face and online instruction—might more fully engage students in their learning (Aspden & Helm, 2004; Graham & Robison, 2007). No single framework exists for blended learning (something discussed hereafter), but certain affordances and characteristics exist. They may include increased flexibility and personalization due to diversified learning pathways (Horn & Staker, 2015); expanded opportunities for interactivity (face-to-face as well as online and synchronous as well as asynchronous; Means, Toyama, Murphy, & Baki, 2013); technical advantages (immediate feedback, online tracking data, etc.) but potential technical difficulties (Azevedo & Bernard, 1995; Picciano, 2014; Shute, 2008); preservation of the humanness and spontaneity in face-to-face instructional activities; and increased learning time and instructional resources (Means et al., 2013). Blended learning may support improved cognitive engagement through reflection and critical discourse (Garrison & Kanuka, 2004; Nystrand & Gamoran, 1991); agentic engagement (Reeve & Tseng, 2011) via added learning pathways; and emotional engagement through the face-to-face interactions in blended learning, though this idea needs further research. Nelson, Laird, and Kuh (2005) found a strong positive relationship between use of information technology for educational purposes and indicators of engagement, as per the National Survey of Student Engagement (NSSE).

Even though scholars and practitioners show interest in the potential of blended learning to increase learner engagement (Halverson, Graham, Spring, & Drysdale, 2012), few of the top-cited authors in blended learning are seriously addressing it in their research questions and problem statements (Halverson, Graham, Spring, Drysdale, & Henrie, 2014). Thus, more research is needed to understand learner engagement in blended contexts. This paper seeks to address this gap by offering a review of the research on learner engagement, proposing a set of indicators of engagement, and showing the importance of those indicators to engagement in blended settings.

Several hurdles to researching engagement in blended settings exist, including the dynamic and evolving conception of blended learning, the lack of definitional clarity about learner engagement, and the confusion between facilitators and indicators of engagement. The first obstacle is the nature of blended learning itself. At the most basic level, blended learning involves the combination of face-to-face and technology-mediated instruction (Graham, 2013). However, *blended learning* is a high-level term that is often defined in terms of its surface features (online and face-to-face) rather than its pedagogical features (Graham, Henrie, & Gibbons, 2014). Certain authors (Laumakis, Graham, & Dziuban, 2009; Norberg, Dziuban, & Moskal, 2011) have referred to the term as a boundary object, "plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites" (Star & Griesemer, 1989, p. 393). Some are frustrated by this lack of specificity, while others see a flexibility that allows actors "to tailor the concept to maximize its potential while being responsive to a new generation of students" (Moskal, Dziuban, & Hartman, 2012, p. 16). Accordingly, engaging and effective blending can involve countless possible combinations of human- and technology-mediated instruction—neither conceived nor implemented unilaterally. Research is needed to clarify which blended designs most effectively increase learner engagement and thus student learning.

To measure changes in learner engagement, greater theoretical and definitional clarity is required. At present, no definition for learner engagement is universally accepted. Literature on the topic has been described as weakened by the "duplication of concepts and lack of differentiation in definitions" (Fredricks, Blumenfeld, & Paris, 2004, p. 65). If research on learner engagement is theoretically ambiguous, it is no surprise that learner engagement in blended settings is a theoretically undefined and untested domain. Henrie, Halverson, and Graham (2015) found little consistency or specificity in the definitions and operationalization of engagement in literature measuring engagement in technology-mediated learning.

A final challenge in researching engagement is the not infrequent confusion of *facilitators* and *indicators* of engagement. According to Skinner, Furrer, Marchand, and Kindermann (2008), "Indicators refer to the features that belong inside the construct of engagement proper, whereas facilitators are the causal factors (outside of the construct) that are hypothesized to influence engagement" (p. 766). Personal and contextual facilitators of engagement, including learner characteristics and thoughtful learning experience design, can increase the likelihood of learner engagement (see Figure 1). When blended learning advocates speak of best practices or optimal blends, they are proposing the contextual facilitators that will encourage engagement and thus student learning. But researchers cannot evaluate the effect of those proposed interventions until they have a clear set of engagement indicators to measure. Several existing instruments to measure engagement haphazardly conflate facilitators and indicators. For example, the recently revised NSSE lists 10 *engagement indicators*, but many (especially those in the Effective Teaching Practices category) assess practices that facilitate engagement, not the indicators that engagement is occurring.

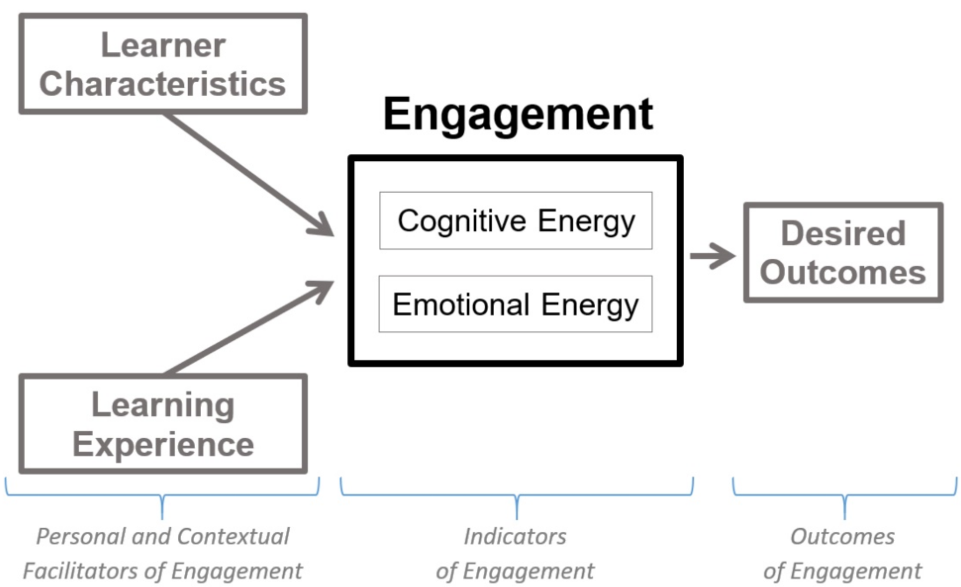

Figure 1. Relationship between *facilitators* (such as learner characteristics and learning experience), *indicators* of engagement, and learning outcomes.

The investigators reviewed the research on learner engagement from fields such as educational psychology, human development, and human–computer interaction. This paper proposes a cohesive list of engagement indicators that are applicable to the contexts of both face-to-face and technology-mediated instruction. Although factor analysis can be used to test the framework with empirical data (a process our research team has begun), this paper is not an empirical study but a conceptual one. Nor will this study attempt to enumerate all the facilitators of blended learning engagement. Research into facilitators is critical, but without clear indicators we cannot measure engagement and test the efficacy of blended interventions and designs to determine which facilitators most effectively improve engagement. By recommending a framework of engagement indicators, this study can assist future measurements of engagement.

Review of Literature

Overview

Terms like *learner engagement* or *student engagement* are used prolifically—even excessively—in educational research. Azevedo (2015) reported that a search in PsycINFO unearthed more than 32,000 articles about engagement from the previous 14 years. Standard keyword database searches for the term *engagement* turned up much that was irrelevant or too imprecisely used to guide theory and research.

Instead we propagated our review from core, grounded, and highly reputable citations, following Locke, Spirduso, and Silverman's (2014) advice that "the writer's task is to employ the research literature artfully to support and explain the choices made *for this study*" (p. 69, original emphasis). To give greater weight to studies committed to defining and conceptualizing learner engagement, as opposed to those just utilizing engagement as a popular buzzword, investigators first utilized Harzing's Publish or Perish software program (2017), which retrieves and calculates academic citations from Google Scholar, to determine the most frequently cited works on engagement. With the highest average citations per year among publications relating to learner engagement, Fredricks, Blumenfeld, and Paris's (2004) 51-page overview of school engagement was an appropriate place to start: It reviewed definitions, measures, facilitators, and outcomes of engagement; its appendix compiled 44 studies that used the term *engagement*, listing definitions, measures, methods, and key findings; its reference list held 165 citations. We looked up every study, instrument, and applicable reference. Another extensive resource was the recently published, 839-page *Handbook of Research on Student Engagement* (Christenson, Reschly, & Wylie, 2012): We reviewed the 39 chapters on learner engagement and explored the citation lists. Core figures in engagement research emerged, leading us to search for additional publications by key authors. References were added from Henrie, Halverson, and Graham (2015), who investigated how engagement has been measured in technology-mediated learning experiences and who performed a systematic database search using search terms to cover engagement, technology, measurement, and school context. Finally, we circled back to the 100 top-cited Publish or Perish results for *engagement*, *learner engagement*, and *student engagement* and reviewed the titles to ensure that no influential works on learner engagement had slipped from the collection. In this way the study eventually collected more than 1,000 articles, chapters, and instruments on engagement.

Literature was prioritized if it (1) included explicit definitions of learner engagement, (2) presented a theoretical framework for learner engagement, or (3) attempted to operationalize and measure learner engagement. With the eventual goal of measuring engagement, the researchers also targeted research on indicators instead of facilitators of engagement. After the authors determined to focus on cognitive and emotional indicators (discussed in greater detail hereafter), special attention was paid to the subconstructs proposed in the various models and definitions of emotional and cognitive engagement. The investigators noticed that cognitive engagement and especially emotional engagement were being investigated in human–computer interaction research on cognition and emotion in learning with technology, but without the terminology common to more mainstream learner engagement research. In fact, few intersections were being made between mainstream learner engagement research and the field of human–computer interaction until Gobert, Baker, and Wixom (2015). With this realization, we enriched our thinking about emotional engagement by including human–computer interaction research on emotions during technology-mediated learning. We will present our findings on the models, definitions, and constructs in engagement research next.

Models and Definitions of Engagement

Christenson et al.'s (2012) expansive *Handbook of Research on Student Engagement* asked each contributor to consider the following: "What is your definition of engagement?" and "What overarching framework or theory do you use to study/explain engagement?" (p. vii). The diverse contributions showed, as Fredricks et al. (2004) had warned, that research still seeks a consensus on the definitions, frameworks, and constructs of engagement. The tome's opening chapter (Reschly & Christenson, 2012) is titled "Jingle, Jangle, and Conceptual Haziness": In psychology, *jingle* refers to the same term being used for different things, and *jangle* designates different terms being used for the same construct (see Kelly, 1927; Thorndike, 1913). Reschly and Christenson displayed a table comparing four prominent engagement models on key dimensions, such as number of types or subconstructs and definitions or indicators; we have compiled a similar but expanded table (Table 1). As these demonstrate, a plethora of constructs have been proposed for engagement research and theory.

Table 1
Comparisons of Prominent Engagement Models on Key Dimensions

Source	No. of types	Indicators of engagement
Appleton & colleagues[a]	4	*Academic*: Time on task, credit accrual, homework completion *Behavioral:* Attendance, in-class and extracurricular participation *Cognitive:* Value/relevance, self-regulation, goal setting, strategizing *Affective/psychological:* Belonging, identification, school membership
Bangert-Drowns & Pyke (2001)	7	*Disengagement*: Avoidance or premature discontinued use *Unsystematic engagement:* Unclear goals *Frustrated engagement*: Inability to accomplish goals *Structure-dependent engagement*: Pursuit of goals communicated by software *Self-regulated interest:* Creates personal goals, makes interesting to self *Critical engagement:* Tests personal understandings, limits of the software *Literate thinking:* Interprets software from multiple, personally meaningful perspectives
Finn (1989)	2	*Participation:* Task-oriented interaction, on-task behaviors, responding to requirements, expenditure of extra time on work *Identification:* Belonging and valuing success in school-relevant goals
Fredricks, Blumenfeld, Friedel, & Paris (2005)	3	*Behavioral:* Participation; positive conduct; involvement in academic, social, or extracurricular activities *Cognitive:* Investment, thoughtfulness, and willingness to exert effort *Emotional:* Appeal; affective reactions to teachers and classmates, academics and school (boredom, interest, anxiety, etc.); belonging; valuing

Table 1 (Continued)
Comparisons of Prominent Engagement Models on Key Dimensions

Source	No. of types	Indicators of engagement
Handelsman, Briggs, Sullivan, & Towler (2005)	4	*Skills engagement*: Skills practice, general learning strategies *Emotional engagement*: Emotional involvement with the class material *Participation/ interaction engagement:* Participation in class, interactions with instructors and classmates *Performance engagement*: Levels of performance in class, including confidence, performance goals, and extrinsic motivation
High School Survey of Student Engagement[b]	3	*Cognitive/intellectual/academic engagement*: "Engagement of the mind"—effort, investment in work, and strategies for learning *Emotional engagement*: "Engagement of the heart"—students' feelings of connection to (or disconnection from) their school *Social/behavioral/participatory engagement*: "Engagement in life of the school"—actions, interactions, and participation within school community
Martin (2007)	4 higher order factors, 11 subconstructs	*Adaptive cognition:* Valuing, mastery orientation, self-efficacy *Adaptive behavior:* Persistence, planning, study management *Maladaptive behavior:* Disengagement, self-handicapping *Impeding/maladaptive cognition:* Uncertain control, failure avoidance, anxiety
Miller, Greene, Montalvo, Ravindran, & Nichols (1996)	1 higher order factor with 4 subconstructs	*Cognitive engagement:* Self-regulation, cognitive strategy use (deep vs. shallow), effort, and persistence
National Survey of Student Engagement[c]	4 "themes" with 10 "engagement indicators"	*Academic challenge:* Higher-order learning, reflective and integrative learning, learning strategies, quantitative reasoning *Learning with peers:* Collaborative learning, discussions with diverse others *Experiences with faculty:* Student–faculty interaction, effective teaching practices *Campus environment:* Quality of interactions, supportive environment
Pekrun & Linnenbrink-Garcia (2012)	1 + 5	*Emotional:* Considered the antecedent of other components of engagement *Cognitive:* Attention, memory processes *Motivational:* Intrinsic and extrinsic motivation, achievement goals *Behavioral:* Effort, persistence *Cognitive-behavioral:* Strategy use and self-regulation *Social-behavioral:* Social on-task behavior
Reeve & colleagues[d]	4	*Agentic:* Constructive contribution into flow of instruction *Behavioral:* Task involvement, effort, attention *Cognitive:* Metacognitive strategy use, self-regulation, personal application and relevance *Emotional:* Enjoyment, interest, curiosity
Skinner & colleagues[e]	4	*Engagement* • *Behavioral:* Action initiation, effort, hard work, persistence, intensity, attention, absorption, involvement • *Emotional:* Enthusiasm, interest, enjoyment, satisfaction, pride, vitality, zest *Disaffection* • *Behavioral:* Passivity, giving up, withdrawal, restlessness, inattentiveness, distraction, mental disengagement, burnout, lack of preparation • *Emotional:* Boredom, disinterest, frustration/anger, sadness, worry/anxiety, shame, self-blame

[a] Appleton, Christenson, Kim, & Reschly (2006); Appleton (2012). [b] Yazzie-Mintz (2010). [c] McCormick, Gonyea, & Kinzie (2013). [d] Reeve & Tseng (2011); Reeve (2012); Reeve (2013). [e] Skinner, Kindermann, Connell, & Wellborn (2009); Skinner, Kindermann, & Furrer (2009); Skinner & Pitzer (2012).

Initially the investigators hoped to find an existing framework to modify and apply to the affordances of blended learning. Fredricks et al.'s (2004) comprehensive review of engagement has led many to adopt their tripartite model of emotional, cognitive, and behavioral engagement. However, overlapping elements for cognitive and behavioral engagement have been found in this and other models (Fredricks, Blumenfeld, Friedel, & Paris, 2005). Skinner and colleagues have been gathering data for their model of emotional and behavioral engagement and disaffection since the 1990s (e.g., Skinner & Belmont, 1993) and have some of the clearest explications of indicators versus facilitators of engagement. This combination of clarity and substance is enticing, but the absence of a cognitive measurement leaves vital aspects of learner engagement unexamined. Concentrating on blended or online learning engagement frameworks is not more productive. Bangert-Drowns and Pyke (2001) observed students in a blended setting, then proposed a seven-level taxonomy of engagement with educational software; however, no discussion of the blended nature of their engagement constructs was included. O'Brien and Toms (2008) created a list of engagement attributes to predict user-computer engagement, but conflated facilitators and indicators, as well as characteristics of the computer application and the participant (challenge, positive affect, endurability, aesthetic and sensory appeal, attention, feedback, variety/novelty, interactivity, and perceived user control). Redmond, Heffernan, Abawi, Brown, and Henderson (2018) have reviewed the literature and proposed an Online Engagement Framework for Higher Education, but in their list of 24 illustrative (though not exhaustive) indicators of engagement, only one indicator is online-specific ("upholding online learning norms"). Moreover, their discussion does little to situate their propositions in online or blended learning research. No comprehensive framework has been established to understand engagement in blended contexts.

Even if agreement had been reached on the overarching framework terminology, careful study of the construct descriptions revealed additional jingle and jangle. *Absorption* is considered by some to be an aspect of cognitive engagement, by others to be part of behavioral engagement. *Valuing* indicates emotional engagement in one framework and cognitive engagement in another (Christenson, Reschly, & Wylie, 2012; Fredricks et al., 2011). *Persistence* is a component of cognitive engagement for Miller, Greene, Montalvo, Ravindran, and Nichols (1996), but of behavioral engagement in the frameworks of Fredricks et al. (2004), Pekrun and Linnenbrink-Garcia (2012), and Skinner and colleagues. Henrie, Halverson, and Graham (2015) found particular conceptual fuzziness between cognitive engagement and behavioral engagement; some research stated the intent to measure cognitive engagement but operationalized the construct in ways other frameworks deemed behavioral.

This research found additional confusion when examining engagement definitions. Jimerson, Campos, and Greif (2003) examined 45 articles on engagement and found that 31 did not explicitly define terms. Other research skipped definitions and jumped straight to operationalization (see Table 1 in Appleton, Christenson, & Furlong, 2008). In the narrower context of technology-mediated learning, Henrie, Halverson, and Graham (2015) likewise found that the majority of articles reviewed did not clearly define engagement. They wrote, "The future success of research relating subconstructs of engagement to specific outcomes relies on consensus of definitions and measures of engagement" (p. 37). Findings from two studies on engagement may conflict simply because of differences in definition or construct conceptualization.

The investigators even temporarily bypassed theory, consulting operationalized instruments. To evaluate engagement in online college students, Sun and Rueda (2012) used Fredricks et al.'s (2005) K-12 classroom engagement scale. To measure engagement in game-based learning, Rowe, Shores, Mott, Lester, and Carolina (2011) combined the Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1998) and the Presence Questionnaire (Witmer & Singer, 1998). Coates (2007) applied the Student Engagement Questionnaire (SEQ) to online as well as more "general campus-based engagement" (p. 121) but narrowly limited online learning to the use of learning management systems. However, existing engagement instruments have numerous items that transfer poorly to blended contexts, requiring revalidation of any instrument adapted to blended learning, making this approach unsatisfactory as a method for developing a framework for engagement in blended contexts.

A focus on institutional-level engagement (Skinner & Pitzer, 2012) also limited the usefulness of several instruments including the SEQ, NSSE (Kuh, 2009; NSSE, 2014), and Student Engagement Instrument (Appleton, Christenson, Kim, & Reschly, 2006). Institutional engagement promotes retention and discourages dropout—vital educational goals. But improving blended learning design requires understanding when students are engaging with their learning and when they begin to disengage. To do this, "engagement should be measured at the same specificity level as the intervention" (Wang, Bergin, & Bergin, 2014, p. 518)—the course level and activity, or *microprocess level* (Ainley, 2012).Indeed, engagement at the institutional or school level is "a different reality than engagement in the classroom or, even more circumscribed, in learning activities. … [T]here may be no necessary equivalence between engagement in school and engagement in specific learning activities" (Janosz, 2012, p. 698). Thus, models and scales that focus on the institutional level can tell us little about measuring engagement in specific blended learning courses and activities. If "engagement is fundamentally situational" (Kahu, 2013, p. 763) and "occurs during the actual experience of an activity or event" (Davis & McPartland, 2012, p. 516), we must understand how engagement fluctuates in varied face-to-face and online situations to improve the design of blended learning.

But merely collecting class- and activity-level case studies of learner engagement will not give us the "reasonably stable theory base … [that] allows for a clear focus on important issues and provides sound (though still limited) guidance for the design of improved solutions to important problems" (Burkhardt & Schoenfeld, 2003, p. 6). A theoretical framework can guide research into learner engagement in settings that combine face-to-face with technology-mediated instruction. As Meyer (2014) noted regarding online learning,

> It is not sufficient to rely on the research conducted in the pre-Internet era to claim that pursuing student engagement has an effect on positive outcomes of interest to institutions and students; instructors and designers involved in online learning must prove such an effect for online learning specifically. (p. 72)

Current engagement models and instruments are inadequate due to contextual affordances (course and activity level vs. institutional) and the conflation of constructs and subconstructs of engagement. A new framework, applicable to engagement in general but also suited to inform the creation of instruments to measure engagement in both face-to-face and technology-mediated contexts, is needed to guide research in blended learning settings.

Formation of the Blended Learning Engagement Framework

Janosz (2012) stated, "To develop new skills and acquire new knowledge, individuals must consciously mobilize and devote some of their physical and psychological (cognitive, emotional) energy; they must *engage* themselves in the learning situation" (p. 695). Other research also acknowledges the primacy of emotional and cognitive engagement as the most fundamental expressions of learner engagement. Reschly and Christenson (2012) classified cognitive and affective engagement as internal processes that mediate and precede academic and behavioral engagement. Appleton et al. (2006) proposed moving beyond academic and behavioral indicators to focus on "the underlying cognitive and psychological needs of students" (p. 430). Research from human–computer interaction and educational data mining measure this energy by examining what they call "cognitive-affective states" (Baker, D'Mello, Rodrigo, & Graesser, 2010; D'Mello & Graesser, 2011). The literature suggests and the authors of this study concur that the most elemental indicators of engagement show whether learners are investing mental and emotional energy in the learning process.

In a domain that has sometimes and perhaps erroneously emphasized seat time over pedagogy in its definition of blending (Picciano, 2009), a focus on cognitive and emotional engagement reminds us that internal processes are paramount. Still some may be surprised that this framework will not include behavioral engagement as a key indicator. Henrie, Halverson, and Graham (2015), reviewing measures of student engagement in technology-mediated learning, found that 77% of the research measured behavioral indicators, while only 43% measured cognitive and 41% emotional indicators. Educational data mining techniques, for example, may measure online behaviors, such as click data, assignment submission, or time viewing videos (Kizilcec, Piech, & Schneider, 2013; Ramesh, Goldwater, Huang, Daum, & Getoor, 2013), hoping those behaviors imply emotional and cognitive engagement. Researchers may infer internal processes from external behaviors, and while those behaviors are not trivial, they still can be recognized as the outward displays of the mental and emotional energies that fuel learning.

Consequently, this study proposes that cognitive and emotional engagement are the key factors essential to understanding learner engagement. Engagement is manifest via cognitive and emotional *indicators* and contributes to desired *learning outcomes* (see Figure 1). Proceeding from the importance of cognitive and emotional engagement, this study will suggest the first-order factors that indicate cognitive and emotional engagement. These factors are those subconstructs which appeared most frequently throughout this review, were supported by the strongest argumentation and research (especially technology-mediated learning research), and worked together to form a cohesive framework that can be acceptably operationalized in blended, face-to-face, and technology-mediated contexts. In discussing each one, this study will offer some examples of why such indicators are important in and how such indicators have been measured in blended contexts.

Cognitive Engagement

Cognitive engagement—the expenditure and reception of mental energy—has long been the subject of theoretical debate (Pintrich & DeGroot, 1990; Zimmerman, 2002). This framework proposes that cognitive engagement is comprised of several first-order factors, some of which indicate the quantity of cognitive engagement, others the quality (see Figure 2).

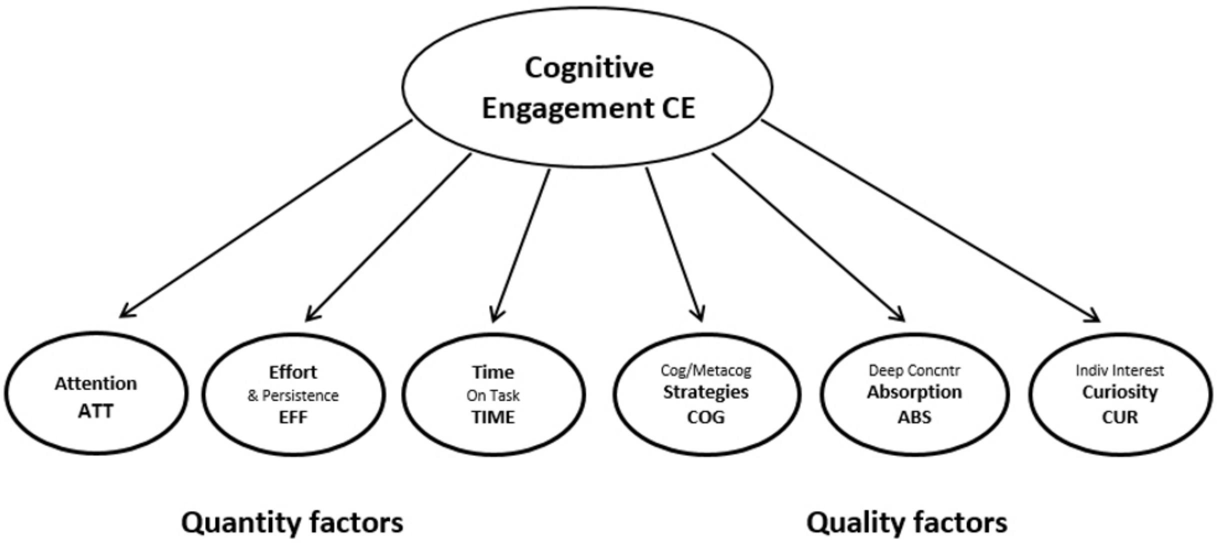

Figure 2. Cognitive Engagement Framework. Attention, effort and persistence, and time on task indicate the *quantity* of cognitive engagement, while cognitive strategy use, absorption, and curiosity indicate its *quality*.

Factors indicating quantity of cognitive engagement. The framework's first three factors include the more outwardly visible and quantifiable indicators that mental energy is being put toward learning: attention, effort and persistence, and time on task. In the literature, these variables were labeled *behavioral* in some frameworks and *cognitive* in others (Henrie, Halverson, & Graham, 2015). Pekrun and Linnenbrick-Garcia's (2012) model verbalizes the overlap: Cognitive, behavioral, and cognitive-behavioral are among their five types of engagement. While the variables incorporated here may include behaviors, this study suggests that they are behaviors reflecting the presence or absence of mental energy focused on learning. The authors hypothesize that subsequent empirical studies will find that these factors converge, together reflecting the expenditure and reception of mental energy.

Some consider *attention,* the allocation of limited perceptual and processing resources, the defining attribute of engagement (e.g., Cocea & Weibelzahl, 2011). Miller (2015), using self-paced reading and eye-tracking methodologies to measure engagement, called attention "the baseline of engagement" (p. 34). Keller's (1987, 2008) ARCS model of motivational design established attention as the first stepping-stone to other means of motivating learners (relevance, confidence, and satisfaction follow). Attention, a cognitive process (Calvo & D'Mello, 2010; Lehman, D'Mello, & Graesser, 2012), is included in Pekrun and Linnenbrick-Garcia's (2012) conceptualization of cognitive engagement. Attention is the gatekeeper for information processing (Atkinson & Shiffrin, 1968), one of the most basic indicators that learners are engaging mental effort in the learning process.

Some measure attention using classroom observation, but online aspects of a blended course may be at a distance, making such techniques impractical. Other methods for measuring attention during online instruction track eye movement (Boucheix, Lowe, Putri, & Groff, 2013; Miller, 2015; Toyama, Sonntag, Orlosky, & Kiyokawa, 2015), brainwaves (Sun, 2013), or gross body language (D'Mello et al., 2008). Already intelligent tutoring systems attempt to reengage students when they perceive waning attention (D'Mello et al., 2008), and as understanding of blended and online learner engagement improves, data-rich systems will sense ebbing attention and provide real-time feedback to both learner and instructor (Bienkowski, Feng, & Means, 2012).

Effort and persistence and *time on task* are dimensions of cognitive engagement that manifest in outward behaviors but, more importantly, reflect expenditure of mental energy towards learning. The focus on cognitive engagement over behavior is apparent to any researcher who has tried to differentiate between time logged on a learning management system and actual time on task characterized by effort and persistence: As in face-to-face learning, time spent on task must be accompanied by cognitive effort and committed persistence to be truly effective. Miller et al. (1996) saw effort and persistence as variables that indicated cognitive engagement, and found both to be significantly related to academic achievement.

Persistence counteracts the likelihood of attrition, a factor which may be higher in online than in traditional settings (Carr, 2000; Diaz, 2002). In addition to course-level measures of persistence (often course completion), Tan, Sun, and Khoo (2014) employed activity-level measures of persistence. They used log data from the online ASSISTments Math Tutor program to map engagement levels to engagement indicators. “Persistency” was operationalized as revisiting and spending extra time on difficult tasks, using hints appropriately, and completing all tasks on time. Persistence occupied the fourth of five hierarchical levels, just lower than enthusiasm, in importance to learning.

The link between *time on task* (also called academic engaged time) and learning “is one of the most enduring and consistent findings in educational research” (Gettinger & Walters, 2012, p. 654). Consequently, some have labeled time on task as the single most influential factor in student success (Farragher & Yore, 1997) and the “most reflective of the degree of student engagement in classroom learning” (Kong, 2011, p. 1856). Nevertheless, in blended and online contexts, conceptualizing and measuring time on task can be complex. Beck (2004), studying learner interaction with computer tutors, considered time on task the most basic component of engagement, yet his model fit best when he incorporated question difficulty and response accuracy. Macfayden and Dawson (2010), mining log data to measure engagement in online courses, found that other measures of engagement—interaction with peers through discussion forums, number of optional self-test quizzes completed, and attention to administrative details—were more important than time online. Cocea and Weibelzahl (2011) also examined log data and found the most valuable factor for detecting disengagement to be the average time spent on content pages: Spending too little *or* too much time on a page could indicate disengagement.

Care must be taken if time-on-task data are drawn from diverse blended courses. Many blended courses replace seat time with online expectations (Picciano, 2009), but some instructors may consider the face-to-face activities an optional enhancement, not required work. In blended learning contexts, measuring time on task must account for policies of seat-time flexibility.

Factors indicating quality of cognitive engagement. Cognitive engagement also comprises factors indicating the *quality* of engagement—namely, cognitive and metacognitive strategy use, deep concentration or absorption, and individual interest or curiosity. These factors are supported by one of the most frequently employed theories in blended learning research (Halverson et al., 2012, 2014), Garrison, Anderson, and Archer’s (2001) Community of Inquiry framework. The framework proposes that the requirements for effective online educational transaction include cognitive presence, which is further broken down into triggering events (which pique curiosity), exploration, integration (cognitive strategies applied to solidify understanding), and resolution.

Many existing descriptions of cognitive engagement focus either on effort and persistence or on *cognitive and metacognitive strategies*, which include strategies used to learn more successfully and processes to "actively engage in thinking about [one's] learning" (Winne & Baker, 2013, p. 3). Because he found that metacognitive strategies cross-loaded with behavioral engagement (Reeve & Tseng, 2011), Reeve (2012, 2013) stated that cognitive learning strategies were the better indicators of cognitive engagement. Reeve's finding confirms the previously mentioned conceptual fuzziness that Henrie, Halverson, and Graham (2015) found between cognitive and behavioral engagement and provides additional support for interpreting behavioral engagement as an outward manifestation of the more fundamental constructs of cognitive engagement (and sometimes emotional engagement).

In blended and online contexts, cognitive and metacognitive strategy use and the closely correlated ability of self-regulation (Pintrich & DeGroot, 1990; Sun & Rueda, 2012) are particularly important. Meyer (2014) wrote, "Learning self-regulation is especially important in online learning [where being successful] … depends upon the student's discipline, self-direction, and ability to remain motivated" (p. 24). Hypermedia use, a feature common in blended and online instruction, "greatly increases task demands and requires the learner to stretch limited processing resources across two major constraints: to-be-learned information and the hypermedia environment" (Schraw, 2010, p. 258). Fortunately, online tasks also provide new ways to measure cognitive and metacognitive strategy use and self-regulation: Winne and Baker (2013) proposed using educational data mining techniques to produce real-time data about these factors and the learning process "as it unfolds" (p. 1).

Another first-order factor that indicates the quality of mental energy in learning is *deep concentration or absorption*. Early conceptualizations defined absorption as a trait or disposition (Tellegen & Atkinson, 1974), but later research distinguished ways in which absorption functions as a state to which individual or situational factors lead (Agarwal & Karahanna, 2000). Absorption may express a deep level of attention (Keller, 2008) but is qualitatively different: "paying attention" may be associated with coercion, whereas absorption is a "state in which people are so involved in an activity that nothing else seems to matter" (Csikszentmihalyi, 1990, p. 4). Csikszentmihalyi's theory of flow describes "states of intense concentration or absolute absorption in an activity" (Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2003, p. 161) accompanied by a sense of control, exhilaration, and deep happiness; in such cases mental energy is not only being expended but also created. Researchers have applied the flow theory to human–computer interaction studies (Agarwal & Karahanna, 2000; Hoffman & Novak, 1996). For example, Ghani and Deshpande (1994) evaluated enjoyment and total absorption while studying computer use in the workplace. Esteban-Millat, Martínez-López, Huertas-García, Meseguer, and Rodríguez-Ardura (2014) proposed a model of flow in online learning environments and found that focused attention (similar to our conception of absorption) was one of the two most important direct determinants of a state of flow.

Our final first-order variable of cognitive engagement, *individual interest or curiosity*, must be distinguished from the short-lived emotional experience of situational interest (Ainley, 2012). The latter "refers to enjoyment of external stimuli, such as an entertaining lecture or catchy story" (Senko & Miles, 2008, p. 567); we propose that situational interest and enjoyment are part of positive emotional engagement, to be discussed shortly. When the learner perceives the material to be personally relevant, “situational interest may develop into individual interest, which is characterized by curiosity and self-guided exploration” (p. 567; see also Dewey, 1910). Interest research portrays cognitive and affective components as co-occurring (Hidi & Renninger, 2006; Renninger & Bachrach, 2015) but prioritizes emotion in triggering situational interest, whereas cognitive processes, such as stored learning and curiosity, have primacy in individual interest. *Cognitive curiosity* (Reio, Petrosko, Wiswell, & Thongsukmag, 2006)—also termed *scientific* (James, 1890/1950), *epistemic* (Berlyne, 1978), or *intellectual curiosity* (Dewey, 1910)—is a “deeper level of attention” stimulated by the learner’s sense of inquiry (Keller, 2008, p. 177). Berlyne (1978) posited that curiosity, resulting from subjective uncertainty, may generate “exploratory behavior aimed at resolving or partially mitigating the uncertainty” (p. 98). This exploration is one way that mental energy is expended in learning.

Some have argued that computer use can abet curiosity as the learner explores, experiments, and browses (Ghani & Deshpande, 1994), though such behaviors, if labeled *surfing the Web* may be discouraged in educational contexts. Meta-analysis showed curiosity among the discrete cognitive–affective states frequently present in technology-mediated learning (D’Mello, 2013); the analyzed studies demonstrate innovative ways to measure curiosity, such as using multichannel physiological signals to gauge learner reactions to intelligent tutoring systems (Pour, Hussein, AlZoubi, D’Mello, & Calvo, 2010; Hussein, AlZoubi, Calvo, & D’Mello, 2011) or prompting frequent self-reports via smartphone in game-based learning environments (Sabourin, Mott, & Lester, 2011). Technology-pervasive learning environments may also alter how curiosity is expressed and sustained (Arnone, Small, Chauncey, & McKenna, 2011).

The affordances of blended learning have the potential to encourage cognitive engagement, an energy indicated by attention, effort and persistence, time on task, cognitive strategy use, absorption, and curiosity. Blended learning may diversify the learning pathways available to accomplish a task; this increased flexibility and personalization abets curiosity, absorption, and attention (Esteban-Millat et al., 2014). At the same time, personalization and flexibility may require learners to employ greater effort and cognitive strategy use. When time on task is accompanied by effort (even absorption), deep learning occurs. At the same time, blended learning preserves the benefits of humanness (Graham, 2006), which encourage cognitive engagement while mediating the varied emotions that inevitably arise during learning.

Emotional Engagement

Picard, who researches technologies that can respond intelligently to human emotion (“affective computing”), has noted the increase in “findings in multiple disciplines supporting a view of affect as complexly intertwined with cognition in guiding rational behaviour, memory retrieval, decision-making, creativity, and more” (Picard et al., 2004, p. 253). Pekrun (2011) argued that emotions influence “a broad variety of cognitive processes that contribute to learning, such as perception, attention, memory, decision making, and cognitive problem solving” (p. 26), and Skinner and Pitzer (2012) labeled emotion “the fuel for the kind of behavioral and cognitive engagement that leads to high-quality learning” (p. 33). Human–computer interaction research on cognitive-affective states (Baker et al., 2010; D’Mello & Graesser, 2011) further acknowledges the intertwining of mental and emotional energy.

Even as consensus coalesces around the importance of emotions in learning, the emotions to be studied—particularly in technology-mediated learning—are still up for debate. According to Picard et al. (2004), “There is still very little understanding as to which emotions are most important in learning, and how they influence learning. To date there is no comprehensive, empirically validated, theory of emotion that addresses learning” (p. 255; see also Lopatovska & Arapakis, 2011). Research from the fields of human–computer interaction, artificial intelligence, and computer science has found that the prominent emotions occurring during complex learning with technology are different from Ekman’s (1992) basic universal emotions: anger, disgust, fear, joy, sadness, and surprise (Graesser & D’Mello, 2011). D’Mello (2013) performed a meta-analysis tracking 17 affective states across 24 studies; he found the discrete states most frequent in technology-mediated learning to be boredom, engagement/flow, confusion, curiosity, happiness, and frustration. This framework includes five of these cognitive–affective states in our emotional engagement constructs, considering curiosity part of cognitive engagement.

In this framework the above-mentioned affective states are combined with the work of Skinner and colleagues (e.g., Skinner et al., 2008; Skinner, Kindermann, & Furrer, 2009), who divided emotional engagement into two constructs: emotional engagement and emotional disaffection; Wang, Chow, Hofkens, and Salmela-Aro (2015) similarly argued that positive and negative emotional engagement are conceptually and methodologically unique. Here the comparable constructs are called *positive emotional engagement* (POS) and *negative emotional engagement* (NEG; see Figure 3).

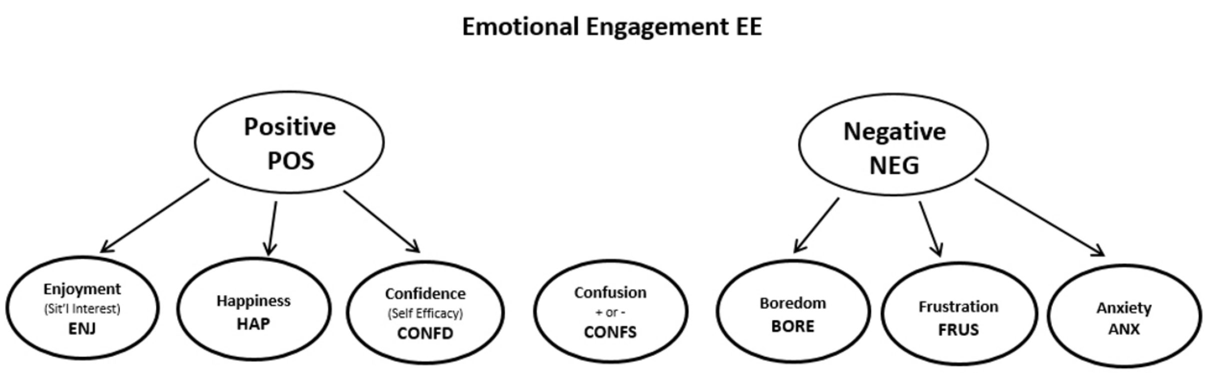

Figure 3. Emotional Engagement Frameworks (Positive and Negative). The factor of confusion is unattached for now, for confusion affects engagement and learning differently depending on contextual details.

Positive emotional engagement. Research has noted how positive emotions assist learning by broadening the scope of action, attention, and cognition, and by helping learners “to see relatedness and interconnections … and to process material in a more integrated and flexible fashion” (Fredrickson, 1998, p. 308; see also Hazlett & Benedek, 2007). This framework further proposes that particular emotions indicate learner engagement. Skinner and colleagues do not differentiate the positive aspects of emotional engagement but focus primarily on interest or enjoyment. Representative items from their scale include “Class is fun” and “When we work on something in class, I feel interested” (Skinner et al., 2008, p. 781). Despite Patrick, Skinner, and Connell’s (1993) finding that various positive emotional items were accounted for by a single factor ($\alpha = .88$), this study suggests that additional positive emotions described in other research may indicate the expenditure and reception of emotional energy in the learning process. This framework proposes that POS includes not only the first-order factor of situational interest (Senko & Miles,

2008) or enjoyment (Skinner et al., 2008) but also happiness (D’Mello, 2013) and confidence (Arroyo et al. 2009; Keller, 2008). These subconstructs are explained below.

As stated, many conceptualizations of emotional engagement focus on *enjoyment or situational interest* (Milne & Otieno, 2007; Furlong et al., 2003). Situational interest, or enjoyment created by external stimuli (Hidi, 1990; Senko & Miles, 2008), is a short-lived affective state that indicates emotional energy expended and created by learning efforts. Though short-lived, this interest focuses attention, enhances cognitive performance and learning, and improves integration (Hidi & Renninger, 2006). For Ainley (2012), interest functions as a “hook”: A learning activity that sparks interest easily engages students, and the learning process begins. For most instruments that we investigated, enjoyment and interest were central components of positive emotional engagement.

These factors matter in blended and online learning. Tempelaar, Niculescu, Rienties, Gijselaers, and Giesbers (2012) found significant correlations between students’ engagement in the online component of blended learning and their self-reported levels of enjoyment. Although they reported no clear correlation between face-to-face engagement and achievement emotions (enjoyment, boredom, anxiety, and hopelessness), the proxy measure they employed to estimate face-to-face engagement was the number of clicks in the learning management system, a questionable substitute for the fidelity, synchronicity, and humanness available in face-to-face settings (Graham, 2006).

Happiness research abounds with various definitions of the constructs. Some define happiness as a relatively stable feeling towards life, noting its association with better social and marital relationships, longevity, higher income, and lower unemployment (Oishi, Diener, & Lucas, 2007). As an indicator of engagement, however, we are interested in happiness more as a momentary state expressing engagement in a learning task. This state of happiness is similar to the mild joy and contentment that Fredrickson (2001) found to be associated with increased creativity and cognitive performance.

In technology-mediated learning research, this state of happiness has been examined (D’Mello, Lehman, & Persons, 2010; Lehman, D’Mello, & Persons, 2008) and found among the more frequent affective states experienced by learners when interacting with technology (D’Mello, 2013). As an indicator of engagement, we expect happiness to occur after engagement-facilitating experiences, such as receiving positive feedback, attaining learning goals, and resolving confusion or other impasses (D’Mello, 2013; Lehman et al., 2008; Stein & Levine, 1991). D’Mello et al. (2010) found that when students using an intelligent tutoring system reacted with happiness to feedback on one problem, their performance improved on subsequent problems. This suggests that, as Figure 1 indicates, learners’ POS improved their learning outcomes. Some have argued that engagement (along with pleasure and meaning) can be a key pathway to happiness; thus, happiness may result from and indicate an engaged state (Parks, Schueller, & Tasimi, 2013; Seligman, Ernst, Gillham, Reivich, & Linkins, 2009). Future research could investigate such pathways with increasingly fine-grained and real-time tools to recognize expressions of happiness, including facial action coding, posture, and eye tracking (D’Mello & Graesser, 2012; D’Mello et al., 2010).

Confidence, or self-assurance in one’s abilities or qualities, is proposed as a third dimension of POS. Confidence provides a clear contrast to the NEG factor (suggested by Skinner and colleagues) of anxiety (Kort, Riley, & Picard, 2001); research indicates an inverse relationship between the two (Pajares, 1996; Shea & Bidjerano, 2010). It is possible that confidence may double as both an indicator and a facilitator of engagement. Confidence may precede and facilitate engagement: Students are more likely to exert effort in academic tasks if they believe they have the capacity to succeed (Greene, 2015; Milligan, Littlejohn, & Margaryan, 2013). But confidence may also indicate engagement: Self-reports of confidence "depen[d] on events that occurred in [solving] the previous problem and not on [learners'] incoming beliefs" (Arroyo et al., 2009, p. 19). Thus, subsequent testing of this model might frame items to measure not only learners' general confidence in a course but their confidence during or immediately after particular learning activities. Arroyo et al. (2009) used physiological sensors and frequent self-reports to create models of confidence (plus frustration, excitement, and interest) for students interacting with an intelligent tutoring system to learn math. One kind of confidence—belief in one's ability to work with computers (called *computer self-efficacy* or *technical confidence* [Conrad & Kanuka, 1999])— may be of particular relevance in blended and online learning, where confidence in one's technical abilities might facilitate or reflect engagement during technology-mediated activities.

Negative emotional engagement. Skinner and colleagues found emotional disengagement to be a multidimensional construct consisting of *enervated emotion* (tiredness, sadness, boredom), *alienated emotion* (frustration, anger), and *pressured participation* (anxiety; see Skinner, Kindermann, & Furrer, 2009); D'Mello (2013) noted that frustration and boredom are critical in learning with technology. We propose that NEG is comprised of three first-order factors: boredom, frustration, and anxiety. This is a narrower configuration than Skinner and colleagues employ. The emotions they group as enervated emotion—sadness, tiredness, and boredom—are considered discrete emotions by other researchers (Russell, 2003; Segura & Gonzalez-Roma, 2003). In research evaluating cognitive-affective states during technology-mediated learning, the unit of analysis is usually the discrete emotion (boredom, not enervated emotion). This study will employ the narrower unit so that this framework may be applicable to such methodologies.

Baker et al. (2010) defined *boredom* as weariness or restlessness due to lack of interest. Skinner, Kindermann, Connell, and Wellborn (2009) called boredom "a sufficient condition for lack of effortful involvement" (p. 226). Such weariness and lack of involvement indicate the absence of emotional energy towards learning. Boredom may threaten cognitive engagement "by reducing cognitive resources, undermining both intrinsic and extrinsic motivation, and promoting superficial information processing" (Pekrun, 2011, p. 31).

Baker et al. (2010) found that boredom occurred during approximately 5% of the times examined as students interacted with computer-based learning environments. Though infrequent, once boredom settled in, it was an especially persistent affective state that could "reduce learning more than other cognitive–affective states by leading students to engage in gaming behaviors which are associated with poorer learning" (p. 236). Researching intelligent tutoring systems, Lehman et al. (2008) labeled boredom "the least productive state" (n.p.); frustration and confusion at least indicated investment in the learning process. In his meta-analysis of the affective states experienced in technology-mediated learning environments, D'Mello (2013) found that boredom and frustration were more likely in laboratory studies with simple computer interfaces, while engagement was more frequent in authentic learning contexts using advanced learning technologies (such as intelligent tutoring systems, animations and simulations, and immersive educational games) with enhanced interactivity and human-like communication capabilities. Thus, preserving interaction and humanness may increase engagement and decrease boredom and frustration.

Skinner, Kindermann, and Furrer (2009) grouped frustration and anger under the heading of *alienated emotion*, whereas Pekrun and Linnenbrink-Garcia (2012) combined these two as *negative activating emotions.* This framework will focus on *frustration*, the more common of the two during learning with technology (D'Mello, 2013) and situate it as another first-order factor in NEG. When Dennerlein, Becker, Johnson, Reynolds, and Picard (2003) frustrated computer users (through poor software usability), they found increased physical risk associated with musculoskeletal and cardiovascular disorders. Baker et al. (2010) noted that frustration "may lead students to use (or fail to use) learning environments in ways that reduce their learning" (p. 231). Even so, they acknowledged that frustration (and confusion—see below) "may be a natural and unavoidable part of the experience of learning when difficult material is encountered … a byproduct of positive learning experiences" (p. 235). They found that frustration and confusion rarely led to gaming the system at levels caused by boredom, even titling an article "Better to Be Frustrated Than Bored."

Anxiety is the last first-order factor in the proposed NEG construct. Pekrun (2011) explained that any emotion could deplete cognitive resources, but the "resource consumption effect" was particularly bound to emotions such as anxiety "that have task-extraneous objects and produce task-irrelevant thinking" (p. 27). Pekrun noted that on simple tasks anxiety may not affect or may even enhance performance, but on complex or difficult tasks that demand cognitive resources, learning is impaired (see p. 30). Thus, anxiety may be most deleterious to emotional and cognitive energy reserves in complex learning contexts.

Regardless of the complexity of the learning task, some students may find nontraditional settings like blended or online instruction to produce anxiety. Conrad (2010) described adult learners beginning a completely online course: "Their anxiety level is universally high, even among those who have already completed many online courses" (p. 220); without a face-to-face component, "it is hard to demonstrate empathy without a facial nod or smile. Words alone, which are all online educators have at their fingertips, often fail to convey a deep sense of humanness" (p. 214). In contrast, face-to-face social connectedness strengthens the human vagus nerve, which counteracts stress responses to situations of anxiety (Bergland, 2017). Consequently, the face-to-face component in blended learning may reduce not only physical isolation but also psychological isolation (Bollinger & Inan, 2012), helping to reduce anxiety.

Researchers have debated whether *confusion,* a "noticeable lack of understanding" (Baker et al., 2010, p. 231), is a cognitive state, an emotion, or even an affective state that is not an emotion (D'Mello, Lehman, Pekrun, & Graesser, 2014). Confusion arises with cognitive disequilibrium, when incoming information does not seem to align with existing knowledge structures (Graesser, Lu, Olde, Cooper-Pye, & Whitten, 2005). This can be productive to learning, as D'Mello et al. (2014) noted: When "there is a discrepancy in the information stream and the discrepancy is identified and corrected…, one important form of deep learning occurs" (p. 155). D'Mello's meta-analysis (2013) found confusion the second most frequent emotion (of 17) among students interacting with learning technologies, giving it a critical role in learner engagement. Thus far, researchers have found varied effects depending on contextual details. When accompanied by enjoyment, curiosity, or confidence, confusion spurs engagement and learning; when combined with boredom or frustration, it correlates with disengagement and lower learning outcomes (Baker et al., 2010; D'Mello et al., 2014). Future research can investigate the interplay of confusion with other first-order factors, such as frustration, boredom, and interest, and whether confusion aligns more with POS or NEG.

Emotional engagement is indispensable to the learning process, a "fuel" (Skinner & Pitzer, 2012, p. 33) for high-quality learning and the "antecedent of other components of engagement"

(Pekrun & Linnenbrick-Garcia, 2012, p. 260). The importance of emotion to cognition and learning is conveyed by findings that human tutors spend at least as much time dealing with affective and motivational goals as they do with cognitive and informational challenges (Lepper, Woolverton, Mumme, & Gurtner, 1993). The ability to deal with the emotions that arise during learning may help explain why human tutors are "unrivaled in their ability to promote deep and lasting learning" (Paul, 2014). Human actors are more adept at managing emotional engagement than are computers, but that does not mean that technology-mediated resources are not sufficient or even more expeditious to learning in certain situations. In blended learning environments, where the decisions to blend human- and technology-mediated instruction must consider the effect upon learner engagement, instructional designers need to understand when human–human interaction is necessary to maintain emotional engagement and when technology-mediated resources are desirable.

Research can investigate how the affordances of blended learning impact emotional engagement. Blended learning's additional channels for interactivity—with asynchronous online discussions increasing flexibility and opportunity for reflection, and in-class interactions promoting spontaneity and human connection (Graham, 2006)—might result in "absolutely richer interaction" (Gedik, Kiraz, & Ozden, 2012, p. 108). Improved personalization could increase interest and confidence while curtailing boredom, frustration, or anxiety. Immediate feedback from online tools could lessen confusion, frustration, and anxiety. On the other hand, blended learning may introduce barriers, such as increased workload or technical difficulties (Gedik et al., 2012), which increase frustration, anxiety, and confusion.

Conclusion

This paper began by mentioning three challenges to researching learner engagement in blended settings. The dynamic nature of blended learning and the diverse ways of combining human- and technology-mediated instruction make the ability to measure engagement under different conditions all the more important. To do this, we need greater clarity about the definitions and constructs of engagement. This paper has critically reviewed models, definitions, and constructs of learner engagement and suggested factors for a conceptual framework grounded in existing engagement literature and contextualized for blended settings. We have tried to maintain the distinction between indicators and facilitators, for "research and intervention efforts require a clear demarcation between these two" (Skinner et al., 2008, p. 766).

Researchers have some knowledge (and need more) about factors with potential to facilitate blended learning engagement, and one limitation of this study is our focus on indicators but not facilitators. We have chosen to first establish what indicates engagement so that subsequent research can measure the impact various facilitators have upon these indicators. We hope that future research will test both the strength of this framework and the impact of various blended learning designs on facilitating engagement. In addition, here we have proposed the same indicators for engagement in face-to-face and online contexts, but this assumption must be tested: Does engagement manifest itself differently in face-to-face settings than in online settings? We suggest factor analysis research to determine whether, for example, face-to-face curiosity and online curiosity are comparable in factor loadings and estimated intercepts, or whether they are unique constructs. Factor analysis could also provide evidence for or against our proposition that indicators labeled as behavioral elsewhere are actually outward manifestations of cognitive or emotional engagement.

At the same time, when examining blended learning engagement, researchers must think beyond the physical attributes of face-to-face and online instruction, for psychosocial relationships are core to blended learning research and design (Graham, 2013). Instructors, designers, and researchers need to better understand how engagement indicators are affected by human and by machine interaction. In the first fMRI study to compare brain responses to live interactions versus prerecorded ones, Redcay et al. (2010) found that live interaction sparked greater activity in brain regions associated with attention. What might be seen if researchers could likewise examine brain activity in regions associated with curiosity, enjoyment, or anxiety? Is face-to-face human interaction the gold standard (as often accepted) in encouraging learner engagement? Or are some engagement indicators equally propelled by technology-mediated human interaction or even by machine interaction, with its affordance of near-instant feedback in certain situations?

To answer such questions, research is needed not only at the completion of a blended course but throughout the course at the activity level. In future studies the authors' research team will use an end-of-course survey to operationalize and test this framework but will also compare the results to log data and experience-sampling surveys collected biweekly in blended courses. Possibly, engagement indicators function differently at the activity and course levels: Confusion noted in real time might be an indicator of focused engagement (D'Mello et al., 2014), but confusion recalled later (e.g., in an end-of-course survey) might indicate residual frustration and anxiety. By examining activity- and course-level engagement, we can study relationships between human- and machine-driven intervention strategies, learning pathways, and engagement (D'Mello & Graesser, 2012).

Blended contexts expand the methods for collecting data to measure engagement (Henrie, Halverson, & Graham, 2015), and this study has referenced many ways of collecting data on various engagement indicators. Due to both the complex nature of engagement and the differences inherent to measuring it in multiple contexts, research on engagement in blended settings will often require mixed methods for collecting data. Research on blended learning engagement ought to be increasingly real time, minimally intrusive, and maximally generalizable across various subject matter contexts. Yet these aims sometimes conflict with one another or with the need for scalability. Experience-sampling methods ask learners to report on both internal (thoughts, feelings, mood) and external (date, time, location, companions, activities) dimensions of specific experiences (Fleeson, 2007; Hektner, Schmidt, & Csikszentmihalyi, 2007); this method produces considerable quantitative and qualitative data but is fairly obtrusive. Collecting machine-generated log data is unobtrusive, but interpretability regarding cognitive and emotional engagement is questionable (Henry, Bodily, Larsen, & Graham, 2017). Advances in blended learning engagement research will, we hope, increasingly address these challenges.

This paper reviews current challenges in engagement research as well as core constructs important in understanding learner engagement, particularly in blended contexts. Finding much confusion in the domain, we offer a clear definition and conceptualization of learner engagement and then suggest factors that might indicate that engagement. These indicators include the cognitive and emotional energies (cognitive and emotional engagement) present when learners are engaged. Cognitive and emotional engagement are broken down into subconstructs that our review has suggested are key aspects of engagement in blended settings. Cognitive engagement, we propose, is indicated in attention, effort and persistence, time on task, cognitive and metacognitive strategy use, absorption, and curiosity; emotional engagement through interest, happiness, confidence, and the absence of boredom, frustration, and anxiety. We encourage subjecting these factors to empirical testing using factor analysis and structural equation modeling. After being empirically tested, this framework may add conceptual clarity and direction for future research. At a time when learner engagement is considered "the holy grail of learning" (Sinatra et al., 2015, p. 1) and interventions are touted for their ability to improve engagement, this is a starting point with the potential to further our understanding of engagement in blended settings.

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Posting Patterns of Students' Social Presence, Cognitive Presence, and Teaching Presence in Online Learning

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Abstract
Using the Community of Inquiry framework, this case study probes the posting patterns of students' social presence, cognitive presence, and teaching presence in an online learning setting. Using purposive sampling, qualitative data were collected from 91 students in the Department of Medical Documentary and Secretary, a fully online associate degree program at a well-known public university. Students participated in six online asynchronous discussion activities on Moodle. The data were analyzed through descriptive and deductive transcript analysis. The findings revealed students' posting behaviors of social presence, cognitive presence, and teaching presence were at a substantially high level, and could be enhanced during treatment fairly significantly. The most important points behind a high level of social presence and cognitive presence were found to be the topics based on real-life cases and scenarios and reflective course activities. The findings further indicated that the difficulty caused by large class size in online discussion could be resolved.

Keywords: social presence, cognitive presence, teaching presence, online asynchronous discussion, online learning

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Posting Patterns of Students' Social Presence, Cognitive Presence, and Teaching Presence in Online Learning

Aimed specifically at online and blended learning settings, one instructional development of significance is the Community of Inquiry (CoI) framework, developed by Garrison, Anderson, and Archer (2000). CoI provides a coherent perspective to enhance the complex dynamics of collaborative online learning environments (Garrison & Akyol, 2015). It aims to facilitate greater learning by constituting a community with an emphasis on the processes of instructional conversations likely to lead to epistemic engagement (Shea & Bidjerano, 2009). The CoI framework also articulates the behaviors and processes required to nurture knowledge construction through the cultivation of various forms of *presence*. It explains any type of online educational experience as the intersection of three presence types: social presence, teaching presence, and cognitive presence (Swan, Garrison, & Richardson, 2009). Social presence is the mediating variable between teaching presence and cognitive presence (Garrison, Cleveland-Innes, & Fung, 2010). Social presence encompasses three constructs: affective/personal responses, open communication, and cohesive responses. Affective/personal responses refer to emotional expression, use of humor, self-disclosure, and so on. Open communication includes continuing a thread, quoting from others' messages, referring explicitly to others' messages, asking questions, complimenting or expressing appreciation, expressing agreement, and so on. Cohesive responses refer to vocatives, referring to the learning group using inclusive pronouns, common salutations, and so on. (Rourke, Anderson, Garrison, & Archer, 2001).

Cognitive presence reflects the learning and inquiry process and is operationalized in the practical inquiry (PI) model as four phases: triggering event, exploration, integration, and resolution (Garrison et al., 2000). A triggering event is considered the starting phase and includes recognizing the problem, puzzlement facilitating curiosity, motivation, and a problem-based approach. Exploration is inquisitive and includes the searching for relevant information about the problem, exchanging information, exploring content collaboratively, brainstorming, making suggestions for consideration, and proposing a conclusion. Integration tends to be more tentative and includes convergence among community members through the connection of ideas and synthesis of information, and sustained critical reflection. Resolution includes testing knowledge through vicariously applying it to real-life problems and defending solutions (Garrison, Anderson, & Archer, 2000). According to Garrison and Anderson (2003), cognitive presence is central to successful higher education.

Teaching presence includes design and organization, facilitation of discourse, and direct instruction (Anderson, Rourke, Garrison, & Archer, 2001). Design and organization refers to activities in which teachers engage to design and organize a course or learning environment, such as determining curriculum, designing or selecting instructional methods, establishing time parameters, utilizing mediums effectively, and so on. Facilitating discourse refers to teachers facilitating the activities of learners as they agree or disagree and seek to reach consensus. Teachers facilitate discourse by encouraging, acknowledging, or reinforcing students' contributions; setting a positive climate for learning; drawing in participants; prompting discussions; and assessing the efficacy of the process. Direct instruction refers instructors presenting content or questions, confirming understanding through assessment and exploratory feedback, diagnosing misconceptions, and so on (Anderson et al., 2001).

Background

Following Garrison, Anderson, and Archer's (2010) statement, the CoI framework is still in need of further elaboration since it is a developmental model and has areas of incompleteness, especially with regard to cognitive presence. Earlier studies indicated that cognitive presence is likely the most challenging to study (Akyol, 2009) and develop in online courses among the three components of the CoI framework since it is a cyclical form of practical inquiry in which learners move deliberately from understanding the problem or issue to exploration, integration, and application (Garrison & Arbaugh, 2007), and students often face great difficulty arriving at a resolution (Garrison, Anderson, & Archer, 2001; McKlin, Harmon, Evans, & Jones, 2002; Vaughan & Garrison, 2005). Regarding social presence, the literature indicates that it is essential to establish a CoI (Garrison et al., 2000) as it has an impact on learning due to social interaction (Richardson & Swan, 2003; Swan & Shih, 2005; Tu & McIsaac, 2002). It is significantly related with and a predictor of cognitive presence (Akyol, 2009; Kozan & Richardson, 2014; Rourke, Anderson, Garrison, & Archer, 1999). Therefore social presence is of value and still requires more attention due to its importance (Garrison & Arbaugh, 2007).

Respecting teaching presence, previous research concludes that teaching presence is the most known element in the CoI framework. It functions as a mediating role and must be available in order to evolve from social presence into cognitive presence (Akyol, 2009; Garrison

& Cleveland-Inness, 2005; Kozan & Richardson (2014). The current study examined students' social presence, cognitive presence, and teaching presence within an online asynchronous discussion setting by describing their posting behaviors relative to these three constructs.

Methods

This research adopts an instrumental case study design in which "a researcher is interested in understanding something more than just a particular case, and the researcher is interested in studying the particular case only as a means to some larger goal" (Fraenkel, Wallen, & Hyun, 2012, p. 435). This study was conducted within an Information and Communication Technology-I course offered online by the Department of Informatics at a large public university. The two-credit course is compulsory for all students. It lasts 16 weeks, with 100 minutes of synchronous session each week. The course aims to teach the fundamentals of computer literacy based on the European Computer Driving License (ECDL) and helps students gain competency in basic office software. The course is taught fully online through Adobe Connect and is supported with Moodle as the learning management system (LMS) and a Facebook page for the instructor's and students' use. The instructor used direct instruction, demonstration, drill and practice, and problem-based learning instructional methods. The first author was included in both Moodle and the course Facebook page with the course instructor's authorization, indicating full of authority in management of the online platforms. All course materials and course sessions in video format were shared on Moodle for nonparticipants. Assessment of students' performances was conducted using both formative and summative assessment.

Participants

Purposive sampling was used for this study. Students, who had prior experience in online learning and also were enrolled in a fully online degree program in the Department of Medical Documentary and Secretary (MDS) at a well-known public university, were selected purposively. Among the 162 students who enrolled in the program, 91 students who participated in most of the six discussion activities in the course were selected for the study. The number of students in each discussion activity (DA) is provided in Table 1.

Table 1
Number of Students in Discussion Activities

Discussion activity (DA)	Number of students
DA1	73
DA2	70
DA3	62
DA4	64
DA5	60
DA6	62
Participating students	91
No participation	71
Class size	162

The average number of students who participated in each DA was 65. The minimum number of students was 60, and the maximum number was 73 in the six discussion activities.

Data Collection Instrument and Procedure

Asynchronous discussion postings of students were used to identify indicators for social presence, cognitive presence, and teaching presence. Discussion questions were developed based on course content, and required students to articulate their own ideas and interpretations and then think reflectively. The discussion questions were checked by the instructor of the course and the researchers to assure content validity, understandability, and appropriateness for the students, content, and context. The questions aimed to facilitate students' cognitive presence and social presence. In two discussion activities, the questions aimed to facilitate teaching presence. The questions were in open-ended format. Each week, students discussed two questions and offered their ideas, knowledge, and feelings accordingly.

The first discussion activity (DA1) included students' first experiences in using computers, the difficulties and/or problems they faced, and how they overcame those difficulties. In addition, they were asked about their views on computers being beneficial in their daily life, their strategies and skills in handling information pollution, their suggestions to overcome this problem, and their justification of their solutions. The second discussion activity (DA2) focused on excessive use of social networking services and the reasons behind it. Plagiarism and unethical use of any information on the Internet, their own experience with plagiarism, and suggestions and solutions to handle this problem were also included. The third discussion activity (DA3) concerned the students' experience when learning something new on the computer, problems they faced, and how they solved those problems. Students were also asked about how they benefitted from their friends and from the Internet in addition to the group activities, and the various benefits and drawbacks of each of these. The fourth discussion activity (DA4) targeted the safety of digital information and potential ways either individual or mass users (e.g., public organizations, universities, legislative regulations) addressed the safety of usage and protection. Students' experiences with word processing software were also discussed, as well as the problems they faced and their solutions. The fifth discussion activity (DA5) dealt with online search strategies and step-by-step solutions for assigned problems on the Internet. Moreover, students were asked about the course instructor's efforts, behaviors, and teaching style, as well as the course, design, organization, discourse, and instruction. Students also made suggestions to overcome identified problems and improve the course. Finally, the sixth discussion activity (DA6) examined the students' sense of community, communication and interaction with the course instructor and their classmates, their likelihood to integrate course content into real life, and their impressions of Moodle and the course page on Facebook.

Each discussion was open for two weeks and held asynchronously on Moodle, the course management system. Data collection started during the second week of the semester and was completed in 12 weeks. The instructor served as facilitator and the researchers as observers during this process.

Data Analysis

Students' posts were analyzed through qualitative and quantitative data analysis methods. Both descriptive and transcript analysis were conducted. For descriptive analysis, the number of all discussion posts in each activity was investigated to determine whether or not it contained any indicator of social presence, cognitive presence, and teaching presence together or separately. The percentages were calculated based on the total number of students that participated in each activity divided by the number of posts containing any indicator of the categories of social presence, cognitive presence, and teaching presence. Transcript analysis of discussion postings was conducted deductively based on the coding matrix provided by the developers of the CoI framework. The data were coded in accordance with the categories of social presence, cognitive presence, and teaching presence, and in the analysis, students' posts could be included in one or more categories at the same time.

Trustworthiness

Objectivity of transcription analysis of coding discussions was ensured using the interrater-agreement method. The posts were analyzed by the researcher and another rater separately to ensure accuracy and validate the findings. In the interrater agreement process with regard to social presence, 40 students' posts in DA1 were coded based on its three categories: affective/personal, open communication, and group cohesion. The results yielded an 80.4% agreement (Cohen, 1960), which shows substantial agreement. Moreover, Kappa value was also calculated. This is a better approach, which calculates the measure of agreement while taking into account random agreement opportunities (Altman, 1999; Landis & Koch, 1977). Since the data were qualitative, and coding was based on categorical, nominal codes, Cohen's kappa (κ) was used to detect the level of agreement. According to the result, there was a substantial (good) agreement between the two raters' judgments, $\kappa = .715$, $p < .05$. Both methods indicate a good level of agreement between the raters in the coding of discussion posts based on social presence.

Corresponding to the interrater agreement process for cognitive presence, 40 students' posts in DA1 were coded based on its four categories: triggering event, exploration, integration, and resolution. The level of agreement was 91.8%, which indicates coding of discussion posts was conducted with an almost perfect level of agreement, eliminating subjectivity of the researcher (Cohen, 1960). Another, more accurate measure, Cohen's kappa, was also calculated and yielded substantial agreement between the two raters' judgments, $\kappa = .892$, $p < .05$.

With regard to the interrater agreement process for teaching presence, 40 students' posts in DA5 were coded for its three-categories: design and organization, facilitating discourse, and direct instruction. The percentage of agreement indicated almost perfect agreement (83.1%) between the two coders (Cohen, 1960). Similarly, Cohen's kappa yielded substantial agreement between the two raters' judgments, $\kappa = .736$, $p < .05$.

Results

Students' posting patterns were analyzed deductively based on a coding matrix. For each DA, Table 2 presents a summary of descriptive information to provide a general viewpoint for all the discussion activities and the students' participation ratio.

Table 2
Summary of Discussion Posts in Online Asynchronous Discussion Activities

	DA1	DA2	DA3	DA4	DA5	DA6	Average
Number of students	73	70	62	64	60	62	65
Number of sentences	555	640	448	461	346	501	492
Average number of sentences	8	9	7	7	6	8	8
Number of words	7,183	8,302	6,079	5,299	4,402	6,271	6,256
Average number of words	98	119	98	83	73	101	95

The number of students participating in discussions differed for each activity. From a total of 162 students in the class, 91 students (56%) participated in discussions. The minimum number of participating students was 60, while the maximum was 73. The total number of sentences also varied. Students wrote the most for DA2 and the least for DA5. Details of posts for each presence are provided separately in the following subsections.

Social Presence

Percentage values were calculated from the total number of students that participated in each DA divided by the number of posts containing any indicator of the categories of social presence—namely, affective/personal, open communication, and group cohesion. The result is presented in Table 3. There were no indicators of social presence in two of the students' posts in DA2 and in DA6.

Table 3
Coding Result of Social Presence

	Affective/personal	Open communication	Group cohesion
DA1	95%	47%	29%
DA2	80%	87%	53%
DA3	76%	89%	66%
DA4	98%	41%	38%
DA5	82%	88%	35%
DA6	95%	90%	60%
Average	87%	73%	47%

As provided in Table 3, students' posts in regard to social presence reflected mostly affective/personal (87%), followed by open communication (73%), and then group cohesion (47%) categories. The sharpest increase occurred in open communication in the second and the fifth activities, whereas the sharpest decrease was seen in DA4 for open communication and group cohesion. Students' posting behaviors are also presented graphically in Figure 1, which shows the indicators in their discussion posts. It is explicit that the highest reflected category overall was affective/personal while the least reflected category overall was group cohesion. It can be inferred that students generally responded individually more than collaboratively. An example of the indicator of affective/personal expressions from the students' discussion posts is the following:

> It is not possible to be bored in this class because the instructor teaches the course very well and makes us active, although ICT-I course is an online course. She is interested with our problems and repeats and explains insistently what we initially did not understand. The course is designed so well that I cannot see any deficiency (smiling). (DA5, Student 13)

In addition, in three activities (DA1, DA4, and DA6), the affective/personal indicator was at the highest level, while in the other three (DA2, DA3, and DA5) open communication was at the highest level. A sample student post indicating open communication is this: "I like this course since I overcame my deficiencies and enhanced my knowledge with the help of this course. Our instructor planned and designed the course very well. Thanks to our instructor and for her effort" (DA5, Student 16).

Group cohesion behaviors enhanced up to the midpoint and then decreased sharply. Open communication and group cohesion behaviors indicated similar patterns based on looking solely at the beginning and endpoint of the Das. Group cohesion behaviors increased at the midpoint and slightly decreased at the endpoint. Two samples from students' posts indicating group cohesion are as follows: "Thank you very much, teacher. Thanks for your effort!" (DA6, Student 20), and "Everything is excellent. Thank you teacher!" (DA5, Student 57). Overall, in students' discussion posts, the affective/personal indicator was the highest while the group cohesion indicator was the lowest throughout the whole period.

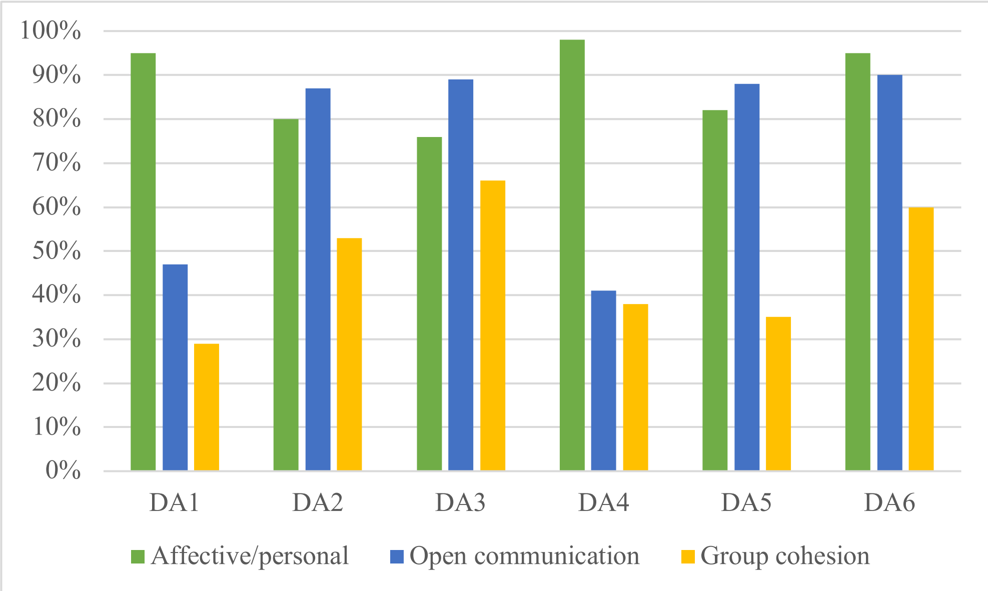

Figure 1. Coding result for social presence.

Cognitive Presence

Students' posts were examined for the four categories of cognitive presence, which are triggering event, exploration, integration, and resolution. The coding results are presented in Table 4. Two posts, one in DA2 and the other in DA6, were not suitable for any of the categories.

Table 4

Coding Result for Cognitive Presence

	Triggering event	Exploration	Integration	Resolution
DA1	67%	90%	52%	51%
DA2	39%	34%	14%	27%
DA3	77%	95%	16%	55%
DA4	77%	92%	42%	45%
DA5	20%	98%	67%	27%
DA6	48%	23%	16%	89%
Average	55%	72%	35%	49%

The findings shown in Table 4 indicated that students' posts reflected exploration (72%) the most and integration (35%) the least. The posts reflected triggering event (55%) and resolution (49%) at average levels. It can be inferred from the findings that overall indicators of exploration were twice that of integration. Both the most remarkable increase and decrease occurred in exploration, in DA3 and DA6, respectively. There was a sharp decrease again in exploration in DA2. Considering striking enhancement, they were also seen in the categories of triggering event, integration, and resolution. In DA3, a remarkable improvement occurred in triggering event, similar to integration in DA4, and the case of resolution in both DA3 and DA6. On the other hand, there was an outstanding decrease across categories except for the resolution category, and there was a salient decrease in all four categories for DA2. An outstanding decline was also seen in DA5 in both triggering event and resolution. Furthermore, in DA6 a noticeable decrease occurred in both exploration and integration.

Figure 2 indicates the changes graphically. The graphic indicates that students mostly tried to explore the content, appreciate the diverse perspectives, explore the content collaboratively, and so on. The following is an example of the indicator of exploration in students' discussion posts:

> Some of them try to use social media to communicate while some do not, but they are only a waste of time. Even though they are in our lives, people forgot about having a heart-to-heart talk or even saying Hello in real life. This is a bitter experience… With each passing day, social media platforms used for communication are pulling people inside themselves subconsciously. This addiction can cause psychological illnesses beyond addiction. Caution is in fact inside oneself. If they know the usage reasons of those platforms and use them consciously, then precautions could be taken. However, for those that cannot prevent this addiction we need to direct them to psychological therapy centers, like in the USA; we could organize conferences about the disadvantages of virtual communication and social media usage or some activities that could be done for those to direct them into real communications beyond virtual ones. (DA2, Student 18)

Additionally, the results gave hints as to the lack of sustained critical reflection, connecting ideas and synthesis, and so on. Triggering event declined after DA1 but increased sharply at the midpoint. For instance, one student posted, "I wondered about it and in essence, fiddling about with the computer provided me the opportunity to learn and satisfy my own curiosity" (DA1, Student 27).

Indicators of integration were generally low, except for two activities. A sample of the indicator of integration from the students' posts is the following

> Information retrieved from the Internet is not always correct; for this very reason, I always check its correctness from at least three websites and if it does not persuade me, then I look for official webpages; and if it is still not enough, then I look for the main source of the information that I found on the Internet, searching for the books and through encyclopedias. The Internet provides easy access to something, but its correctness is always questionable. (DA1, Student 29)

At the endpoint, resolution was strikingly enhanced. A sample student's post in resolution is below:

> As I learned on the Math course, to solve a problem, first you should know the formula and do the required steps in order; like first multiplication and division, and then addition and subtraction in a math problem. For this reason, first I determine the required steps, and the order of the steps is important for me; then I do each step in order to solve a problem… And, the solution accepted by myself comes to the end. (DA5, Student 59)

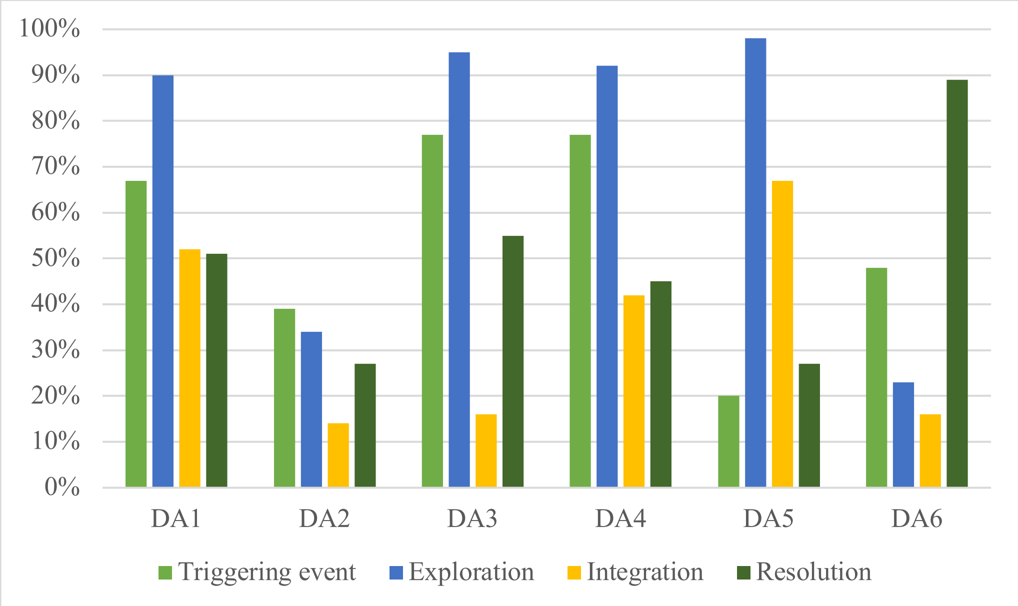

Figure 2. Coding result in cognitive presence.

Teaching Presence

Students' posts in teaching presence were examined based on its three categories—namely, design and organization, facilitating discourse, and direct instruction. The findings are visualized in Figure 4. Students' posts in two discussion activities from highest to lowest were design and organization (84%), followed by direct instruction (65%), and then facilitating discourse (50%). The focus of their posts was on the design and organization of the course, flow of the course, and appropriateness of course methods and activities. For instance, one student posted the following:

> I like the design and organization of the course since my instructor teaches the course, emphasizing the practice... I learn something new in each course. Then, I practice it immediately in order to repeat and not to forget it. The course is so well-designed that I think there is no deficiency. (DA5, Student 2)

Their posts about both design and organization, and facilitating discourse increased in DA6, in contrast to direct instruction. Indicators of facilitating discourse were the lowest, although they increased in DA6 (see Figure 3). A sample student's post that reflect facilitating discourse is the following:

> I like [the instructor's] teaching style, you use a simple language. When you teach any subject, it captures my attention and I can easily listen to you… You encourage us to brainstorm in this way. I feel myself like I am in formal education. (DA5, Student 6)

Regarding the indicator of direct instruction in students' discussion posts, the level was 65%, although it declined in the sixth discussion activity. Still, it was at an adequate level. Following is a sample student's post of the indicator of direct instruction:

> Our instructor teaches the course with details of the topics and in a way that I can understand. This increases my motivation. Also, I am not shy in asking questions. She explains and repeats what we didn't understand again and again. (DA5, Student 10)

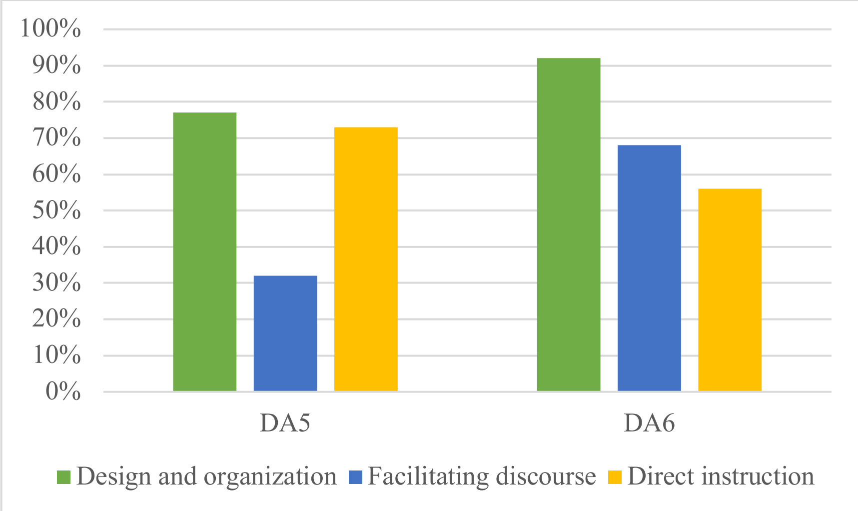

Figure 3. Coding result in teaching presence.

Discussion and Conclusion

The findings were discussed and concluded separately in respect to social presence, cognitive presence, and teaching presence.

Social Presence

This study found a higher level of social presence when compared to earlier research (Akyol, 2009; Kim, 2015). In this case study, the reason for high levels of open communication and group cohesion could be usage of the Facebook group and/or the WhatsApp group. Many students declared in some activities that both Facebook and WhatsApp contributed to their interaction and communication with the rest of the class. They were informed and kept up to date for any activity, announcement, reminder, call for participation, and any other important information. The positive influence of social networking sites (SNS)—specifically Facebook—on social presence was also found in a more recent study by Lim and Richardson (2016). In addition, this situation might be explained by cultural differences. The effect of culture in using SNS in daily life was addressed in some earlier studies (e.g., Chau, Cole, Massey, Montoya-Weiss, & O’Keefe, 2002; Jackson, & Wang, 2013; Qui, Lin, & Leung, 2013). Some differences could also be expected in teaching–learning environments. For example, a recent study concluded that although Turkish instructors anticipated SNS as an information-sharing and socialization platform, Germans were more optimistic about benefits such as discussion, communication, information, and material sharing (Kilis, Rapp, & Gülbahar, 2014). Another recent study investigating students’ involvement and acceptance of Facebook as a course management system concluded that Facebook outperformed Moodle in many respects, including increased communication and interaction among students and instructors, larger number of discussion posts, better facilitating conditions, greater number of involved discussions and higher perceived usefulness, increased behavioral intention to use, greater number of comments, enhanced facilitation of getting timely feedback, and so on (Albayrak & Yildirim, 2015).

In this current study, similar to Albayrak and Yildirim (2015), students favored Facebook over Moodle, which could be also a consequence of the culture itself, with the ever-increasing number of people using Facebook in the country. Also, when compared to Moodle, which is a less user-friendly environment, Facebook could be expected to be favored by the students. This might improve students’ social presence (Kilis & Yildirim, 2018). The other issue is that some previous empirical findings indicated that Facebook is an effective discussion environment in online and/or blended learning (English & Duncan-Howell, 2008; Mazer, Murphy, & Simonds, 2007). Since it facilitates communication, interaction, and cooperation, it has favorable effects on social presence and the sense of community (Mazer et al., 2007; Schroeder, Minocha, & Schneider, 2010). Another study indicated the enhancement of social presence using Twitter, which facilitated free-flowing "of-the-moment" interactions and social connections (Dunlap & Lowenthal, 2009). Considering these points, with the lack of practical studies based upon effective theoretical and pedagogical orientations, Öztürk (2015) examined whether Facebook suited the CoI framework. She concluded that because of the high level of student presence Facebook is a suitable online learning environment for the CoI framework, with features that foster critical thinking, discussion, cooperation, and learning besides the more obvious benefits for social relations. This study corroborates the results of prior studies in the same way through exploring the positive effect of Facebook on students' social presence.

Furthermore, a high level of social presence could be reasoned to have been the result of students' own efforts, self-regulation, presence in a warm and comfortable learning environment, the instructor's effort and guidance, or even students' own innate characteristics. Earlier studies generally studied graduate students, who may already be more self-regulated but may be less socialized. However, it can be inferred that both students and instructors had positive contributions in the development of students' social presence. The discussion activities indicated that students favored the kindness behaviors of their instructor and their classmates during the semester. The instructor might contribute students' self-expression and self-disclosure as well as sense of belonging to the community through kind behaviors. They can facilitate students' contributions, encourage them to ask their questions and to feel comfortable both during the course and outside class hours. In the same way, kind behaviors of classmates might affect sense of belonging to the community, communication, and collaborative work during and outside of the class and, therefore, might positively influence social presence.

Overall, the indicators of social presence in students' posts were high in this study. More specifically, affective/personal behaviors were high at the beginning and maintained throughout the treatment process. Open communication and group cohesion were developed during the semester thanks to the structured discussion activities, the course Facebook page, and course topics addressing real life, as well as focusing on self-disclosure of students rather than pure information and facts. Students favored their instructor's and classmates' kind behaviors. The students initiated a group on WhatsApp for the purposes of collaboration and cooperation to make working with each other easy in the collaborative learning community. The large class size (162 students) could be overwhelming for some, but most students favored the instructor's effort and guidance. However, some students mentioned facing challenges during the course, such as marital status, having children, difficult working conditions, technical and usability problems with Moodle, and individual assignments.

Cognitive Presence

Considering the needs indicated in earlier studies, particularly on cognitive presence, this study focused notably on cognitive presence. The results revealed a substantial level of cognitive presence, contrary to prior research (Akyol, 2009; Akyol & Garrison, 2011; Kim, 2015; Tik, 2016). In the aforementioned studies, it was claimed that synchronous online discussions constituted a time barrier to reach the resolution phase. To overcome this barrier, this study designed online discussions asynchronously to fully understand the actual constitutions and improvement of cognitive presence. This resulted in significant development across all four categories and also sustained cognitive presence at high or fair levels, contrary to the other studies. These findings could be the result of design and organization of the discussions, as well as a level of attractiveness of the topics covered. The topics were selected based on real-life situations to stimulate brainstorming and critical thinking in addition to inspiring the use of students' own experiences rather than relying on pure information and facts. More importantly, besides triggering their curiosity, interest, and motivation, the topics covered provided an opportunity to explore the tasks, appreciate diverse perspectives, create solutions, and apply solutions to their life. Students were encouraged to share their own experiences, reflect on them and develop new or deeper knowledge. Therefore, the design and context of the discussion activities were of paramount importance for the improvement seen in students' cognitive presence. It was noted in a few recent studies (e.g., Redmond, 2014) that when online discussions were structured appropriately, students could share and document their own thinking and reflect on both their own and other students' contributions. When asked to reflect on their learning experience with a given scenario, students could apply their new knowledge more easily and resolve the issue, which means they could reach the resolution phase.

Another recent study (Liu & Yang, 2014) reached similar conclusions as this current study, stating that discussion types and context affect students' cognitive presence and recommended that real-life experiences should be covered in discussions in order to enhance cognitive presence. This current study was specifically designed to invoke discussions focusing on the dimensions of cognitive presence and, thus, succeeded with a high level of cognitive presence, and even saw half of the student's progress right through to reaching the resolution phase. Through these findings, researchers of this current study have come to appreciate the importance of real-life experiences, such as assigned cases and scenarios, covered in online discussions. Moreover, the discussion questions were designed in accordance with problem-based learning approach.

Overall, this study was found to be in agreement with both Redmond's (2014) and Liu and Yang's (2014) statements, and enhanced the understanding of cognitive presence with a more complete exploration by indicating the ways to attain, improve, and sustain a high level of cognitive presence in the nature of online learning. Therefore, online instructors and educators should be aware that students are able to reach all four phases of cognitive presence, and they should set appropriate course activities to guide students and foster their ability to challenge themselves through the process of critical thinking (Giannousi & Kioumourtzoglou, 2016; Ladyshewsky, 2013). Thus, it is highly recommended to design discussion activities based on real-life experiences and provide scenarios for discussion activities rather than pure factual information. It would also be better to design activities based on the problem-based learning approach to enhance students' reflections and critical thinking and help them construct new knowledge or deepen their existing knowledge.

Another issue behind a high level of cognitive presence is cooperation among students. Many students placed significant emphasis on cooperation to foster their cognitive presence. Collaboration is already a part of the basis of the CoI framework. Although these two concepts, collaboration and cooperation, are not the same, they are close to each other to some extent, and support students' experiences in cognitive ability. Cooperation could therefore improve students' cognitive presence by encouraging brainstorming or exploration and interaction. Therefore, with regard to designing a collaborative learning community, it could be better for online instructors to take cooperation into consideration in addition to collaboration both in-class and out-of-class, and also when designing course activities.

The other issue related to the high level and improvement of cognitive presence was sustaining motivation. Holding asynchronous discussion in a large class of 162 students without forming small groups is not an easy task. However, in the case of the class of the current study, it was deemed successful after providing and maintaining a high level of cognitive presence. In a recent study, Kim (2015) stated that choosing attractive topics for students and addressing real-life cases could lead to a high level of cognitive presence. In the current study, students were willing and motivated through the application of regular activities. Also, the questions were not seen as boring for the students, and they could easily express their own experiences and conduct brainstorming with their classmates. This case study provides more elaboration on cognitive presence and how it can be facilitated. This current study also contributes to the literature that indicates that students can in fact reach the resolution phase, and this could be developed further, as opposed to earlier studies in which difficulty was found at the lowest level (Akyol, 2009; Akyol & Garrison, 2011) or where students completely failed (Tik, 2016).

In summary, the indicators of cognitive presence in students' discussion posts were at a fairly substantial level in this study. Although earlier studies stated that reaching the resolution phase was very difficult or even did not occur in their study, this current research had students that in fact did reach the resolution phase. The students emphasized the importance of addressing real-life topics and assigning cases or scenarios in discussion activities. Therefore, the researchers of this current study accept the recommendations of both Redmond (2014) and Liu and Yang (2014).

Teaching Presence

Earlier studies contended that teaching presence was the most known element; therefore, this current study was solely comprised of two activities. It resulted in a substantially or fairly high level of teaching presence, and it succeeded in its significant development during the treatment process, contrary to some earlier studies (e.g., Akyol, 2009; Kim, 2015). Teaching presence was developed especially with the aids of regular discussion activities, and immediate feedback from the course instructor to students. Encouraging students' contributions, reinforcing participation and collaboration, giving instant feedback, and addressing their misconceptions, as well as providing a comfortable learning environment were the reasons behind establishing and sustaining a substantial level of teaching presence. The benefits of using SNS, specifically a Facebook group page, were proven, which is similar to the study of Lim and Richardson (2016). In order to have a better understanding about the effect of instant feedback, further elaboration on a theoretical and pedagogical basis is highly recommended. Still, it indicates the most important factors that have an influence on teaching presence. Further research could focus on the benefits of SNS and instant feedback in order to contribute to the elaboration and improvement of teaching presence.

Implications and Recommendations

The findings highlighted the importance of designing course and discussion activities that address real-life cases and scenarios in a reflective and attractive way for students. Rather than relying on pure fact-based information in discussions, they can be designed on problem-based learning and reflective thinking. Moreover, a comfortable and friendly environment like Facebook or other suitable SNS could be used to facilitate communication, interaction, collaboration, and the feeling of a sense of community. Therefore, SNS has some contribution to make to social presence, cognitive presence, and teaching presence, and further research could look into its application. On the other hand, course management systems—in this case Moodle—could be utilized more and usability problems could be addressed to remove unnecessary distractions. According to Yildirim, Reigeluth, Kwon, Kageto, and Shao (2014), instructors should provide collaborative learning opportunities both inside and outside the classroom, allow for more easy-to-use customizations in the instruction in accordance with learner characteristics, address personalized assessment, include progress tracking and reporting, and demonstrate a responsiveness to learner needs. Thus, an ideal system to meet the standards and required functions in this information age could be developed and further practiced.

In addition, providing timely feedback both in and outside of class is so important in the online learning setting (Akyol, 2009; Shea, Li, Swan, & Pickett, 2005; Sheridan & Kelly, 2010) to ensure that students are more motivated and interested in the tasks, to address their misunderstandings, to prevent them from getting lost, and to fill their need for a real-time (physical) instructor. Therefore, instant feedback and immediate responsiveness to students' needs, as in this current study, could support learners' social presence and cognitive presence and, consequently, could be subjected to further studies. Finally, kind behaviors of the course instructor, use of simple and easy to understand language, and responsiveness are important factors, particularly for social presence and teaching presence. An instructor's attitude toward their students and awareness of students' overexertion could play an important role in their sense of community. As a concluding remark, further research could concentrate on synchronous online discussion, including instruction in both online and blended learning settings.

A few potential limitations of this study need consideration. First, in this study, discussions were asynchronous; however, in a synchronous format, the results could differ, especially for social presence and, therefore, this could be seen as one of the study's limitations. Second, the instructor was not an active participant in discussion activities, but rather was merely facilitator and observer. If the instructor were an active participant during discussion activities, the results could differ. Hence, this might also be considered as a limitation. Further research could concentrate on online discussion in which the instructor participates actively.

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A Structural Equation Model of Predictors of Online Learners' Engagement and Satisfaction

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Abstract
This study investigated the structural relationships among online learners' teaching, social, and cognitive presence, engagement, and satisfaction. Data were collected from graduate students enrolled in an online graduate program at a large midwestern public university through online surveys. Structural equation modeling (SEM) was used to analyze the data. According to the results, teaching presence, cognitive presence, emotional engagement, behavioral engagement, and cognitive engagement were significant predictors of satisfaction, and these determinants explained 88% of the variance in satisfaction. The results indicate that the dominant determinant of the satisfaction was teaching presence, which had direct and indirect effects on satisfaction. Moreover, the study revealed significant predictors of emotional, behavioral, cognitive, and agentic engagement. Implications are discussed in terms of theoretical insights, practices for online learning environments, and further research directions.

Keywords: community of inquiry, structural equation modeling, online learning, social presence, teaching presence, cognitive presence, engagement, satisfaction

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A Structural Equation Model of Predictors of Online Learners' Engagement and Satisfaction

Over the past decade, the popularity of online education has been increasing in the world. In the United States, more than one in four college students (28%) had taken at least one online course in fall 2014 (Allen, Seaman, Poulin, & Straut, 2016). The continuing interest in online education has created a growing and competitive market for online courses, which makes ensuring the quality of such courses an important long-term strategy for higher education institutions (Kozan & Richardson, 2014). The increased capabilities of online technologies have increased expectations for the effectiveness of online education (Means, Toyama, Murphy, & Baki, 2013). In order to increase quality of online education, it is necessary to employ robust theoretical frameworks. The Community of Inquiry (CoI) framework (Garrison & Akyol, 2013; Garrison, Anderson, & Archer, 2000, 2001, 2010; Garrison & Arbaugh, 2007), which is based on social constructivism and Dewey's notions of community and inquiry (Akyol & Garrison, 2011; Swan, Garrison, & Richardson, 2009; Swan & Ice, 2010), is one of the most popular theoretical frameworks for understanding online learning processes. It has been widely used as a guide for developing and evaluating online courses as well as for training faculty to teach online. The CoI framework suggests that three elements—teaching presence, social presence, and cognitive presence—work together to create and maintain a collaborative community of inquiry and effective learning processes in online education environments (Akyol & Garrison, 2008; Kozan & Richardson, 2014; Swan et al., 2009). The three elements of CoI and their intersection reflect the dynamics of online learning experiences that are important to improving and maintaining the quality of online education (Garrison, Cleveland-Innes, & Fung, 2010).

The main components of teaching presence include design and organization, facilitating discourse, and direct instruction (Akyol & Garrison, 2008; Anderson, Rourke, Garrison, & Archer, 2001). Teaching presence creates opportunities for meaningful learning and ensures that intended learning outcomes are reached when it includes "monitoring and managing purposeful collaboration and reflection" (Garrison et al., 2010, p. 32). In the CoI framework, teaching presence is viewed as influencing both social and cognitive presence (Garrison et al., 2010). Social presence includes emotional expression, open communication, and group cohesion (Garrison et al., 2000), which encourages online learners to participate in social interactions by creating personal but purposeful relationships (Garrison & Arbaugh, 2007). In addition, social presence is considered a mediating variable between teaching and cognitive presence (Garrison et al., 2010; Shea & Bidjerano, 2009). Cognitive presence is based on the practical inquiry model (Dewey, 1938) and includes the iterative phases of the inquiry process—namely, the triggering event, exploration, integration, and resolution phases (Akyol & Garrison, 2008; Garrison et al., 2000; Garrison et al., 2010; Garrison & Arbaugh, 2007). Cognitive presence is central to the student learning process and "refers to the extent to which online learners can construct and validate meaning based on critical and continued communication and thinking" (Kozan & Richardson, 2014, p. 68). In the CoI framework, cognitive presence is viewed as "the focus and success of the learning experience" (Vaughan & Garrison, 2005, p. 8).

Much research has tested the CoI framework (Befus, 2016; Stenbom, 2018) and explored the relationships among the CoI presences (Arbaugh, 2008; Garrison & Arbaugh, 2007; Swan, Garrison, & Richardson, 2009; Garrison et al., 2010; Kozan & Richardson, 2014), and it has been consistently reported that the three presences are related to one another, directly or indirectly (Joo, Lim, & Kim, 2011). Research on the CoI has also shown it to be an effective pedagogical framework in terms of explaining important variables in the online learning process, such as engagement, perceived learning, and satisfaction (Arbaugh, 2001; Nagel & Kotze, 2010; Richardson, Maeda, Lv, & Caskurlu, 2017; Rovai, 2002; Shea, 2006; Shea, Li, & Pickett, 2006; Swan, 2001). However, there is a need to examine how the CoI presences relate to other variables for learning outcomes in order to better understand how to use online learning environments to foster learning. For example, few studies have investigated online learners' engagement. The purpose of this study is to present a path model that predicts online learners' engagement and satisfaction based on the CoI framework.

Determining which factors affect online learners' engagement and satisfaction based on the CoI framework can help guide practitioners in selecting appropriate strategies to promote the active engagement of learners and overall student satisfaction (Ma, Han, Yang, & Cheng, 2015; Richardson & Newby, 2006; Robinson & Hullinger, 2008). In this study, we examine specific types of student engagement, including behavioral, emotional, cognitive, and agentic engagement, as proposed by Fredricks, Blumenfeld, and Paris (2004), and Reeve and Tseng (2011). *Behavioral engagement* refers to students' attention, effort, and persistence in learning. *Emotional engagement* includes having positive emotions and high interest in class activities. During the learning process, strategic thinking and using sophisticated learning strategies translate into cognitive engagement (Fredricks et al., 2004; Reeve, 2013). Lastly, *agentic engagement* refers to students' constructive contribution to the flow of the instruction they receive, as proposed by Reeve and Tseng (2011), serving as a fourth component of the engagement framework of Fredricks et al. (2004).

In the current literature base, student satisfaction is one of the main predictors of the quality of online courses (Eom & Ashill, 2016; Kauffman, 2015; Moore & Kearsley, 2005; Roach & Lemasters, 2006; Yukselturk & Yildirim, 2008). Satisfaction refers to how students perceive their learning experiences, and it is a fundamental link in student outcomes associated with higher level student engagement and achievement (Biner, Welsh, Barone, Summers, & Dean, 1997; Sahin & Shelley, 2008). In turn, high levels of satisfaction lead to motivation to persevere for online students and so to higher persistence rates (Ali & Ahmad, 2011; Alaulamie, 2014; Joo et al., 2013; Kuo, Walker, Belland, & Schroder 2013; Reinhart & Schneider, 2001; Yukselturk & Yildirim, 2008).

Even though the literature reports that all three CoI components affect student engagement (Dixon, 2011; Young & Bruce, 2011), the relationships between specific engagement elements are unknown. Therefore, additional research is needed to understand how using the CoI framework in designing online courses specifically affects students' engagement (Meyer, 2014). In this study we aim to provide a comprehensive view of the development of the CoI presences in relation to satisfaction and engagement. Understanding interrelationships among these important variables may enrich theoretical insights and practices for online learning environments.

Satisfaction

Many factors may affect online learners' satisfaction, such as presence (social, cognitive, teaching), perceived usefulness of a course, perceived ease of use of the platform, actual usage, computer expertise, flexibility, and flow (Joo, Lim, & Kim, 2011; Joo, Joung, & Kim, 2013; Sahin & Shelley, 2008). Much research has examined the effects of the three presences represented in the CoI framework on satisfaction and found that there are positive relationships between satisfaction and social presence (Cobb, 2011; Gunawardena & Zittle, 1997; Harrison, Gemmell, & Reed, 2014; Johnson, Hornik, & Salas, 2008; Newberry, 2003; Richardson & Swan, 2003; Richardson et al., 2017), teaching presence (Arbaugh, 2008; Estelami, 2012; Jackson, Jones, & Rodriguez, 2010; Khalid & Quick, 2016; Ke, 2010; Kranzow, 2013; Ladyshewsky, 2013; Shea, Pickett, & Pelz, 2003), and cognitive presence (Akyol & Garrison, 2008; Hosler & Arend, 2012; Kang, Liew, Kim, & Park, 2014). Furthermore, several studies have examined how the three CoI presences predict satisfaction. The majority of these studies found that all three CoI presences significantly predict satisfaction (Alaulamie, 2014; Giannousi & Kioumourtzoglou, 2016; Ke, 2010); however, a few studies have found that social presence is not a predictor of online learners' satisfaction (Joo et al., 2011; Kang et al., 2014).

Engagement is an additional predictor of satisfaction. Research shows that engagement has significant effects on satisfaction in online learning environments (Bitzer & Janson, 2014; Gray & DiLoreto, 2016; Shin & Chan, 2004; Swan, 2001). Students who engage in their courses may experience more satisfaction (Meyer, 2014; Newberry, 2003). Based on the literature, we have formulated the following seven hypotheses related to satisfaction:

- Teaching, social, and cognitive presence have positive effects on online learners' satisfaction.
- Behavioral, emotional, cognitive, and agentic engagement have positive effects on online learners' satisfaction.

Engagement

Engagement, in addition to its relationship with satisfaction, is one of the most important variables for the learning process. *Engagement* refers to active involvement in course activities with continuous efforts to attain desired learning outcomes (Hu & Kuh, 2002; Richardson, Long, & Woodley, 2003; Richardson & Newby, 2006). Students' active involvement affects the level of their learning outcomes, cognitive development, and educational quality (Ma et al., 2015). Regarding online courses, engagement is one of the key factors affecting students' persistence and improving learning efficiency (Dennen, Darabi, & Smith, 2007; Dixon, 2015; Kuh, 2003; Robinson & Hullinger, 2008).

Since online learning differs from traditional education in terms of online learners' time and attention demands, keeping them actively engaged is very important and may require more effort compared with on-campus classes (Meyer, 2014). Previous research has indicated that many factors can influence online learners' engagement—for example, using humor and feedback, choice of activities, presenting extra course resources, applying active learning approaches, using course tutors, and including motivational factors (Baker & Taylor, 2012; Bates & Khasawneh, 2007; Hew, 2016; Kanuka, 2005; Kelly, 2012; Richardson & Long, 2003; Sull, 2012; Sun & Rueda, 2012; Webster & Hackley, 1997). While educationally purposeful activities support student engagement and learning, poor instruction has negative effects on student engagement (Hu & McCormick, 2012; Mason, 2011; Meyer, 2014).

The CoI model is important in understanding the factors that influence online learners' engagement. When online courses are designed by maximizing the three CoI presences, interaction, and engagement, the construction of meaningful knowledge and effective learning occur (Garrison & Arbaugh, 2007; Garrison & Cleveland-Innes, 2005; Joo et al., 2011; Meyer, 2014). Since social presence encourages social interaction through emotional expression, open communication, and group cohesion, greater perceptions of social presence may be related to emotional engagement, while lower social presence levels may cause frustration and impact affective learning negatively (Garrison et al., 2000; Garrison & Akyol, 2013; Wei, Chen, & Kinshuk, 2012). Higher teaching presence facilitates students' interaction with the instructor and potentially a strong classroom community encouraging students to actively engage in the learning process (Joo et al., 2013; Young & Bruce, 2011). Therefore, teaching presence may be a useful predictor for agentic and emotional engagement (Reeve, 2013). Cognitive presence leads to the construction of meaningful knowledge and is supported by employing sophisticated learning strategies, such as critical thinking, learners' active involvement through their experiences, interaction, and communication (Joo et al., 2013; Kanuka & Garrison, 2004). Therefore, cognitive presence may be linked to behavioral, emotional, and cognitive engagement.

Researchers have found the four engagement components to be "dynamically interrelated within the individual; they are not isolated processes" (Fredricks et al., 2004, p. 61; Reeve & Tsai, 2011; Reeve, 2013). The engagement components are relatively new concepts in classroom research and in research on online learning environments. Hence, there is a need to research the structural relationships among the four components further. For example, since cognitive engagement refers to students' level of investment in learning, it may be a predictor of learning and the engagement process. In online learning environments, students who actively participate in activities requiring cognitive interpretations demonstrate higher cognitive engagement (Meyer, 2014). Moreover, students who have more experience and take more responsibility for their learning promote cognitive engagement (Richardson & Newby, 2006). Therefore, cognitive engagement may itself have an effect on the other three components of engagement. Likewise, behavioral engagement, which means active participation in course activities through completing assignments, may be predictive of agentic engagement. Based on the literature, we have formulated the following 10 hypotheses related to engagement.

- Cognitive presence has a positive effect on behavioral, emotional, and agentic engagement.
- Teaching presence has a positive effect on agentic and emotional engagement.
- Social presence has a positive effect on emotional engagement.
- Cognitive engagement has a positive effect on behavioral, emotional, and agentic engagement.
- Behavioral engagement has a positive effect on agentic engagement.

The hypothesized research model for the study, based on a review of the previous literature, is presented in Figure 1. Arrows show the direction of the influence.

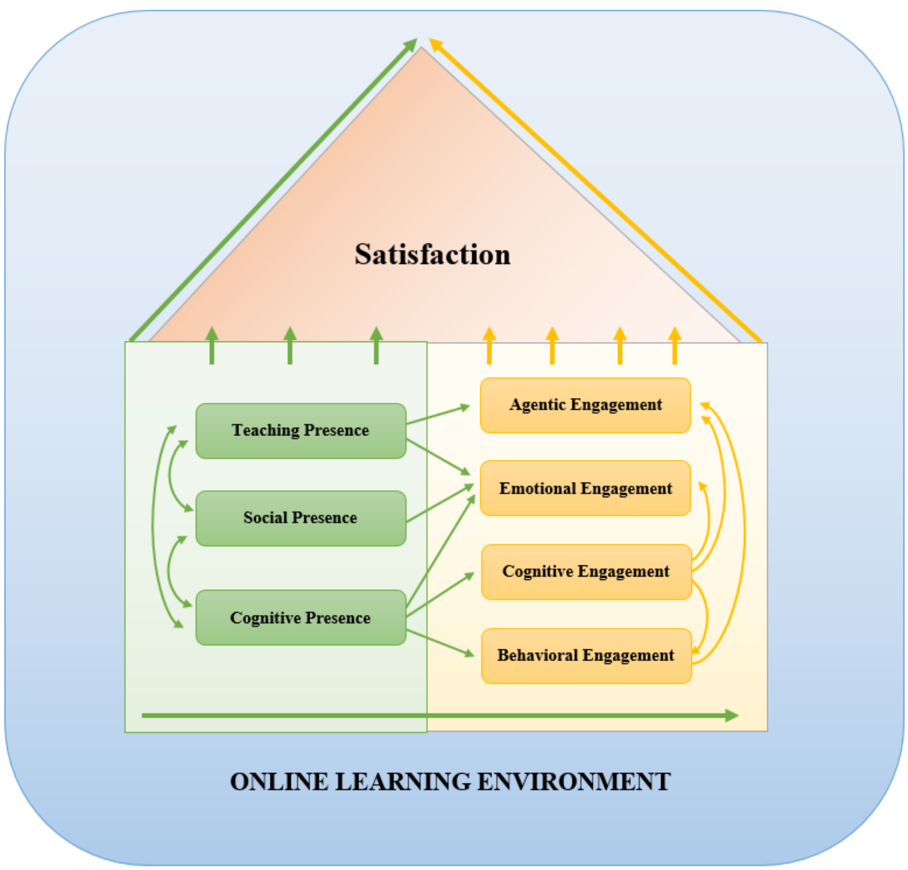

Figure 1. Hypothesized research model.

Methods

In this study, we employed a structural equation modeling (SEM) approach to investigate the structural relationships among the three CoI presences, four components of engagement, and student satisfaction. We collected data in fall 2016 through an online survey and included questions for each variable in the research model. The surveys were posted to the online course announcements area and were collected as part of the course evaluation procedure; completing the surveys was voluntary.

Participants

Students enrolled in an online graduate program at a large midwestern public university participated in this study. We collected data from four 3-credit graduate level online courses consisting of 15 sections with 13 different instructors. These courses are fully online, and the CoI framework is used to design these courses. One hundred and twenty-three students, ranging from 21 to 65 years old, participated in this study, reflecting a 63% response rate. All of the participants had taken at least one online course previously within the program.

Measurement Instruments

The survey for the three CoI presences, four types of engagement, and satisfaction were based on previously designed instruments. The Cronbach's alpha values were recalculated to ensure reliability of the instruments. Table 1 presents the variables, original sources, number of items implemented, and Cronbach's alpha calculated in this study.

Table 1.
List of Measurement Instruments

Variables		Items	Sources	Cronbach's alpha
Presence	Teaching presence	13	Arbaugh et al. (2008)	.96
	Social presence	9		.90
	Cognitive presence	12		.94
Engagement	Agentic engagement	5	Reeve (2013)	.84
	Behavioral engagement	4		.84
	Cognitive engagement	4		.80
	Emotional engagement	4		.91
Satisfaction		5	Kuo et al. (2013)	.89

The CoI questionnaire, developed by Arbaugh et al. (2008), was used to measure teaching, social, and cognitive presence. The instrument is comprised of 34 items on a 5-point Likert scale, and the validity and reliability of the instrument has been established. Cronbach's alpha values indicated high internal consistency: (a) teaching presence (13 items) = 0.94; (b) social presence (nine items) = 0.91; and (c) cognitive presence (12 items) = 0.95 (Arbaugh et al., 2008).

The engagement scale developed by Reeve (2013) was adopted for this study in order to measure engagement. Wording was modified to reflect the online context. For example, "When I'm in this class, I listen very carefully" was modified to "When I'm in my course, I am able to focus" to fit the fully online environments. The items' meaning did not change. Therefore, we did not need to validate the scale again. The instrument is comprised of 17 items on a 5-point Likert scale; the validity and reliability of the scale has been established. Cronbach's alpha values indicated high internal consistency: (a) agentic engagement (five items) = 0.84; (b) behavioral engagement (four items) = 0.87; (c) emotional engagement (four items) = 0.91; and (d) cognitive engagement (four items) = 0.72 (Reeve, 2013).

In order to measure satisfaction, an instrument developed by Kuo et al. (2013), based on Kuo, Eastmond, Schroder, and Bennett's instrument (2009), was used. The instrument is comprised of five items on a 5-point Likert scale. The reliability and content validity of the satisfaction scale were previously established, and Cronbach's alpha values were $\alpha = 0.93$ (Kuo et al., 2013).

Data Analysis

Regarding sample size requirements for SEM, it has been stated that minimum sample size can be 100–200 and five to 10 observations per estimated parameter (Boomsma, 1985; Bentler & Chou, 1987; Kline, 2011). Since this study includes 17 parameters, the sample size should be at least 85. In the present study, the data was collected from 123 people; therefore, the sample size is sufficient to conduct SEM analysis. The data were analyzed using SPSS 24.0 in order to conduct descriptive analyses to test the validity and reliability of the scores. First, outliers were determined, and eight extreme values were excluded from the data set of 123 ($n = 115$). We checked skewness and kurtosis values and found each variable to be approximately normally distributed. All relationships among the variables were sufficiently linear. Tolerance and variance inflation factor (VIF) values were calculated for multicollinearity. VIF should be less than 10, and tolerance should be above 0.2 (Field, 2009). VIF values were all well below 10, and the tolerance statistics were all well above 0.2; therefore, we found no collinearity within the data. Thus, the data met all of the assumptions for the SEM.

In SEM studies, variables are classified as either *exogenous*, which are like independent variables, or *endogenous*, which are dependent, intermediate, or outcome variables (Hoyle, 1995; Iacobucci, 2009; Kline, 2011). In this study, the proposed model includes five endogenous variables: satisfaction, emotional engagement, cognitive engagement, behavioral engagement, and agentic engagement. AMOS 24.0 was used for the SEM in order to assess the fit of the proposed model.

Results

Descriptive Statistics and Correlations Among the Variables

The descriptive statistics are presented in Table 2. All means were above 3.9. The standard deviations ranged from .45 to .95. The data met assumptions of normality for the purposes of SEM (Kline, 2011). The correlations among all of the variables were significant ($p < .01$).

Table 2
Correlation Coefficients and Descriptive Statistics

Measurement variable	Correlations of measurement variable							
	1	2	3	4	5	6	7	8
1. Teaching presence	1	.325*	.656*	.302*	.387*	.389*	.698*	.823*
2. Social presence	.325*	1	.641*	.464*	.411*	.433*	.528*	.530*
3. Cognitive presence	.656*	.641*	1	.561*	.515*	.555*	.799*	.820*
4. Behavioral engagement	.302*	.464*	.561*	1	.561*	.543*	.494*	.492*
5. Agentic engagement	.387*	.411*	.515*	.561*	1	.539*	.462*	.456*
6. Cognitive engagement	.389*	.433*	.555*	.543*	.539*	1	.589*	.450*
7. Emotional engagement	.698*	.528*	.799*	.494*	.462*	.589*	1	.863*
8. Satisfaction	.823*	.530*	.820*	.492*	.456*	.450*	.863*	1
Mean	3.95	4.35	4.22	4.52	4.00	4.45	3.93	4.21
Standard deviations	.978	.505	.589	.454	.636	.482	.825	.743
Skewness	-.986	-.492	-.411	-.699	.016	-.262	-.661	-.710
Kurtosis	.190	-.472	-.373	-.173	-.642	-1.310	-.185	-.333

***** $p < .01$

Assessment of Measurement Model

Based on the result of maximum likelihood estimation, Table 3 shows the goodness of fit indices for the research model. The χ^2 statistic, the goodness-of-fit index (GFI), the root mean square error of approximation (RMSEA), the adjusted goodness-of-fit (AGFI), and the comparative fit index (CFI) values are presented in Table 3. All values satisfied the recommended levels of fit (Baumgartner & Homburg, 1996; Hoyle, 1995; Klem, 2000; Kline, 2011).

Table 3
Fit Indices for the Research Model

Model of fit indices	Values	Recommended guidelines for perfect fit	Fit
χ^2/df	.95	$0 \leq \chi^2/df \leq 2$	Perfect
GFI	.98	.95 ≤ GFI ≤ 1.00	Perfect
RMSEA	.00	.00 ≤ RMSEA ≤ .05	Perfect
AGFI	.93	.90 ≤ AGFI ≤ 1.00	Perfect
CFI	1.00	.95 ≤ CFI ≤ 1.00	Perfect

Hypothesis Testing

Table 4 presents the analysis of the proposed relationships, and Figure 2 shows the resulting path coefficients of the research model. The structural model provided a good fit to the data; 14 of the 17 hypotheses were supported by the data. Among the exogenous variables, the effects of cognitive presence (CP), teaching presence (TP), behavioral engagement (BE), cognitive engagement (CE), and emotional engagement (EE) on satisfaction were significant (CP: β =.207, *p* = .001; TP: β = .395, *p* = .000; BE: β = .097, *p* = .029; CE: β = -.151, *p* = .000; EE: β = .427, *p* = .000), whereas the effects of social presence (SP) and agentic engagement (AE) on satisfaction were not significant (SP: β = .061, *p* = .161; AE: β = -.001, *p* = .979). Second, the effects of cognitive presence, teaching presence, and cognitive engagement on emotional engagement were significant (CP: β = .458, *p* = .000; TP: β = .307, *p* = .000; CE: β = .195, *p* = .001), whereas the effect of social presence was not (SP: β = .051, *p* = .439). Third, the effect of cognitive presence on cognitive engagement was significant (CP: β = .555, *p* = .000). Fourth, the effects of cognitive engagement and cognitive presence on behavioral engagement were significant (CE: β = .334, *p* = .000; CP: β = .376, *p* = .000). Fifth, the effects of behavioral engagement, cognitive engagement, and teaching presence on agentic engagement were significant (BE: β = .357, *p* = .000; CE: β = .277, *p* = .002; TP: β = .170, *p* = .029).

Table 4

Hypothesis Testing Results

Hypotheses	Path	Path coefficient	*SE*	*t*-value	*p*	Results
Satisfaction ←	CP	.207	.082	3.201	.001	Supported
	SP	.061	.065	1.403	.161	Not supported
	TP	.395	.037	8.171	-	Supported
	AE	-.001	.050	-.026	.979	Not supported
	BE	.097	.073	2.182	.029	Supported
	CE	-.151	.069	-3.374	-	Supported
	EE	.427	.056	6.952	-	Supported
Emotional engagement ←	CP	.458	.120	5.330	-	Supported
	SP	.051	.108	.774	.439	Not supported
	TP	.307	.056	4.587	-	Supported
	CE	.195	.103	3.237	.001	Supported
Cognitive engagement ←	CP	.555	.064	7.117	-	Supported
Behavioral engagement ←	CE	.334	.083	3.811	-	Supported
	CP	.376	.068	4.281	-	Supported
Agentic engagement ←	BE	.357	.120	4.175	-	Supported
	CE	.277	.117	3.136	.002	Supported
	TP	.170	.051	2.186	.029	Supported

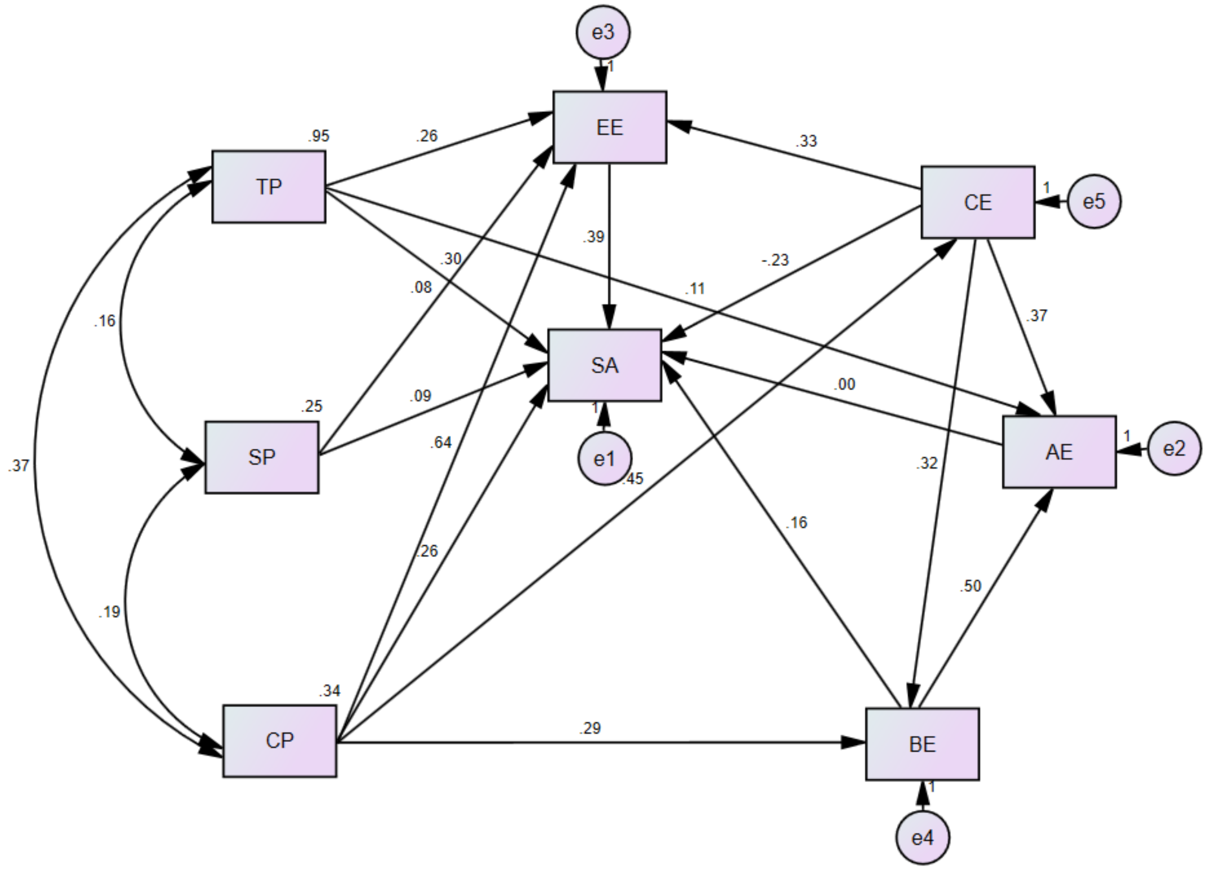

Figure 2. Hypothesized research model.

Based on the analysis of path coefficients, five endogenous variables were tested in the model. Cognitive presence, teaching presence, behavioral engagement, cognitive engagement, and emotional engagement explained 88% of the variance in satisfaction. The other four endogenous variables, emotional engagement, cognitive engagement, behavioral engagement, and agentic engagement, were explained by their determinants in amounts of 72%, 31%, 39%, and 42% respectively (Table 5). Namely, these dependent variables are predicted by the relationships between functions within the model with these percentages.

Table 5 shows the direct and indirect effects and standardized total effects, associated with each of the eight variables. The sum of the direct and indirect effects indicates total effect. According to Cohen (1988), an effect-size value greater than .5 is large, .5–.3 is moderate, .3–.1 is small, and anything smaller than .1 is insubstantial. The dominant determinant of satisfaction was teaching presence, with a total effect of .526. This was followed by emotional engagement and cognitive presence, with total effects of .427 and .420, respectively. The direct, indirect, and total effect values of the determinants on each dimension of engagement are presented in Table 5.

Table 5
Direct, Indirect, and Total Effects of the Research Model

Outcome	Determinant	Standardized estimates		
		Direct	Indirect	Total
Satisfaction (R^2 = .880)	CP	.207*	.212*	.420
	SP	.061	.022	.083
	TP	.395*	.131*	.526
	AE	-.001	-	-.001
	BE	.097*	-	.097
	CE	-.151*	.115*	-.036
	EE	.427*	-	.427
Emotional engagement (R^2 = .719)	CP	.458*	.108*	.566
	SP	.051	-	.051
	TP	.307*	-	.307
	CE	.195*	-	.195
Cognitive engagement (R^2 = .308)	CP	.555*	-	.555
Behavioral engagement (R^2 = .392)	CE	.334*	-	.334
	CP	.376*	.185*	.561
Agentic engagement (R^2 = .420)	BE	.357*	-	.357
	CE	.277*	.119*	.397
	TP	.170*	-	.170
	CP	-	.354*	.354

*$p < .05$

Discussion

This study investigated the structural relationships among the three CoI presences, four components of engagement, and satisfaction in fully online courses. The results of the study showed that the proposed model perfectly fits the observed relationships with online learners' engagement and satisfaction. Further, the dominant determinant of satisfaction was found to be teaching presence, which demonstrated direct and indirect effects on satisfaction. According to this result, we can infer that when teaching presence is strong, online learners are more likely to be satisfied with their online courses. The study findings are consistent with the results from previous studies (Arbaugh, 2008; Estelami, 2012; Jackson et al., 2010; Khalid & Quick, 2016; Ke, 2010; Kranzow, 2013; Ladyshewsky, 2013; Shea et al., 2003). Teaching presence, which begins prior to course implementation with curriculum design through the duration of the course with facilitation, is generally carried out by instructors, but can also involve peers as "teachers." It involves developing materials and scaffolds, monitoring and managing purposeful collaboration and reflection, and facilitating interactions in order to create meaningful learning (Garrison et al., 2010; Joo et al., 2013). Teaching presence has been shown to lead to increased cognitive presence and social presence (Kozan & Richardson, 2014). Therefore, effective instructional design and engaging teaching activities are extremely important in ensuring online learners' satisfaction.

The results also showed that cognitive presence was a main predictor of satisfaction, which coincides with results from previous studies (Akyol & Garrison, 2008; Giannousi & Kioumourtzoglou, 2016; Hosler & Arend, 2012; Kang et al., 2014). Online learners' understanding of their learning environment, cognitive activity, construction of knowledge to solve learning problems, and resource management to support all of these occur through cognitive presence. Moreover, it is possible to develop self-regulation of learning, ownership of learning, generative learning, and knowledge construction in the online learning process (Garrison & Arbaugh, 2007; Kang et al., 2014; Kozan & Richardson, 2014). Since these outcomes provide the focus and success of the learning experience, cognitive presence may be regarded as an important factor for students in terms of satisfaction. As stated by Akyol and Garrison (2008), cognitive presence is related to the purpose of students enrolling in an online course. Therefore, it should be taken into consideration as the determinant of satisfaction as well.

Contrary to expectations, the results showed that even though social presence was significantly correlated with satisfaction, it was not a significant predictor of satisfaction. A possible explanation for this might be that the students in this study are at the graduate level, enrolled in an online program, and have prior experience with online learning. They have purposefully chosen online learning rather than a face-to-face program, and most are probably aware of their learning preferences. Therefore, they could already have an emotional sense of belonging from previous courses with peers and a willingness to participate in social interactions by focusing on purposeful relationships. The average score for social presence was higher than the other two presences. Taken together, these results may indicate that social presence could have been a mediator for teaching and cognitive presence. As stated by Armellini and De Stefani (2016), social presence plays an important role in the construction of meaningful teaching and cognitive discourse, and both teaching presence and cognitive presence have "become social." Therefore, social presence may aid in enhancing satisfaction through interactions with the other two presences. Additionally, some researchers have outlined the misalignment and the problems with measuring social presence using the CoI framework. Accordingly, in order to obtain clearer results, social presence measures may need to be revisited and adjusted (Armellini & De Stefani, 2016; Kozan & Richardson, 2014; Lowenthal & Dunlap, 2014; Richardson et al., 2017; Shea et al., 2010). Moreover, it can be inferred that as stated by Kozan and Caskurlu (2018), the CoI framework should be refined with more theoretical and methodological considerations.

Emotional, behavioral, and cognitive engagement have significant effects on satisfaction. These results seem to be consistent with other research that found that engagement has significant effects on satisfaction in online learning environments (Bitzer & Janson, 2014; Shin & Chan, 2004; Swan, 2001). Emotional engagement was found to be one of the most important determining factors of satisfaction. Specifically, emotional engagement refers to students' having high interest and positive emotions towards teachers, peers, the course, and the learning experience (Fredricks et al., 2004). Therefore, providing and maintaining the students' emotional engagement for the entirety of the online learning process may contribute to students' overall satisfaction in online courses. Moreover, behavioral and cognitive engagement had small effects on satisfaction while agentic engagement had no significant effect. These results may be explained in part by the fact that these three engagement components are more related to the learning process than students' emotions.

Regarding the predictors of engagement, we found that cognitive presence is the dominant determinant of emotional, cognitive, and behavioral engagement, and had an indirect effect on agentic engagement. These results indicate that cognitive presence is very important to maintaining engagement. Cognitive presence includes constructing meaningful knowledge, higher order thinking, and active involvement in the learning process based on students' experience, interaction and communication (Kanuka & Garrison, 2004). Therefore, it encourages students to be deeply involved in their learning and facilitates the engagement of students in their learning (Joo et al., 2013; Wang & Kang, 2006). Moreover, cognitive presence promotes the development of self-regulation of online learners. As stated by Park and Yun (2017), specific types of motivational regulation strategies can be used to promote emotional, cognitive, and behavioral engagement of online learners.

Teaching presence also had effects on emotional and agentic engagement. As stated in the literature, instructor presence, the availability of feedback, the choice of activities, and/or instructional deficiencies in the design of online courses are directly related to instructor and instructional design and could affect student engagement (Kelly, 2012; Mason, 2011; Meyer, 2014; Sull, 2012). Specifically, we can infer that students' constructive contribution and emotional involvement in the instructional process may be directly influenced by these factors. On the other hand, it is surprising that, while we found significant correlations between social presence and engagement, social presence is not a significant predictor of emotional engagement. This finding is contrary to studies that have suggested that lower levels of social presence may cause frustration and impact affective learning negatively (Garrison et al., 2000; Garrison & Akyol, 2013; Wei et al., 2012). In this study, since the online classes were at the graduate level and had small numbers of students, some of which may have previously been in class together, the interaction level may have been increased in a shorter period.

Regarding interrelationships among the engagement components, we found that cognitive engagement was mainly a predictor of the other three—agentic, behavioral, and emotional engagement. As explained by Richardson and Newby (2006), students who take more online courses and take more responsibility for their learning become more cognitively engaged. Therefore, triggering cognitive engagement may lead to deep engagement in all aspects of the learning process.

Conclusions

Understanding the predictors of online learners' engagement and satisfaction based on the CoI framework can provide significant contributions to online education theory and practice. This study found that increasing learners' perceptions of levels of teaching and cognitive presence enhanced their satisfaction with emotional engagement in online courses. Therefore, online instructors and instructional designers should apply teaching and cognitive presence strategies as suggested by the CoI framework. Moreover, significant predictors of each of the four engagement components should be considered in designing online courses:

- for emotional engagement, cognitive presence, teaching presence and cognitive engagement;
- for cognitive engagement, cognitive presence;
- for behavioral engagement, cognitive presence and cognitive engagement; and
- for agentic engagement, cognitive engagement, behavioral engagement, and cognitive presence.

This proposed model could serve as a guide for the improvement of both satisfaction and engagement.

This study does present some limitations that should be addressed in further research. First, data were obtained from a single graduate program with a limited sample size that was obtained through convenience sampling. In order to enhance the degree of generalization of research results, this model should be tested on larger, multiprogram samples. Also, the subcategories of each presence could be added as predictors in the model to obtain more detailed implications in terms of theory and practice. Finally, the data were collected through self-report instruments. Further research could enrich the data sources by analyzing students' online behaviors to support the results. Future research could also address other variables such as academic achievement or demographic control variables (e.g., age, experience, gender), which are possibly related to students' perceptions of presence, engagement and satisfaction.

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Scribe Hero: An Online Teaching and Learning Approach for the Development of Writing Skills in the Undergraduate Classroom

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Abstract

This study examined whether writing skills could be taught to post-secondary students via online learning modules and what student perceptions of such a learning process were like. A pilot study of the modules—called *Scribe Hero*— was conducted in the Fall of 2017. Statistical analysis of quantitative data reveals an improvement in student writing skills following their engagement with the online learning modules. Thematic analysis of qualitative data revealed that the students were engaged by the experience, finding it educational and refreshingly different from in-class options. The feedback also suggested that user-friendly technology, tone of the online environment, incentivising meaningful feedback, and maintaining a sense of direct applicability of content are essential to capitalising on this teaching and learning methodology. Overall, the findings of this small-scale research study support further development of this technology while also offering lessons that can be transferred to other contexts for teaching writing.

Keywords:

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Scribe Hero: An Online Teaching and Learning Approach for the Development of Writing Skills in the Undergraduate Classroom

Students' ability to write academically has been identified as a bottleneck (Pace, 2017)—an area in which students consistently struggle or "get stuck"—in several undergraduate courses. This research study was borne out of a ubiquitous need to teach writing skills explicitly in an effective and timely way in the first-year undergraduate classroom. Many first-year, introductory-level courses tend to attract students from a variety of disciplines across a given campus—students enrolled include elective seekers and the curious alike. The specific course which served as the initial inspiration for this project was the first-year music history course, "Amadeus to Zeppelin: Music and Culture I," at the University of Guelph. Students in this course are required to learn foundational writing and research skills, which can be particularly burdensome for instructors. Finding ways to effectively integrate and to explicitly teach these skills in an engaging manner is a perennial issue, making it a prime venue for exploring the efficacy of a blended approach that includes online learning modules. Though we initially developed *Scribe Hero* for this music course, after opening use of the modules to professors outside the field of music, the pilot study soon included classes from ten different subject areas, rendering our first study of *Scribe Hero* a multidisciplinary endeavour.

Online learning and teaching have played a significant role in shifting the pedagogical, economic, and social landscape of post-secondary education in Canada. According to a 2017 survey, almost all Canadian colleges and universities offer online courses and most of these institutions have been doing so for fifteen years or more (Bates, 2017). With the rapid development of educational technologies, and an increasing demand for multiple pathways toward degree and diploma completion, teaching and learning online offers a viable solution for accommodating a diverse community of learners. More specifically, Heuer and King (2004) point to the unique attributes that online learning offers, such as "flexibility—anytime, anyplace—along with time for reflection and learners' anonymity." Drawing on these unique attributes, we set out to provide students with an online learning experience to develop their writing skills.

Scribe Hero is just that, a series of modules designed to enhance the development of writing skills in the undergraduate classroom. To explore the efficacy of our approach, and in the interest of continued development, we launched a pilot study intended to capture the learners' experience when engaging with *Scribe Hero*. The three central research questions we explored were the following:

1. In what ways, if any, did quantitative test scores change following the introduction of online learning modules?
2. What roles did feedback play in the online learner experience?
3. What were students' perceptions of the online learning module experience?

Review of Literature

Designing the Online Experience

In designing the *Scribe Hero* online modules, a strong pedagogical driver was creating a personalized learning experience for students. Recent research indicates that student engagement in multimedia learning is an approach that motivates undergraduate learners (Burke, 2010; de Freitas, 2012; Reimers, 2008; Zeni, White, Wilson, & Troop, 2018). Thus, *Scribe Hero* employed a mixed media approach, combining tasks that took place both within and were external to the online environment. In addition, numerous studies reveal that a sense of agency and autonomy in online learning is essential for student engagement (All, Castellar & Looy, 2016; Barab, Peetyjohn, Gresalfi, Volk & Solomou, 2012; Dalton 2000; de Freitas, 2012; Jalongo, 2007). Further, students are more engaged when a narrative or immersive element is present in a virtual environment (Asbell-Clarke & Edwards, 2016; Barab, Arici & Jackson, 2005; Hamari, Shernoff, Rowe, Coller, 2016). With these considerations in mind, the *Scribe Hero* modules were designed to reinforce what researchers have identified as the three key features of motivating online experiences: interactivity, agency, and engagement. (All et al., 2015; Erhel & Jamet, 2013; Hamari, et al. 2016; Qian & Clark, 2016; Rigby & Ryan, 2007)

Beyond the overall look, feel, and structure of online learning modules, we applied outcome-based language acquisition principles (Carter, 2003, 2007; Condon & Kelley-Riley, 2004; Gammill, 2006). In alignment with the developed learning outcomes, we established paraprofessional exercises—assignments that mimic job-based writing scenarios— throughout the modules. We based this design component upon research that showed that paraprofessional contexts frequently yield a higher level of student engagement than is normally generated through the use of more traditional assignment structures such as essays or stand-alone, abstract writing modules (Antonius, Brown, Todman & Safran, 2007; Gresty & Edwards-Jones, 2012). Similarly, interactive writing projects tend to encourage students to become more invested in the content and therefore assist in developing their own research interests (Antonius et al., 2007; Zhao & Wardeska, 2011). The incorporation of these elements into the pedagogical structure is also in keeping with best practices in online tutorial design (Blummer & Kritskaya, 2009; Erhel & Jamet, 2013; All et al., 2016; Hamari et al., 2016).

Additional design elements were drawn from the principles of strategy instruction (Graham, 2006). Strategy instruction is a cognitive approach to learning writing skills whereby writing is broken down into explicitly identified components, which are analysed and practiced, thus leading to familiarity and expert performance. Strategy instruction has been shown to have a significant impact on the quality of post-secondary student writing (Graham, 2006). Similarly, evidence suggests that small, “nested” assignments provide systematic support for students working toward larger, more complex writing projects (Bean, 2011). All these ideas were incorporated into the design of the *Scribe Hero* modules. For the learning outcomes of the four modules of *Scribe Hero*, see Table 1:

Table 1
Learning Outcomes, Scribe Hero

Module	Learning Outcomes
One: Planning/Pre-Writing	• Identify how to approach an assignment through brainstorming and pre-writing stages • Describe and demonstrate the difference between analytical and descriptive prose
Two: Writing	• Confidently apply verbs (how to choose good verbs), positive vs. negative constructs, and known-to-new tips for increasing clarity and flow • Construct effective paragraphs through a series of writing exercises
Three: Citation – *discipline specific*	• Explore the ethics of scholarly citation to interpret scenarios dealing with plagiarism and academic misconduct • Identify how to cite materials (either through quoting or paraphrasing) in a discipline-specific manner • Explain what a style guide is and how to use it effectively and in a discipline-specific manner
Four: Grammar	• Recognize that grammar is a *secondary* tool • Evaluate the grammar errors *after* the first stage of writing • Locate and correctly construct certain clauses and fragments • Develop different sentence types • Identify and employ various types of punctuation • Locate and correctly employ modifiers

Building the Online Modules

The *Scribe Hero* modules were built with *Adobe Captivate* software. Students chose to engage with the modules as one of three different characters, drawn from music-based professions: (1) a band publicist; (2) an arts magazine intern; or (3) an arts website music critic. The modules employed cut-screen videos to present a paraprofessional scenario and instructional videos with embedded, on-screen text to introduce specific skills and concepts. These videos were built using the shareware *Powtoons*. Links to these videos were then embedded into the Captivate shell, and the videos streamed from YouTube to prevent buffering due to the large sizes of the video files. Learning interactions and games drawn from the *Captivate* library were built to reinforce content taught in the instructional videos. Students were also provided with a "notebook," which was a resource external to the online environment that contained fill-in-the-blank notes that students could complete while watching the instructional videos. These notebooks also encouraged multiple learning modalities. Students had the choice to work with this notebook either as a form-fillable PDF or to print it off and work with it as a hard copy. Instructors were given the option of whether to collect the notebook from students to provide feedback.

The notebook was essential to executing certain online activities because it allowed for the housing of larger text examples, such as full paragraphs when discussing proper paragraph structure. Embedding these larger paragraphs into the online environment itself would have required the use of unreadable fonts or scrolling functionality that exceeded the capabilities of the *Captivate* environment. The notebook resolved these issues. It was also intended to serve as a reference tool that students could keep and return to after they had finished with *Scribe Hero*.

Instructional material was organized by using the same methodology for each module. First, students entered the online environment through their Learning Management System (LMS). There, they encountered scenarios via cut-screen videos. These videos prompted students to learn specific writing skills so as to be able to execute the paraprofessional tasks with which the video presented them. For example, students who chose the arts magazine intern narrative were told of a colleague caught and fired for plagiarizing. They were then challenged to improve their own knowledge of citation skills to avoid similar errors. This setup was followed by videos about the ethics and mechanics of citation. Students then completed activities and exercises that reinforced citation skills. At the end of each module, students were prompted to exit the online environment to complete a summary exercise. This exercise, found in their notebook, required them to synthesize and transfer the skills taught in the online modules to execute an error-detection or composition task. Upon completing this task, students were prompted to upload an image of their work to the LMS for evaluation by their professor either by taking a picture of their work (hardcopy of the notebook) and uploading it to the LMS or by taking a screen shot (digital copy of the notebook) and uploading it to the LMS.

All module elements were designed with accessibility concerns in mind. Students could engage with the content on any digital device (phone, tablet, or personal computer), although they were encouraged to use personal computers because functionality decreased when students accessed the material on other devices. All materials in the modules were tested for contrast to optimize visual accessibility, and all material presented in the videos contained both text and audio to optimize accessibility and to speak to a variety of learning modalities. The team also created additional transcripts for videos that were available for download when closed captioning was not also available. Accessibility was somewhat limited with the learning activities provided by *Captivate*, so the team developed alternate, fully accessible versions of each module. An entirely accessible version for Module 1 was ready for use when the beta project rolled out, providing enough lead time to develop subsequent modules should someone request the remainder of the game in an accessible format. The team has identified accessibility as an area that can and will be improved upon in future development.

When exported as HTML5 files, the *Adobe Captivate* shell was quite fragile and prone to freezing or failing, especially when embedded in the LMS. As a result, each of the four modules was broken down into smaller pieces. For example, Module 2 was delivered in four parts. (See Table 2.)

Table 2
Module 2, Structure

Part	Capstone Activity at End of Each Section	Skills Covered/Badges Earned	Instructor Feedback Provided
1	*Millionaire* Activity	• Using positive constructions • Verb usage • Linking verbs	No
2	Notebook Task	• Active versus passive voice	Yes
3	*Dinger Shot* Activity	• Paragraph structure	No
4	Notebook Task	• Known-to-New, sentence formation • Advanced paragraph structuring techniques	Yes

To maximize flexibility for instructors, *Scribe Hero* was designed with various feedback options. Within the context of the LMS, instructors were given the opportunity to provide as much written commentary as they wished on notebook materials uploaded by students. Instructors also had the opportunity to assign badges based upon student performance on end-of-module notebook exercises. The badges had no in-course value but were there to incentivise student engagement with the notebook tasks. Instructors were given five different badge levels from which to choose: needs improvement, bronze, silver, gold, or platinum. Elsewhere, badges were designed and programmed for automatic release based on Shareable Content Object Reference Model (SCORM) reported data (i.e., performance on quizzes and completion of given modules). Instructors could track student performance based upon badge acquisition. Also, badges were designed to stress inclusivity. For example, the badge for excellence for Module 2, Part 4 was named after Misty Copeland, the first African American female principal dancer with the American Ballet Theatre (see figure 1).

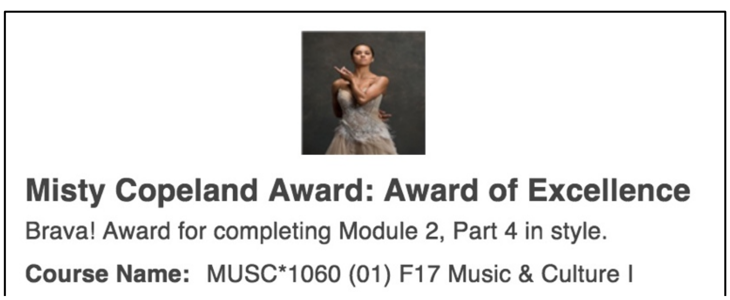

Figure 1. Scribe Hero badge, Module 2, Part 4

The intention was to have progression through the game be automated, with modules triggered by SCORM reporting. Unfortunately, an update to the University of Guelph's LMS two weeks prior to the beginning of the *Scribe Hero* project rendered SCORM reporting non-functional. Instead, the team chose to date release modules, meaning game flow was controlled by calendar date and not by student performance. Thus, the completion of a given challenge did not generate automatic badges, nor did it unlock subsequent portions of the online modules as had been envisioned. A more robust discussion of how this technical shortcoming affected the implementation of the online learning experience will follow in the results section of this paper.

Scribe Hero was developed from September 2016 – August 2017 with sound engineering completed during the summer of 2017. User testing was conducted throughout by research assistants, who were responsible for testing the effectiveness of the modules, commenting on the level of challenge, and troubleshooting the stability of the online environment

Methods

This research study used a mixed-methods approach. Students completed pre- and post-quizzes using Qualtrics to provide quantitative data. These Qualtrics quizzes were designed to assess students' basic knowledge of the content prior to completing the modules (pre-test) as well as the acquisition of learning outcomes after students participated in each module (post-test). The quizzes were accessed via a widget on the LMS homepage for each course. Students were given a week to complete the pre- and post-quizzes, with pre-quizzes released before students had access to the online modules and post-quizzes released after access to the corresponding *Scribe Hero* module had closed. Students were asked to provide a self-assessment of their skills on module-specific content and were then invited to complete a quiz to track their knowledge.

Qualitative data responses were gathered from user experience surveys administered following the completion of the online modules. In the survey, students were asked a series of open-ended questions aimed at eliciting their perspectives and insights about their online learning experience of the Scribe Hero modules. (See Appendix 1.) Student responses were coded by hand and categorized manually by the study's PIs to identify patterns and ascertain primary themes. The researchers engaged in a process of emergent thematic coding, wherein they read the text several times to identify themes.

A purposeful sampling strategy was used to recruit participants for the study. Specifically, the research team reached out to professors who had previously incorporated workshops from the University Writing Centre into their courses. As mentioned earlier, we received positive responses from faculty who taught courses on Art History, Biology, Chemistry, Family Resources and Human Development, Music History, Psychology, Toxicology, and History. This population increased our potential student sample size to n=1219. The participation of diverse disciplines necessitated design changes to Module 3. We adapted the existing module's focus on the Chicago Manual of Style to accommodate an additional three style guides: American Psychological Association, American Society of Chemists, and Ecological Society of America.

All participants in this study were undergraduate students, though the open-ended nature of many of these courses meant that students enrolled were at all levels of study, from first to fourth year. This pool resulted in a range of students with a variety of disciplinary and personal backgrounds. To comply with Research Ethics Board (REB) guidelines, students were required to complete *Scribe Hero* as part of their course instruction; this component counted as 3 to 5% of their overall grade, depending on the instructor. Though obligated to complete the tool, students could opt out of having their data included in the study. All data presented here, therefore, appears with the consent of the participants. Approval was received to run the study, with all participating faculty agreeing that completion of the online modules (as opposed to performance on quiz content) would result in a final participation grade. The modules launched as part of the curriculum in these courses in the Fall 2017 semester.

Researchers visited the participating classrooms to promote *Scribe Hero* during the first week of the semester and circulated additional emails and announcements through the LMS system to promote the study. A research assistant tracked student completion data over the course of the semester to provide grades to the students, but all subsequent data used by the research team was anonymized.

Due to the failure of the automated features of the modules, different professors chose to integrate *Scribe Hero* in different ways. For some instructors, monitoring submissions to the LMS and asking teaching assistants to provide feedback on those submissions was understandably too work-intensive, and therefore this feature of the modules was abandoned in certain courses. In fact, the music history classes were the only environments where students received feedback on end-of-module submissions along with badges based upon completion of module content. While on the one hand, these methodological variations introduced confounding factors, these changes also inadvertently generated an intriguing data set that allowed us to explore the roles of feedback in the online learning experience. Our results then draw upon mixed methods, reporting first on the quantitative data generated from the Qualtrics quiz scores, followed by the responses captured through qualitative data in the form of a post-game user-experience survey.

Results

Quantitative Data: In What Ways, if Any, Did Quantitative Test Scores Change Following the Introduction of Online Learning Modules?

Our analysis of quantitative data was limited by the low number of participants in some of the classes selected. To satisfy basic statistical requirements, only courses with sufficiently high (n> 15) sample sizes were included. (See Table 3.)

Table 3

Participants Involved in the Research Study Broken Down by Course

Subject	Course Number in Analysis	Overall Course Enrolment	Participants (Module 1)	Participants who completed all 4 modules
Art History	N/A	120	23	>15
Biology	Course 1	356	182	131
Chemistry	N/A	49	26	>15
Family Resources and Human Development	Course 2	377	224	175
History	N/A	20	11	>15
Music History – First Year	Course 3	87	59	36
Music History – Second Year	N/A	20	20	>15
Psychology	Course 4	176	76	49
Toxicology	Course 5	50	27	29

The quantitative data captured through comparison of Qualtrics pre- and post-quiz performance speaks directly to research questions 1 and 2, allowing us to track both student skill acquisition controlling for variations in students' basic level of knowledge at pre-test, as well as providing one way of viewing how variations in classroom use of the online modules may have been reflected in Qualtrics scores. Given the size of the participating population, the design did not include a true control group. That said, our analysis of the data does include different conditions that are compared to one another, thus providing a non-equivalent design without a control group. Module 3, which focused on citation skills, tested different types of content, because citation format in some disciplines differs significantly from others. In light of this variation in style, we decided that comparing data from this module would not provide a fruitful comparison. The data for Module 3, therefore, will not be considered in this paper. Because Modules 1, 2, and 4 tested similar content across all courses, we present the data pulled from Qualtrics quizzes relating to those modules here.

For Module 1, an analysis of covariance (ANCOVA) was conducted, examining post-test score differences across the five courses while controlling for pre-test individual differences of students' knowledge prior to completing the module. There was a statistically significant effect of pre-test scores on post-test scores (F 1, 562) = 232.277, $p < 0.001$), which supported our decision to control for pre-test scores in our analysis. The ANCOVA also identified a significant difference in performance at post-test across all five courses (F *4*, 562) = 5.391, $p < 0.001$) A Bonferroni post hoc test revealed that post-test scores were statistically significantly higher for Course 1 (53.496 ± 0.499, $p < 0.001$) compared to Course 2 (50.694 ± 0.450, $p < 0.001$) after adjusting for pre-test scores. No other discrepancies were detected (see figure 2).

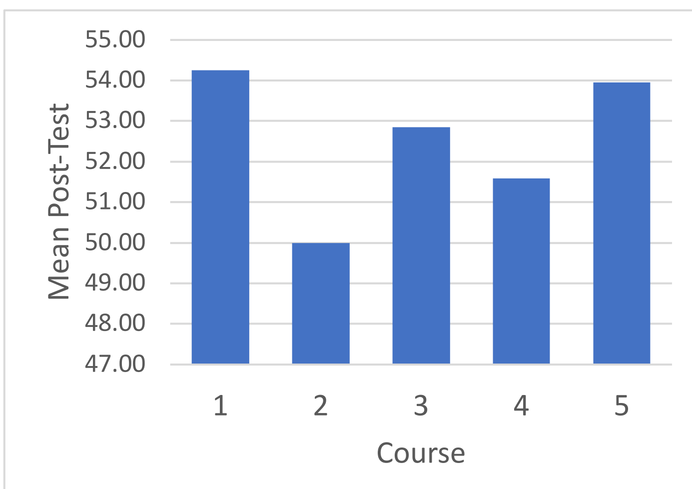

Figure 2. Comparison of mean test scores by course, controlling for pre-test scores, Module 1

A similar one-way ANCOVA was conducted on Module 2 to test post-test score differences across the five courses after covarying pre-test scores. Again, as expected, pre-test scores were significantly associated with post-test performance with students who had more prior knowledge performing better at post-test (F *1, 388*) = 232.723, $p < 0.001$). The ANCOVA controlling for pre-test scores revealed that all courses improved from pre- to post-tests, with significant differences in post-test performance across some of the courses (F *4, 388*) = 6.789, $p < 0.001$). Bonferroni post hoc test showed that the mean post-scores for Course 3 (25.349 ± 0.953,

$p < 0.05$) were statistically significantly higher than the post-score means for Course 1 (21.499 ± 0.499, $p < 0.01$), 2 (20.205 ± 0.414, $p < 0.001$), and Course 4 (20.703 ± 0.740, $p < 0.001$) (see Figure 3).

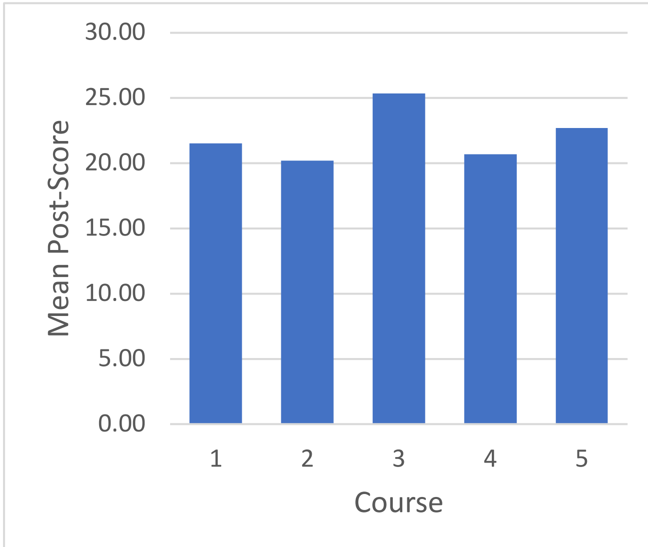

Figure 3. Comparison of mean test scores by course, controlling for pre-test scores, Module 2

For Module 4, a final ANCOVA was conducted using performance data on Module 4. This analysis again revealed that pre-test scores were predictive of post-test scores (*F 1, 414*) = 447.207, $p < 0.001$) as those with more prior knowledge performed better at post-test. After covarying pre-test scores, post-score means were shown to differ across the courses (*F 4, 414*) = 6.436, $p < 0.001$). Post-test scores for Course 3 (32.218 ± 0.936, $p < 0.001$) were statistically higher than those for Course 1 (28.138 ± 0.491, $p < 0.001$), 2 (27.341 ± 0.42, $p < 0.001$), and Course 4 (26.859 ± 0.802, $p < 0.001$). Ultimately, though the analysis suggested that all courses had an impact on post-test scores, this effect was associated only with the performance improvement for Course 3, which out-performed those of the other classes in Modules 2 and 4 (see figure 4).

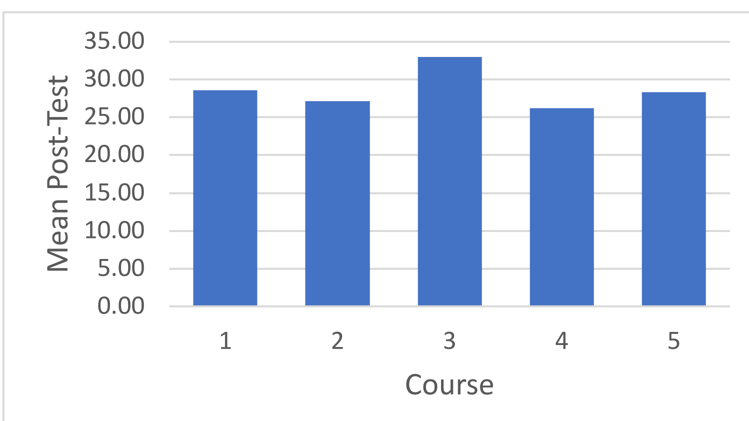

Figure 4. Comparison of mean test scores by course, controlling for pre-test scores, Module 4

Qualitative Summaries from the User Experience Surveys

What Were Students' Perceptions of the Online Learning Experience?

Students from all classes were invited to participate in the user survey after access to the online modules had closed. This condition also meant that students who did not complete any part of *Scribe Hero* could contribute comments, and some did so to justify their reasons for refusing to engage with the tool. Students were asked to report on aspects of their online learning experience that they deemed relevant or useful and to provide feedback about the ways in which the modules could be improved.

Overall, we received 232 responses to the user experience survey with answers submitted by students from all participating classes. Overwhelmingly, when asked which parts of the modules they enjoyed, 50% (146/292) of respondents identified *Scribe Hero's* instructional games as enjoyable, and 23.63% (29/292) identified the instructional videos as enjoyable. An additional 61 students responded when asked to identify which portions of the modules they did not enjoy. In other words, students were far more inclined to identify things they did not like than those they did like. For this question, 41.32% (150/363) of students identified the end-of-module notebook exercises and 32.51% (118/353) of students selected the narrative videos as particularly unenjoyable. When asked about level of difficulty, students were fairly uniform in their responses with 84% of students responding that module content was moderately easy to neither easy nor hard, and 78% of students expressed that writing exercises were moderately easy to neither easy nor hard. As far as subject-matter was concerned, students were evenly split about which subjects they would like to see covered in further detail, with "None, the subject matter was covered enough" receiving slightly more votes with 24.32% of student responses (72/296). At the conclusion of the survey, students were provided space to elaborate on their ideas through prose comments. 102 respondents provided commentary. These comments were grouped thematically by the authors, with an eye to isolating trends in feedback.

The first qualitative theme that emerged from the data involved elements of the online learning experience that students found engaging and effective. Several students spoke positively about the instructional activities and the instructional videos found in the online modules. From the open-ended responses gathered, students characterized their learning experiences as "enjoyable," "a fun change of pace," and "a fun break from other assignments." One student wrote of *Scribe Hero* that it was a "breath of fresh air [from] the suffocating stress of my other assignments" and other students reported that they appreciated the chance to practice their writing, stating "I now feel that I have better writing skills for sure," and that the "[experience] taught me a lot about scientific writing!" Another student wrote that the modules were "actually more helpful than I thought it would be." When asked about specific subject matter, students generally agreed that the pedagogical material had been covered enough. Only one student identified a specific concept—passive voice —as something that should have been covered in further detail. Another student identified that they "learned a lot, especially about citations." Many commented that modules helped them to improve their grammar.

A second theme revealed students' self-reflection on how *Scribe Hero* might fit into their university studies more globally. For example, students wrote that the experience "really made me realise that I am not as solid as I thought I was with writing," and that it was "much preferred over writing an essay." Two students responded that the online modules should be assigned to all incoming first-year students in some capacity, one even commenting that "I think something like this should be [administered] to all incoming students during their summer before starting their first year." This student noted that providing these modules to students before they arrived on campus would give them time to self-select if they needed reinforcement of these skills and give them the opportunity to complete the material on their own time, outside of the stresses of coursework.

A third theme highlighted the long-term benefits of the experience and the transferability of the subject matter. For example, one student noted, "I think it has helped me a lot so far, and I found myself referring to it a lot when doing my final project" while another pointed out that, "overall, I found the [note]book the most helpful because I can look back on it when I need reminders on the subjects." Another student reported that *Scribe Hero* was "very helpful when writing paper [*sic*] such as literature reviews." Another student responded that "I think a lot of the information that was taught on [*Scribe Hero*] is very beneficial for the rest of my undergrad as well as for my career."

Challenges and Areas for Improvement

Several students spoke of the challenges and areas for improvement within the online learning environment. The first area identified by students were the end-of-module notebook exercises. One student reported, "the writing exercises were good, but I found it time consuming…If there was a quicker way…it would be much easier." Another student wrote that the notebook was too "difficult" to work with, another that it was not very "interesting." Two students requested the notebook be delivered as a word processable document, rather than a form-fillable pdf, to make it more user-friendly.

A large number of students also discussed the integration and tone of narrative content across the online modules. Several students suggested an improvement to the paraprofessional premise presented through the cut-screen narrative videos. Some reported that the videos and final writing exercises "needed to be more seamlessly integrated" while other students suggested eliminating the narrative content altogether, claiming that it detracted from the effectiveness of the modules. Additionally, students were displeased with the tone in the videos. There were those who were critical of it, commenting, for example, that "the videos were a little childish," and "the tone of the videos seemed appropriate[*sic*] for early high school students, not really university level." Other students identified the narrative tone as detracting from their investment in the modules, writing "it felt way too childish and because of this ultimately made me unmotivated to complete the modules," and "it was condescending/demeaning." Overall, the majority of students who completed the survey indicated that the video content was not well targeted to a university audience—despite being instructionally sound, the storyline often seemed silly.

A final theme identified by students involved a desire for more feedback and for more personalised control over their progress through the game. Several students requested feedback be provided directly to them in the context of the online environment in real time. They wrote, "there were no signs of where you go wrong on games, and you just have to keep guessing until the next level pops up." Other students requested "a mark to see how well we have done" be embedded into the module itself, while another student suggested a "tracking system" or checklist be inserted that would allow students to self-monitor progress. Several students suggested the material would have been more engaging had they been able to complete material at their own pace. One reported that he should be able to "start or complete all modules at any time." Another wrote that the options for the modules should be "more diverse." Another responded that "the set up" did not allow students to “complete the game when they had free time,” meaning the date-dependent delivery of the modules forced students to engage with *Scribe Hero* when other assignments, tests, and exams were the higher priority.

Discussion

The quantitative data indicates that students’ acquisition of writing skills was enhanced following their interaction with the online learning modules. For those students who chose to complete all four modules, there was a consistent improvement in post-test scores across Modules 1, 2, and 4, regardless of which course they were enrolled in, suggesting that their grasp of writing skills improved. It is also possible that this improvement was the result of an increased emphasis on writing skills brought about by the implementation of the *Scribe Hero* modules in the course, or as a direct result of the testing effect. In other words, testing students on writing skills may have in and of itself made them more aware of, and more focused on, those elements between pre- and post-quizzes. Though we cannot say definitively whether or not students would have improved without *Scribe Hero*, the fact that they improved significantly in some courses more than others suggests that certain implementations of the online modules were more effective than others. For example, students in Course 3 received specific, frequent, and timely comments on their online submissions from their instructor, while the other classes did not. Also, students in Course 3 were the only group in this study to receive badges directly related to the quality of their submissions. This group showed a significantly higher rate of improvement in scores overall compared to the other classes sampled, suggesting that the intervention, when used with full functionality (including feedback and badges) was far more efficacious than the altered versions of the tool. Also, several students’ reflections in the user experience survey connected their increased skill level with the content taught in the online learning modules, suggesting *Scribe Hero* played a role in improving some students’ knowledge of writer’s craft.

The results from Course 3 suggest that feedback incentivised learning throughout the process and resulted in improved engagement on the part of students. Indeed, despite the moderate autonomy provided by the online learning experience, students from across the study still articulated their desire for feedback of some kind. The students’ comments emphasised their interest in knowing how they performed on a given task in real time, as well as their desire to have a clear sense of their overall progression through the material. Therefore, feedback is important to student engagement in an online learning environment, thus presenting a significant challenge when teaching writing to larger classes. If approaches such as *Scribe Hero* are to be useful to instructors of large classes—one of the primary goals of design—then finding a way to generate automatic yet meaningful feedback will be essential both for professor uptake and for student performance.

Scribe Hero, then, represented a diversion for some students and an opportunity to learn while “having fun.” For others, certain aspects of the *Scribe Hero* experience were not enjoyable, running contrary to the team’s assumptions. For example, the opposition to the arts-based scenarios and to the design of the modules in general meant that some students dropped out of the study or were less receptive to the lessons delivered. Indeed, the greatest complaints seemed to focus less on the pedagogical materials and more on the manner in which they were delivered, suggesting that graphics, sound engineering, and immersive elements such as narrative are essential in designing online modules for the discerning post-secondary student. Setting the correct tone, especially, requires that the material strike a balance between being fun and engaging, while still being challenging but not overwhelming. When introducing material through the online environment, questions of the sophistication of the delivery mechanism must be taken into serious consideration. Based upon student reports, if the technology or the online learning environment does not live up to expectations, it can create barriers to student learning.

The suggestion by students for further customisability seems to be a fruitful path forward. Allowing students the opportunity to progress at their own pace or having some sort of competency-based design would certainly enhance this type of approach. Fundamental to our future plans will be ensuring the dependability of the modules and the usability of design, but also the value and significance of building the modules in a manner whereby the pedagogy drives the technology and not the other way around. Designing the online experience with a focus on learning outcomes will help to facilitate a process of curating and selecting appropriate tools, processes, and strategies for use within the modules, structures that will be essential for any large-scale application of this sort of online learning template. Though the team considered these elements during the development phase for *Scribe Hero*, budget limitations and access to skilled personnel greatly curtailed the extent to which material could be developed. These lines of decision making can and will be a primary focus for future development.

Conclusions

Our research study, which ultimately served as a pilot project, indicates that undergraduate students' writing skills improved as a result of engaging in the online modules. Additionally, the results of this project suggest that many students both appreciated and enjoyed the flexibility and format of online learning as a means for developing writing skills that are essential to success in most, if not all, undergraduate courses. The data revealed that many students enjoyed the game-based elements and videos embedded in the modules. These findings, therefore, suggest that homing in on further online methods and approaches to teach writing skills will be an important and interesting avenue to consider in future development.

Another important consideration moving forward is that the teaching and learning experience of these online modules was enhanced through the periodic insertion of formative instructor feedback. Automation of some of this feedback will be necessary for wide-spread uptake of this sort of technology by instructors, whilst maintaining a feel of customization for the learner. Also, additional technological tools and approaches will be explored in subsequent design and development to find a more effective and integrated solution. In some cases, the technology impeded rather than enhanced or supported the learning, which is an area that warrants further investigation prior to any (re)development.

Overall, participants identified three key aspects for an effective online learning experience: the incorporation of competency-based elements, the compatibility and user-friendly nature of the technology, and the direct applicability of taught skills rather than remedial writing instruction. This small-scale research project provides us with some evidence to build on in future design, development, and delivery, and it offers many lessons that can be transferred to other undergraduate classrooms cases, in particular music and arts-focused spaces.

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Appendix I

Open-Ended User Experience Survey Questions:

Q1 Which of the following parts of *Scribe Hero* did you enjoy?

- **a)** The narrative videos
- **b)** The instructional videos
- **c)** The instructional games
- **d)** Notebook exercises

Q2 Which of the following parts of *Scribe Hero* did you not enjoy?

- **a)** The narrative videos
- **b)** The instructional videos
- **c)** The instructional games
- **d)** Notebook exercises

Q3 How easy would you say the instructional games in *Scribe Hero* were?

- **a)** Too easy
- **b)** Moderately easy
- **c)** Neither easy nor difficult
- **d)** Moderately difficult
- **e)** Too difficult

Q4 How easy would you say the writing exercises in *Scribe Hero* were?

- **a)** Too easy
- **b)** Moderately easy
- **c)** Neither easy nor difficult
- **d)** Moderately difficult
- **e)** Too difficult

Q5 Which subjects from *Scribe Hero* would you like to see explained more?

- **a)** None, the subject matter was covered enough.
- **b)** Part on descriptive vs. analytical prose
- **c)** Part on passive voice
- **d)** Part on citation
- **e)** Part on grammar

Q6 Which part(s) from *Scribe Hero* did you like the least?

- **a)** Nothing, the game was well balanced.
- **b)** Part on descriptive vs. analytical prose
- **c)** Part on passive voice
- **d)** Part on citation
- **e)** Part on grammar
- **f)** The notebook

Q7 Which of the following platforms/delivery systems would you prefer for *Scribe Hero*?

- **a)** Embedded directly in your LMS
- **b)** As an extension to the online textbook materials
- **c)** As a stand-alone app

Q8 Anything else you'd care to share about your experience with *Scribe Hero*?

Book Review of *Blended Learning in Action: A Practical Guide Toward Sustainable Change*

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Book Review of *Blended Learning in Action: A Practical Guide Toward Sustainable Change*

Tucker, Wycoff, and Green's *Blended Learning in Action: A Practical Guide Toward Sustainable Change* provides useful information for K-12 educators looking to differentiate instruction in a blended learning environment. Tucker is an experienced Google-certified teacher, best-selling author, trainer, consultant, and speaker. Wycoff is a specialist in technology integration and blended learning who works as a school leader and learning platform designer. Green is an adjunct professor, speaker, nonprofit board member, and consultant. All are experienced in blended learning integration in the K-12 environment, and the information they present in this book is in keeping with literature stressing the importance of differentiation in increasing student achievement, particularly when paired with Understanding by Design (UbD).

While this book is most appropriate for those in a K-12 learning environment, it would most likely be useful for those designing lessons for postsecondary instruction as well, particularly as students who are accustomed to blended personalized learning move into higher education settings. This book does help with informing those who make the overall instructional and financial decisions, but the most helpful portion of the book, the second half, is powerful for teachers looking to use blended learning to individualize instruction to better meet the interests, preferred methods of instruction or assessment, skill levels, or other modifications or accommodations for specific student social and educational needs. The information here is not only helpful to teachers new to personalization, but because it provides various ways to address students, create smaller learning communities within the class, and adjust the content and delivery of information, it could also help teachers who want to expand their repertoire of techniques for differentiation. Since planning is paramount in using these models effectively, this gives teachers the opportunity to slowly introduce and practice new ways of using them in the classroom. Also, each chapter has book discussion questions, and several sections include useful templates for planning and graphics for timelines of making the shift from the traditional classroom to digital differentiated learning and information, such as the roles of stakeholders, the visioning processes, and elements of effectiveness in blended learning. The vocabulary and style make the information conveyed very accessible. These elements make this book ideal for a summer- or semester-long book study for a leadership team, school committee, group of educational technology consultants, or any other group that would utilize this information to make a shift to individualized blended learning.

The first half of this book is important for administrators and technology coordinators who ultimately make the decisions about when and how to make a shift to a blended learning culture, as well as what hardware and platforms to purchase. However, the real power of this book for teachers and professional development providers lies within Chapters 6 through 13. While the authors sprinkle in useful information in the form of applications for teachers and leaders, teacher vignettes, and real-world examples, it is when they begin to explain the benefits and drawbacks to three major differentiation techniques which blended learning allows for that the true benefits of this work become apparent.

The authors begin with a breakdown of timelines necessary for fostering a blended learning culture within a school system, encouraging risk-taking and empowerment of both students and educators as active learners. This begins with collaboratively building a vision, assessing the realities of the current system, designing this transition and what it will look like, and prepiloting a test run of intended changes. Individualization isn't limited to students here but also involves looking closely at the needs of the educators who will be a part of this process and meeting their technological and pedagogical needs. Based upon these needs, the school will then decide on productivity suites, learning management systems, devices, applications, and other resources involved.

An important shift in the book takes place when the authors describe the power of digital curricula to reduce the time needed to personalize and differentiate instruction and give timely feedback to students. Teachers must prepare students with the technical and self-learning advocacy skills they need in a blended learning classroom so that they can learn to understand and address their own learning needs. This self-sufficiency allows the teacher to move into facilitator or coaching role and help the students to be even more self-directed. Tucker, Wycoff, and Green remind readers that "through personalization, students become primary stakeholders in their learning" (p. 67). Obviously, this places significant emphasis on planning, for which they suggest using the UbD framework with ongoing formative assessments to gauge student progress and adapt the learning to each student's needs. This opens their discussion in the following chapters of three major types of differentiation that blended learning supports—the station rotation model, the whole group rotation model, and the flipped classroom—and gives examples, benefits, and drawbacks to each.

Station rotation allows a teacher to develop smaller communities of learning within the class, engage students in the learning in different ways, and have more personalized direct interaction with students to target different skills. However, the teacher must consider and plan for assessments to determine student understanding of the objectives, roles of the students and teacher, and student understanding of the skills, as well as how to save time in giving direction to the students and ensuring that students have other activities ready when they finish so as not to become distractions to the other students.

Whole group rotation, on the other hand, uses online elements to differentiate pace and do away with the need for students to move to different stations around the room. It also allows the teacher to have individualized time with students while others are working. The drawback here is a need for software or some technique to monitor student computer use to ensure students remain on task.

The *flipped classroom* model also allows for individualization and differentiated pace since students can access information outside of class and have the teacher for help as needed while they work on activities in class. The challenges this presents involve keeping students motivated and engaged with an activity by offering a connection or critical thinking activity with it and dealing with lack of student access to technology outside of the classroom.

The authors advocate using a blend tailored to the needs of the class, but they do not offer adequate advice on the best methods for specific types of learning goals. Teachers and administrators can sometimes focus on technology for the sake of innovation, losing sight of the fact that these techniques are meant to help meet student needs. The authors emphasize that the learning objectives, not the technique or technological aspect, should still be what drives the lesson. With that in mind, it would have been more helpful to see how the methods align with depth of knowledge levels. Overall, however, this book offers helpful information on personalized learning in the blended classroom.