The purpose of the Online Learning Consortium (OLC) is to help learning organizations continually improve the quality, scale, and breadth of online programs according to their own distinctive missions, so that education will become a part of everyday life, accessible and affordable for anyone, anywhere, at any time, in a wide variety of disciplines.

Attributions should be made with a full citation including the link to the article or issue available by search at the *Online Learning* webpage, http://onlinelearningconsortium.org/publications/olj_main. Please direct all inquiries to olj@onlinelearning-c.org.

To learn more about submission guidelines for authors and subscription information, please visit: http://onlinelearningconsortium.org/publications/olj_guidelines.

Publications assistants:

Michael Mastroianni: Copyeditor

Beth Meigs: Layout Editor

Printed in the United States of America 0 9 8 7 6 5 4 3 2 1

Standard Book Number 978-1-934505-11-3-1-934505-11-0 (print) International Standard

Book Number 978-1-934505-12-0-1-934505-12-9 (online)

The Online Learning Consortium, Inc. is a consortium of higher-education providers sharing the common bonds of understanding, supporting and delivering education via asynchronous learning networks (ALNs). With the mission of providing learning to anyone anywhere, OLC seeks to provide new levels of learning capability to people seeking higher and continuing education. For more information about OLC please visit: http://onlinelearningconsortium.org.

Online Learning

Volume 19 Issue 3 – June 2015

Table of Contents

A JOLT of New Energy for the Scholarship of Online Teaching and Learning

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

I warmly welcome our readers to a fresh issue of the newly expanded journal, *Online Learning (*which we are now abbreviating as OLJ). As many of you know we recently merged OLJ with the Journal of Online Teaching and Learning (JOLT), published by the MERLOT organization with which the Online Learning Consortium (OLC) is a frequent collaborator. This merger brings with it a new wave of energy and enthusiasm as we join forces to continue to enhance scholarship and research in online teaching and learning. I offer a special welcome to our new authors, reviewers, and readers from JOLT and look forward to the many opportunities that the combined resources of the two publications will offer us. We have already seen some of these opportunities realized with a recent expansion of submissions to the journal. Fortunately with more than one thousand new reviewers from the ranks of MERLOT we will be well prepared to handle the greater volume.

This issue of OLJ reflects our recent growth with an expanded selection of new articles. These papers examine a range of related themes crucial to conceptual and practical development of online learning. These themes include further defining and expanding our understanding self-regulated learning, investigations of lecture, video, and the establishment of forms of presence, community, and collegiality in online environments.

Community of Inquiry, Avatars, and Video

In the first article Suzanne Hayes of Empire State College, Sedef Uzuner Smith of Lamar University and Peter Shea (yes, that's me) of the University at Albany present new work on the Community of Inquiry model (Garrison, Anderson, & Archer, 2000). In this paper the concept of "learning presence" is further articulated to describe regulation of online learning processes. It is nearly universally recognized that collaborative online learning environments present challenges for the regulation of learning. This paper provides some much-needed guidance including a broader framework for understanding not only self-regulated learning, but also co-regulation and socially shared regulation in the kinds of small group activities commonly designed in a Community of Inquiry-based instructional approach. This work reflects the sophisticated thinking of my colleague Suzanne Hayes, supported in this paper by her collaboration with Sedef Uzuner Smith, both of whom I have worked with for many years. I thank them for taking up the effort to further develop the concept of learning presence developed in our

previous collaborations and to advance the CoI framework. Any investigator using CoI as a theoretical foundation would do well to read this piece as the study represents a nuanced and informed conceptualization in the very large and sometimes uneven field of CoI research.

A second paper examining components of the CoI model authored by Jennifer Cunningham of Kent State University seeks to investigate the role of digital avatars in supporting social presence in online discussion forums. Hypothesizing that avatars might help to recreate some of the lost dynamics of face-to-face interaction the researchers, using grounded research methods, examined student responses to survey questions reflecting dimensions of the social presence construct. They found little direct evidence that avatars enhanced the salience of interpersonal relationships or the sense of interacting with real people, but rather affirmed the importance of the role of the instructor and teaching presence, in developing an environment conducive to positive social presence. However, additional research methods and approaches may be needed to confirm these findings and other designs may disclose that the potential of avatars for supporting forms of online presence may be mediated through other processes.

Mediating processes featuring other research methods are aspects of two other studies in this issue both of which look at the use of video as the medium of instruction in online discussion environments. Investigating additional dimensions of the CoI framework Cynthia Clark, Neal Strudler, and Karen Grove of the University of Nevada examined asynchronous video posts and synchronous video conferencing in comparison to the largely text-based discussion platform currently used at their university (and many others). Utilizing a randomized experimental design and self-report outcome measures the researchers found that perceptions of both social and teaching presence improved with video-enabled instruction. Unlike the previous study of avatars, the use of video-enabled discussion, both synchronous and asynchronous, has positive effects not only on social presence but also on other related measure of sociability and social space. These findings should prove important to other researchers with interest in the use of technologies that lead to better collaboration in the service of online knowledge construction.

Another related study in this issue, authored by Jennifer Hegeman of Missouri Western State University investigates the use of video in online mathematics instruction. The author notes that institutions of higher education continue to struggle to improve student outcomes, that online outcomes especially at the community college level are often worse than classroom outcomes, and that mathematics is a particularly difficult content area for online delivery despite ongoing growth of such courses. Given this constellation of challenges, we must welcome efforts to investigate course designs to improve online math education. Hegeman's study indicates that increased teaching presence, as opposed to what might be called "publisher content presence", has positive effects on learner outcomes. These findings are in alignment with conceptual models advanced by work conducted previously indicating the direct and indirect benefits of teaching presence on significant learning. Hegeman's work adds specificity with regard to the benefits of faculty generated, video-based, direct instruction in the mathematics context. A good linking between theory and empirical research is reflected in this article and the work represents a fertile base for additional investigation.

Blended and Experiential Learning

Two related articles discussing blended learning also appear in this issue of the journal. The first of these by Cheryl Murphy of the University of Arkansas and John Stewart of West Virginia University again examines the use of video but in a different context. This study compares the provision of choice of

either recorded video or face-to-face lectures with physics students. Using a within-group design with 168 students the authors allowed students to choose to continue to come to class to view lectures or to watch them online with a subsequent reduction in classroom seat time. Results suggest that this increased flexibility was accompanied by no serious downsides with solid support for the efficacy of video lectures, even in a demanding introductory physics class. With regard to initial difference between students the authors conclude that initially high achieving students remained high achieving, while lower achieving continued to struggle, though to a lesser degree. The study finds that students self-selecting higher levels of video lecture were lower achieving and less engaged before face-to-face lecture was replaced by video. These students were somewhat more engaged and slightly higher achieving after the video option was made available. This result suggesting an aptitude-treatment interaction deserves further study perhaps with additional considerations for the needs of the less engaged lower achieving group, the duration of the treatment, or other design considerations that get at "why" questions.

The second paper examining blended learning is by Robert Heckman, Carsten Osterland, and Jeffrey Saltz of Syracuse University. Experiential learning is on the minds of many these days, for example in New York State the current executive budget makes experiential learning a requirement for graduation from both the State University of New York and the City University of New York, systems that together provide higher education to almost one million learners. The work of these authors applies boundary theory to explore how online and blended environments can bridge academia and the workplace in order to facilitate experiential learning. This paper identifies three principles for creating internships that leverage blended learning by creating productive boundary spaces between work and school. These principles hold much promise for improving internship experiences from both academic and industry perspectives. This insightful model provides a vehicle for assessment and communication that is difficult to achieve in the absence of blended learning. SUNY and CUNY officials responsible for the many thousands of internship experiences that may be soon be mandated for graduation should take note as should other researchers of blended learning, experiential learning, and boundary theory.

In another article that addresses the relationship between technology-mediated instruction and workplace learning Ingrid Provident, Joyce Salls , Cathy Dolhi, Jodi Schreiber, Amy Mattila, and Emily Eckel of Chatham University employ transformational theory to examine the context of post-professional doctoral students in occupational therapy professions. Consistent with the theory the authors document the process these learners experienced traversing phases reflecting disorientation and dilemma, critical discourse with peers and instructors, and new meanings and intentions to act based on their experiences with the curriculum. Interesting parallels exist between this theoretical framing and the Community of Inquiry (CoI) model. The stages of transformation identified here seem conceptually related to the phases of inquiry in cognitive presence component of the CoI model. For example disorientation/dilemma resembles the triggering event in the early stages of inquiry in CoI. Other elements of the two models are also consistent, including exploration, integration, reflection and resolution of the initial triggering event/dilemma. Yet no references are made to CoI in the work of Provident and her colleagues. One wonders if a productive conversation might be on the horizon between those working with transformational theory and Community of Inquiry researchers to better articulate the commonalities and distinctions between the two models in the context of online learning.

Faculty Issues

Aimee LaPoint Terosky of Saint Joseph's University and Chris Heasley of Drexel University also investigate challenges related to community in this issue of OLJ but this time from a faculty development perspective. Faculty attitudes toward online learning remain problematic with numerous studies indicating a majority of college professors continue to hold negative opinions (e.g. Allen & Seaman, 2010; Jaschik & Lederman, 2014). Terosky and Heasley argue here that a stronger focus on developing a sense of community and collegiality in faculty development efforts would help engage faculty more deeply in online instruction but that the seven professors in their research setting found such community almost non-existent. No doubt there are many colleges where faculty development efforts for online teaching are not a high priority and the sudden growth in the online programs reported at the institution in this study may not have been accompanied by additional faculty support resources. However, the deeper questions that are raised by this paper relate to developing meaningful social support for the consideration of authentic teaching philosophies and coherent teacher identities brought on by the transition from classroom to online teaching. What does it mean to be an online educator? Are authentic faculty roles inextricably linked to the dynamics of the classroom? Many would argue that they are not but much opportunity remains to be realized in this area of scholarship.

The next study in this issue presents inquiry into fertile issues of a different sort; these are related to stereotyping in online education settings. While a broad spectrum of opinion exists with regard to the dynamics of online communication at least one viewpoint suggests that the relative anonymity typical of online interaction may help reduce some of the negative dimensions associated with bias found in face-to-face settings. Although a host of caveats must be mentioned (flaming anyone?) some would suggest that the elimination of physical cues that may trigger stereotypical responses could have beneficial effects in redressing longstanding issues related to, for example, the Pygmalion effect (e.g. Rosenthal & Jacobsen; 1968) and extensions to this (e.g. Boser, Wilhelm & Hanna, 2014; Rubovits & Maehr, 1973) in education. Such effects include negative prejudicial associations that shape subsequent disadvantageous instructional choices with both immediate and longer term outcomes. While not always acknowledging the full complexity of the aforementioned online interactional dynamics, Wendy Conway and Sonja Bethune of Ashford University present an interesting investigation of implicit racial bias among online instructors in which they utilize a well-known and validated version of the Implicit Association Test with a convenience sample of online instructors. They found that their sample of online faculty do reveal some of the same kind of racial bias that is found in the general population using this same instrument. The additional insights and evidence here are that the anonymity of the online environment may not inhibit racial bias. These results are important for the same reason cited by Rosenthal and Jacobsen in the 1960s, Rubovits and Maehr in the early 70s, and Boser et.al more recently. For example, Boser and his colleagues found that secondary classroom educators believed African American and Hispanic students were 42- 47 percent less likely to graduate from college than their white peers. Volumes of research indicate that such biased beliefs can lead to lower expectations among educators that negatively shape actual outcomes. We need to be aware of the ongoing existence of potential racial bias in online settings to begin to understand and address it to avoid the same issues that confront education more broadly beyond online settings. This piece contributes to that awareness and much more work needs to be undertaken to address it.

Review of Literature

The final paper in this issue examines interaction, a central theme in online education. The main focus of this review by Hong Zhou of the University of Texas is on the characteristics of the literature examining formal interaction in what are commonly referred to as "threaded discussion" boards used in most online courses. Zhou systematically searched peer-reviewed literature for articles from 2000-2014, located more than 500, and reviewed 42 that met her eight inclusion criteria. The findings here provide a snapshot of common variables investigated in online discussion and some general findings that span multiple studies. This review is helpful in that it is a launching point for others conducting studies investigating this very common instructional tool. This paper contributes to efforts going forward with nine categories of replicated findings upon which progress can be made. The critical opportunity is to apply theories, especially those that foreground dialogic and socio-cultural approaches to understand the value, opportunity, and challenges associated with the use of computer-mediated interaction in support of learning.

Once again, welcome to our new partners from MERLOT and the Journal of Online Teaching and Learning. We look forward to our expanded and combined efforts to improve the field of online learning through peer-reviewed research. Please share this new issue with colleagues!

References

Allen, I.E. & Seaman, J. (2010). *Class differences: Online education in the United States, 2010*. Needham, MA: Babson Survey Research Group.

Boser, U., Wilhelm, M., & Hanna, R. (2014). The power of the Pygmalion Effect: Teachers expectations strongly predict college completion. *The Center for American Progress.*

Clark, C. (2015) Comparing Asynchronous and Synchronous Video versus Text Based Discussions in an Online Teacher Education, *Online Learning Volume 19 Issue 3*, 48 - 69

Conaway, W. & Bethune, S. (2015) Implicit Bias and First Name Stereotypes: What are the Implications for Online Instruction? *Online Learning Volume 19 Issue 3*, 162 - 176

Cunningham, J. (2015) Mechanizing People and Pedagogy: Establishing Social Presence in the Online Classroom, *Online Learning Volume 19 Issue 3*, 34 - 47

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education model. *The Internet and Higher Education*, 2(2-3), 87-105.

Hayes, S., Uzuner-Smith, S. & Shea, P., (2015) Expanding Learning Presence to Account for the Direction of Regulative Intent: Self-, Co- and Shared Regulation in Online Learning, *Online Learning Volume 19 Issue 3*, 15 - 33

Heckman, R., Østerlund, C. & Saltz, J. (2015) Blended learning at the Boundary: Designing a New Internship, *Online Learning Volume 19 Issue 3*, 111 - 127

Hegeman, J.(2015) Using Instructor-Generated Video Lectures in Online Mathematics Courses Improves Student Learning, *Online Learning Volume 19 Issue 3*, 70 - 88

Jaschik, S. & Lederman, D. (2013). The 2012 *Inside Higher Ed* survey of faculty attitudes on technology. Washington DC: *Inside Higher Ed*.

LaPointe Terosky, A., & Heasley, C. (2015) Supporting Online Faculty through a Sense of Community and Collegiality, *Online Learning Volume 19 Issue 3*, 147 - 161

Murphy, A. &Stewart, J.(2015) The Impact of Online or F2F Lecture Choice on Student Achievement and Engagement in a Large Lecture-Based Science Course: Closing the Gap, *Online Learning Volume 19 Issue 3*, 91 - 110

Provident, I., Salls, J., Dolhi, C., Schreiber, J., Mattila, A. & Eckel, E. (2015) Design of an Online Curriculum Promoting Transformative Learning in Post Professional Doctoral Students, *Online Learning Volume 19 Issue 3,* 128 - 144

Rosenthal, R. & Jacobsen L. (1968). *Pygmalion in the classroom: teacher expectation and pupils' intellectual development*. New York: Holt, Rinehart and Winston, 1968.

Rubovits, P. &.Maehr, L. (1973). Pygmalion black and white. *Journal of Personality and Social Psychology*, 25(2), 210-218.

Zhou, H. (2015) A Systematic Review of Empirical Studies on Participants' Interactions in Internet-Mediated Discussion Boards as a Course Component in Formal Higher Education Settings, *Online Learning Volume 19 Issue 3*, 181 - 200

SECTION I: Community of Inquiry, Avatars, and Video

Expanding Learning Presence to Account for the Direction of Regulative Intent: Self-, Co- and Shared Regulation in Online Learning

Suzanne Hayes
Empire State College, State University of New York

Sedef Uzuner Smith
Lamar University

Peter Shea
University at Albany, State University of New York

Abstract

As the pivotal role of self-regulation has been widely accepted in online learning literature, much interest is focused on identifying pedagogical strategies to help foster regulatory behaviors in online learners. The authors of this article argue that the learning presence (LP) construct, a recently proposed addition to the Community of Inquiry (CoI) theoretical framework of online learning, needs to be included in these conversations. To this end, they re-articulate and clarify the underlying structure of LP by drawing on the theoretical models of self-regulation, co-regulation, and socially shared regulation. They further present examples to illustrate how LP can manifest itself in learners' discourse in the online learning environment. Finally, they conclude by outlining strategies online instructors can use to help learners execute regulatory behaviors and thus demonstrate LP in online courses.

Introduction

There is a growing body of literature that employs the Community of Inquiry (CoI) framework—developed by Garrison, Anderson, and Archer (2000)—to investigate and explain the effectiveness of online teaching and learning (see Arbaugh, 2008; Benbunan-Fich & Hiltz, 2003; Boston et al. 2009; DiRienzo & Gregory, 2014; Kang & Im, 2013; Stodel, Thompson, MacDonald, 2006). This framework asserts that successful online learning occurs through the cultivation of three forms of presence: social presence, teaching presence, and cognitive presence. Social presence refers to behaviors that enhance rapport, trust, and collegiality among online course participants; teaching presence refers to the design and facilitation of learning tasks and their assessment; and cognitive presence refers to shared negotiation of meaning through knowledge construction. As Swan and Ice (2010) stated, "Since its formulation, the CoI framework has been adopted and adapted by educators worldwide. It has been used in a variety of ways to inform both research and practice in online and blended learning" (p. 1).

Recently, we highlighted the CoI framework's lack of attention to the attitudes and behaviors that engaged and active students bring to their individual and collaborative online activities (Shea et al., 2012, 2013, 2014). Specifically, we described prior research efforts to examine evidence of teaching, social, and cognitive presence within all areas of an online course which resulted in examples of learner discourse that could not be reliably coded as the three key CoI indicators (Shea, Hayes & Vickers, 2010). Further investigation suggested to us that learners' discourse focusing on individual and group efforts to regulate their learning (such as understanding instructions provided by the instructor, dividing up tasks, managing time and setting group project goals, etc.) could not be accounted for by the existing constructs found within the CoI framework. To account for these missing behaviors, we called for inclusion of a new presence into the framework, called learning presence (LP). We defined LP "by the phases of forethought, performance, and reflection associated with self-regulated learning, but with emphasis on the goals and activities of online learners specifically" (p. 10). We further proposed that the LP construct is "simultaneously self- and co-regulatory in nature as it is predicated on not only individual efforts, but also group dynamics within collaborative learning activities" (p. 10).

Given that exploration and discussion of the LP construct is in its early stages (see e.g., Akyol & Garrison, 2011; Garrison & Akyol, 2013; Hayes, 2014; Mayordomo & Onrubia (In press); Traver, Colchok, Bidjerano & Shea, 2014; Wertz, 2014), we propose further clarification of its underlying structure is needed. In our earlier studies described above we suggested the LP construct was "simultaneously self- and co-regulatory in nature." This statement, while accurate, requires further elaboration. In this paper, we will explicate and exemplify the self- and co-regulatory processes the LP construct encompasses by drawing on salient differences among self-regulation, co-regulation, and socially shared regulation identified by Volet, Vauras, and Salonen (2009), Hadwin, Järvelä, and Miller (2011), Hadwin and Oshige (2011), and Grau and Whitebread (2012).

Learning Presence Construct Viewed through Self-Regulation, Co-Regulation, and Shared Regulation

The notion of self-regulation in education literature is generally based on Zimmerman's (1989, 1990, 2008) three-phase model of the cyclical processes of planning (forethought), performance (monitoring and strategy use), and evaluation (reflection). In this model, self-regulation is described as "proactive processes that students use to acquire academic skill, such as setting goals, selecting and deploying strategies, and self-monitoring one's effectiveness" (Zimmerman, 2008, p. 166). The *self*-prefix in self-regulation indicates the learner is concerned with regulating his/her *own* thinking, motivation and behavior during learning. Against this theoretical backdrop, Grau and Whitebread (2012) refer to self-regulation as "intra-personal regulation" (p. 401). Additionally, the emphasis on the word 'proactive' in

Zimmerman's formulation indicates self-regulation is a product of deliberate action. This idea is reinforced in Hadwin, Järvelä, and Miller's (2011) definition of self-regulation when they wrote, "Self-regulation of learning refers to a learner's deliberate planning, monitoring, and regulating of cognitive, behavioral, and motivational/emotional processes towards completion of an academic task/goal" (p. 68).

In our work, Zimmerman's (1989, 1990, 2008) three-phase model of the cyclical processes of planning (forethought), performance (monitoring and strategy use), and evaluation (reflection) also formed the theoretical background for the LP construct to represent the regulatory activities of online learners. However, in our description of the LP construct, we conflated the intrapersonal (regulating self) and interpersonal (regulating others) dimensions rather than separating them. As Iiskala, Vauras, Lehtinen, and Salonen (2011) wrote, intrapersonal regulation is not equivalent to interpersonal regulation, and vice versa, therefore, both types of regulation "should be conceptualized differently" (p. 379). In line with this reasoning, we define the self-regulation aspect of LP as "Regulation behavior used by the [learner] mainly to regulate himself/herself, with no apparent intentions to influence other [learners'] cognitions, emotions and behaviors" (Grau & Whitebread, 2012, p. 411). Next, we also delineate the interpersonal (social) aspects of LP.

In the literature on student regulation of learning, the interpersonal dimension of regulation is referred to as co-regulation (Salonen, Vauras, & Efklides, 2005; Volet, Summers, & Thurman, 2009). Co-regulation means regulation directed toward a specific member of a group in a collective activity, and it stands in contrast to self-regulation where regulation is directed toward one's own individual performance. To convey the meaning of co-regulation, Grau and Whitebread (2012) use the following examples:

- Peer tutoring in which one [learner] monitors or controls another [learner] who might need some help with some aspects of the task
- When a [learner] is trying to influence another [learner's] behavior either because the second is not doing well in the task or is not behaving properly in order to carry out the activity.

To expand Grau and Whitebread's definition a bit farther, we can apply Hadwin, Järvelä, and Miller's (2011) idea that co-regulation is "a manifestation of emergent interaction within [Vygotksy's] . . . zone of proximal development" (p. 73). It is this expanded notion of co-regulation that we draw on here to explicate the co-regulatory dimension of the LP construct. As such, the co-regulatory aspect of LP refers to asymmetrical situations whereby one member of a group with more knowledge and skills provides scaffolding support for another.

Shared regulation is another term used in the literature to account for the social aspects in the regulation of learning (Iiskala, Vauras, & Lehtinen, 2004; Vauras, Iiskala, Kajamies, Kinnunen, & Lehtinen, 2003). Unlike co-regulation, which includes asymmetrical scaffolding, shared regulation refers to "a symmetrical style of communication" wherein regulation is directed toward "some shared understanding or strategic decision within the group" (Grau & Whitebread, 2012, p.5). According to Volet, Vauras, and Salonen (2009), shared regulation "is considered the most profoundly social mode of regulation, because it refers to individuals' metacognitive processes that operate as a genuine social entity, aimed at a single direction, that is, the fully shared goal for the activity" (p. 219). Put another way, Hadwin and Oshige (2011) state shared regulation refers to those "processes by which multiple others regulate their collective activity." This collective regulation reflects "shared awareness of goals, progress, and tasks toward co-constructed regulatory processes" (p. 254-255). In light of these descriptions, we argue the interpersonal dimension of regulation encompassed by the LP construct is shared regulation, which refers to symmetrical situations where members of a group collectively set goals, track their progress, use strategies, and consider their effectiveness in the service of a shared outcome.

In sum, the above-mentioned differences among self-regulation, co-regulation, and shared regulation have led us to conclude that the LP construct includes the three-phase model of the cyclical processes (planning, monitoring, and reflection) at three levels: an individual looking after his/her own activity (self-regulation); an individual scaffolding and regulating another's learning (co-regulation); and individuals working together to regulate each other's learning (shared regulation). Below we will demonstrate each regulation type within the LP construct with examples found in the discourse of online learners. The examples will show how LP can manifest itself in learners' discourse in the online learning environment.

Examples of LP Showing Direction of Intentionality: Self-, Co-, and Shared Regulation

Before we illustrate the three dimensions of the LP construct with examples, we must describe the context from which we selected those examples as well as the methodology we used for their identification and analysis.

Context

The course, Advanced Health Assessment, which was offered in a school of nursing at a college in the northeast, provided the setting. It was delivered via Moodlerooms during the 2013 fall term. Eighteen students were enrolled in the course. Before the class was divided into four teams for a six-week-long collaborative project, we obtained consent from nine of the students (constituting two teams) to access, read, analyze and use anonymized quotes from their project related conversations. The project required teams to develop a plan of care for an assigned case, using a wiki as their authoring tool for the final product. Both teams were provided with identical project instructions. They were also provided identical workspaces within the Moodlerooms to support their planning and decision-making. These workspaces were a discussion area for asynchronous communications and an optional chat area for real time conversations. The LP examples we provide here come from these discussions and chats.

Methodology

We began our search for examples for this article by creating a chronological transcript of the two teams' discussions and chats, and by replacing all names with pseudonyms. The transcripts yielded a total of 435 messages. To ensure systematic selection of examples from these messages, we decided to first count frequencies of LP in them and then qualitatively examine the regulative direction in segments of those messages.

For our first task, we employed quantitative content analysis, which is often used in studies of computer-mediated communications and learning (e.g., DeWever, Schellens, Valcke, & Vankeer, 2006; Gunawardena, Lowe & Anderson, 1997; Henri, 1992; Rourke, Anderson, Garrison & Archer, 2001) to create categorizations and frequency counts based on a pre-established or emergent coding scheme. Using the LP coding scheme (Shea et al. 2012; Shea et al., 2013; Shea et al., 2014) with some modifications (see Appendix), we identified occurrences of LP in both teams' transcripts. To calibrate consistency in applying the LP codes, two of us first practiced coding using two archived team discussions from an earlier term of the same course (we call this phase 'practice coding'). Because the LP construct addresses the regulatory processes students display, instructor postings were excluded from our analysis. After calibration, we shifted our attention to the discussion and chat postings generated by the nine students who comprised the two teams identified above (we call this phase 'actual coding'). During the practice coding and the actual coding, we first worked independently to examine each sentence in every posting to identify one of the four LP categories (forethought and planning, monitoring, strategy use, and reflection).

Following this, we met to negotiate our disagreements. We used Holsti's coefficient of reliability to calculate inter-rater reliability (IRR). Neuendorf (2002) considers an IRR of .70 to be reliable. In both the practice and actual coding, we obtained an IRR that exceeded .70 initially and reached 100% agreement during negotiation of disagreements (see Table 1).

Table 1 *Inter-rater Reliability for LP Coding: Holsti's Coefficient of Reliability*

	Initial (CR)	Negotiated (CR)
Practice Coding 1	0.81	1.00
Practice Coding 2	0.88	1.00
Actual Coding Transcript 1	0.77	1.00
Actual Coding Transcript 2	0.79	1.00

The aggregated findings for the two teams yielded a total of 396 LP indicators which were distributed as follows:

Table 2 *Frequency of LP Indicators*

Forethought & Planning		Monitoring		Strategy Use		Reflection		Total	
Count	%	Count	%	Count	%	Count	%	Count	%
116	29.2	183	46.2	90	22.7	4	1.9	393	100

For our second task of qualitatively examining the regulative direction in segments that were identified as LP in the transcripts, we employed directed qualitative content analysis. This is a structured approach where textual content is coded into categories based on an existing theoretical framework or theory (Hsieh & Shannon, 2005). During this analysis, we applied the three categories of regulation listed below, which were derived from our preceding review, to the LP coded messages.

- *Self-regulation* when the utterances included "behavior used by the [learner] mainly to regulate himself/herself, with no apparent intentions to influence other [learners'] cognitions, emotions and behaviors" (Grau & Whitebread, 2012, p. 411).
- *Co-regulation* when the utterances included asymmetrical situations whereby one member of a group who has more knowledge and skills provides scaffolding support for another
- *Shared regulation* when the utterances included symmetrical situations where members of a group collectively set goals, track their progress, use strategies, and consider their effectiveness in the service of a shared outcome.

So far, we have described the systematic efforts we made to select the examples to show how LP can manifest itself in learners' discourse in the online learning environment. Below, we present the examples.

Self-Regulation Dimension of LP

In our discussion above, we argued the LP construct encompasses students' regulatory activities at three levels, one of which is self-regulation, referring to an individual looking after his/her own activity. In the transcripts we observed numerous instances in which students verbalized their self-regulation processes. For example, in Figure 1, a student, Crystal, identifies a problem (lines 1-2), which is uploading a file to the team's wiki, and then acts to resolve this problem on her own (lines 4-5) by contacting the help desk. Crystal's use and verbalization of self-monitoring and help seeking strategies are examples of the self-regulatory aspect of the LP construct: She identifies a problem and takes

intentional productive action to advance her performance. It is this sense of student-initiated intentional productive action in online learning that the LP construct accounts for with its self-regulation component.

Line	Student Posting	LP Code	
1 2 3 4 5 6 7	Crystal: I just want you all to know that *I am having a problem with the wiki* site. When I click on the files tab, I do not have the icon on the bottom that says "Edit wiki files." Therefore I cannot add a file. *I was on the phone today with tech support and they were unable to resolve my problem.* They will notify me by email as soon as it is corrected.	MO2 SU1	Identifying problem Seeking, offering or providing guidance

Figure 1. Excerpt from asynchronous discussion illustrating self-regulation.

In the next example (see Figure 2) the first student, Sarah, raises a series of questions related to how and where the team should present their individual contributions for their care plan. Rather than answering these questions directly, a second student, Fern, demonstrates *metacognitive awareness* and surfaces her own concerns about the work she has just recently completed. In doing so, Fern describes a series of self-initiated acts of self-regulation: her awareness of her own learning behaviors in terms of recognizing her strengths and weaknesses (lines 8-9); her recognition of the need for better formatting as an area for improvement (lines 11-12); and asking for assistance to accomplish this (lines 13-15). It is notable that Fern not only identified these specific concerns independently, but that she was also able to verbalize them to her peer, Sarah. Again, as is the case in the previous excerpt, Fern's verbalization of her self-regulatory activities points to the conscious deliberate actions she has undertaken to assume responsibility for her learning. This awareness of personal conditions (e.g., cognitive states, abilities, and actions) and seeking ways to improve those conditions is a critical component of the self-regulation aspect of LP.

Line	Student Postings	LP Code	
1 2 3 4 5 6 7	Sarah: Hi all, I was just thinking that it might be helpful to present the care plans and information on each of our selected CHF (congestive heart failure) topics as it would be presented in an educational pamphlet. When creating the final project, this would make it easier to put all the pieces together. Also, I was wondering if we should create the pamphlet in a Word program or use the Wiki project place?		
8 9	Fern: Hi all, *Computer formats and templates are not my strong area.* Please review the wiki for the template…	MO6	Recognizing learning behavior(s) in self /others
10 11 12	I entered by information part of the care plan with interventions/prevention, goals for Libby. *It needs to be formatted better, for easier reading for the patient.*	MO4	Evaluating quality
13 14 15	*I need help with the format to make sure that all information fits on the page. There is [sic] five columns, too many [and the] font [is] too small for the patient to read.* Help please.	SU1	Seeking, offering or providing guidance
16 17	Please advise if I left anything out or need to add more information. Thank you for your help.		

Figure 2. Excerpt from asynchronous discussion illustrating self-regulation.

Co-Regulation Dimension of LP

A second level of regulatory activity the LP construct encompasses is co-regulation. Co-regulation is evident when one learner provides scaffolding and support to another. Displayed in the student-student exchange in Figure 3, Samantha provides scaffolding to Pat to help her accomplish the given task by shifting Pat's view of a potential problem into an unrecognized opportunity. The excerpt begins with Pat indicating she has limited access to health care professionals who would be suitable to interview for the case study. Pat identifies this potential barrier to her participation in the team's project and conveys it to her team members (lines 5-9). In response, Samantha offers guidance, a form of intentional strategy use, to help Pat realize she does in fact have access to a professional who is suited to the requirements of the case study (lines 15-17). In the process of this interaction, we see the following aspects of co-regulation that the LP construct encompasses: One student exhibits misunderstandings or gaps in knowledge that prevents him/her from successfully completing a task; and another student takes the opportunity to remediate those misunderstandings or knowledge gaps through interactions that can be characterized as "I see something that you don't see, and I can help."

Line	Student Postings	LP Code	
1 2 3 4 5 6 7 8 9	Pat: Hi, I was again reading the directions tonight and I have come to the same conclusion that we first have to do an interview with another profession. My question is: are we going to be given a new case study or are we going with the previous one "Manny"? *I work in home care, so I have access to Medical Social Workers, and Registered Dietitians, the only issue I see is that most of the clientele that these professions deal with are seniors.* [the project is about an overweight youth with asthma]	MO2	Identifying problems
10 11 12 13 14 15 16 17	Samantha: I had the same question as to if we are getting a more detailed case study. I can interview a dietician, as she actually specializes in peds [pediatric] patients. (assuming the patient is still obese) -- I already spoke to one on my floor about the possibility of an interview. Although if he isn't obese then she won't be able to contribute much. *Pat, what about interviewing a social worker? They usually deal with all types of patients and families.*	SU1	Seeking, offering or providing guidance

Figure 3. Excerpt from synchronous chat illustrating co-regulation.

The interactions featured in the next excerpt (Figure 4) illustrate another instance where Samantha offers technical help (about wiki use) to another student, Crystal. In this series of exchanges, it is notable that Samantha offers procedural help and guidance to check or confirm Crystal's understanding (lines, 1-2, 4, 7, 11-14). Crystal, in turn, uses self-monitoring to identify where she encountered problems (line 3) and conveys her willingness to remain engaged by "trying again" (lines 9-10). Ultimately this interaction marked by Samantha's co-regulative actions served as a valuable investment of effort because Crystal was then able to work independently in the wiki for the duration of the project.

Line	Student Postings	LP Code	
1 2	Samantha: *Do you want to go to the wiki page now and we can have you add something in?*	SU1	Seeking, offering or providing guidance
3	Crystal: *I just tried to add the [text for the] cover page and couldn't do it*	MO2	Identifying problems
4	Samantha: Hmmm. *Are you copying and pasting it in?*	MO1	Checking or confirming
5 6	Crystal: *I think Pat put the pictures of the different HCP [health care providers] in the files*	MO2	Identifying a Problem
7	Samantha: *You can't add the whole file separately…*	SU1	Seeking, offering or providing guidance
8	Samantha: *I've been using copy/paste [in the wiki's editor.]*	SU1	Seeking, offering or providing guidance
9 10	Crystal: *I will try again. I did add [information that the family] add that all speak and understand English.*	MO5	Appraising personal engagement
11 12 13 14	Samantha: Okay... good. *We can write directly in the document… Where you see the FILES tab, there is also an EDIT tab... and you can highlight your Word document, copy it and then paste....* I did that with mine in the different sections.	SU1	Seeking, offering or providing guidance

Figure 4. Excerpt from synchronous chat illustrating co-regulation.

The co-regulation aspect of LP, as evidenced in Figures 3 and 4, points to asymmetric, scaffolding-like situations constructed between two students: a student who has familiarity or better understanding of a task/concept assists another student who needs help. It is this collaborative, peer-to-peer scaffolding in online learning that the LP construct accounts for with its co-regulation component.

Shared Regulation Dimension of LP

In addition to self- and co-regulation, another level of regulatory activity the LP construct encompasses is shared regulation. In the following examples, we demonstrate online students' collective regulatory intents which are directed toward accomplishing a communal goal. The first illustrates how students undertake purposeful regulative actions to realign their group's direction after receiving feedback from their instructor. In the second, the members of another team makes a series of regulative decisions as they work on a plan for completing their assignment.

The dialogue featured in Figure 5 takes place during a scheduled team chat at the mid-point of the project. In this dialogue, the team is about to face an important decision. Earlier in the day, the instructor posted an announcement informing the team they had misconstrued the nature of the written assignment they were to complete (i.e., rather than developing a *creative* inter-disciplinary plan of care emphasizing health promotion, students created a research paper). In order to refocus the team's efforts to meet the instructor's expectations, one of the team members, Fern, notifies the team of the instructor's feedback by cutting and pasting the text of the instructor's announcement directly into the chat (lines 1-2). She purposely shares this information to highlight the need for the team to make an adjustment in their strategy to meet the instructor's creativity requirement (lines 6-9, 12-13). In response, the team members propose alternative suggestions, using the pronoun 'we.' The use of this pronoun indicates the team members' creation of a group perspective rather than an individual one. After exhausting possibilities, the team collectively agrees on a strategy to follow.

Line	Student Postings	LP Code	
1 2	*Fern: I just copied and pasted professor's announcement [above], for us to review.*	SU2	Reviewing
3	Fern: professor just posted this at 12:22 P.M. today		
4 5	Denise: thank you for re-posting, I haven't seen this. *Now I'm a little confused as well on what we're exactly supposed to do.*	MO5	Appraising personal reaction
6 7 8 9	Fern: I guess this changes things a bit, *So it looks like forget the APA format[ed paper], and we each need to do a care plan based on the professional we interviewed based on Libby [our assigned case study]. Thoughts??*	SU4	Making adjustment in strategy
10 11	*Denise: are we setting up the care plan like a diagram though? Or just a regular care plan?*	MO1	Checking or confirming
12 13	Fern: The diagram was a creative way to present data for plan. *We need to decide on creative presentation*	MO2	Identifying problem
14	Denise: any ideas on that?		
15	Sarah: *I'm not sure how to create a diagram*	MO2	Identifying problem
16 17	Molly: *Just an idea but maybe an illustration of the body showing symptoms*	SU1	Seeking, offering or providing guidance
18	Denise: *what if we made a concept map?*	SU1	Seeking, offering or providing guidance
19 20 21 22	Molly: *Then using ADPIE [*Assess, Diagnose, Plan, Identify outcomes, and Evaluate*] maybe give a nursing dx [diagnosis] and the plan to care for dx [diagnosis], etc*. Basically a care plan.	SU1	Seeking, offering or providing guidance
23	Fern: Me either, *maybe we can do educational handout pamphlet?*	SU1	Seeking, offering

24 25 26 27	Concept map sounds good too, *but I do not know how to format boxes to input data, It may be hard to visualize*, if we do we may need to do several concept maps for each professional we interviewed for case study.	MO2	or providing help Identifying problem
28 29	Denise: I'm okay with whatever everyone else is. I like the idea of a pamphlet.		
30	Molly: Yes, a pamphlet is a good idea.		
31	Sarah: I agree on the pamphlet.		

Figure 5. Excerpt from synchronous chat illustrating shared regulation. *Note:* Not all applicable LP codes are shown in this example.

The shared regulation aspect of the LP construct is also evident in Figure 6 which highlights a conversation that took place as one team worked toward establishing a shared plan for how to approach the assignment. As seen in the previous example, this team also uses inclusive pronouns such as "we" and "ours," indicating a clear direction for their regulatory intent.

Here, shared regulation commences with students using collective forethought and planning as they consider how they will coordinate their activities and assign specific tasks to each other to complete the assignment (lines 6-24). This team also uses monitoring as they acknowledge problems and check for mutual understanding (lines 33-39). Lastly, the team moves toward a better shared understanding of their assignment (lines 40-52) as a result of one team member effectively demonstrating the value of using a specific regulatory strategy: reviewing course content (i.e., instructions) when beginning an assignment.

Line	Student Postings	LP Code	
1 2	Samantha: Hi Team! We are now in module 6 and we are asked to conduct interviews presenting our case study.		
3	*If you go back to module 2, our case study is there.*	SU2	Reviewing
4 5	*Let's discuss who each person in the group would like to interview.*	FP1	Goal setting
6 7 8 9 10 11 12 13	*I'd like to interview a registered dietitian who specialized in pediatrics.* I work in the neonatal ICU, but she comes in everyday to assess our babies' diets and caloric intake. Our patient "Manny" is 4 feet 6inches and 112 pounds, which makes him obese. *I think interviewing the dietitian will help us deal with his obesity as well as ways to address Manny's mother who seems to think Manny is just a "healthy growing boy" (according to the case study quiz we initially took).*	FP3 SU3	Assigning task to self Noting outcome expectations
14 15 16 17	I just saw that people were responding who to interview for this part of the project in last week's module. *Is anyone able to interview a respiratory therapist?* I have access to one who does NICU/Pediatrics if no one else does...	FP3	Coordinating tasks
18 19	Pat: *Hey, on Monday I wrote and now it's gone?* I asked the same question:	MO2	Noting problem
20 21	Samantha: Dietician Pat: Medical social worker		

Althea: Respiratory Crystal: Physician or NP [Nurse Practitioner]		
We need to decide what the questions will be and how many? I wrote these same questions somewhere in here????	FP3	Coordinating tasks
Crystal: Hi Team, I have no problem conducting interviews with both a physician and an NP. *I will post questions relative to these specialties by Saturday morning.*	FP3	Assigning tasks to self or others
I think if we all do this then our efforts will be coordinated and someone in the group may identify a question missed. I can conduct my actual interviews on Monday and Tuesday and will post the transcription on Wednesday. Is that OK with everyone? Pat, I cannot find your questions either.	SU3	Noting outcome expectation
Samantha: *I wasn't under the impression that we needed to decide on questions together. If we are each doing different specialties/health care areas, then none of us would really ask the same thing anyways.* It's more of a discussion than a formal interview...As if asking another health care worker for their opinion on a patient. I didn't see that we needed to come up with questions as a team, did anyone else?	MO1	Checking or confirming
The instructions I found were:	SU2	Reviewing
The Interview: For this project, each team member (student) will interview one individual (representing a different discipline of the health care team) to obtain input on the priorities for the assigned case study. You should have input from a variety of sources (physician, nurse practitioner, pharmacist, case manager, dietician, physical/occupational therapist, respiratory therapist, counselor, etc.). The interview should be with someone that you have convenient access to, such as a colleague at your place of employment. Present the known case study information to that individual, and ask for his/her perspective on priorities for patient care. Discuss this input with your team members, and integrate the information into the plan of care.		
Let me know if I missed something.... I'm working tomorrow and Friday and will talk to the dietician then.		
Crystal: *I went back and read the instructions again.* I only see what you just posted for clarification. I must have had a senior moment blush. I will go ahead then and interview both the NP and Physician. What is our target day to have this done by?	SU2	Reviewing

Figure 6. Excerpt from asynchronous discussion illustrating shared regulation. *Note:* Not all applicable LP codes are shown in this example.

All in all, students' interactions as displayed in Figures 5 and 6 exemplify symmetrical situations where team members direct their efforts toward shared goals, purpose, decisions and outcomes. It is this collective thinking and acting of online learners in the service of a shared outcome that the LP construct accounts for with its shared regulation component.

Implications for Practice

Some online learners may instinctively know how to plan and monitor their performance—as well as the performance of their team members—and therefore demonstrate LP at three levels (self-, co-, and shared-regulation). Others may be self-taught or self-trained, demonstrating regulatory behaviors as a result of the strategies they learned through trial and error. And still others may never have a handle on how to regulate their own or others' learning. In this section, we outline strategies online instructors can use to help all learners execute regulatory behaviors and thus demonstrate LP in online courses.

Earlier in this paper, we defined the self-regulation aspect of LP as an individual looking after his/her own activity. Drawing on the idea that self-regulation is guided by feedback (Hadwin, 2008) and building on the explanations we have provided so far, a first practical implication emanating from this paper is that online instructors should provide their students with qualitatively good, goal-directed feedback. Research shows that feedback where a learner's current performance is compared against a goal/standard serves as the trigger to initiate self-regulation (Shapiro & Schwartz, 2000). As Nicol and Macfarlane-Dick (2006) wrote, "It is these comparisons that help the student determine whether current modes of engagement should continue as is, or if some type of change is necessary" (p. 202). Therefore, to trigger the self-regulation aspect of LP, it is important to make goals and standards explicit in course documents, such as syllabi, assessment instructions, rubrics, etc., and make specific references to these in the feedback provided. In addition to being goal-directed, feedback given to online learners should be directly-actionable. If the learners lack awareness that they must close the gap between their current and targeted performance, they may not be able to make sense of what they are expected to do. This, however, does not mean online instructors should give learners straight directions or provide correction. Rather, they should provide hints for improvement and ask questions that provide learners with an opportunity to clarify their thoughts and rethink their actions.

It is important to note feedback alone is not helpful in triggering the self-regulation aspect of LP in online students. Sometimes learners receive goal-directed and directly-actionable feedback, yet they are not able to construct a personal interpretation of that feedback and act accordingly. Similarly, for some learners, understanding or making sense of the provided feedback does not mean they will act on it; they may choose to ignore the feedback. Determining how learners make sense of the feedback they have received and whether or not they will act on it can be difficult. This is where encouraging learners to reflect on the feedback they received becomes crucial. Whenever possible, after providing feedback on learners' performance or the products they produce, online instructors should have learners write a short reflection where they identify the criteria their work/performance was judged against, assess where their work/performance does not match the targeted goals, and decide what action(s) to take to close the gap(s) between current performance and good performance. In addition to encouraging reflection, providing learners with strategies used by successful students and with exemplars of performance are other practical tips for online instructors to promote the self-regulation aspect of LP in their learners.

We identified the co-regulation aspect of LP as instances where an individual scaffolds and regulates another's learning when the latter might need some help with some aspects of the task, is not doing well in the task, or is not behaving properly in order to carry out the activity. As Hadwin, Järvelä, and Miller's (2011) state, co-regulation is "a manifestation of emergent interaction within the zone of proximal development" (p. 73). In promoting the co-regulation aspect of LP in learners, a crucial question

for online instructors is: How can I make sure my students work within each other's zone of proximal development in the online learning environment? Here we offer a few general suggestions. One is to assign small group projects rather than individual assignments. Before the project is due, set up a communal area where group members can post misunderstandings or questions that are a source of struggle or uncertainty. Encourage students to seek help from each other in order to figure out how to resolve issues and concerns. Peer sharing of feedback and productive approaches and strategies will allow individual group members to see it is possible to work through roadblocks with the assistance of each other. Of course, just putting learners in groups and encouraging them to help and peer tutor one another does not always lead to success. For this reason, instructors should monitor learners' interactions with each other in the public forums to check the spread of misinformation as well as to assess when to provide assistance and when to step back to let learners work through their difficulties on their own. The second suggestion for making sure the students work within each other's zone of proximal development in the online learning environment is concerned with individual assignments. Even when online learners are working on individual assignments, opportunities for peer tutoring can be created through the use of public forums/discussion spaces. For example, before an assignment is due, instructors can set up these interactional spaces to allow learners the opportunity to post individually prepared assignments to receive input from the class.

Finally, we identified the shared-regulation aspect of LP as instances where individuals work together to regulate each other's learning. Järvelä, Järvenoja, Malmberg, and Hadwin (2013) state that shared regulation takes place when groups regulate themselves by focusing on communal goals, co-constructing plans, and arriving at shared task perceptions through group level monitoring and evaluation of their collective progress. This means that in online learning environments, a joint activity is where instructors will see their students demonstrate the shared regulation aspect of LP. Below are a few practical tips for instructors in promoting this aspect of LP.

At the outset of a group project, group members can be directed through discussion or chat to examine their understanding of the project's instructions by putting into their own words what the project's deliverable should be and to identify the individual tasks or processes that must be addressed, any new skills that are required, as well as areas of confusion that require further clarification. Instructor initiated prompts guiding these discussions may include: As a group, have you reviewed the project instructions? Do you fully understand the requirements? While the group members are executing the project, they can be asked to post progress reports on their collective efforts in the discussion or chat areas. In their progress reports, learners can describe the group's plan, what has been accomplished, what has been working and what has not, and how they might consider changing their approach. Instructor initiated prompts guiding these discussions may include: As a group, have you set aside time to evaluate the quality of your work? How will you measure the success of your project? Once the project is complete, the group members can be directed to participate in a reflection activity via a discussion forum or chat where they can examine how well their planning and monitoring efforts worked, how their efforts were divided among particular types of tasks and activities, and how they might have changed their approach in retrospect. Instructor initiated prompts guiding these discussions may include: What are some take-aways? What have you learned from this group work experience? What will you stop doing, continue doing, or try to do differently, either on an individual or group basis? How will you apply what you learned from this experience for your future group projects?

Significance

In conclusion, this paper extends and clarifies the current LP construct, a recently proposed addition to the CoI framework, by highlighting the salient differences among self-regulation, co-regulation, and socially shared regulation identified by Volet, Vauras, and Salonen (2009), Hadwin,

Järvelä, and Miller (2011), Hadwin and Oshige (2011), and Grau and Whitebread (2012). The differences identified among self-, co-, and shared regulation have led us to conclude that the LP construct includes the three-phase model of the cyclical processes (planning, monitoring, and reflection) at three levels: an individual looking after his/her own activity (self-regulation); an individual scaffolding and regulating another's learning (co-regulation); and individuals working together to regulate each other's learning (shared regulation). We demonstrated each regulation type within the LP construct with examples found in the discourse of online learners

As the pivotal role of self-regulation has been widely accepted in online learning literature (Artino & Stephens, 2009; Bol & Garner, 2011; Cho & Shen, 2013; Sun & Rueda, 2012), much interest is focused on identifying pedagogical strategies to help foster regulatory behaviors in online learners, both at the individual and group levels. In this paper, we argue that the LP construct needs to be included in those conversations. We further contend that examining the LP construct through the lens of the three regulatory behaviors, self- co-, and shared regulation, will deepen our understanding of this important construct. And such enhanced understanding will help instructors develop appropriate instructional strategies to foster regulatory behaviors in online learners.

References

Akyol, Z., & Garrison, D. R. (2011). Assessing Metacognition in an Online Community of Inquiry. *The Internet and Higher Education, 14*(3), 183-190. doi: 10.1016/j.iheduc.2011.01.005

Arbaugh, J. B. (2008). Does the community of inquiry framework predict outcomes in online MBA courses? *The International Review of Research in Open and Distance Learning, 9*(2), 1-21.

Artino, A.R., & Stephens, J. M. (2009). Beyond grades in online learning: Adaptive profiles of academic self-regulation among naval academy undergraduates. *Journal of Advanced Academics, 20*(4), 568–601.

Benbunan-Fich, R., & Hiltz, S. R. (2003). Mediators of the effectiveness of online courses. *Professional Communication, 46*(4), 298-312.

Bol, L., & Garner, J. K. (2011). Challenges in supporting self-regulation in distance education environments. *Journal of Computing in Higher Education, 23*(2–3), 104-123. doi:http://dx.doi.org/10.1007/s12528-011-9046-7

Boston, W., Diaz, S. R., Gibson, A. M., Ice, P., Richardson, J., & Swan, K. (2009). An exploration of the relationship between indicators of community of inquiry framework and retention in online programs. *Journal of Asynchronous Learning Networks, 13*(3), 67-83.

Cho, M. -H., & Shen, D. (2013). Self-regulation in online learning. *Distance Education, 34*(3), 290-301. doi: 10.1080/01587919.2013.835770

De Wever, B., Schellens, T., Valcke, M., & Vankeer, H. (2006). Content analysis schemes to analyze transcripts of online asynchronous discussion groups: A review. *Computers & Education, 46*(1), 6-28. doi:10.1016/j.compedu.2005.04.005

DiRienzo, C., & Gregory, L. (2014). Online versus face-to-face: Does delivery method matter for undergraduate business school learning? *Business Education & Accreditation, 6*(1), 1-11.

Garrison, D. R., & Akyol, Z. (2013). Toward the development of a metacognition construct for communities of inquiry. *The Internet and Higher Education*, 17, 84-89. doi:10.1016/j.iheduc.2014.10.001

Garrison, D. R., Anderson, T., & Archer, W. (1999). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2*, 87–105. doi:10.1016/S1096-7516(00)00016-6

Grau, V., & Whitebread, D. (2012). Self and social regulation of learning during collaborative activities in the classroom: The interplay of individual and group cognition. *Learning and Instruction, 22*(6), 1-12. doi:10.1016/j.learninstruc.2012.03.003

Gunawardena, C. N., Lowe, C. A., & Anderson, T. (1997). Analysis of a global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing. *Journal of Educational Computing Research, 17*(4), 397-431.

Hadwin, A. F. (2008). Self-regulated learning. In T. L. Good (Ed.), *21st century education: A reference handbook* (pp. 175-183). Thousand Oaks, CA: Sage Publications.

Hadwin, A. F., Järvelä, S., & Miller, M. (2011). Self-regulated, co-regulated, and socially shared regulation of learning. In B. J. Zimmerman & D. H. Schunk (Eds.), *Handbook of self-regulation of learning and performance* (pp. 65-84). Routledge.

Hadwin, A., & Oshige, M. (2011). Self-regulation, coregulation, and socially shared regulation: exploring perspectives of social in self-regulated learning theory. *Teachers College Record, 113*(2), 240-264.

Hayes, S. (2014). *A mixed methods study of shared epistemic agency in team projects in an online baccalaureate nursing course (Doctoral dissertation,* University at Albany, State University of New York). Retrieved from Dissertations and Theses database (UMI no. 3667396).

Henri, F. (1992). Computer conferencing and content analysis. In A. R. Kaye (Ed.), *Collaborative learning through computer conferencing: The Najaden Papers (New York* (pp. 117-136). New York: Springer New York.

Hsieh, H.-F. & Shannon, S. E., (2005). Three approaches to qualitative content analysis. *Qualitative Health Research, 1*5(9), 1277-1288. doi: 10.1177/1049732305276687

Iiskala, T., Vauras, M., & Lehtinen, E. (2004). Socially shared metacognition in peer learning? *Hellenic Journal of Psychology, 1*, 147-178.

Iiskala, T., Vauras, M., Lehtinen, E., & Salonen, P. (2011). Socially shared metacognition of dyads of pupils in collaborative mathematical problem-solving processes. *Learning and Instruction, 21*, 379-393.

Järvelä, S., Järvenoja, H., Malmberg, J., & Hadwin, A. F. (2013). Exploring Socially Shared Regulation in the Context of Collaboration. *Journal of Cognitive Education and Psychology, 12*(3), 267-286.

Kang, M., & Im, T. (2013). Factors of learner-instructor interaction which predict perceived learning outcomes in online learning environment. *Journal of Computer Assisted Learning, 29*(3), 292-301. doi: 10.1111/jcal.12005

Mayordomo, R., & Onrubia, J. (In press). Work coordination and collaborative knowledge construction in a small group collaborative virtual task. *The Internet and Higher Educatio*n. doi: 10.1016/j.iheduc.2015.02.003

Neuendorf, K. A. (2002). *The content analysis guidebook*. Thousand Oaks, CA: Sage Publications.

Nicol, D. J., & Macfarlane-Dick, D. (2006). Formative assessment and self-regulated learning: a model and seven principles of good feedback practice. *Studies in higher education, 31*(2), 199-218. Doi: 10.1080/03075070600572090

Rourke, L., Anderson, T., Garrison, D. R., & Archer, W. (2001). Methodological issues in the content analysis of computer conference transcripts. *International Journal of Artificial Intelligence in Education, 12*, 8-22.

Salonen, P., Vauras, M., & Efklides, A. (2005). Social interaction - what can it tell us about metacognition and co-regulation in learning? *European Psychologist, 10*(3), 199-208. Doi: 10.1027/1016-9040.10.3.199

Shapiro, S. L., & Schwartz, G. E. (2000). The role of intention in self-regulation: Toward intentional systemic mindfulness. In M. Boekaertz, P. R. Pntrich, and M. Zeidner. (Eds). *Handbook of self-regulation* (pp. 255-270). Burlington, MA: Elsevier Academic Press.

Shea, P., Hayes, S., Uzuner Smith, S., Vickers, J., Bidjerano, T., Gozza-Cohen, M., Jian, S, Pickett, A., Wilde, J. & Tseng, C. (2013). Online Learner Self-Regulation: Learning Presence Viewed through Quantitative Content- and Social Network Analysis. *International Review of Research in Open and Distance Education, 14*(3), 428–461.

Shea, P., Hayes, S., Uzuner-Smith, S., Gozza-Cohen, M., Vickers, J., & Bidjerano, T. (2014). Reconceptualizing the Community of Inquiry framework: Exploratory analysis. *The Internet and Higher Education, 23*, 9–17. doi:10.1016/j.iheduc.2014.05.002

Shea, P., Hayes, S., Smith, S. U., Vickers, J., Bidjerano, T., Pickett, A., Gozza-Cohen, M., Wilde, J. & Jian, S. (2012). Learning presence: Additional research on a new conceptual element within the community of inquiry (CoI) framework. *The Internet and Higher Education, 15*(2), 89-95. doi:10.1016/j.iheduc.2011.08.002

Stodel, E. J., Thompson, T. L., & MacDonald, C. J. (2006). Learners' perspectives on what is missing from online learning: Interpretations through the community of inquiry framework. *The International Review of Research in Open and Distance Learning, 7*(3), 1-16.

Sun, J. C. -Y., & Rueda, R. (2012). Situational interest, computer self-efficacy and self-regulation: Their impact on student engagement in distance education. *British Journal of Educational Technology, 43*(2), 191-204. 10.1111/j.1467-8535.2010.01157.x

Swan, K., & Ice, P. (2010). The community of inquiry framework ten years later: Introduction to the special issue. *The Internet and Higher Education, 13*, 1-4. doi:10.1016/j.iheduc.2009.11.003

Traver, A. E., Volchok, E., Bidjerano, T., & Shea. (2014). Correlating community college students' perceptions of community of inquiry presences with their completion of blended courses. *The Internet and Higher Education*, 20, 1-9. doi:10.1016/j.iheduc.2013.09.001

Vauras, M., Iiskala, T., Kajamies, A., Kinnunen, R., & Lehtinen, E. (2003). Shared-regulation and motivation of collaborating peers: A case analysis. *Psychologia*, *46*(1), 19-37. http://dx.doi.org/10.2117/psysoc.2003.19

Volet, S., Summers, M., Thurman, T. (2009). High-level co-regulation in collaborative learning: How does it emerge and how is it sustained? *Learning and Instruction, 19*(2), 128-143. doi:10.1016/j.learninstruc.2008.03.001

Volet, S., Vauras, M., & Salonen, P. (2009). Self- and social regulation in learning contexts: An integrative perspective. *Educational Psychologist, 44*(4), 215-226. doi: 10.1080/00461520903213584

Wertz, R. E. (2014). *Toward a new model within the community of inquiry framework: Multivariate linear regression analyses based on graduate student perceptions of learning online*. (Doctoral dissertation, Purdue University) Retrieved from Dissertations and Theses database (UMI No. 3636686)

Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology*, *81*(3), 329-339. doi: 10.1037/0022-0663.81.3.329

Zimmerman, B. J. (1990). Self-regulating academic learning and achievement: The emergence of a social cognitive perspective. *Educational Psychology Review*, *2*(2), 173-201.

Zimmerman, B. J. (2008). Investigating self-regulation and motivation: Historical background, methodological developments, and future prospects. *American Educational Research Journal*, *45*(1), 166-183. doi: 10.3102/0002831207312909

Appendix Refined Coding Scheme for LP

Category	Code	Indicator	Description	Example
Forethought & Planning	FP1	Goal Setting	Deciding upon specific actions and outcomes	At the end of next week, as a team, we have to submit a summary of our discussion points. Our goal is to submit a two-page position paper defending the position against outsourcing
	FP2	Planning	Deciding on methods/strategies appropriate for the task	I was thinking we should decide what arguments we want to use in this paper
	FP3	Coordinating, delegating or assigning tasks to self and others	Distributing, sequencing tasks and sub-tasks to others/self for future completion	I will take care of the intro and the summary. I have to work all night tonight. I will submit it for the group tomorrow evening sometime
Monitoring	MO1	Checking or confirming	Confirming that a task or process aligns with instructions	I have come to the same conclusion that we first have to do an interview with another profession.
	MO2	Identifying problems or issues	Identifying difficulties related to materials, technologies, process that interfere with progress	I believe the assignment is 500 words or less so we may need to skimp down a bit.
	MO3	Noting completion of tasks or progress	Comments about tasks/activities completed to support attaining a goal	I did some research and then typed up the employer section.
	MO4	Evaluating quality	Evaluating the quality of a process or product, its content or its constituent parts	This information needs to be formatted better, for easier reading for the patient.
	MO5	Appraising personal interest, engagement or reaction	Comments about self or others' engagement, interest, commitment or participation. Also includes personal reactions to tasks, materials and activities	I found that information [in the chapter] all new and a little scary.
	MO6	Recognizing learning behaviors of self or group	Statements about individual or group preferences, strengths or weaknesses as learners	I am one who likes to explore new programs and put together an object without reading directions
	MO7	Advocating effort or focus	Encouraging others to contribute or focus on tasks, materials and	Please let me know if there are any other ideas

			activities.	
	MO8	Noting use of strategies	Statements illustrating that students are mindful and aware of the strategies that they are using	I decided to extract concepts from the graphic organizer on page 26 and Google each word to try and make sense how the concepts tie together
Strategy Use	SU1	Seeking, offering or providing guidance	Requesting, offering, or providing guidance or describing efforts to obtain guidance or help related to learning materials, tasks, processes or products	If you need any assistance, please let me know what I can do to help you out
	SU2	Reviewing	Comments noting the need to review or the completion of re-examining content related to the course	I would need to refer to this chapter in order to review the principles of this philosophy
	SU3	Noting outcome expectations	Statements in which students acknowledge the relevance of current tasks or processes to a future learning outcome	I think interviewing the dietician will help us deal with his obesity as well as ways to address his mother who thinks he is just "a healthy growing boy"
	SU4	Making adjustment in strategy	Recognizing that current strategy is not working and trying new strategy	I say we paste the whole thing into a word document when we're finished and then paste it back to the wiki after correcting the font
Reflection	RE1	Change in thinking	Statements indicating a change in thinking as a result of process, product or outcome	This issue is not as simplistic as I once thought…
	RE2	Causal attribution of results	Statements in which students credit their results to personal or group performance	Any minor technology issues and questions/confusion about the project were easily solved in discussions

Mechanizing People and Pedagogy: Establishing Social Presence in the Online Classroom

Jennifer M. Cunningham
Kent State University at Stark

Abstract

This research addresses the affordances of using Voki avatars to create a sense of social presence in an asynchronous online writing classroom setting. Digital media afford online educators the opportunity to harness different technologies and new ways of being in a digital classroom that can enhance student engagement in ways similar to yet unlike face-to-face instruction, but this current research questions the effectiveness of these technologies. Original data was obtained from forty students in an online writing course who responded to open-ended questions about their perception of social presence. This study reiterates the importance of establishing social presence in an online course, but suggests students may find specific Web 2.0 technology less effective than other pedagogical methods.

Introduction

Mechanizing people and pedagogy: Establishing social presence in the online classroom

Online classes can be impersonal and lack the simple but meaningful verbal and nonverbal cues and the overall social presence and immediate response-time that permeates traditional, face-to-face classrooms. Although approximating social presence can be a challenge in digital environments, incorporating avatars might be one way to enrich online learning. As the types of reading, writing, and ways of being continue to change in our new capitalistic world (Gee & Hayes, 2011), so, too, should the kinds of pedagogies and techniques instructors employ. Digital media afford online educators the

opportunity to harness different technologies and ways of replicating and, perhaps, enhancing more traditional pedagogical techniques in a digital classroom that can encourage student engagement in ways similar to, yet unlike, face-to-face instruction. This study considers the ways that a specific Web 2.0 technology might enhance or "power up" (Gee & Hayes, 2011, p. 9) learning in online classes. Specifically, this study addresses the perceived effectiveness of using Voki avatars (www.voki.com), a specific type of Web 2.0 technology, to establish a sense of social presence (Short, Williams, & Christie, 1976) in an asynchronous online writing class. *Effectiveness* is operationalized as whether students provided qualitative responses to a survey discussing or mentioning, specifically, that the use of Vokis helped create a sense of a more personalized class experience and/or helped students feel as though they connected with another person in the class, thus creating a sense of community.

Community of Inquiry

Establishing social presence is one of the biggest challenges when teaching online (Sung & Mayer, 2012). As Wei, Chen, and Kinshuk (2012) indicate, "Lack of social presence may lead to a high degree of frustration, an unreasonably critical attitude toward the instructor's effectiveness, and a lower level of affective learning" (p. 529). Their study, among others (Gunawardena & Zittle, 1997; Sung & Mayer, 2012; Tu & McIssac, 2002; Walther, 1992), found that "social presence has a high positive impact on learning" (Wei, Chen, & Kinshuk, 2012, p. 539). Other scholars have examined concepts beyond social presence that influence successful online learning. One, in particular, worth discussing before moving on to social presence in particular is the Community of Inquiry (CoI) framework.

Garrison, Anderson, and Archer (2000) developed the CoI framework as a "process model that provides a comprehensive theoretical model that can inform both research on online learning and the practice of online instruction" (Swan, et al., 2008). The CoI framework is founded on the precept that effective online learning must develop a sense of community. According to Garrison, Anderson, and Archer (2000) there exist three elements that make up and create a CoI: cognitive presence, teaching presence, and social presence. Cognitive presence is defined as the ability to "construct meaning through sustained communication" (Garrison, Anderson, & Archer, 2000, p. 89). The authors are careful to explain, however, that cognitive presence alone "is not sufficient to sustain a critical community of learners" (p. 94). To reinforce cognitive presence, teaching presence must also exist. Teaching presence is comprised of two functions: design and facilitation. Design "includes the selection, organization, and primary presentation of course content, as well as the design and development of learning activities and assessment" (Garrison, Anderson, & Archer, 2000, p. 90). Facilitation is defined as "a responsibility that may be shared among the teacher and some or all of the other participants or students" (Garrison, Anderson, & Archer, 2000, p. 90). Teaching presence supports and strengthens cognitive presence and social presence. Social presence is the third element and the one which will be investigated in the present study. Social presence is defined as "the ability of participants in the CoI to project their personal characteristics into the community, thereby presenting themselves to the other participants as 'real people'" (Garrison, Anderson, & Archer, 2000, p. 89). In other words, social presence is "the degree to which learners feel socially and emotionally connected with others in an online environment" (Swan et al., 2008).

Garrison and Cleveand-Innes (2005) stress a CoI is comprised and created from multiple interactions among instructors, students, and the course content. A successful CoI relies on interaction, but interaction does not ensure learning. Garrison and Cleveland-Innes (2005) write:

To appreciate interaction and the quality of learning out-comes, one must understand how cognitive, social, and teaching presence come together to create a purposeful community of inquiry. An interactive community of learners is generally considered the *sine qua non* of higher education. However, interaction is not a guarantee that students are cognitively engaged in an educationally meaningful manner (p. 135).

Although the CoI framework is readily applied and held in high esteem among academics, it is not without limitations. Arbaugh, Bangert, and Cleveland-Innes (2010) found that the framework might be more applicable when discussing applied disciplines rather than pure or theoretical disciplines. In other words, online classes that include mostly lectures are less relevant when applying the CoI framework than classes that require real-life application or encourage more activity and involvement among students. Likewise, Akyol and Garrison (2008) found that students perceive that they learn in online classes but that their learning tends to be lower-level learning. In this current research, students' perceptions of or actual learning is beyond the scope. Those topics tend to focus on indicators of cognitive presence. Here, the topic of focus is students' perceptions of social presence.

Social Presence

The concept of social presence was first defined by social communication studies researchers Short, Williams, and Christie (1976) as the "degree of salience of the other person in a mediated communication and the consequent salience of their interpersonal interactions" (p. 65). Later, Walther (1992) found that participants in online settings developed visual interpretations of others based on their writing to help create a sense of intimacy and identification, which inspired this present study and the inclusion of Voki avatars to help students approximate a visual interpretation of their instructor and classmates. Further reinforcing this study and the use of Voki avatars, researchers Kim, Kwon, and Cho (2011) found that media integration positively affects social presence in distance learning.

Adding to the previous definition of social presence, Gunawardena and Zittle (1997) included the idea that *presence* was related to whether a person felt as though he or she was interacting with a "real" person. Tu and McIssac (2002) further redefined social presence in digital environments as being able to create a "feeling of community" (p. 131) and found that social presence positively influences online instruction. They specify that social presence is the "degree of feeling, perception, and reaction to another intellectual entity in the CMC [computer-mediated communication] environment" (Tu & McIsaac, 2002, p. 146) and include four dimensions used to establish and maintain social presence: social context, online communication, interactivity, and privacy. Addressing the importance of social presence in a learning environment, Wei, Chen, and Kinshuk (2012) wrote, "Learners must perceive an appropriate degree of social presence before feeling comfortable in interaction with others. Therefore, social presence is a key element for enhancing and fostering learning interactions in online classrooms" (p. 530).

As the definition of social presence continued to change, so, too, did the categories used to define it. For example, Aragon (2003) included three categories—course design strategies, instructor strategies, and participant strategies—while Sung and Mayer (2012) identified thirty affective indicators and five factors of online social presence. Sung and Mayer's (2012) study focused on the premise that "online learning is [or should be] an inherently social endeavor, and social interaction with the teacher and other learners is instrumental in motivating learners' efforts to learn as well as promoting their satisfaction with online courses" (p. 1738.) They associate the "fundamental nature of social presence" with "a feeling rather than reason" (p. 1738), identifying five factors that make up online students' perceptions of social presence: social respect, social sharing, open mind, social identity, and intimacy. Drawing on the available definitions, Sung and Mayer (2012) proposed that "social presence relates to whether participants [feel] they are interacting with real people when they are online" (p. 1738) and that it is "the subjective feeling of being connected and together with others during computer mediated communication" (p. 1739). This current study relies on Sung and Mayer's (2012) definition of social presence as well as Gunawardena and Zittle (1997) with attention to the need for students to feel that they are communicating with and are connected to real people as well as the ability to create a sense of community (Tu & McIssac, 2002).

Avatars

One potential way to achieve a sense of community and of communicating with real people, ironically perhaps, is via avatars, which provide a visual image of a digital (and, therefore, not real) person or character. In the gaming industry and some social platforms such as Second Life—a virtual world where people interact as avatars—using avatars is nothing new. Some online and hybrid classes have even been conducted virtually using Second Life. Exploring the effectiveness of using avatars for pedagogical purposes when teaching social work students about cultural competence, Lee (2014) considered using Second Life because it is "the most sophisticated virtual community on the market," but chose to incorporate Voki, because it required less time to learn to navigate and was "simple and easy to teach students" (p. 96). Lee found that using Voki avatars "present[ed] an opportunity for individuals to experience different perspectives" and "that virtual communities provide a useful and safe medium for integration of culture competence training" (p. 104). Lee's study incorporated Voki avatars in the form of a "cocktail party," asking students to choose avatars that represented roles they would play during the virtual event. In this current study, Voki were chosen as the optimal option for incorporating avatars into an online class for similar reasons as Lee. This research, however, investigates using avatars to a lesser extent than required when communicating in a virtual word or at a virtual party. The students in this study were asked to create an avatar on three separate occasions to respond to prompts on a discussion forum.

With Voki (www.voki.com), users choose from a template of options in order to create avatars in the likeness of themselves, animals, historical figures, and other characters. Users can choose to add a text-to-speech voice message in several masculine and feminine voices and accents or record their own voice message using a microphone. Although these avatars do not accommodate or recreate facial cues, their creators' choices in character, clothing, and style (e.g., hair color and style, accessories, etc.) allow for some insight into the students' personalities, tastes, and likenesses. Additionally, if users choose to record their voices, verbal cues like tone and inflection are more apparent. With all of this in mind, including avatars could be one way to establish social presence—to help make physical the innate desire to imagine an image and voice when communicating in a more removed or abstract setting such as learning in an online classroom. This conception of social presence also assumes that including visual and auditory cues will establish a sense of a "real" person as well as a sense of community.

Methodology

Participants

The participants in this study all attended the same large, Midwestern community college and all completed the same online writing class with the same instructor. Students in this particular writing course were asked to create talking avatars and post them to discussion forums on three separate occasions throughout the semester. All students in the course were required to create a Voki, which they used when participating in class discussions. On each occasion, students could change the appearance and accent or voice of their avatars. No features were automatically saved for future use, so students had to recreate their chosen characters for each discussion forum activity. Students responded to questions and prompts by creating their avatars, recording their response, and embedding their chosen Voki character within a discussion forum. Once embedded, the avatars would play on command whatever recorded message each student had prepared.

Participants were students in a college's pre-requisite composition class (College Composition II) during one of three semesters. This course was offered face-to-face and online and all participants were students in the online version of this class with the same instructor. Seven total sections of the course were included in the data collection: two sections during the Spring semester, three sections in the Summer semester, and two sections from the Fall semester. All students who took this course during

these three semesters were invited to participate in the survey once the semester ended. Students were contacted once they had completed the course and grades had been posted. The project and consent form had also been approved by the Institutional Review Board (IRB). By the end of the third and final semester of data collection, 40 self-selected student participants out of a possible 140 students total participated. Students *self-selected* in that they chose to, but were not required to, respond to a questionnaire after indicating interest and consenting based on an email sent to them after grades were posted and they were no longer students in the class.

The questionnaire was adapted from Gunawardena and Zittle's (1997) and Richardson and Swan's (2003) social presence surveys about their overall experience with social presence in this particular online class as well as the potential affordances of incorporating Voki avatars to establish social presence. Eleven male students and 29 female students chose to participate and complete the survey. Their mean age was 31.9 years with an age range of 18-49 years. This specific course was the first online class (of any subject at any university) for six of the participants, 15 participants indicated that they had taken between two to four other online classes, nine survey participants had taken between five to six online classes, one participant had taken nine online classes, and four participants had taken 10 or more online classes.

Open-ended Questions

Participants were given a newly-created survey that was adapted from Part I of Richardson and Swan's (2003) survey, modified from Gunawardena and Zittle's (1997) survey, which examined social presence in computer mediated conferences. The first part of the survey asked about social presence in general and the second part of the survey asked the same questions but as they related to Vokis specifically. This adapted survey also included three additional open-ended questions, not included in either of the previous surveys, which are the focus of this present research. The hypothesis was that students would make mention of the Voki avatars when answering open-ended questions, particularly when answering question 2 below, because students were asked to create, watch, and respond to their peers' avatars. In that way, the following hypothesis guided this research and research questions:

H 1. Participants will perceive that visual and auditory aspects afforded via creating and watching Voki avatars played a significant role in establishing and maintaining social presence in this current online class, and, therefore, will make mention of Vokis when responding to the current research survey's open-ended questions, indicating that Vokis, specifically, helped create a sense of social presence.

The three open-ended questions are the focus of this current research. Their purpose was to better understand the kinds of course activities and assignments students felt better-established social presence and facilitated learning. The open-ended questions are as follows:

> Please explain what, if anything, best helped you feel like you were more than just a number in this class.
>
> Please explain what, if anything, helped you feel like you became acquainted with fellow students in this class.
>
> Please include any other comments or feedback that you have not been able to express yet but would like to.

Question 1 relates to the first phase or earlier definition of social presence, which focused on salience of interpersonal relationships. Question 2 relates to the second phrase or later definition of social presence, which addresses the importance of feeling as though a student is interacting with a real person. Question 3

was included to allow participants a space to include any other information that they deemed relevant or important.

Analysis and Reliability

To analyze the responses obtained from the open-ended questions, content analysis (Berelson, 1952; Hsieh & Shannon, 2005; Krippendorff, 2004; Neuendorf, 2002), informed by grounded theory (Glaser & Strauss, 1967), was applied. Open coding began by reading through all student responses, looking for patterns among the feedback. Comments were coded according to topics discussed within each response. Consider the following three examples to the first question, "Please explain what, if anything, best helped you feel like you were more than just a number in this class":

The instructor's thorough feedback on our essays.

I liked how the instructor was very personal in all of her responses and emails.

A lot of interaction with your peers and emails from the professor kept the class interesting

The topics mentioned in each response became the categories. In other words, in Example 1, the topic is "instructor's feedback," which is easier to determine because the statement is short and focused. In this example, the topic "instructor feedback" was categorized as *Feedback*. Example 2 includes both "instructor's responses" (categorized as *Essay Feedback from Instructor*) and "email from instructor," which was categorized as *Email from Instructor*. Example 3 also includes two topics: "interaction with peers" (categorized later as *Peer Workshop/Review*) and "email from instructor," which, again, was categorized under that same name. Each of the responses were coded and categorized likewise for Question 2 and Question 3.

Question 1 yielded 7 categories: *Email from Instructor*, *Essay Feedback from Instructor*, *Other/Vague*, *Peerworkshop/Review*, *Discussion Forum*, *Voki*, and *Nothing*. Inter-rater reliability simple agreement and Cohen's Kappa when coding responses for Question 1 were .93 and .90, respectively. Question 2 yielded 6 categories: *Group/Collaborative Project*, *Peer Workshop/Review Feedback*, *Discussion Forum*, *Voki*, *Emailing with Students*, *Other/Vague*. Inter-rater reliability simple agreement and Cohen's Kappa when coding responses for Question 2 were .90 and .91, respectively. Question 3 yielded 7 categories: *Accolades for Instructor*, *No Vokis*, *Accolades for Course*, *Unhappy with Course*, *Liked Voki*, *Statement Regarding Online Class*, *Other/Vague*. Inter-rater reliability simple agreement and Cohen's Kappa when coding responses for Question 3 were .90 and .90.

Results

Table 1 (next page) includes the coded and categorized results regarding participants' perceptions of individual attention online or what made them feel like "more than just a number" when communicating in an asynchronous online class. As evident from Table 1, students thought receiving individual emails from their instructor was the most important factor that helped them feel more individualized within this class, followed by the feedback the instructor included on student essays. There was no expectation or hypothesis regarding how students would answer Question 1. However, Vokis were anticipated to be mentioned since they afforded students the ability to personalize their avatars. The number of times the instructor was mentioned was not anticipated, but correlates with previous research, which will be discussed below in Instructor Presence and Immediacy. The majority of students discussed the importance of detailed, relevant, and timely instructor responses, indicating that, in order to feel as though they "matter," students appreciated and somewhat expected the instructor to have a prominent presence online,

responding to individual emails timely and respectfully and mentioning students by name or referencing class-specific ideas or comments when responding to group emails.

Table 1 *Perception of Individuality Online*

Question: Please explain what, if anything, made you feel like more than just a number in this class.

Category	**Definition**	**Frequency n=31***
Email from Instructor	The student indicated that individual email responses from the instructor helped him or her feel less like a number in this online class.	15 (48%)
Essay Feedback from Instructor	The student indicated that individual essay feedback directly from the instructor helped him or her feel less like a number in this online class.	12 (39%)
Other/Vague	The student included a general statement that was too vague to categorize.	6 (19%)
Peer Workshop/Review	The student indicated that participating in Peer Workshop/Review where small groups of students uploaded their essays to a forum, reading and providing feedback for each of their group members helped him or her feel less like a number in this online class.	5 (16%)
Discussion Forum	The student indicated that Discussion Forums between students where they were expected to post and discuss topics helped him or her feel less like a number in this online class.	5 (16%)
Voki	The student indicated that creating and watching Voki avatars (Web 2.0 technology that allows students to choose historical, animal, and various other characters and add a recorded or text-to-speech voice message) helped him or her feel less like a number in this online class.	2 (6%)
Nothing	The student indicated that nothing was helped him or her feel less like a number in this online class.	1 (3%)

**Note*: Frequency count is higher than *n* because some students listed or included more than one item in their responses.

Although feeling like an individual and receiving personalized attention is important, feeling like part of a community is also important to students and vital to creating a sense of social presence, which leads to the second question and responses found in Table 2 (next page).

Table 2 *Perception of Social Presence Online*

Question: Please explain what, if anything, helped you feel like you became more acquainted with fellow students in this class.

Category	**Definition**	**Frequency n=33***
Group/Collaborative Project	The student indicated that participating in the group/collaborative project with other students in the class helped him or her become more acquainted with fellow students.	13 (39%)
Peer Workshop/Review Feedback	The student indicated that participating in Peer Workshop/Review where small groups of students uploaded their essays to a forum, reading and providing feedback for each of their group members helped him or her become more acquainted with fellow students.	12 (36%)
Discussion Forum	The student indicated that participating in Discussion Forums with other students in the class helped him or her become more acquainted with fellow students.	6 (18%)
Voki	The student indicated that creating and watching Voki avatars (Web 2.0 technology that allows students to choose historical, animal, and various other characters and add a recorded or text-to-speech voice message) with other students in the class helped him or her become more acquainted with fellow students.	6 (18%)
Emailing with Students	The student indicated that communicating via email with other students in the class helped him or her become more acquainted with fellow students.	2 (6%)
Other/Vague	The student included a general statement about the course or instructor that was too vague to categorize.	2 (6%)

**Note*: Frequency count is higher than *n* because some students listed or included more than one item in their responses.

Although Vokis were hypothesized to play a larger role in establishing social presence, more direct, interpersonal communication between students seemed to be more significant. Further, participants were expected to dislike the collaborative group project assigned for this particular class, given the difficulty of working in groups with the added complexity of working asynchronously online. Perhaps students did dislike the collaborative group project, but, nevertheless, the majority of students who responded to this question found it to be the most valuable in creating social presence. Peer workshops, too, played a significant role, and, again, students were expected to dislike or fail to understand the value in reading and responding to group members' essays in an asynchronous environment via a discussion board. However, students indicated that they enjoyed this activity and that reading their peers' essays helped them feel more connected to their classmates.

Participants were also asked to include any additional comments or feedback that they were not already able to discuss in the previous two questions. Table 3 includes the students' open-ended responses.

Table 3 *Additional Comments or Feedback*

Question: Please include any other comments or feedback that you have not been able to express yet but would like to.

Category	**Definition**	**Frequency n=20***
Accolades for Instructor	The student included a general or specific statement praising the instructor.	8 (40%)
No Vokis	The student indicated that creating Voki avatars was not helpful.	5 (25%)
Accolades for Course	The student included a general or specific statement praising this particular online class.	4 (20%)
Unhappy with Course	The student indicated that he or she was unhappy with at least one aspect of this course, other than the Vokis which are included as a separate category.	2 (10%)
Liked Voki	The student indicated that he or she enjoyed creating Voki avatars or found them useful.	1 (5%)
Statement Regarding Online Class	The student included general information about his or her experiences with online learning.	1 (5%)
Other/Vague	The student included a statement that did not include any comments or feedback.	1 (5%)

**Note*: Frequency count is higher than *n* because some students listed or included more than one item in their responses.

As evidenced in Table 3, a strong instructor presence was important to these students, which they reiterated when discussing the instructor's timely email responses (24-hour response time) and detailed, individualized feedback on essays. For these students, timely (i.e., email) and individualized (i.e., feedback) attention seemed to be all that was necessary for instructor presence to be regarded as high and satisfactory. Also as evidenced in Table 3, students found less value in creating and using Vokis than anticipated.

Discussion

This study found that, in this specific online class, the use of Voki avatars did not play a significant role in establishing social presence or creating a sense of community. Although there are many characteristics and factors that constitute social presence, this study relies on a conflation and expansion of many scholars' concepts (especially Ke, 2010; Stacey, 2002; Sung & Mayer, 2012) in order to make sense of what these specific students found to establish social presence. Initially, this research

hypothesized that incorporating Voki avatars would significantly increase students' perceptions of social presence, but other factors seem to play a larger role. Sung and Mayer (2012), as discussed previously, mention many of the varying factors, also including two particular factors relevant to this study. They write,

The degree of online social presence is based on the characteristics of the medium and the user's perception. These are associated with two components of online social presence, which are intimacy and immediacy.… According to a large number of studies in online social presence, intimacy and immediacy are good predictors or potential indicators of student's online learning. (p. 1739)

With this current research, the characteristics of the medium (e.g., email) and users' perceptions (e.g., quick email replies from the instructor) played the biggest role in establishing social presence. Swan, Richardson, Ice, Garrison, Cleveland-Innes, and Arbaugh (2008) conducted a factor analysis, concluding that "an online community of inquiry emerges out of social, cognitive and teaching presence" and that "[s]tudent responses to statements about his or her online experiences clustered around items as defined by the theory." Likewise, this current research found that students' qualitative comments tended to cluster around the same items, specifically, teaching presence and social presence. Just as Sung and Mayer (2012) found, intimacy and immediacy seemed to be prominent indicators of a student's sense of social presence, this current research suggested likewise. Although social presence is much more complex than two simplified characteristics, the data obtained in this current study can be categorized with those specific factors in mind. However, rather than *intimacy* (Sung & Mayer, 2012), these current data suggest that *instructor presence* and *interactivity* along with the underlying necessity for *immediacy* help establish social presence in an online mediated learning environment.

Instructor Presence and Immediacy

The findings for Question 1 and 3 speak directly to teaching presence, categorized here as Instructor Presence and Immediacy, much like the category of teaching presence discussed in the CoI framework. Students indicated that, overall, the instructor's feedback and quick responses helped them feel like "more than just a number in this class." Much of the previous research, likewise, has indicated the importance of instructor presence in relation to establishing a CoI. Garrison and Cleveland-Innes (2005) argue that "teaching presence is important for the creation and sustainability of a community of inquiry focused on the exploration, integration, and testing of concepts and solutions (p. 135) and that "teaching presence contributes to the adoption of a deep approach to learning and that interaction by itself does not promote a deep approach to learning" (p. 140).

Richardson and Swan (2003) found that the instructor was one of the most essential aspects when investigating students' perception of social presence. Likewise, Stacey (2002) found that the instructor's role was "a major factor" in the success of online learning. Ke (2010) examined social presence in online classes, specifically focusing on adult learners, finding that "teaching presence should be the catalyst that initiates the community development process" (p. 817). This current study reinforces what these previous scholars found. Ke (2010) also found that "adult students have identified instructors who demonstrated high presence online as the key to learning satisfaction," which included providing "prompt and meaningful" feedback (p. 817). Likewise, the students' comments in this study reiterated the fact that they found the instructor to be instrumental in that *Email from Instructor* and *Instructor Feedback* were the most mentioned items that helped the students feel as though they had an individual learning experience with a real person.

Garrison and Cleveland-Innes (2005) suggest that social presence by itself and the exchange of information alone cannot create meaningful learning. Instead, "[t]eaching presence provides the structure (design) and leadership (facilitation/direction) to establish social and cognitive presence (i.e., community

of inquiry)" (p. 144). They suggest, then, that simple interaction—absent of structure and leadership—is not enough to create social presence. A lack of structure and leadership might explain why Vokis were less successful than other aspects of the class that had more structure and leadership. Specifically, in this class, "purposeful and systematic discourse," an important component when discussing a CoI and social presence, was present in other facets of the class such as peer workshops and essays submissions along with feedback but less so when creating and embedding Vokis in a discussion forum (Garrison & Cleveland-Innes, 2005, p. 135).

Interactivity

Perhaps not surprising (though, unexpected in this research) is the role group work—small group discussions, peer feedback, and a collaborative project—played in establishing social presence. Answering Question 2, students indicated that group work and interacting directly with their peers helped them feel more acquainted with other students. Stacey (2002) found that collaborative learning enhanced overall online learning (p. 293). Similarly, Kim, Kwon, and Cho (2011) found that student demographics and previous online experience mattered little regarding students' perceptions of social presence; however, "evidence showed that both social presence and learning satisfaction are affected by media integration and quality instruction" and that "[i]nteractivity was found to be a good predictor of social presence" (p. 1517). Likewise, Akyol and Garrison (2008) analyzed social presence over time in messages posted in a discussion board during a graduate course, finding that "some of the students' responses to open-ended questions also confirmed the importance of collaborative activities for their learning" (p. 16). Social presence is necessary for collaborative projects to be effective (Garrison, 2007) but collaborative projects, according to this study, may also help establish and maintain social presence. As Garrison (2007) writes, "The purpose of social presence in an education context is to create the conditions for inquiry and quality interaction (reflective and threaded discussions) in order to collaboratively achieve worthwhile educational goals" (p. 64).

This finding shows that, perhaps, the interactions and not the technology are what matter. In this way, a better research question might have been whether avatars support interactions and group work. This current research incorporated Vokis among more individualized activities such as discussion forums, asking students to post one and listen to/watch two other students' posts and respond. Perhaps if communication were extended to ongoing interaction among students, the usefulness and perception of Vokis might have changed or been more prominent. Again, the positive responses regarding peer workshops were unexpected, so future research could attend to a more specific focus on the ways that Vokis or avatars in general might be used when incorporating peer workshops or whether incorporating avatars among group work changes the perceived effectiveness of the activity at all.

Limitations

Within this study, there are three major limitations. The first limitation is the small sample size of 40 participants. Ideally, a higher participation rate would have allowed for more diverse opinions. Out of a total of 140 students who completed the course and were emailed asking to participate, only 40 students (29%) self-selected to complete the survey. Allowing students to self-select was important in achieving more valid results, because students were not required to participate and were not asked to participate until after their respective semesters had ended. The second major limitation was that this course was developed and taught by one instructor, which, again, does not allow for true diversity or broadness of perspectives. However, even though data was collected from one instructor's class, the findings provide a foundation for further discussion about social presence in online classroom environments and allow for higher internal validity, since each of the classes would have been taught similarly by the same instructor. The third limitation was that there was no control group with which to compare data. Each of the participants included in the data set were students in a class that incorporated Vokis. The data is still

worthwhile, suggesting that there is a correlation between participants who used Vokis and finding other kinds of communication more valuable when establishing social presence. Future research could include a pre- and post-survey about with two different groups of participants: one who completed a class that incorporated Vokis and one that completed a class without Vokis. Group feedback could be compared in order to establish a correlation between the perception of social presence when considering classes that incorporate Voki avatars and those that do not.

Conclusion

In sum, instructor presence and interactivity when combined with immediacy help online students feel as though they are communicating with real people in a timely and practical manner, creating a sense of community. Applied subjects fare better online in terms of social presence than pure subjects. As Arbaugh, Bangert, and Cleveland-Innes (2010) found, their research

suggests the possibility that the CoI framework may be more applicable to applied disciplines than pure disciplines. The CoI's assumption of a constructivist approach to teaching and learning may not align with the cumulative, instructor-oriented approaches particularly associated with hard, pure disciplines. (p. 43)

In that way, I would argue that writing is an applied subject, and, unlike lecture-based courses, includes peer workshops and instructor feedback, which all reinforce a CoI.

The concept of social presence and the CoI might not work well in some classes, as Rourke and Kanuka (2009) argue, "CoI fails as a model for achieving deep and meaningful learning because the procedures for achieving those outcomes do not materialize" (p. 43). Achieving social presence might not work well in some classes, but I would argue that a CoI works well in a composition class—perhaps better without avatars, or, at least, the way that avatars were applied within this particular class. Deep and meaningful thinking happened outside of the discussion forum, often, when students were writing and revising essays after receiving feedback from their peers and instructor.

Particular Web 2.0 technology such as Voki avatars seems to matter less to students than a responsive, attentive instructor and the ability to work collaboratively with other students in the online environment. Although incorporating Vokis into this online class was entertaining for some students, taking the time to create a talking avatar for each of the assigned discussion forums seemed pointless or annoying to others. The way that Vokis were incorporated into this class, essentially, was less "real" than directly communicating with other students and the instructor via email and peer workshops. Here, then, text-based communication was more effective in creating a sense of community than a visual and auditory representation that took more time and effort to create. Perhaps if avatars were incorporated in a more robust and regular manner (i.e., the way avatars are used in Second Life), then students might have found the use of avatars to be more helpful and capable of producing a sense of community and social presence. Regardless of whether instructors should include Voki avatars in online classes if the avatars help the instructor establish the kind of social presence Walther (1994) suggests by envisioning what students might look like or enjoy (e.g., dog-lovers tend to choose dog avatars), it is clear that there are other factors that help establish social presence. From the qualitative data collected and analyzed in this study, there are two major factors in creating social presence. First, it seems there needs to be a present and responsive instructor who can provide relevant feedback via emails, discussion forums, and on essays in a timely manner. And, the second important factor seems to be the ability to work with other students in small groups and on larger projects in ways that are direct and pragmatic. Overall, this research suggests that the instructor's presence and interacting with other students establishes more social presence than any talking dog or cartoon character is capable of doing on its own.

References

Akyol, Z. & Garrison, D. R. (2008). The development of a Community of Inquiry over time in an online course: Understanding the progression and integration of social, cognitive, and teaching presence, *Journal of Asynchronous Learning Networks, 12*(3-4), 3-22.

Aragon, S. R. (2003). Creating social presence in online environments. In Aragon, S. R. (Ed.), *New directions for adult and continuing education: Facilitating learning in online environments*, (Vol. 100, pp. 57-68). Hoboken, NY: Wiley.

Arbaugh, J. B., Bangert, A., & Cleveland-Innes, M. (2010). Subject matter effects and the Community of Inquiry (CoI) framework: An exploratory study, *Internet and Higher Education, 13*, 37-44.

Berelson, B. (1952). *Content analysis in communication research*. New York: Free Press.

Garrison, D. R. (2007). Online community of inquiry review: Social, cognitive, and teaching presence issues. *Journal of Asynchronous Learning Networks*, *11*(1), 61-72.

Garrison, D.R., Anderson, T., Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2*, 87-105.

Garrison, D. R., & Cleveland-Innes, M. (2005). Facilitating cognitive presence in online learning: Interaction is not enough, *The American Journal of Distance Education, 19*(3), 133-148.

Gee, J. P., & Hayes, E. R. (2011). Language and learning in the digital age. New York: Routledge.

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory*. Chicago: Aldine Publishing Company.

Gunawardena, C. N., & Zittle, F. J. (1997). Social presence as a predictor of satisfaction within a computer-mediated conferencing environment. *The American Journal of Distance Education, 11*(3), 8-26.

Hsieh, H., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research, 15*(9), 1277-1288.

Inman, J. A. (2004). Computers and writing: The cyborg era. Mahwah: Lawrence Erlbaum Assoc.

Ke, F. (2010). Examining online teaching, cognitive, and social presence for adult students. *Computers and Education, 55*, 808-820.

Kim, J., Kwon, Y., & Cho, D. (2011). Investigating factors that influence social presence and learning outcomes in distance higher education. *Computers & Education, 57*(2), 1512-1520.

Kress, G. (2003). *Literacy in the new media age*. New York: Routledge.

Krippendorff, K. (2004). *Content analysis: An introduction to its methodology*. Thousand Oaks, CA: Sage Publications.

Landow, G. P. (1992). *Hypertext 3.0: Critical theory and new media in an era of globalization*. Baltimore: Johns Hopkins UP.

Lankshear, C. & Knobel, M. (2008). *New literacies: Everyday practices & classroom learning*, 2nd Ed. New York: Open University Press.

Lee, E. O. (2014). Use of avatars and a virtual community to increase cultural competence. *Journal of Technology in Human Services, 32,* 93-107.

Neuendorf, K. A. (2002). *The content analysis guidebook.* Thousand Oaks, CA: Sage Publications.

Richardson, J. C. and K. Swan. (2003). Examining social presence in online courses in relation to students' perceived learning and satisfaction. *Journal of Asynchronous Learning Networks, 7*(1), 68–88.

Rourke, L. & Kanuka, H. (2009). Learning in communities of inquiry: A review of literature. *Journal of Distance Education, 23*(1), 19-48.

Self, C. L. (2007). *Multimodal composition: Resources for teachers*. Cresskill: Hampton Press, Inc.

Short, J. E., Williams, E., & Christie, B. (1976). *The Social Psychology of Telecommunications*. Toronto: Wiley.

Schunk, D. H., Pintrich, P. R. & Meece, J. (2008). *Motivation in Education: Theory, Research, and Applications (3rd ed).* Upper Saddle River, NJ: Pearson.

Stacey, E. (2002). Social presence online: Networking learners at a distance. *Education and Information Technologies, 7*(4), 287-294.

Sung, E., & Mayer, R. E. (2012). Five facets of social presence in online distance education. *Computers in Human Behavior, 28,* 1738-1747.

Swan, K. P., Richardson, J. C., Ice, P., Garrison, D. R., Cleveland-Innes, M., & Arbaugh, J. B. (2008). Validating a measurement tool of presence in online communities of inquiry, *E-mentor 2*(24). http://www.e-mentor.edu.pl/artykul/index/numer/24/id/543

Tu, C. H., & McIssac, M. (2002). Relationship of social presence and interaction in online classes. *The Journal of Distance Education, 16*(3), 131-150.

Tyner, K. (1998). *Literacy in a digital world: Teaching and learning in the age of information*. Mahwah: Lawrence Erlbaum Assoc.

Walther, J. (1994). Interpersonal effects in computer mediated interaction. *Communication Research, 21*(4): 460-487.

Wei, C., Chen, N., & Kinshuk. (2012). A model for social presence in online classrooms. *Education Technology Research and Development, 60,* 529-545.

Wysocki, A. F., Johnson-Eilola, J., Selfe, C. L., & Sirce, G. (2004). *Writing new media: Theory and applications for expanding the teaching of composition*. Logan: Utah State UP.

Comparing Asynchronous and Synchronous Video vs. Text Based Discussions in an Online Teacher Education Course

Cynthia Clark and Neal Strudler and Karen Grove

University of Nevada, Las Vegas

Abstract

The purpose of this study was to investigate whether asynchronous video posts and synchronous videoconferencing would create higher levels of teaching and social presence within an online course when compared with the university's current text-based discussion platform. Undergraduate students in an online teacher education course were randomly assigned to either the text-based discussion platform or the video-based discussion platform. A switched replications design was used and halfway through the semester students switched platforms. Analysis of student interviews and surveys administered at the end of the semester indicated self-reported perceptions of social and teaching presence were significantly higher when using the video-enabled discussion site. Implications of the added value of video, both in synchronous and asynchronous contexts, are discussed and recommendations for further study are provided.

Introduction

Today online learning, learning that occurs at a distance where the learner uses some type of technology to interact with the instructor and other learners (Anderson, 2004), is no longer relegated to non-traditional students. Enrollment levels at predominantly online schools such as the University of Phoenix, Kaplan University, and Western Governors University are influencing traditional institutions to increase their number of online offerings (Burnsed, 2011). Massively open online courses, or MOOCs, are adding to the pressure to increase the number of online courses as states such as California seek to reduce the cost and time required by students to obtain post-secondary degrees, thereby expecting to help increase graduation rates (Fain, 2013).

Unfortunately, online instruction has not appeared to increase graduation rates. Attrition is significantly higher for online students than for students attending traditional classrooms (Doherty, 2006; Patterson & McFadden, 2009). Time constraints as well as work and family obligations were cited as posing limitations on the amount of time online students could devote to their coursework. Online students' feelings of isolation have been identified as one factor that can lead to attrition (Rovai, 2003). Students stated that that they felt alone and they missed attending class with other students (Dickey, 2004). The odds of students persisting in a course were positively related to their feelings of social presence (Liu, Gomez, & Yen, 2009), "the ability of participants…to project their personal characteristics into the community, thereby presenting themselves to the other participants as real people" (Garrison, Anderson, & Archer, 2000, p. 89). Students were more likely to stay in the course as feelings of social presence increased.

It is important that online instructors employ methods that will help reduce students' feelings of isolation. The purpose of this study was to determine whether the integration of asynchronous video posts and synchronous videoconferencing as part of a discussion platform would more effectively help increase feelings of social and teaching presence when compared with the currently used text-based discussion tool. As the course platform employed, WebCT, did not allow students to easily incorporate video posts in the text-based discussion format, it was decided that Google+ would be used to host class discussions. Google+ launched in June 2011 (Kaste, 2011) as a free social networking site and can be accessed by any online instructor and student. Google+ incorporates videoconferencing, referred to as 'Hangout', and has the ability to create video posts directly within the platform. By comparing student discussion experiences with text-based versus video-based platforms, this study sought to answer the following research questions:

1) What differences in social presence, if any, did students perceive between communications with video versus text-based communications?
2) What differences in teaching presence, if any, did students perceive between communications with video versus text-based communications?

Theoretical Perspectives

The theoretical framework for social and teaching presence guiding this study was drawn from the Community of Inquiry (CoI) model developed by Garrison, Anderson, and Archer (2000). The basic elements of the model are Social Presence, Teaching Presence, and Cognitive Presence. Social presence is "the ability of participants in the Community of Inquiry to project their personal characteristics into the community, thereby presenting themselves to the other participants as real people" (Garrison et al., 2000; p. 89). Teaching presence consists of three areas: instructional design, facilitation of discussion and direct instruction, along with displays of personality that demonstrate humanity (Nowak, 2001). Cognitive presence is "…the extent to which the participants of a community of inquiry are able to construct meaning through sustained communication" (Garrison et al., 2000; p. 89). Teaching and social presence support cognitive presence by creating the environment necessary to sustain the communication required to construct meaning.

The early descriptions of the CoI framework imply set characteristics and relationships. More recent investigations have hinted that a dynamic relationship exists and that there can be an ebb and flow of the presences as a course progresses (Akyol, 2014). This may be due to the group nature of social presence. It is not only individual presence that is important in the development of a CoI, there must be group cohesion as well (Remesal & Colomina, 2013). Student on-task behavior will vary based on their interest on various tasks, thus increasing and decreasing their participation in the group.

Discussion boards are the primary form of communication between students and instructors for online courses, which make them the focus for the creation of social and teaching presence in those courses. While social sharing has been shown to provide a pathway to social presence (Kreijns, Kirschner, Jochems, and Van Burren, 2004), the sharing must have a purpose and be linked to group identity (Remesal & Colomina, 2013). Feelings of group affiliation and group cohesion rather than perceptions of 'self' help build and sustain online learning communities where effective collaborations can occur (Pinsk, Curran, Poirier, & Coulson, 2014).

Online Discussion Boards and Presence

Text-based discussion platforms have been shown to lead to teaching and social presence (Gunawardena & Zittle, 1997; Nagel & Kotze, 2010; Nowak, 2001) though this can be time consuming and complex due to the lack of non-verbal social clues (Rovai, 2001). Miscommunication can occur as actions might go unobserved for a period of time, and online discussions require a longer time frame to complete (Wang & Woo, 2007). Due to inherent facial and physical clues in face-to-face discussions, they are perceived to be more authentic when compared with online discussions. Video discussions can help address this issue. Video posts provide necessary visuals, allowing students to experience each other as actual humans rather than text on a screen, thereby increasing social presence. This form of presence, aided by video, is "a psychological state in which virtual objects are experienced as actual objects in either sensory or nonsensory ways" (Lee 2004, p. 27).

Student performance has been shown to improve slightly when students are given the opportunity to participate synchronously through videoconferencing as compared with students who used only text-based learning materials (Skylar, 2009). Higher learning outcomes have also been shown to occur when students are provided with a combination of asynchronous and synchronous forms of communication (Moallen, Pastore, & Martin, 2011). Synchronous videoconferencing provided immediate social interaction and co-construction of knowledge while asynchronous text communication allowed for reflective thinking. Online video discussions develop group cohesion and affiliation, helping students to feel 'part of the group', thereby increasing engagement and participation (Pinsk et al., 2014).

In order to help create social presence within the computer supported collaborative learning (CSCL) environment, the environment must lend itself to the creation of a social space (Kreijns et al., 2004). Social space refers to the social interactions that occur among group members, the established group culture wherein beliefs and rules are developed, and the group ideals (Remesal & Colomina, 2013). The extent to which social space is created within a CSCL is dependent upon the sociability of the environment. Sociability defines the characteristics of the environment that lead to the development of a social space and includes "strong group cohesiveness, trust, respect and belonging, satisfaction, and a strong sense of community" (Kreijns et al., 2004, p. 157). Sociability provides the structure needed to help develop social presence, while social space provides evidence that social presence has developed.

Teaching presence has also been shown to increase through the use of video posts. Voice Thread, a web-based application that allows users to create asynchronous video posts, was used as the communication tool for teacher preparation courses conducted at a large institution (Borup, West, & Graham, 2012). Students indicated that watching instructors' video posts helped them see their instructors as real people, leading to feelings they were talking to their professors even though the video was asynchronous. Teaching presence is distributed among group members and is not strictly the purview of the instructor (Akyol, 2014). In the case of college courses, students primarily assist in the development of teaching presence by helping to facilitate course dialogue.

Video versus a text-based discussion platform is not the only factor that should be considered when designing a course discussion board. Group size can also have an effect on communication (Gall,

1980). The most efficient group size for promoting task-oriented interactions during synchronous discussions is between two and three members (Tu & McIsaac, 2002) as the smaller size allows members to participate equally. The discussion quality for computer mediated communication was found to be highest when group size was between three and six members (Lowry, Roberts, Romano, Cheney, & Hightower, 2006). One reason for the discrepancy may be that synchronous discussions conducted by smaller groups experience less off-task behavior that results in greater knowledge construction (Schellens & Valcke, 2004). Another reason for the difference in effective group size between synchronous and asynchronous discussions is that larger group sizes may increase the time needed to develop communication channels between individuals. This lag time may place obstacles to the formation of trust required for open discussions in a synchronous communication structure. Assigning students to subgroups within the overall course discussion platform can help students form relationships more quickly, resulting in increased "quality of discussion, communication appropriateness, communication richness, openness, and accuracy" (p. 656).

Teaching and social presence have been shown to improve student retention by helping to lessen feelings of isolation that can come with enrollment in online courses (Liu et al., 2009). Student responses pertaining to a university web-based teacher education course demonstrated feelings of loneliness and isolation. Student comments included "…missing being in a class with other students" as well as "I liked the convenience of the class but I felt like I was alone" (Dickey, 2004, p. 281). Such feelings of isolation can result in a lack of persistence for online students (Rovai & Wighting, 2005). However, as student feelings of social presence increase, feelings of isolation decrease while student persistence tendencies increase (Liu et al., 2009). Teaching presence plays an important part at reducing isolation as well. The teacher acts as a facilitator in developing the learning community for his or her class (Doherty, 2006; Joo, Kim, & Kim, 2011) by modeling communication and facilitation expectations (Akyol, 2014).

While these authors acknowledged that factors leading to attrition are complex, they all pointed to the lack of social and academic integration as primary factors. Academic integration, student satisfaction in intellectual development, is less dependent on the form of communication when compared with social integration. Social integration typically measures the satisfaction a student feels with the social aspects of life on campus (Munro, 1981). In relation to the online environment, social integration is related to feelings of social connectedness and group cohesion (Zydney, deNoyelles, & Seo, 2012). Social presence provides an environment for this connectedness and group cohesion to develop. In turn, teaching presence has been found to be significantly correlated with student persistence due to its effect on social presence (Joo, Y-J, Lim, K-Y, Kim, E-K, 2011). Online instructors therefore need to help students cultivate social presence, enabling the development of a community of inquiry (CoI). The CoI helps facilitate the learning process and leads to increased student persistence (Garrison, Anderson, & Archer, 2000; Tinto, 1997). In the present study we investigated whether students experienced a difference in teaching and social presence based on the discussion platform used during the online course.

Method

A mixed-methods action research approach was used to evaluate whether undergraduate teaching students perceived differences in teaching and social presence when using a platform that provided the ability to participate in synchronous videoconferencing and asynchronous video discussions (video-enhanced) (VED) as compared to the university's text-based discussion (TBD) platform. For the purposes of this paper, the acronym VED will refer to the video-enhanced platform and TBD will refer to the university's text-based discussion platform.

Mixed methods allows for a triangulation of data, helping to explain the data more fully by providing insight into complex human behavior (Cohen, Manion, & Morrison, 2011). This study used

non-parametric statistics to quantify the differences, if any, between the development of social and teaching presences based on student perception measured using survey instruments of the two discussion platforms. Interviews were conducted with some of the students in order to obtain a better understanding of student experiences using both discussion platforms and to help identify reasons for any differences that might be identified between the two platforms.

Participants

Undergraduate preservice teachers enrolled in an online teacher technology course at a large, urban university in a southwestern state were recruited to participate in this study. The course introduced students to educational uses of technology and was a requirement for graduation. Five of the 26 students elected not to participate in the study and an additional five students did not complete the course. This resulted in a participant sample of 16 students.

Measuring Presence

Sociability Scale, Social Presence Scale, and Social Space Scale. One of the goals of this study was to measure whether students perceived differences in the development of social presence based on the discussion platform used. As discussed above, sociability helps in the development of social presence, and social space provides evidence that social presence has occurred within the group structure. Therefore an instrument that measures all three constructs was chosen for this study. A modified combined version of Kreijns, Kirschner, Jochems, and Burren's (2004) Sociability Scale, Social Presence Scale, and Social Space Scale was used to measure social presence. The theoretical framework for these scales includes an ecological approach, where the social affordances of the media are viewed as "…properties of a computer-supported collaborative learning (CSCL) environment that act as social-contextual facilitators relevant for the learners' social interactions" (Kreijns, Kirschner, & Jochems, 2002, p. 13).

Kreijns et al. used face-validity to develop items during a computer mediated communication (CMC) social interaction literature review. Cronbach's alpha measures reported in this article for the Sociability Scale, the Social Presence Scale, and the Social Space Scale respectively were 0.92, 0.81, and 0.91. Principal factor analysis with varimax rotation was used to confirm the uniqueness of each scale. In this study, two surveys were created and the questions contained in the three scales were adapted for use with the present online course. Most of the adaptation involved changing terminology for Google+. For example, "Google+ allows spontaneous informal conversations" and "Google+ enables me to identify myself with my group."

Teaching Presence Scale. The instrument used to measure teaching presence was the Teaching Presence Scale first developed by Rovai (2002) as part of the Classroom Community Index. Shea, Li, and Pickett (2006) used the instrument to investigate perceived differences in community when comparing face-to-face classes and online courses with respect to teaching presence. A principal component analysis was performed by Shea et al., (2006) to verify that the construct measured was teaching presence and the correlation coefficient for each item was greater than 0.30. A reliability analysis indicated there was internal consistency of the learning community measure and the teaching presence scales. Cronbach's alpha values were calculated for the learning community scale, connectedness, and learning subscales and found to be 0.93, 0.91, and 0.90 respectively. In this study, the Teaching Presence questions were added at the end of the Social Presence survey items for each platform and included items such as "Overall, the instructor for this course helped to keep students engaged and participating in productive dialog."

These instruments were chosen as the basis for this study as they focus primarily on social presence and teaching presence. As stated earlier, cognitive presence was not explored in this study. Therefore it was decided that a more recent instrument developed by Arbaugh et al, (2008), would not be

used. Many of the items on that instrument incorporated cognitive presence, and authors of that paper noted that some of the survey items were more highly correlated with cognitive presence than with teaching presence.

Student Interviews

A standardized open-ended interview method was used to obtain a more in-depth analysis of student perceptions of social and teaching presences associated with the two platforms. This technique used structured questions where each participant was asked the same question, but allowed response flexibility due to the open-ended nature of the questions (Gall, Gall, & Borg, 2003). The interview contained questions about perceived differences between the use of VED and TBD in relation to the course and the instructor experience. The average interview length was 15 minutes.

Procedure

During the Fall 2012 semester one of the authors of this paper conducted a pilot study to determine whether the VED could effectively be implemented as a discussion board in an undergraduate online teacher technology course. As the purpose of the pilot study was to identify possible barriers to implementation and communication, data on social and teaching presence were not collected. That experience, as well as an extensive literature review, informed the procedures used for this study.

A preliminary technology survey was administered the first week of the Spring 2013 semester to determine student technology comfort level and gauge their experience with Web 2.0 applications. The results of the survey indicated that most students had high self-efficacy in their ability to learn and apply technology skills. It also indicated that all participants had access to the hardware necessary to successfully participate in video posts and videoconferencing.

Platform Assignment. At the beginning of the semester students were randomly assigned to treatments groups requiring discussions posts on either the text-based platform (TBD) or the video-enhanced platform (VED). Half of the students started the semester using the TBD and the other half of the students started the semester using the VED. There were concerns by the researchers the order of the platforms could affect student responses on the surveys. Beginning the semester with the VED may have caused students to develop feelings of social and teaching presence that extended into their use of the TBD, thereby inflating the scores for the TBD. Ending the semester with the VED may have caused inflation of scores on the VED survey as students would currently be using that platform during the administration of the survey. Therefore, a switched replications design was used to help balance out those possible effects.

A random number generator was used to determine group membership. All students participated in the experimental treatment; however data for those who declined to participate were not used for the study. On the eighth week students switched platforms, and for the final week all students used the VED platform. This resulted in students using each platform for seven weeks prior to the administration of the surveys, which occurred near the end of week 14 of the semester.

The students were further divided into smaller groups. The ideal group size for discussions has been shown to be dependent upon the type of communication. For synchronous communications, group sizes of two to three are considered to be most effective, while group sizes of three to six are considered to be most effective for asynchronous discussions (Lowry, Roberts, Romano, Cheney, & Hightower, 2006; Tu & McIsaac, 2002). For this study discussion group size was set at four as both types of communication were expected to occur. After having been assigned a platform, students were further divided into discussion groups at the beginning of the semester and remained in these groups throughout

the term. The researchers believed this would allow group members to establish the level of trust and comfort necessary to collaborate effectively (Dooner, Mandzuk, & Clifton, 2008). The created groups contained both females and males when possible and were based on the secondary subject area students planned to teach. Geographical locations of students' residences were also a consideration should students decide to meet face-to-face for collaborative purposes.

Creating the VED Course Page and TBD Discussion Format. Privacy is an important consideration when using an online social networking site (Buchanan, Paine, Joinson, & Reips, 2006). Social networking sites such as Facebook, Twitter, and Google+ were originally created with the premise that ideas were to be shared around the world uncensored (Rosenblum, 2007). Privacy settings may not be as rigorous as some students may prefer, inhibiting participation. Therefore it was decided that the VED course page should be created to provide an extra layer of security. A Gmail account, a free web-based email service developed by Google, was created using the course name. Students, after establishing a Google account, were provided the link to the Google course page.

Circles are the method Google+ uses to group people who have been granted permission to read the user's postings. Circles provided control over who saw which particular posting and determined the level of privacy of each post. This was an important consideration as students must feel they are in a safe space in order for social presence to occur (Kreijns, Kirschner, & Jochems, 2003). Three Circles were created which included all course members—a "Help" Circle, "Social" Circle for unrelated course content, and a "Communique" Circle which was used to share educational technology information the instructor encountered on the Internet.

Module Circles were created for the weekly course discussion assignments. The VED did not allow for threaded discussions, therefore Circles were created for all groups each week, allowing separation of the weekly discussion posts. Each week students accessed the course material through WebCampus, the university's designation for WebCT. Students were required to comment on the materials assigned each week and to include at least one quote that caught their interest as well as discuss how the topic may or may not contribute to student learning in their future classrooms. Providing a topic for discussions has been shown to encourage motivation to participate (Aviv, Erlich, Ravid, & Geva, 2003; Garrison, Anderson, & Archer, 2001). A "typical" video discussion post can be seen in Figure 1 below.

Figure 1. Initial student video post with accompanying follow-up text posts.

A discussion rubric was used to grade each week's participation. Incorporating course discussions into the grade structure has been demonstrated to increase student motivation to participate (Kay, 2006). The rubric was based on the discussion structure necessary to generate reflection and social interaction that can lead to improved learning outcomes (Greenlaw & DeLoach, 2003; Roblyer & Wiencke, 2003). To help ensure the privacy of the posts, students were warned that public posts would receive zero points. Public posts can be accessed by anyone with a Google+ account, regardless of the fact that the post was created on a private Google+ page. Full participation consisted of one initial video/text post and three follow-up posts for each discussion and represented 22.5% of the course grade.

The TBD discussion board had a similar design. Threads were created which mirrored the three all-member Circles on the VED. Topics were created for each week's discussion. Threads within each discussion topic were created for each of the smaller discussion groups. Students assigned to the TBD group were instructed to post only to their assigned subgroup for each week's discussion. The title of the subgroup threads included student names to help clarify group membership. The TBD discussion board structure and thread structure can be seen in Figures 2 and 3 below.

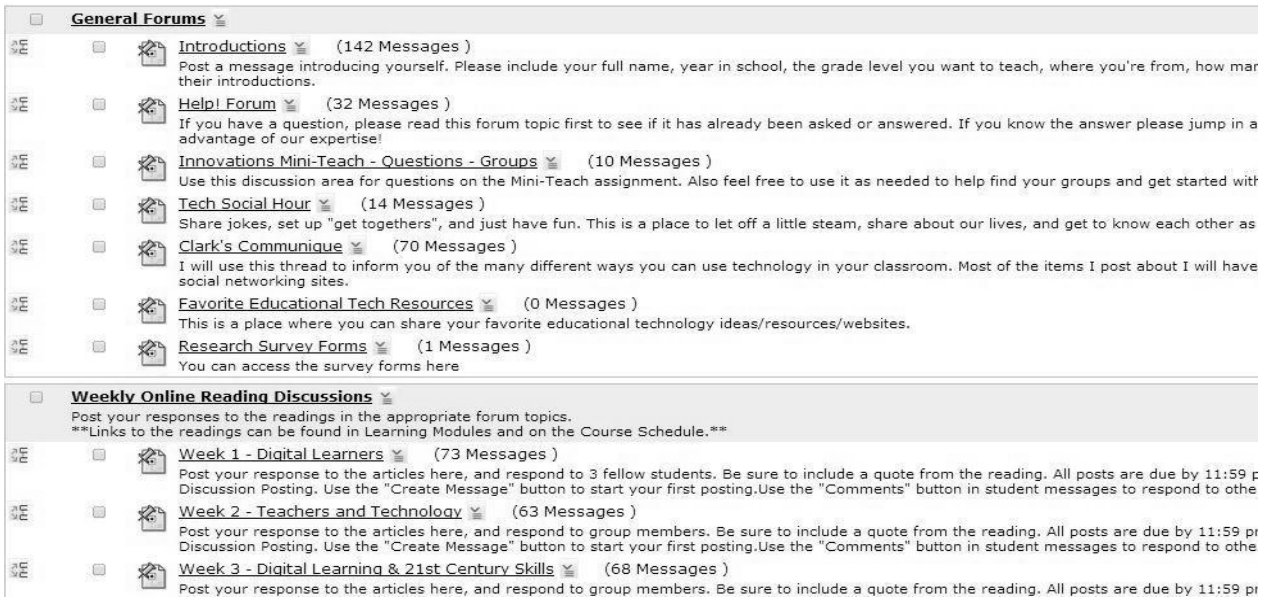


Figure 2. The structure and menu for the text-based discussion board

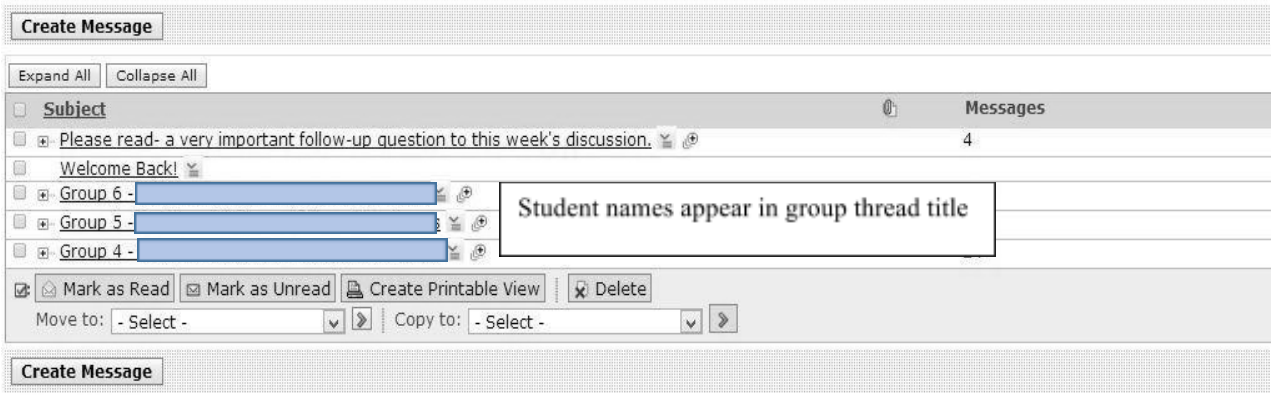


Figure 3. Demonstration of how groups were created for the text-based discussion platform.

Teacher-Student Interactions and Teaching Presence. Screencasts were created by the instructor for each step required to communicate within the VED: creating the account, creating a video post, creating and sharing Circles, accepting a Circle, joining a Hangout, and starting a Hangout. Video posts were modeled by the course instructor. Figure 5 shows an opening scene from an instructor created video post. At the beginning of each week the instructor created a video post discussing the upcoming week's content and expectations. The video posts also included off topic conversations on happenings in the community or issues preservice teachers might find interesting. Similar content was provided on the TBD to ensure equal participation by the instructor on the two platforms. The week's text-based introduction post on the TBD platform was included in a separate thread under each week's discussion heading. The goal of these activities were help facilitate discussion, one of the primary components of teaching presence (Garrison et al., 2000).

Initiation to the VED. Students were notified at the beginning of the spring 2013 semester of their group and platform assignments. All students were required to access the VED tutorial materials and to complete the VED quiz during the first week. The VED quiz was designed to ensure students were comfortable with the VED's features. The instructor felt this step was necessary as few of the students had prior experience with the VED.

Students were required to create video posts each week in which they discussed their understandings and viewpoints on the assigned weekly topics. They were required to respond to at least three classmates' posts. During the discussions, students were expected to relate the topics to their future positions as teachers and describe how they felt the technologies under discussion may or may not aid in student learning. They were also required to respond via text reply to at least three of their classmates' video posts. The instructor responded to student posts in order to model critical discussion and to demonstrate to students that this activity was considered an important part of the course (Kawachi, 2013).

Follow-up responses for each initial video post were text-based. Responses could not be recorded directly on the VED site and it was decided not to further burden students by requiring them to create a video response outside of the platform structure. Given that some students experienced discomfort creating video posts, or felt that video posts compromised their privacy, they were given the option to create initial posts via text. Only two students chose this option for the duration of the course, and both had elected not to participate in the study.

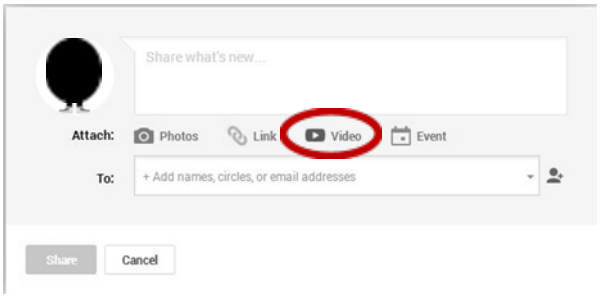


Figure 4. Posting screen for video discussion posts

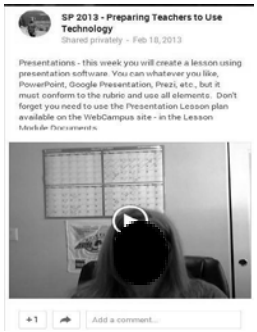


Figure 5. Weekly video post created by course instructor

Hangouts, the videoconferencing feature of the VED, were scheduled using the Event Calendar (Figure 6). The Event calendar afforded the ability to schedule several types of events and provided email reminders of upcoming events. The instructor used the videoconference feature in conjunction with the screen share option to give a tour of the VED thereby increasing the familiarity of the VED platform for the students. Students were instructed that the Event Calendar could be used to schedule videoconference-based office hours (Figure 7). Students also had the option to schedule impromptu videoconferences with the instructor if they required extra help, or with fellow students for collaborative or social purposes. On four occasions three different students used the event scheduler to set up office hours, and during the collaborative project students used the event scheduler to set up times to meet with their groups using the videoconferencing feature.

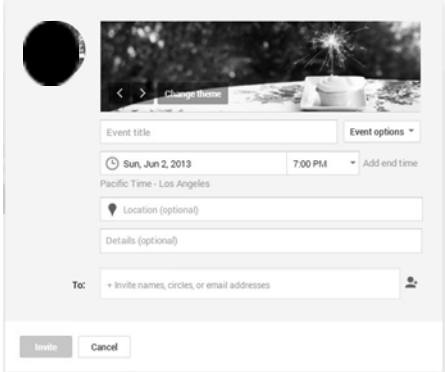


Figure 6. Screen used to create an Event in Google+

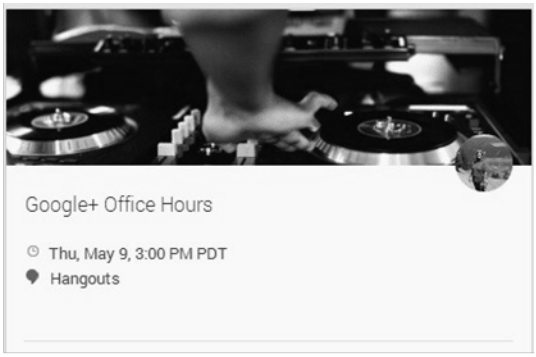


Figure 7. Scheduled office hours using the Google+ Events feature

Administering the Presence Surveys and Student Interviews. The social presence and teaching presence surveys were administered online. The links to the surveys were provided to students via Gmail, the TBD mail system, and posted to the VED course page. The surveys were administered towards the end of week 14 to ensure that both groups of students, the VED group and the TBD group, had equal time using the two different platforms.

Student interviews were conducted towards the end of the term to enable participants to describe their experiences and make judgments as to any differences they felt in social and/or teaching presence. As there was only a short window of time to conduct the interviews before summer break, it was determined that only half of the participants would be interviewed. A stratified sampling method was used. Two students were randomly selected from each of the four subgroups: students that (a) started with TBD and no videoconference with the instructor, (b) started with TBD and videoconference with the instructor, (c) started with VED and no videoconference with the instructor, and (d) started with VED and videoconference with the instructor. The videoconference/no videoconference designations were included as a number of students did not participate in a videoconference with the instructor and it was believed this may have an effect on their feelings of teaching presence. One of the eight students selected did not wish to participate in the interview and another was selected using the same method described above. Due to scheduling and technical difficulties, only six out of the eight interviews were conducted.

Google Hangout On Air was used to conduct the interviews as it allowed Hangout sessions to be digitally recorded and stored in the researcher's YouTube account. YouTube is a web-based video-sharing password protected site that allows users to store, upload, edit, and share videos. The interview videos were stored with "private" selected for the sharing level which requires the user's password in

order to view the video. As several of the interview questions pertained to the instructor, interviews were conducted by the other researchers unknown to the students to allow the students to be more open in their responses. The interviews were transcribed using the YouTube voice-to-text transcription feature and checked for correctness by the one of the research members.

Results

Comparison of Social and Teaching Presence Surveys

Given the ordinal, dependent nature of the data the Wilcoxon Signed-rank test was used to compare medians as an indicator of student perceived differences in social and teaching presence between the two discussion platforms. The Wilcoxon Signed-rank test uses the sign function of the difference between the medians and the sum of the ranks in order to determine whether the population medians are significantly different. Participants received both surveys simultaneously and responses were matched using the timestamp provided with the responses. The three constructs contained in the Kreijns et al. (2004) instrument, the Sociability Scale, Social Presence Scale, and Social Space Scale, were analyzed separately, as was the Teaching Presence data. Frequency distributions can be found in Appendix A.

The results of the survey indicated that all areas of social and teaching presence were higher for the VED than for the TBD. The Sociability measure was significantly higher for the VED platform (*Median* = 5) than for the TBD platform (*Median* = 2.5), (Z = -8.93, p < .0005, r = 0.71). The Social Presence measure was significantly higher for the VED platform (*Median* = 5) than for the TBD platform (*Median* = 2.5), (Z = -5.76, p < .0005, r = 0.67. The Social Space measure was significantly higher for the VED platform (*Median* = 5) than for the TBD platform (*Median* = 2), (Z = -8.44, p < .0005, r = 0.66). Finally, the Teaching Presence measure was significantly higher for the VEDE platform (*Median* = 5) than for the TBD platform (*Median* = 5), (.Z = -3.11, p < .002, r = 0.23.

Student Voices

Analysis of the qualitative data was informed by the CoI construct and the categories contained in the presence surveys (Garrison et al., 2000). NVivo®, a qualitative analysis software package, was used to help code the transcripts derived from the six student interviews. The purpose of the interviews was to obtain detailed interpretation as to the meaning behind the survey responses. Initial codes were developed based on definitions of social and teaching presence, as well as the factor descriptions for sociability and social space contained in the Kreijns et al., (2004) instrument and the Shea et al., (2006) instrument. A member of the research team coded all six interviews, consisting of two female and four male participants, using a pre-established code table which was "modified as the exposure to the data increased" (O'Donoghue & Punch, 2003, p. 89). After analyzing the data using a constant comparison coding method, the following coding schemes were developed: Sociability, Social Presence, Social Space, and Teaching Presence. Teaching Presence included three subcategories: Connectedness, Facilitation of Discussion, and Directing Cognitive Processes. Descriptions and definitions for these codes can be found in Appendix B. The six student interview transcripts were reviewed for specific examples of each category and subcategory where applicable and analyzed to see whether those statements were in agreement with the empirical results from the survey. Pseudonyms were used in the following interview analysis.

Sociability. Sociability concerns the affordances contained in a computer-supported collaborative learning (CSCL) environment. All six participants referred to the video features of the VED in relation to its importance at creating social space and social presence within the online course. Tom felt that the video features of the VED "made you feel like you're in class instead of just being online." This is the

opposite of the feelings John had towards the TBD. He found the lack of video led to a lack of connectedness due to the fact that "you don't see someone." This was a recurring theme in the interviews, the lack of connectedness when participating in a strictly text-based communication discussion board.

Three of the interview participants related how videoconferences during the semester were effective at helping to create a social climate in the course. Bill spoke of noticing "something in the background of somebody I chatted with" and how it provided context to start a conversation that allowed them to get to know one another on a more personal level. Ann felt she established a friendship with Bill during their videoconferences as they discussed their group project and she began to learn about his personal life, something that had never happened in her face-to-face classes.

Social Presence. Feelings of social presence were mentioned in all six of the participants' interviews. Tom discussed how he preferred using the VED to the TBD "because you can hear somebody's voice and see them talking." Ann relayed a particularly effective example about the difference between text-based communication and video communication. During her interview she described how her opinion changed about a classmate she at first thought to be "really uptight" based on his scholarly-type discussion posts in the TBD. As she viewed his video, and participated in videoconference sessions with Bill, she found him to be "personable and just a funny guy." She pointed out at that "you can get a misconception when you just read." Greg's statement summarizes the overall feelings about the difference between the VED and the TBD: "I preferred it [VED] because you can hear somebody's voice…After you do a few Hangouts…you get a lot better feel for them...You know them a lot better than you do just by reading some text. There's no emotion in text."

Social Space. All of the participants interviewed expressed that they felt they were part of a community. Three students commented on how they felt "part of a class" similar to the feelings of attending a face-to-face course. Ann stated, "I've taken many online classes but…this is the first time I've actually felt that I was in a class," and John noted, "I feel like it gets more into that traditional classroom type feel…this is not a typical online class." The term "connectedness" was mentioned by all but one of the participants, and it was mentioned more than once by four of the participants.

This feeling of social space contributed to a willingness to participate in course assignments, particularly the discussion posts. Bill remarked that he looked forward to the discussion posts each week: "You kind of wanted to do your posts and you kind of wanted to watch the other posts as well. I really enjoyed it." Jane felt that the VED allowed her group to get to know one another well enough to understand individual strengths and weaknesses when it came to assigning responsibilities for the group project. Bill felt being able to discuss responsibilities synchronously using videoconferencing facilitated collaboration by group members on various assignments and prevented confusion as to responsibilities later. He noted, there wasn't a debate of "oh, I didn't get that email, why didn't somebody tell me?"

Teaching Presence

All participants interviewed felt that the VED provided a better platform to communicate with the instructor. Tom stated that it was "very simple to talk to her." Ann relayed how she enjoyed the weekly "coming up" posts. "It's nice to have your teacher physically telling you, 'okay, hi everybody,' versus just reading it."

Connectedness. The participants felt the video features helped to create a sense of connection with the instructor. Jane noted she "got a lot better feel for her" as concepts in the class were explained and discussed during instructor video posts. Greg stated he "felt extremely connected to my professor." When comparing this course to other online courses he said that other "professors would send emails and reminders this is due here…it was pretty impersonal." This was echoed by John when making a

comparison between this course and other online courses he had taken in the past; "before when I just had WebCampus and you just kind of know your teachers, they're just kind of anonymous beings." When asked if other instructors should consider using a VED, Jane advocated its use as a means to "get that more in depth relationship with your students."

Facilitating and Directing Cognitive Processes. The primary reasons for the creation of social presence and teaching presence is to support cognitive presence and increase persistence in online courses (Doherty, 2006; Garrison, Anderson, & Archer, 2000; Morris, Finnegan, & Wu, 2005; Shea, Li, & Pickett, 2006). Although this study did not set out to measure cognitive presence, examples of facilitating cognitive processes in the course were evident during the interviews. One participant provided an example of how teaching presence was created that could lead to the motivation to learn: "Whereas Professor Clark, she's like, wow, that is some crazy weather we had last week. Like this was real time, this was 'I am committed to your education.' I think it makes you feel like she takes you more seriously, she's invested." Two other students spoke directly about how they felt the VED enhanced their learning experience. One participant stated, "I feel like I learned more with the Google+ interaction…you were able to see them and react to things." Another said "it was easier to retain information when I'm actually watching something…as opposed to reading it."

Discussion

In response to the first two research questions social and teaching presence surveys indicated that video-enabled discussions were more effective at helping create social and teaching presence when compared with text-based discussion platforms. The VED was rated significantly higher than the TBD for all three social scale measures: sociability, social presence, and social space. The VED was also rated significantly higher for teaching presence.

The participant interviews helped provide an understanding of how students experienced the course, their classmates, and their teacher due to the nature of the two separate platforms. Interviewees talked about feelings of "connectedness" with their classmates as the VED provided the ability to "see their faces," indicating they experienced lower feelings of isolation when compared with other online courses. These results were consistent with the findings demonstrated by Dickey (2004) that technology can be used to help reduce feelings of isolation among online students. Feelings of group cohesion and affiliation, important components of social presence (Akyol, 2014; Remesal & Colomina, 2013), were acknowledged in the interviews as well.

Students also indicated the VED videoconferencing tool made collaboration much easier and more productive as it was possible to "know" your group-mates' strengths and weaknesses. The video features of the VED provided the ability to see both verbal and non-verbal social cues, helping develop feelings of trust and belonging demonstrated by Kreijns et al., (2003) to be crucial for group cohesion. Some of the participants had used the videoconferencing tool to brainstorm ideas and assign duties and responsibilities during the collaborative project. It was believed that addressing these issues synchronously in an environment that provided social cues such as facial expressions would help eliminate any misunderstandings, leading to feelings of trust within the groups.

The VED was shown to influence the creation of teaching presence to a greater extent than the TBD, although survey data indicated that the difference in teaching presence was much less than for social presence. This was probably due to the fact the instructor ensured her interactions were equal between both platforms. As with social presence, interviewees talked about feelings of "connectedness" with the instructor. One participant spoke of how the instructor's video posts helped her understand the instructor by "how she would explain things and talk about them." Ease of communication was a second

theme during the interviews, particularly given both the synchronous and asynchronous nature of the VED.

The topic of creating video posts was discussed during the interviews. Many of the students spoke about their discomfort level at the beginning, or the difficulty in uploading the posts. Even though they were uncomfortable at first, students were willing to overcome their initial reservations in order to create a more inclusive classroom experience. Once students had created a few videos, most described the process as "easy."

Not all of the responses to the VED platform and discussion subgroupings were positive. Two students, neither of whom participated in the interviews, created text-only posts throughout the majority of the course. One student created two video posts at the beginning of the semester and participated in two videoconferences, but decided the experience was too uncomfortable to continue posting by using the video feature. The second student was uncomfortable with social networking sites and never created a video post and did not participate in videoconferences with either the instructor or fellow students. Of the six discussion groups created, one group had two members who were inactive. The two active members were able to carry on in-depth discussions on the weekly topics, but found it difficult to coordinate effort on the collaborative project as they attempted to include the non-active group members. Another group contained a member who had difficulty understanding both the technology and the course instructions which led to late discussion participation throughout the term. However, based on the data described above and the course postings, both the VED and discussion grouping design led to satisfactory collaborations and course experiences.

Overall, the data indicated that the synchronous and asynchronous video applications provided the visual social cues essential to develop trust, helping participants place value on individual contributions (Ryman, Hardham, Richardson, & Ross, 2009). The participants did report that the VED provided identification with their discussion group, their classmates, and their teacher. The social presence created within the VED aided group identity formation, providing the social-cohesion necessary for collaborative learning (Akyol, 2014; Brandon & Hollingshead, 1999; Remesal & Colomina).

For those conducting online courses, it is important to note that teaching presence was enhanced with synchronous and asynchronous video. Online students begin to feel they are part of a learning community as instructors actively guide discourse (Shea 2006). The VED platform increased the "sense of knowing" the instructor and led to student belief that the instructor was invested in their learning. It is equally important that higher education organizations understand the importance of social and teaching presence in relation to online student learning. Resta and Laferriere (2007) state higher education still employs traditional teaching methods, methods which can "create obstacles for faculty who wish to incorporate pedagogical strategies such as CSCL (computer supported collaborative learning)" (p. 76). The VED platform structure for this study occurred outside of the campus technology infrastructure and required an extra time commitment by the instructor as well as the students. Colleges and universities must recognize that "different learning tasks require different environments, support structures, and technological tools" (Resta & Laferriere, 2007, p. 76), and work with faculty to provide the tools which will help students learn more effectively.

Implications and Limitations

The experiences shared by the students, coupled with the survey results, indicate that the video affordances of the VED were more effective than the TBD at creating a classroom environment where students and the instructor connected. This is not surprising as research has previously demonstrated the effectiveness of asynchronous video in promoting social and teaching presence (Borup, West, & Graham, 2012; Skylar, 2009). However, as noted by Lawson, Comber, Gage, and Cullum-Hanshaw (2010),

videoconferencing opens up new methods for computer supported collaborative learning and current research is lacking as to pedagogical concerns that should drive this type of learning. This study demonstrated a way to address two pedagogical concerns: student access and use. The VED was available to any student with an internet connection thus allowing easy access to the video affordances which helped develop social and teaching presence. Instructor intervention was not required, unlike other video options such as Blackboard Collaborate or Voice Thread. There were many instances in which students interacted with one another via videoconference without including the instructor, indicating that student autonomy may have led to greater use (Lakhal, Khechine, & Pascot, 2013). It is important that the degree of access required for full participation be studied further.

There are several areas ripe for further study. Most of the studies involving video affordances have been conducted using asynchronous video applications. As Moallem, Pastore, and Martin (2011) demonstrated, a blend of both asynchronous and synchronous video may result in increased outcomes over either format alone. Sites such as the VED which provide access to both synchronous and asynchronous video affordances could be used to extend this research. Participants mentioned other features of the VED that were not part of the study which they preferred to the TBD. For example, students found outside video and document sharing much easier with the VED than with the TBD. The VED also provided greater flexibility due to its mobile application. Students could receive notifications on their mobile devices and respond whenever and wherever they were. An ecological study of this or another social networking site, as compared to the typical learning management system (LMS), could be conducted in order to identify features that could help improve communication and distance learning outcomes.

Finally, perhaps it is time to look at "student presence" from the viewpoint of the instructor. The instructor for this course noticed a difference in feelings of connection between students she interacted with on the TBD and those she interacted with on the VED. It is suspected that online instructors could be subject to feelings of isolation as well (Reed, Aqui, & Putney, 2009). A platform similar to the VED, or a combination of technologies, could be used to investigate whether synchronous and asynchronous video increases online instructors' connections to their students, and if these connections lead to increased course effectiveness and learning outcomes.

There are limitations to this study. The coding scheme was applied by the researcher/instructor thus biasing the interpretation of the transcripts. The sample size of 16 students was very small. The participants were enrolled in a teacher technology course and may have been more motivated to learn how to use technology than typical online post-secondary students. The instructor was very familiar with the features of the VED and had preconceived notions as to its ability to contribute to social and teaching presences. Therefore the results cannot be generalized to other student populations.

Conclusion

This study builds on the literature by providing descriptions of the implementation and effectiveness of one pedagogical strategy to help increase teaching and social presence: asynchronous video discussions posts combined with synchronous videoconferencing. Multiple data sources were used to investigate possible differences in feelings of teaching and social presence based on the video affordances of the discussion platform or based on the lack of such video affordances. The findings suggest that the participants felt greater teaching and social presence when discussions occurred with video posts and synchronous videoconferencing as compared to text based discussions.

Implications for online course discussion structure and possible teacher isolation effects were discussed. Online learning is fast becoming an integral part of education. It is important to identify pedagogically driven tools that can help students and instructors experience success in this environment.

References

Akyol, Z. (2014). The development of a community of inquiry over time in an online course: Understanding the progression and integration of social, cognitive, and teaching presence. *Journal of Asynchronous Learning Networks, 12*(3-4), 3-22.

Anderson, T. (2004). *Theory and practice of online learning*. Edmonton: AU Press, Athabasca University.

Arbaugh, J.; Cleveland-Innes, M.; Diaz, S.; Garrison, R.; Ice, P.; Richardson, J.; & Swan, K. (2008). Developing a community of inquiry instrument: Testing a measurement of the community of inquiry framework using a mult-institutional sample. *Internet and Higher Education, 11*(3-4), 133-136. doi: 10.1016/j.iheduc.2008.06.003

Aviv, R., Erlich, Z., Ravid, G., & Geva, A. (2003). Network analysis of knowledge construction in asynchronous learning networks. *Journal of Asynchronous Learning Networks, 7*(3), 1-23. doi: 10.1016/j.iheduc.2011.11.001

Borup, J., West, R., & Graham, C. (2012). Improving online social presence through asynchronous video. *Internet and Higher Education, 15*(3), 195-203. doi: 10.1016/j.iheduc.2011.11.001

Brandon, D., & Hollingshead, A. (1999). Collaborative learning and computer-supported groups. *Communication Education, 48*(2), 109-126. doi: 10.1080/03634529909379159

Buchanan, T., Paine, C., Joinson, A., & Reips, U-D. (2006). Development of measures of online privacy concern and protection for use on the internet. *Journal of the American Society for Information Science and Technology, 58*(2), 157-165. doi: 10.1002/asi.20459

Burnsed, B. (2011). Online education may transform higher Ed. Retrieved June 1, 2013, from: http://www.usnews.com/education/onlineeducation/articles/2011/04/20/online-education-may-transform-higher-ed

Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education*. Oxford: Routledge

Dickey, M. (2004). The impact of web-logs (blogs) in student perceptions of isolation and alienation in a web-based distance learning environment. *Open Learning: The Journal of Open, Distance and e-Learning, 19*(3), 279-291. doi: 10.1080.0268051042000280138

Doherty, W. (2006). An analysis of multiple factors affecting retention in web-based community college courses. *Internet and Higher Education, 9*(4), 245-255. doi: 10.1016/j.iheduc.2006.08.004

Dooner, A. M., Mandzuk, D., & Clifton, R. (2008). Stages of collaboration and the realities of professional learning communities. *Teaching and Teacher Education, 24*(3), 564-574. doi: 10.1016/j.tate.2007.09.009

Fain, P. (2013, January 16). As california goes? Retrieved June 1, 2013, from Inside Higher Ed: http://www.insidehighered.com/news/2013/01/16/california-looks-moocs-online-push

Gall, M., Gall, J., & Borg, W. (2003). *Educational research: An introduction (7th edition)*. Boston, MA: A & B Publications.

Gall, M., & Gillett, M. (1980). The discussion method in classroom teaching. *Theory Into Practice, 19*(2), 98-103. doi: 10.1080/00405848009542881

Garrison, R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2*(2 - 3), 87-105. doi: 10.1016/S1096-7516(00)00016-6

Garrison, D., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. *American Journal of Distance Education, 15*(1), 7-23. doi: 10.1080/08923640109527071

Greenlaw, S., & DeLoach, S. (2003). Teaching critical thinking with electronic discussion. *Journal of Economic Education, 34*(1), 36-53. doi: 10.1080/00220480309595199

Gunawardena, C., & Zittle, F. (1997). Social presence as a predictor of satisfaction within a computer-mediated conferencing environment. *American Journal of Distance Education, 11*(3), 8-26. doi: 10.1080-08923649709526970

Joo, Y. J., Kim, K. Y., & Kim, E. K. (2011). Online university students' satisfaction and persistence: Examining perceived level of presences, usefulness, and ease of use as predictors in a structural model. *Computers & Education, 57*(2)1654-1664. doi: 10.1016/j.compedu.2011.02.008

Kaste, M. (2011). *Facebook's newest challenger: Google Plus*. Retrieved June 1, 2013, from NPR: http://www.npr.org/2011/06/29/137507567/facebooks-newest-challengergoogle-plus

Kawachi, P. (2013). Online social presence and its correlation with learning. *International Journal of Social Media and Interactive Learning Environments, 1*(1). 19-31. doi: 10.1504/IJSMILE.2013.051653

Kay, R. (2006). Developing a comprehensive metric for assessing discussion board effectiveness. *British Journal of Educational Technology, 37*(5), 761-783. doi: 10.111/j.1467-8535.2006.00560.x

Kreijns, K., Kirschner, P., & Jochems, W. (2002). The sociability of computer-supported collaborative learning environments. *Educational Technology & Society, 5*(1), 1436-4522.

Kreijns, K., Kirschner, P., & Jochems, W. (2003). Identifying pitfalls for social interaction in computer-supported collaborative learning environments: A review of the research. *Computers in Human Behavior, 19*(3), 335-353. doi: 10.1016/S0747-5632(02)00057-2

Kreijns, K., Kirschner, P., Jochems, W., & Burren, H. (2004). Determining sociability, social space, and social presence in (a)synchronous collaborative groups. *CyberPsychology & Behavior, 7*(2), 155-172. doi: 10.1089/109493104323024429

Lakhal, S., Khechine, H., & Pascot, D. (2013). Student behavioral intentions to use desktop video conferencing in a distance course: integration of autonomy in the UTAUT model. *Journal of Computing in Higher Education*, 1-29. doi:10.10071s12528-013-9069-3

Lawson, T., Comber, C., Gage, J., & Cullum-Hanshaw, A. (2010). Images of the future for education? Videoconferencing: A literature review. *Technology, Pedagogy and Education, 19*(3), 295-314. doi: 10.1080/1475939X.2010.513761

Lee, K. (2004). Presence, explicated. *Communication Theory, 14*(1), 27-50. doi: 10.1111/j.1468-2885.2004.tb00302.x

Liu, S., Gomez, J., & Yen, C. J. (2009). Community college online course retention and final grade: Predictability of social presence. *Journal of Interactive Online Learning, 8*(2), 165-182.

Lowry, P. B., Roberts, T. L., Romano, N. C., Cheney, P. D., & Hightower, R. T. (2006). The impact of group size and social presence on small-group communication: Does computer-mediated communication make a difference?. *Small Group Research, 37*(6), 631-661. doi: 10.1177/1046496406294322

Moallem, M., Pastore, R., & Martin, M. (2011). A comparative study on the impact of communication tools on student learning, motivation, self-regulation, and satisfaction. In *Society for Information Technology & Teacher Education International Conference* (Vol. 2013, No. 1, pp. 2286-2306). Retrieved from http://www.editlib.org/p/48448/

Morris, L., Finnegan, D., & Wu, S-S. (2005). Tracking student behavior, persistence, and achievement in online courses. *Internet and Higher Education, 8*(3), 221-231. doi: 10.1016/j.iheduc.2005.06.009

Munro, B. (1981). Dropouts from higher education: Path analysis of a national sample. *American Educational Research Journal, 18*(2), 133-141. doi: 10.3102/00028312018002133

Nagel, L., & Kotze, T. (2010). Supersizing e-learning: What a CoI survey reveals about teaching presence in a large online class. *Internet and Higher Education, 13*(1), 45-51. doi: 10.1016/j.iheduc.2009.12.001

Nowak, K. (2001). Defining and differentiating copresence, social presence, and presence as transportation. In *Presence 2001 Conference, Philadelphia, PA*, (pp. 1-23). Retrieved from http://d1l1ifh5i7l9sd.cloudfront.net/wp-content/blogs.dir/36/files/2009/10/Nowak1.pdf

O'Donoghue, T., & Punch, K. (2003). *Qualitative educational research in action*. New York, NY: RoutledgeFarmer.

Patterson, B., & McFadden, C. (2009). Attrition in online and campus degree programs. *Online Journal of Distance Learning Administration, 12*(2), 1-11.

Pinsk, R., Curran, M., Poirier, R., & Coulson, G. (2014). Student perceptions of the use of student-generated video in online discussions as a mechanism to establish social presence for non-traditional students: A case study. *Issues in Information Systems, 15*(1), 267-276.

Reed, K., Aqui, Y., & Putney, L. (2009). Evaluation of an evolving virtual high school. *Educational Media International, 46*(4), 281-294. doi: 10.1080/09523980903387522

Remesal, A., & Colomina, R. (2013). Social presence and online collaborative small group work: A socioconstructivist account. *Computers & Education*, *60*(1), 357-367. doi: 10.1016/j.compedu.2012.07.009

Resta, P., & Laferriere, T. (2007). Technology in support of collaborative learning. *Educational Psychology Review, 19*(1), 65-83. doi: 10.1007/s10648-007-9042-7

Roblyer, M., & Wiencke, W. (2003). Design and use of a rubric to assess and encourage interactive qualities in distance courses. *American Journal of Distance Education, 17*(2), 77-98. doi: 10.1207/S15389286AJDE1702_2

Rosenblum, D. (2007). What anyone can know: The privacy risks of social networking sites. *IEEE Security and Privacy, 5*(3), 40-49. doi: 10.1109/MSP.2007.75

Rovai, A. (2001). Building classroom community at a distance: A case study. *Educational Technology Research & Development, 49*(4), 33-48. doi: 10.1007/BF02504946

Rovai, A. (2003). In search of higher persistence rates in distance education online programs. *Internet and Higher Education, 6*(1), 1-16. doi: 10.1016/S1096-7516(02)00158-6

Rovai, A. (2003). In search of higher persistence rates in distance education online programs. *Internet and Higher Education, 6*(1), 1-16. doi: 10.1016/S1096-7516(02)00158-6

Rovai, R., & Wighting, M. (2005). Feelings of alienation and community among higher education students in a virtual classroom. *Internet and Higher Education, 8*(2), 97-110. doi: 10.1016/j.iheduc.2005.03.001

Ryman, S., Hardham, G., Richardson, B., & Ross, J. (2009). Creating and sustaining online learning communities: Designing for transformative learning, *International Journal of Pedagogies and Learning, 5*(3), 32-45. doi: 10.5172/ijpl.5.3.46

Schellens, T., & Valcke, M. (2004). Fostering knowledge construction in university students through asynchronous discussion groups. *Computers & Education, 46*(4), 349-370. doi: 10.1016/j.compedu.2004.07.010

Shea, P. (2006). A study of a students' sense of learning community in online environments. *Journal of Asynchronous Learning Networks, 10*(1), 35-44. doi: 10.1016/j.iheduc.2006.06.005

Shea, P., Li, C., & Pickett, A. (2006). A study of teaching presence and student sense of learning community in fully online and web-enhanced college courses. *Internet and Higher Education, 9*(3), 175-190. doi: 10.1016/j.iheduc.2006.06.005

Skylar, A. (2009). A comparison of asynchronous online text-based lectures and synchronous interactive web conferencing lectures. *Issues in Teacher Education, 18*(2), 69-84.

Tinto, V. (1997). Classrooms as communities: Exploring the educational character of student persistence. *The Journal of Higher Education, 68*(6), 599-623.

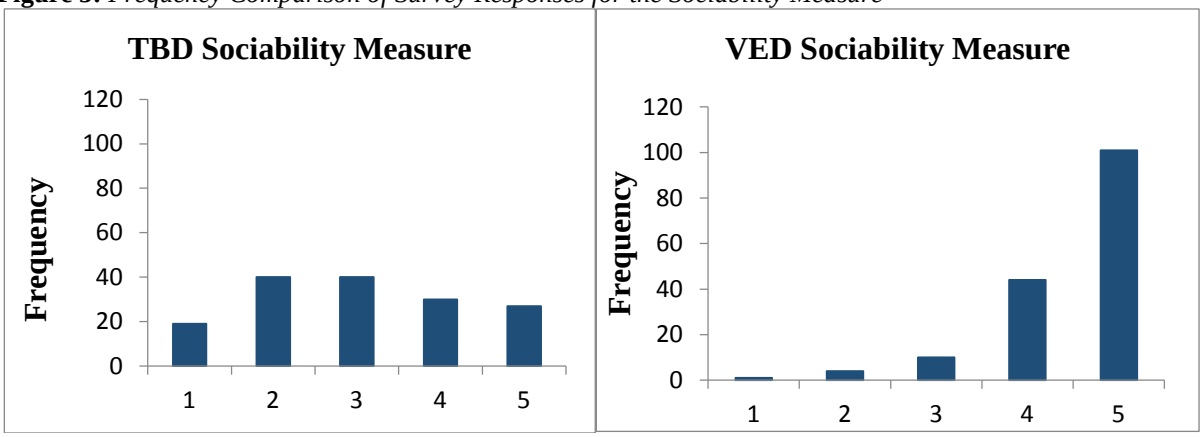
Tu, S. H., & McIsaac, M. (2002). The Relationship of Social Presence and Interaction in Online Classes. *American Journal of Distance Education, 16*(3), 131-150. doi: 10.1207/S15389286AJDE1603_2

Wang, Q., & Woo, H. (2007). Comparing asynchronous online discussions and face-to-face discussions in a classroom setting. *British Journal of Educational Technology, 38*(2), 272-286. doi: 10.1111/j.1467-8535.2006.00621.x

Zydney, J., deNoyelles, A., & Seo, K. (2012). Creating a community of inquiry in online envrionments: An exploratory study on the effect of a protocol on interactions within asynchronous discussions. *Computers & Education, 58*(1), 77-87. doi: 10.1016/j.compedu.2011.07.009

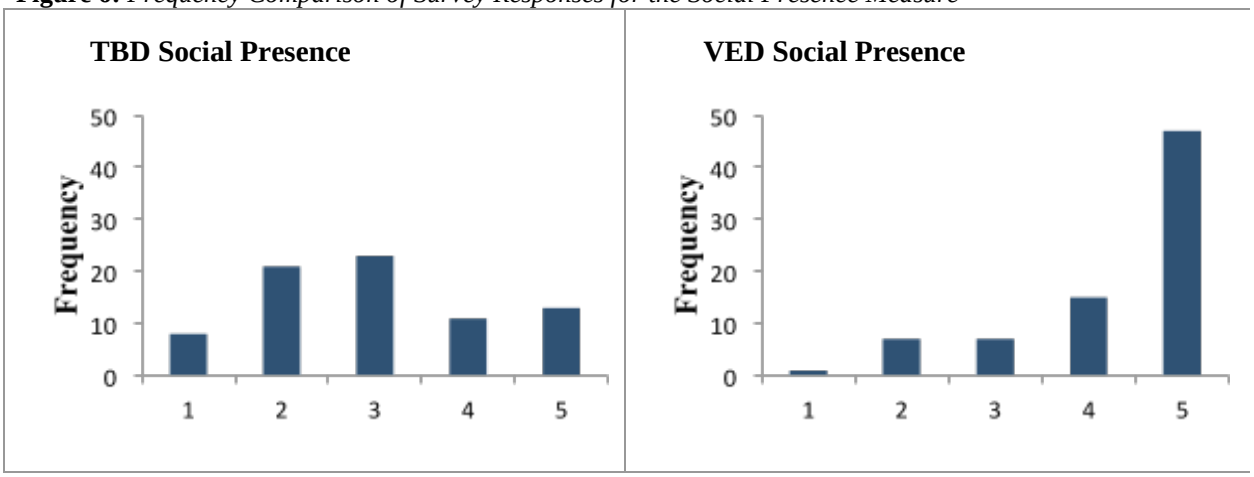
Appendix A Survey Response Frequency Graphs

Figure 5: *Frequency Comparison of Survey Responses for the Sociability Measure*



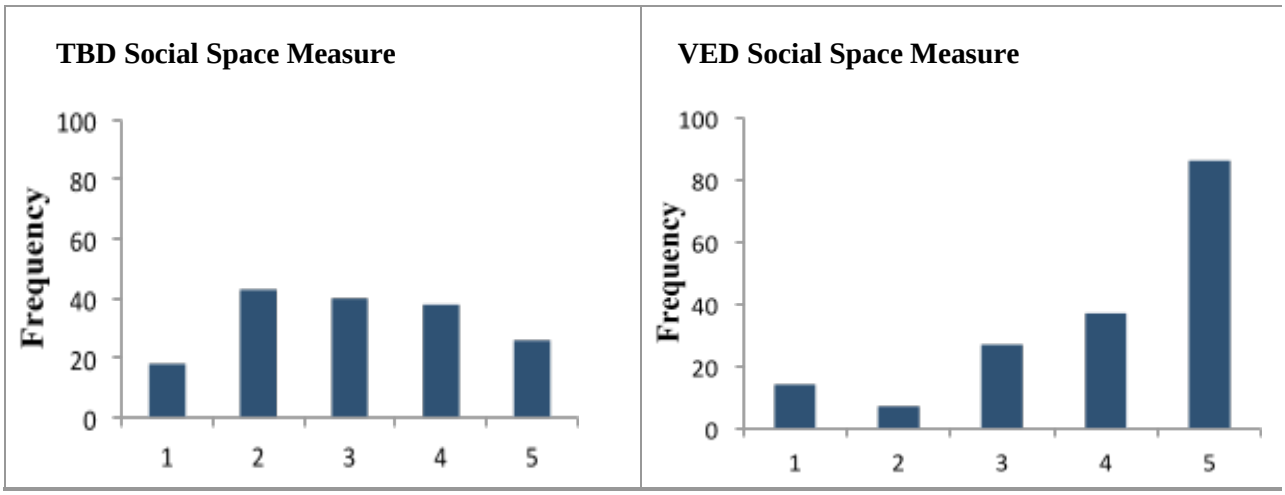
n = 160 Survey responses were scored on a scale from 1 to 5, with 1 being 'strongly disagree' to 5 'strongly agree'

Figure 6: *Frequency Comparison of Survey Responses for the Social Presence Measure*



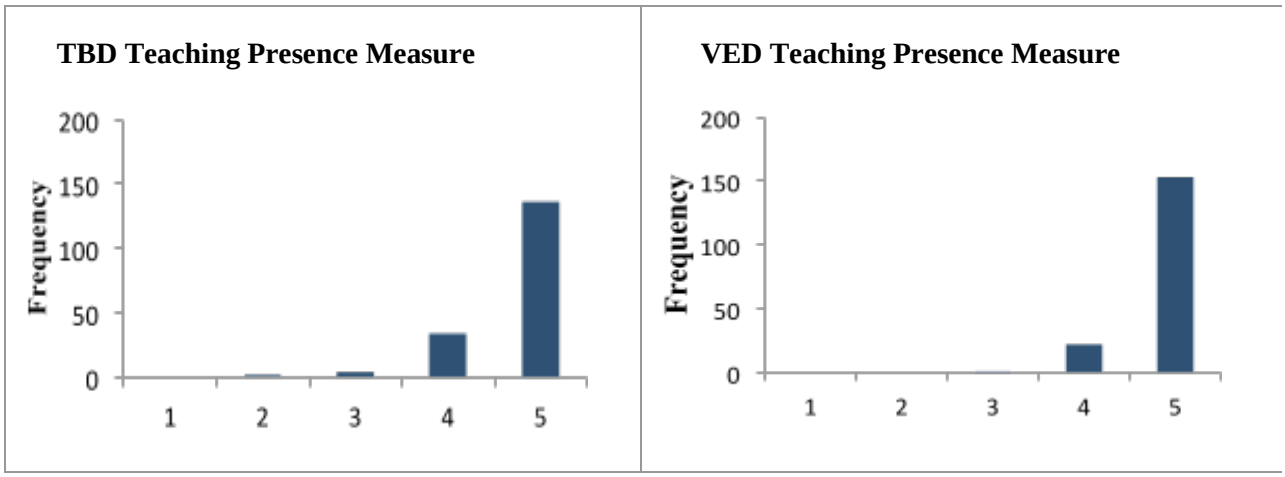
n = 80 Survey responses were scored on a scale from 1 to 5, with 1 being 'strongly disagree' to 5 'strongly agree'

Figure 7: *Frequency Comparison of Survey Responses for the Social Space Measure*



n = 176 Survey responses were scored on a scale from 1 to 5, with 1 being 'strongly disagree' to 5 'strongly agree'

Figure 8: *Frequency Comparison of Survey Responses for the Teaching Presence Measure*



n = 176 Survey responses were scored on a scale from 1 to 5, with 1 being 'strongly disagree' to 5 'strongly agree'

Appendix B Social and Teaching Presence Coding Categories and Definitions

Category	Definition
Social Space	A social space is "characterized by effective work relationships, strong group cohesiveness, trust, respect and belonging, satisfaction, strong sense of community" (Kreijns et al., 2004, p. 157).
Social Presence	Social presence refers to "the degree of illusion that the other in the communication appears to be a 'real physical person'" (Kreijns et al., 2004, p. 157).
Sociability	"…the extent to which a social space" arises based upon "the quality of the set of social affordances" contained in the CSCL environment. (Kreijns et al., 2002, p. 13).
Teaching Presence	"…effective design, facilitation, and direction of cognitive and social processes on the part of the online instructors" (Shea et al., 2006, p. 177).
Connectedness	Expressions of connectedness to the instructor.
Facilitating discussion	Expressions that instructor helped guide and direct discussions.
Directing cognitive processes	Expressions that instructor is interested in learning outcomes of students.

Using Instructor-Generated Video Lectures in Online Mathematics Courses Improves Student Learning

Jennifer S. Hegeman

Missouri Western State University

Abstract

Low retention rates in online freshman-level mathematics courses are a concern, especially at postsecondary institutions that serve academically unprepared students. The purpose of this study was to determine if student performance in an online College Algebra course that relies heavily on text-based multimedia tools can be improved by replacing publisher-generated educational resources with instructor-generated video lectures. The original online College Algebra course placed the publisher-generated educational resources in the role of content provider by enabling all publisher-generated learning aids within the online homework system and treating instructor-generated educational materials as supplemental resources. In contrast, the redesigned online College Algebra course enhanced the course instructor's teaching presence by requiring students to complete instructor-generated guided note-taking sheets while watching instructor-generated video lectures, treating publisher-generated learning aids as supplemental resources by removing them from within the online homework system. Results indicate students who enrolled in a redesigned online College Algebra course that strategically placed the instructor in the role of content provider performed significantly better on both online and handwritten assessments than did students who enrolled in an online College Algebra course that placed the publisher-generated educational resources in that role.

Introduction

The performance-funding approach to financing higher education has concerned college and university administrators nationwide. State appropriations depend upon the institution's ability to meet or exceed performance indicators such as student retention and graduation rates. Given the evidence suggesting that withdrawal from college is associated with students' lack of success in "gatekeeper" courses such as entry-level college mathematics courses (Chen, 2013), it is no surprise faculty members

who teach freshman-level mathematics are the first to be visited by administrators seeking lower failure and withdrawal rates. And, although 46% of chief academic officers at public institutions of higher education believe retaining students in the online environment is more difficult than retaining students in face-to-face formats (Allen & Seaman, 2014), administrators continue to ask faculty to develop more online entry-level college mathematics courses.

As mathematics educators become more comfortable with emerging technologies that offer enhanced teaching and learning opportunities, they are more receptive to administrative requests for additional online general studies mathematics courses such as College Algebra and Elementary Statistics. Indeed, fully online general studies mathematics courses have become more widespread, in part due to the development of text-based, interactive multimedia tools such as ALEKS, MyMathLab, and Enhanced WebAssign. As noted on their product websites, these text-based tools have been adopted by all major academic publishers and integrated with hundreds of textbooks, serving thousands of educational institutions and millions of students (ALEKS, 2014; MyLab and Mastering, 2014; WebAssign, 2014). Students enrolled in mathematics courses utilizing these text-based tools have access to an *e*-book, an online homework system, and a variety of embedded publisher-generated learning aids (e.g., video lectures, animations, completed examples, and guided tutorials). Mathematics faculty who adopt these text-based tools for their face-to-face and online courses have access to an online course management system that provides them with a complete set of relevant mathematics exercises from which to create online assessments, in addition to a gradebook that monitors student success and time on task. Having access to comprehensive online educational resources and a course management system specific to mathematics has been instrumental in convincing hesitant mathematics educators to try teaching in the online environment.

Unfortunately, low retention rates in online freshman-level mathematics courses are a concern, especially at postsecondary institutions that serve academically unprepared students (Xu & Jaggars, 2011; Zavarella & Ignash, 2009). In a study of community college students enrolled in developmental mathematics courses, Zavarella and Ignash (2009) observed that students enrolled in computer-based courses were more likely to withdraw than students enrolled in lecture-based courses. Similarly, Xu and Jaggars (2011) found that community college students enrolled in online freshman-level mathematics courses experienced higher attrition rates and were less likely to earn grades of C or better than those students enrolled in face-to-face offerings. Both studies indicated that online instruction, as it was structured in these cases, may not be as effective as face-to-face instruction for students who are unprepared for freshman-level mathematics courses.

Regardless of the issues with reduced retention, students in higher education continue to enroll in online courses. According to the latest report on the status of online education from the Babson Survey Research Group, approximately 33.5% of all college students enroll in at least one online class (Allen & Seaman, 2014). Furthermore, while the annual growth rate of overall enrollment in higher education from fall 2011 to fall 2012 was 1.2%, the annual growth rate of online enrollment in higher education over the same time period was 6.1%. Given that online education continues to play an important role in institutions of higher education, it is imperative that mathematics faculty determine whether or not instruction provided in online freshman-level mathematics courses is meeting students' needs. If it is determined that online mathematics instruction is ineffective, can mathematics faculty identify and incorporate course design techniques that encourage student engagement, persistence, and learning?

Literature Review

Mathematics anxiety and negative attitudes towards mathematics can have a negative impact on student success in university-level mathematics courses. Nunez-Pena and Suarez-Pellicioni (2013) observed students who failed a mathematically challenging university course had higher mathematics

anxiety and higher course anxiety than students who passed the university course. Furthermore, they noted students who failed the course had lower self-confidence in and motivation toward mathematics than students who passed. While such attitudinal and emotional factors can impact student engagement and persistence in mathematics, Furner and Gonzalez-DeHass (2011) indicated creating a mastery-oriented classroom can help reduce these anxieties. Specifically, they recommended teachers establish a class climate that emphasizes thinking rather than rote memorization, encourages students to ask questions, and allows students to engage in activities that allow them to learn from and correct their mistakes.

Mathematics educators interested in creating a class climate that not only reduces student anxieties, but also improves student learning outcomes, have experimented with text-based, interactive multimedia tools such as ALEKS and MyMathLab (Aichele, Francisco, Utley, & Wescoatt, 2011; Brewer, 2009; Klein, 2005; Taylor, 2008; Xu, Meyer, & Morgan, 2008). While both web-based tools emphasize content mastery and provide students with immediate feedback that offers suggestions for where student errors may have occurred in the solution process, best practice in the use of these technologies in mathematics courses has yet to be determined. Taylor (2008) concluded that college freshmen enrolled in developmental mathematics courses using ALEKS experienced a reduction in anxiety and an improvement in attitude toward mathematics. Furthermore, results indicated that some students' mathematics achievement was also improved. Similarly, Xu et al. (2008) noted that students in a graduate-level educational statistics course using a blended learning approach and ALEKS performed better than students enrolled in a more traditional course. However, Xu et al. also discovered that low- and medium-performing students were more likely to perceive a misalignment between the course textbook and the online multimedia tools. Some students admitted to intentionally "working the system" in order to reduce the amount of time spent engaging with the online tools. And, although students may have appreciated being able to continuously review the material in the online environment, they acknowledged the importance of observing the instructor as problem solutions were being presented, as well as the importance of having their own work evaluated by the instructor so that misconceptions could be more accurately identified and corrected.

Similar issues have been noted in freshman-level mathematics courses that use MyMathLab (Aichele, Francisco, Utley, & Wescoatt, 2011; Brewer, 2009; Klein, 2005). Brewer (2009) found students who enrolled in face-to-face College Algebra courses that used MyMathLab for homework experienced frustration not only with the software's inability to provide more informative feedback when answers were incorrect, but also the level of precision required by the software in order to earn full credit. Overall, the mathematics achievement of students using online homework was comparable to the mathematics achievement of students using textbook homework. However, students who used MyMathLab for homework and who were academically unprepared or repeating the course did outperform their counterparts who used textbook homework. In a second study that explored the use of MyMathLab in College Algebra, Klein (2005) concluded that supplementing traditional College Algebra instruction with the computer-assisted instruction embedded within MyMathLab did not result in a statistically significant improvement in student achievement, nor did it improve student attitude toward mathematics. A third study by Aichele et al. (2011) focused on students' perceptions of the usefulness of the educational resources embedded in MyMathLab. Both Klein (2005) and Aichele et al. (2011) noted that students preferred the *View an Example* and *Help Me Solve This* features embedded within MyMathLab. Furthermore, according to Aichele et al. (2011), students indicated that they preferred these two features because they provided step-by-step procedures for the solution process, with the *View an Example* feature being the most preferred since it required less work on the part of the student. Few students indicated that these features enhanced their conceptual understanding of the reasoning behind the solution process. In addition, the majority of students surveyed considered the publisher-generated videos to be one of the least beneficial resources since watching them required more time on the part of the student.

Research indicates teaching presence in the online classroom, as defined by Anderson, Rourke, Garrison, and Archer (2001), plays an important role in the development of a class climate that provides students with a rewarding educational experience. In a study of online student satisfaction, all three categories of teaching presence—design and organization, facilitating discourse, and direct instruction—were found to be highly correlated with course satisfaction and student perception of learning (Shea, Pickett, & Pelz, 2003). Data collected by Hosler and Arend (2012) indicated that online students believed teaching presence influences their critical thinking. In yet another study, teaching presence was found to be a strong predictor of student affective learning, motivation, and perceived cognition in online undergraduate and graduate classes (Baker, 2010).

As college and university faculty across disciplines have gained experience in teaching and learning in the online environment, intentional course design techniques and instructional activities that tend to promote teaching presence and student motivation have surfaced. Lehman and Conceição (2014) noted that one such course design technique involves dividing the course content into pieces called "chunks" and carefully arranging these chunks into modules having a similar structure. Designing the online course in this manner reduces cognitive overload and allows students to focus on the content being presented. Other intentional design techniques noted in online teaching literature include anticipating student needs and addressing them in orientation activities, providing clear expectations and well-established deadlines early in the course, and providing prompt and personalized feedback (Fish & Wickersham, 2009; Jaggars, Edgecombe, & Stacey, 2013; Lehman & Conceição, 2014).

While online instructors across disciplines agree that the implementation of intentional course design techniques can enhance teaching presence and improve student engagement and persistence, the specific design techniques and instructional activities that best support the online learning environment may differ by discipline. In an effort to identify specific instructor behaviors used to promote teaching presence in online science courses, Stone and Chapman (2006) engaged in formal interviews with three undergraduate science instructors, each having at least five years of online teaching experience. Based on the interview data, Stone and Chapman were able to define instructor presence within three constructs: course content, instructor's role, and student needs. The instructors who were interviewed believed that they were able to create and sustain teaching presence in online science courses by placing themselves in the role of content provider (i.e., the individual who has ownership of and control over the course content, and the ability to make content changes and updates), as well as the role of facilitator of learning; incorporating their own personal educational materials, as well as a variety of multimedia tools; maintaining instructor-student interaction by supplying prompt and frequent feedback; providing an effective student support structure; and organizing content and structuring the course to allow for self-directed learning.

Just as instructors differ in their perceptions of what design techniques and instructional activities are most appropriate for teaching and learning their discipline in an online environment, students enrolled in online courses also differ in their perceptions of what instructional activities best support their learning needs. In an analysis of student behaviors in online general studies courses from various disciplines, Finnegan, Morris, and Lee (2009) discovered that while students must be willing to spend time engaging in online activities if they are to be successful, the online activities they use to engage in the learning process may differ by discipline. Students who successfully completed online English, communication, and social science courses spent more of their time participating in online discussions (e.g., posting their own questions, reading and replying to other students' posts), while students who successfully completed online science and mathematics courses spent more of their time viewing content pages and posting their own questions. Simonds and Brock (2014), in an exploration of student learning preferences in online graduate education courses, concluded that while younger students preferred interactive online learning activities, older students preferred to learn from recorded video lectures. Given the positive impact of providing recorded video lectures for asynchronous viewing in face-to-face undergraduate courses that

have significant mathematical content (Brecht, 2012; Cascaval, Fogler, Abrams, & Durham, 2008), it may be that students enrolled in online mathematics and science courses would also benefit from the inclusion of video lectures as instructional activities.

Although mathematics educators have experimented with the use of text-based multimedia tools such as ALEKS and MyMathLab in the teaching and learning of freshman-level mathematics, additional research is needed to determine the most effective way to use these tools in the online general studies mathematics course. Since text-based tools such as MyMathLab provide students access to comprehensive educational resources, can these publisher-generated resources, by themselves, adequately strengthen students' conceptual understanding to ensure student success? Does the availability of the publisher-generated educational resources diminish the visibility of the course instructor's teaching presence, and if so, what can course instructors do to re-establish their teaching presence? If students have a tendency to take shortcuts to reduce time on task, is it best to restrict the publisher-generated educational resources that are available to them within the online homework system? If certain publisher-generated educational resources are disabled within the online homework system, what instructor-generated educational resources should be provided in their place to facilitate student learning? The purpose of this study was to determine if an online College Algebra course relying heavily on publisher-generated educational resources can be redesigned to make the course instructor's teaching presence more visible and hence, better meet the needs of unprepared students. Consequently, the study focused on the following research questions:

1. Can student performance in an online College Algebra course that relies heavily on text-based multimedia tools be improved by replacing the publisher-generated educational resources with instructor-generated video lectures?

2. Can student attrition in an online College Algebra course that relies heavily on text-based multimedia tools be reduced by replacing the publisher-generated educational resources with instructor-generated video lectures?

3. Can teaching presence in the form of instructor-generated video lectures serve as a predictor of student success in online College Algebra?

Method

Participants

Study participants included students who self-enrolled in the online College Algebra courses offered at an open-enrollment university in the Midwestern United States over a two-year period. All courses were assigned to the author and were available for enrollment throughout the regular registration periods. The chairperson of the university's Institutional Research Board informed the author that standard educational practices were exempt from the IRB approval requirement. Therefore, since the author was simply teaching the online course differently than how it had been taught previously, IRB approval was not required. This study is limited by the fact that students were not randomly assigned to the courses included in the analysis, but perhaps strengthened by the fact that the author has been the only faculty member assigned to the online offerings of College Algebra at this university.

Sixty-nine students enrolled in the original online courses offered during the first year (i.e., Spring 2012 and Fall 2012). Eighty-seven students enrolled in the redesigned online courses offered during the second year (i.e., Fall 2013 and Spring 2014). Although students are not required to have documented ACT scores on file to enroll in the university, the current course prerequisite for College Algebra at the university is an ACT Math sub-score of at least 20, or the equivalent (i.e., a grade of C or better in the university's developmental mathematics courses). Given the strong positive relationship

between ACT scores and college student success (Bleyaert, 2010; Richardson, Abraham, & Bond, 2012), students having no documented ACT scores on file with the university were deleted from the samples. Furthermore, students who remained on the course roster but did not actually complete the course (i.e., they stopped attending the course but did not officially withdraw) were also deleted. Table 1 provides an overview of the student profiles included in all statistical analyses.

Table 1. Online College Algebra Student Profiles, by Course Design

	Original (Spring 2012, Fall 2012)	Redesigned (Fall 2013, Spring 2014)
Number of students	51	44
Mean ACT Math	17.76 (*SD*=2.43)	18.52 (*SD*=3.19)
Mean Age	23.47 (*SD*=6.74)	26.09 (*SD*=9.02)
Gender	Female 67% Male 33%	Female 68% Male 32%
Student Rank	Freshman 35% Sophomore 26% Junior 26% Senior 14%	Freshman 32% Sophomore 27% Junior 18% Senior 23%
Off-Campus	86%	86%
Repeating Course	35%	34%

While the mean ACT Math sub-score for the redesigned course was higher than the mean ACT Math sub-score for the original course, the difference was not statistically significant (H_A: $\mu_1 \neq \mu_2$; $t(79)=-1.29$; $p=0.202$). A similar difference was noted in the overall campus mean ACT Math sub-scores during the two time periods (i.e., 19.81 and 20.07, respectively). A comparison of the campus mean ACT Math sub-scores to the mean ACT Math sub-scores in the online offerings of College Algebra indicates that the online offerings of College Algebra at this open-enrollment university tend to attract mathematically weaker students.

The mean age of students enrolled in the redesigned course was higher than the mean age of students enrolled in the original course, but the difference was not statistically significant (H_A: $\mu_1 \neq \mu_2$; $t(78)=-1.58$; $p=0.117$). Comparisons of student differences in gender (χ^2 (1, N=95)=0.025; $p=0.875$), student rank (χ^2 (3, N=95)=1.754; $p=0.625$), location of residence, and whether or not the College Algebra course was being repeated (χ^2 (1, N=95)=0.015; $p=0.902$), also indicated no statistically significant differences. Furthermore, although approximately 35% of the students enrolled during the four-semester period were repeating College Algebra, none of the students were repeating the online offering of the course.

While this study is limited by the fact that students were not randomly assigned to the courses included in the analysis, the evidence suggests the two samples were independent and drawn from the same population, and thus, may be considered equivalent for the purposes of this study.

Technology

All online courses over the two-year period were required to have access to MyMathLab, an online multimedia educational system designed by Pearson Education to accompany its published mathematics textbooks. Students enrolled in the redesigned online College Algebra course were also required to use Moodle, the university's online learning management system. All instructor-generated video lectures in the redesigned course were created by projecting PowerPoint presentations onto a SMART Podium Annotation Monitor and recording all handwritten solutions and oral explanations with

Panopto, a lecture capture system. Instructor-generated explanations for how to use the graphing calculator were also recorded using Panopto and a document camera.

Course Design

Students enrolled in both the original online College Algebra course and the redesigned online College Algebra course were required to have access to the multimedia educational system that accompanies the course textbook adopted by the university. This text-based multimedia educational system provided students with access to the *e*-book (i.e., an electronic copy of the textbook) and an online homework system.

Original Online College Algebra Course, Spring 2012 and Fall 2012. In the original online College Algebra course, the primary sources for course content and instruction were the publisher-generated learning aids enabled within the online homework exercises provided by the text-based multimedia educational system. Each exercise within the online homework system offered students a variety of publisher-generated learning aids to assist them in obtaining the correct answer for that particular exercise. Publisher-generated learning aids available for each homework exercise included a 15-30 minute video lecture provided by one of five different lecturers, an animation, a completed example, a guided tutorial, a link to the *e*-book, and a mechanism for asking the instructor a question via email. Both the video lecture and the animation provided a general overview of the topic being assessed by the given homework exercise, while the completed example provided a step-by-step solution for a problem identical in type, difficulty level, and conceptual scope. The guided tutorial assisted students in working the given homework exercise, requiring that the student then complete an algorithmically-generated identical problem on their own to earn credit for that exercise.

The course instructor's teaching presence in the original online College Algebra course consisted of supplemental instructor-generated educational resources (i.e., typed lecture notes, offline exam review materials, and video recordings of handwritten solutions to problems included in the offline exam review materials) uploaded into the text-based multimedia educational system and available on the first day of the semester, instructor-student interaction in the form of frequent instructor-initiated group email messages (at least one per week) and periodic individualized course status email messages, and instructor-student interaction in the form of prompt email responses to student questions about content (generally within 12 hours). The importance of email as the main mode of communication was emphasized frequently at the start of each semester. Except for the video recordings of handwritten solutions to problems included in the offline exam review materials, instructor-student interaction was limited to typed communication in the form of typed lecture notes or email correspondence.

In the original online College Algebra course, students were not required to engage with any specific educational resource. They were given the freedom to decide whether or not to engage with a publisher-generated learning aid associated with an online homework exercise or an instructor-generated resource.

Redesigned Online College Algebra Course, Fall 2013 and Spring 2014. In the redesigned online College Algebra course, the primary sources for course content and instruction were instructor-generated video lectures and coordinated note-taking sheets that were organized within the university-adopted course management system (i.e., outside of the publisher's multimedia educational system). The course content was assembled into five units, each unit consisting of five to six similarly-structured modules, a course design technique that has been shown to promote student motivation (Lehman & Conceição, 2014). Each unit of modules became visible to the students only when it was time to begin working on that unit. The offline exam review materials provided by the instructor in the original online College Algebra course were also provided in the redesigned College Algebra course and were attached to the end of each unit.

Each module consisted of a set of instructor-generated guided note-taking sheets and at most five instructor-generated video lectures, each 5- 40 minutes in length, with 65% of the videos being less than 20 minutes and 91% of the videos being less than 30 minutes. The content of the note-taking sheets was carefully coordinated with the content of the instructor-generated video lectures. Students were required to print off the note-taking sheets and complete them while watching the corresponding PowerPoint presentations that provided complete instruction for the algebraic concepts being addressed in that module and solutions to several relevant examples, emphasizing throughout the importance of understanding *why* each step in a solution is being performed. All 91 video lectures (i.e., over 26 hours of recorded lecture) were created in an empty room using an annotation monitor, a document camera, and a lecture capture system. As the instructor displayed the PowerPoint slides, concepts were discussed and examples were completed directly on the annotation monitor, comparable to the instruction provided in the face-to-face environment. All handwritten solutions and verbal explanations were recorded by the lecture capture software, allowing students the opportunity to pause, rewind, fast forward, and replay as needed. The note-taking sheets were graded on completion four times during the semester and returned to the student.

A link to the text-based multimedia educational system was included within the university-adopted course management system. While the original online College Algebra course enabled all of the publisher-generated learning aids within the online homework exercises provided by the text-based multimedia educational system, the redesigned course treated the publisher-generated learning aids as supplemental resources that accompany the course textbook. That is, the only publisher-generated learning aids enabled within the online homework in the redesigned course were the link to the *e*-book and the mechanism for asking the instructor a question via email. Although the publisher-generated video lectures, completed examples, and guided tutorials were not enabled within the homework, these learning aids were accessible via the online version of the textbook, a fact that was not publicized by the course instructor. The online version of the textbook was different from the *e*-book in that it included embedded links to not only relevant publisher-generated video lectures, but also interactive examples that provide access to other publisher-generated learning aids (i.e., completed examples and guided tutorials). While the *e*-book could be accessed within the homework system, the online version of the textbook with the embedded learning aids was only accessible when the homework system was closed.

At the beginning of each offering of the redesigned online College Algebra course, the instructor emphasized the importance of referring to the instructor-generated videos and their corresponding note-taking sheets when questions emerged while completing homework assignments. Students needing additional assistance beyond what the videos and note-sheets could provide were encouraged to email the instructor a detailed question. The instructor also encouraged students in the redesigned course to use their smartphones to send pictures of their work to the instructor rather than typing their questions, as was the norm in the original course. This approach made it easier for students to clearly communicate mathematical symbolism and easier for the instructor to locate student errors.

The course instructor's teaching presence in the redesigned online College Algebra course consisted of instructor-generated video lectures and their respective note-taking sheets (as well as the offline exam review materials) organized within the university-adopted course management system, instructor-student interaction in the form of frequent instructor-initiated group email messages (at least one per week) and periodic individualized course status email messages, and instructor-student interaction in the form of prompt email responses to student-initiated questions about content (generally within 12 hours). Again, the importance of email as the main mode of communication was emphasized frequently at the start of each semester.

In the redesigned online College Algebra course, students were required to complete guided note-taking sheets while watching over 26 hours of instructor-generated video lectures. Although students were given the freedom to decide whether or not to engage with a publisher-generated learning aid, these learning aids were only accessible outside of the homework system.

Table 2 summarizes how the original online College Algebra course compares to the redesigned online College Algebra course in terms of how the course instructor's teaching presence was facilitated according to the eight descriptors identified by Stone and Chapman (2006).

Table 2. Efforts to Facilitate Course Instructor's Teaching Presence, by Course Design

	Original	Redesigned
1. Via the instructor's role as content provider and subject matter expert	Type-set lecture notes (201 pages) *(Optional)*	Instructor-generated video lectures (over 26 hours) *(Required)*
2. By using materials unique to the instructor	Type-set lecture notes (201 pages) *(Optional)*	Instructor-generated video lectures (over 26 hours) *(Required)*
3. Through the creation of one's own learning objects	Type-set lecture notes (201 pages) *(Optional)*	Guided note-taking sheets (182 pages) graded on completion *(Required)*
4. By designing an effective student support structure	Offline and online review materials	Offline and online review materials
5. Through the instructor's role as facilitator of learning	Instructor-initiated weekly group email announcements; Instructor responses to student-initiated questions	Instructor-initiated weekly group email announcements; Instructor responses to student-initiated questions
6. By implementing high instructor immediacy behaviors in feedback	Email responses to student questions (generally within 12 hours)	Email responses to student questions (generally within 12 hours)
7. Through the use of a variety of media formats	Publisher-generated learning aids *enabled within online homework*	Publisher-generated learning aids *accessible within online textbook but disabled within online homework*
8. By organizing content and structuring the course for self-directed learning	Course materials organized *within publisher-provided multimedia system*; Homework assignments and course materials *visible from first day*	Course materials organized *outside of publisher-provided multimedia system*; Homework assignments and course materials *become visible when unit begins*

Adapted from Stone et al. (2006)

As noted in Table 2, the aspects of teaching presence related to facilitating discourse were identical between the two design models. However, the two design models differed in how they facilitated the course instructor's teaching presence in relation to design and organization, and direct instruction.

Course Grading Policies and Assessment Components

Course grades in the original online College Algebra course were computed as follows: Online Homework (10%), Online Quizzes (10%), Online Exams (30%), Handwritten Midterm Exam (25%), and

Handwritten Common Comprehensive Final Exam (25%). In the redesigned online College Algebra course, the Online Homework was reduced to 5% of the overall course grade, with Class Participation (i.e., the note-taking sheets graded on completion) accounting for the remaining 5%. The weights of all other assessment components were the same.

The online assessment components in both the original and the redesigned courses were intentionally structured to create a class climate that emphasizes a mastery-oriented approach to learning. Prior to the due date for a given online homework assignment, students had unlimited attempts to correctly answer each question. During each two-day online quiz window, students were allowed to take the quiz up to three times. During each two-day online exam window, students were allowed to take the exam only once.

The problems selected for inclusion on all online assessments (i.e., homework, quizzes, and exams) were identical in both the original and the redesigned courses. The online quizzes and online exams were non-proctored assessments, while the handwritten midterm exam and handwritten final exam were proctored by either the instructor or by an institution listed as a participant of the Consortium of College Testing Centers.

Beginning in the Spring 2012 semester, the university mathematics department implemented a handwritten common final exam to be given in all College Algebra offerings. The common final exam was given in both the original and the redesigned courses. Associated with this common final exam is a policy that requires students to earn at least 50% on the exam in order to earn a passing grade in the course. The final exam consists of 20 typical College Algebra problems. Each problem is randomly selected from a pool of 2-3 algorithmically-generated problems that are similar in difficulty level and conceptual scope. In an effort to better prepare the online students for the format of the high-stakes final exam, the instructor created the handwritten midterm exam to include problems comparable to those that might appear on the common final exam. The midterm exam was also given in both the original and the redesigned courses. The handwritten midterm exam for Spring 2012 served as the model for the midterm exams given during the Fall 2012, Fall 2013, and Spring 2014. That is, questions selected for inclusion on the midterm exams after the initial Spring 2012 semester were similar in difficulty level and conceptual scope to those questions on the original midterm exam. To maintain consistency in the grading of the handwritten exams given in both the original and redesigned courses, detailed grading rubrics were followed after removing all student names.

Time on Task

Given the tendency for successful online students to spend more time engaging with online learning activities (Finnegan, Morris, & Lee, 2009), a measurement for time on task was determined for all enrolled students.

Original Online College Algebra Course, Spring 2012 and Fall 2012. Time on task (in hours) for each student in the original online College Algebra course was measured by the time tracking feature of the text-based multimedia educational system that monitors student activity within online assessments (i.e., online homework, online quizzes, and online exams). Consequently, when a student chose to engage with a publisher-generated learning aid (i.e., a publisher-generated video, an animation, a completed example, a guided tutorial, or the *e*-book) while working on online homework, the time spent interacting with the learning aid was included in the measurement of time on task. Time spent engaging with a publisher-generated learning aid outside of the online homework assignment, time spent reviewing past online assessments, and time spent working offline were not included in this measurement.

Redesigned Online College Algebra Course, Fall 2013 and Spring 2014. Time on task (in hours) for each student in the redesigned online College Algebra course consisted of the sum of two

quantities—an approximation for the time spent watching the instructor-generated video lectures and the time on task as measured by the time tracking feature of the text-based multimedia educational system. When the video lectures were inadvertently made public, the lecture capture system did not retain user statistics, and hence, an approximation for the time spent watching the instructor-generated video lectures was computed. Since the class participation grade for the redesigned course was determined by the percentage of the note-taking sheets completed, and the note-taking sheets could not be completed without watching the video lectures, the time spent watching the instructor-generated video lectures was approximated by multiplying the total number of hours in the video collection (i.e., 26 hours) by the class participation grade.

As with the original online College Algebra course, the time tracking feature of the text-based multimedia educational system monitored student activity within online assessments (i.e., online homework, online quizzes, and online exams). When a student chose to engage with the *e*-book (i.e., the only publisher-generated learning aid enabled within the online homework in the redesigned College Algebra course) while working on online homework, the time spent interacting with the *e*-book was included in the measurement of time on task. Time spent engaging with a publisher-generated learning aid outside of the online homework assignment, time spent reviewing past online assessments, and time spent working offline were not included in this measurement.

Data Analysis

Student profile data suggests that the two samples were independent and drawn from the same population, and thus, may be considered equivalent for the purposes of this study. The level of significance used in all data analysis was $\alpha=0.05$.

Student Performance. To address the question of whether student performance in an online College Algebra course relying heavily on text-based multimedia tools can be improved by replacing the publisher-generated educational resources with instructor-generated video lectures, five different one-tailed *t*-tests for independent samples were used to compare the original online College Algebra course to the redesigned College Algebra course on all assessment components common to both courses: online homework, online quizzes, online exams, handwritten midterm exam, and handwritten final exam.

Online Homework. The student overall score on online homework was determined by computing the percentage correct on 25 equally-weighted homework assignments.

Online Quizzes. The student overall score on online quizzes was determined by computing the percentage correct on five equally-weighted quizzes.

Online Exams. The student overall score on online exams was determined by computing the percentage correct on three equally-weighted exams.

Handwritten Midterm Exam and Handwritten Final Exam. Student scores on both handwritten exams were determined by awarding points according to detailed grading rubrics, summing all points earned, and computing the corresponding percentage.

Time on Task. A *t*-test for independent samples was used to compare the time on task (in hours) for students in the original online College Algebra course with the time on task for students in the redesigned College Algebra course.

Course Grade Distributions and Student Attrition. Given that many university degree programs require a grade of C or better in general studies mathematics, letter grades of A, B, and C were considered passing grades in this analysis. A chi-square test was used to compare the overall course pass rate of the original online College Algebra course to the overall course pass rate of the redesigned College

Algebra course. Similarly, a second chi-square test was used to compare overall course pass rates when all 156 enrolled students were taken into consideration.

The student attrition rate was defined to be the percentage of students officially withdrawing from the course. To address the question of whether student attrition in an online College Algebra course relying heavily on text-based multimedia tools can be reduced by replacing the publisher-generated educational resources with instructor-generated video lectures, a chi-square test was used to compare the student attrition rate of the original online College Algebra course to the student attrition rate of the redesigned College Algebra course. Similarly, a second chi-square test was used to compare student attrition rates when all 156 enrolled students were taken into consideration.

Teaching Presence as a Predictor of Student Success. To address the question of whether teaching presence in the form of instructor-generated video lectures can serve as a predictor of student success in online College Algebra, a multiple regression analysis was performed. The independent variables for the regression model included design (original=0, redesigned=1), time on task (in hours), and ACT Math sub-scores (1–36). The dependent variable was student learning as measured by the overall course percentage computed according to the course grading policies outline in the course syllabi.

Results

Assessment Components

Online Homework. Results indicated student overall scores on online homework in the original online College Algebra course (M=83.43, SD=16.95) were not statistically significantly different from student overall scores on online homework in the redesigned online College Algebra course (M=82.13, SD=17.12; $t(54)=0.29$, p=0.613, one-tailed).

Online Quizzes. Results indicated student overall scores on online quizzes in the original online College Algebra course (M=67.41, SD=23.55) were statistically significantly lower than student overall scores on online quizzes in the redesigned online College Algebra course (M=76.63, SD=12.95; $t(45)=-1.86$, p=0.035, one-tailed). The magnitude of the difference in means was small (mean difference=-9.22, 95% upper bound: -0.87; r^2=0.06).

Online Exams. Again, results indicated student overall scores on online exams in the original online College Algebra course (M=64.47, SD=21.44) were statistically significantly lower than student overall scores on online exams in the redesigned online College Algebra course (M=78.25, SD=12.40; $t(47)=-3.01$, p=0.002, one-tailed). The magnitude of the difference in means was moderate (mean difference=-13.78, 95% upper bound: -6.09; r^2=0.16). That is, course design explains 16% of the variation in student overall scores on online exams.

Handwritten Midterm Exam. Student scores on the handwritten midterm exam in the original online College Algebra course (M=50.00, SD=21.84) were statistically significantly lower than student scores on the handwritten midterm exam in the redesigned online College Algebra course (M=65.75, SD=15.79; $t(52)=-3.14$, p=0.001, one-tailed). The magnitude of the difference in means was moderate (mean difference=-15.75, 95% upper bound: -7.36; r^2=0.16). That is, course design explains 16% of the variation in student scores on the handwritten midterm exam.

Handwritten Final Exam. Student scores on the handwritten final exam in the original online College Algebra course (M=44.93, SD=26.36) were statistically significantly lower than student scores on the handwritten final exam in the redesigned online College Algebra course (M=59.94, SD=17.29; $t(50)=-2.56$, p=0.007, one-tailed). The magnitude of the difference in means was moderate (mean difference=-15.01, 95% upper bound: -5.20; r^2=0.12). That is, course design explains 12% of the variation in student scores on the handwritten final exam.

Time on Task

Results indicated that while the mean number of hours spent on task by students in the original online College Algebra course (M=60.80, SD=52.29) was lower than the mean number of hours spent on task by students in the redesigned online College Algebra course (M=73.78, SD=32.99), the difference was not statistically significant ($t(49)$=-1.13, p=0.132, one-tailed).

Table 3 summarizes the results obtained in the comparison of the original online College Algebra course and the redesigned online College Algebra course on all assessment components and time on task.

Table 3. Computed Means for Assessment Components and Time on Task, by Course Design

	Original (N=51)	Redesigned (N=44)	p	r^2
Online Homework	83.43%	82.13%	0.613	na
Online Quizzes	67.41%	76.63%	0.035	0.06
Online Exams	64.47%	78.25%	0.002	0.16
Handwritten Midterm	50.00%	65.75%	0.001	0.16
Handwritten Final	44.93%	59.94%	0.007	0.12
Time on Task	60.80 hrs	73.78 hrs	0.132	na

Course Grade Distributions and Student Attrition

Overall course grade distributions, sorted by course design, are provided in Table 4.

Table 4. Grade Distributions, by Course Design

	Original (N=51)	Redesigned (N=44)	Difference
A	5.88%	4.55%	–1.34
B	5.88%	6.82%	0.94
C	3.92%	27.27%	23.35
Grades of A, B, and C together	*15.69%*	*38.64%*	*22.95*
D	15.69%	11.36%	–4.32
F	27.45%	11.36%	–16.09
W	41.18%	38.64%	–2.54

The course pass rate for the redesigned online College Algebra course was statistically significantly higher than the course pass rate for the original online College Algebra course (χ^2 (1, N=95)=6.416; p=0.011). Furthermore, while the course pass rate for the original online College Algebra course was 22.45 percentage points below the campus-wide College Algebra pass rate during the same time period, the course pass rate for the redesigned online College Algebra course was only 4.39 percentage points below the campus-wide College Algebra pass rate during the same time period. The student attrition rate for the redesigned online College Algebra course, however, was not statistically significantly lower than the student attrition rate for the original online College Algebra course (χ^2 (1, N=95)=0.064; p=0.801).

The grade distributions for all 156 students enrolled during the two-year period were also computed. The course pass rate for the redesigned online College Algebra course (25.29%, N=87) was almost double the course pass rate for the original online College Algebra course (13.04%, N=69), though the difference was not statistically significant (χ^2 (1, N=156)=3.623; p=0.057). And, while the attrition rate for the redesigned online College Algebra course (27.59%, N=87) was not statistically significantly lower than the attrition rate for the original online College Algebra course (42.03%, N=69; χ^2 (1, N=156)=3.578; p=0.059), the attrition rate did drop 14.44 percentage points.

Teaching Presence as a Predictor of Student Success

Results from a multiple regression analysis indicated that the linear combination of design, time on task, and ACT Math sub-score was statistically significantly related to the overall course percentage (F(3, 53)=8.47, p < 0.001). The adjusted correlation coefficient was 0.29 indicating that 29% of the variability in student learning was accounted for by design, time on task, and ACT Math sub-score. All three independent variables were statistically significant predictors of student learning (p < 0.05) as seen in Table 5.

Table 5. Summary of Multiple Regression Results

Model	Unstandardized Coefficient	Standardized Coefficient	*t*	*p*
Intercept	20.64	12.97	1.59	0.118
Design	9.401	3.838	2.45	0.018
Time on Task	0.11868	0.004271	2.78	0.008
ACT Math Score	1.6643	0.6784	2.45	0.017

Discussion

This study examined the impact of instructor-generated video lectures on student performance and student attrition in an online College Algebra course at an open-enrollment university. The original online College Algebra course placed the publisher-generated educational resources in the role of content provider by enabling all publisher-generated learning aids within the online homework system and treating instructor-generated educational materials as supplemental resources. In contrast, the redesigned online College Algebra course enhanced the course instructor's teaching presence by requiring students to complete instructor-generated guided note-taking sheets while watching over 26 hours of instructor-generated video lectures, treating publisher-generated learning aids as supplemental resources by removing them from within the online homework system.

In studies by Klein (2005) and Aichele, Francisco, Utley, and Wescoatt (2011), students having access to the publisher-generated learning aids embedded within the MyMathLab homework system found the *View an Example* and *Help Me Solve This* features to be the most valuable because they provide step-by-step solutions to very similar problems. Aichele et al. (2011) suggested that when students associate procedural learning with success, the belief that mathematics is nothing more than the rote memorization of steps in a process is reinforced. In removing the student-preferred, publisher-generated learning aids from within the online homework system and replacing them with instructor-generated video lectures that provided complete instruction for the algebraic concepts being addressed, procedural learning was deemphasized and the importance of conceptual understanding in the learning of mathematics was highlighted.

Replacing publisher-generated learning aids with instructor-generated video lectures not only placed a greater emphasis on conceptual understanding, but also positioned the course instructor prominently in the role of content provider, enhancing the course instructor's teaching presence in the online environment. The importance of course design and direct instruction in the online environment was noted by several earlier studies that indicated teaching presence is highly correlated with student perception of learning and critical thinking (Baker, 2010; Hosler & Arend, 2012; Shea et al., 2003). The results of the study described herein offer additional support to the contention that the course instructor's teaching presence in the online environment and student learning are related. Specifically, while student performance on online homework in the original online College Algebra course was comparable to the student performance on online homework in the redesigned online College Algebra course, students enrolled in the redesigned online College Algebra course performed statistically significantly better on all online and handwritten summative assessments (i.e., quizzes and exams) than students enrolled in the original online College Algebra course.

Given that the students enrolled in the redesigned online College Algebra course performed better on all summative assessments, it is no surprise that the students enrolled in the redesigned course earned a statistically significant higher percentage of passing grades than the students enrolled in the original online College Algebra course. Furthermore, when the overall course grades of all 156 students enrolled during the two-year period were included in the grade distributions, it was noted that the student attrition rate in the course that incorporated the instructor-generated video lectures dropped considerably, an outcome that was also noted by Brecht (2012) in his study of the use of online video lectures as a supplement to a mathematics intensive face-to-face course.

While the results suggest that the amount of time students in the redesigned online College Algebra course spent engaging with the online course content was not statistically significantly greater than the amount of time spent by students in the original online College Algebra course, this difference may be underestimated by the approximation used in measuring the total amount of time on task for the redesigned course. While there is no reason to believe the data collected by the text-based course management system inaccurately measured the amount of time spent working on online assessments, the actual time spent engaging with the video lectures is likely greater than the approximated value since it is known that students frequently pause and rewind the recorded lectures during the process of completing the guided note-taking sheets. And, although the measurement for time on task was computed consistently for each study participant according to the outlined method for their course, the accuracy of time on task, in general, is questionable since the measured value may include logged time during which the student was not actually engaging with the materials. Furthermore, the time on task measurement does not include time spent engaging with publisher-generated learning aids outside of the online homework assignments, time spent reviewing past online assessments, and time spent working offline.

The results of this study also indicate that the design of the online College Algebra course, the amount of time a student spends engaging with the online course content, and the student's ACT Math sub-score, together form a good linear model for predicting student learning as measured by the overall course percentage. That is, to increase the likelihood that a student will successfully pass online College Algebra, not only must students enter the course with an established amount of prerequisite knowledge and a willingness to commit a significant amount of time to learning the course material, but the instructor must also incorporate design techniques and instructional activities that create and sustain a strong teaching presence in the course.

To illustrate the potential importance of the described redesign in online College Algebra, consider the following example. Suppose a student enrolled in the original online College Algebra course that centered around the publisher's text-based multimedia tools had an ACT Math sub-score of 22 (i.e., the course prerequisite for College Algebra at the author's university, effective fall 2015) and spent 61 hours engaging with the online course content (i.e., the average amount of time on task for students

enrolled in the original online course). The regression model predicts this student's overall course percentage to be 64.5%, resulting in a letter grade of D. As a comparison, suppose a student enrolled in the redesigned online College Algebra course that was organized around instructor-generated video lectures had an ACT Math sub-score of 19 and spent 74 hours engaging with the online course content (i.e., the average amount of time on task for students enrolled in the redesigned online course). The regression model predicts this student's overall course percentage to be 70.4%, resulting in a letter grade of C. This suggests that the described redesign for online College Algebra may assist mathematically weaker students in learning the course content well enough to pass the course.

Limitations

Since the participants in this study enrolled themselves in the online sections of College Algebra offered by a public university and students cannot be forced to take an online course, there is the possibility of self-selection bias. Given the lack of random assignment to the different course design models, it is possible unmeasured factors influenced the outcomes of this study. Another limitation of this study is that many changes were made to the redesigned online College Algebra course, and hence, interactions between these changes may have occurred. For example, the redesigned online College Algebra course not only incorporated instructor-generated video lectures and the corresponding note-taking sheets, but also removed the publisher-generated learning aids from within the online homework system.

To overcome these issues, a future research design could be implemented in which the self-enrolled students in a single high-enrollment online College Algebra course are randomly assigned to two distinct online courses. While both courses could incorporate the same instructor-generated video lectures and corresponding note-taking sheets, one course could disable the publisher-generated learning aids within the online homework system while the other course could enable the publisher-generated learning aids within the online homework system.

Also, since the online course instructor was also the researcher, unintentional bias may have also influenced the outcomes. The best way to overcome this concern is to repeat the implementation of the redesigned model and observe the results over several more semesters.

Conclusions

The online College Algebra course offered by the open-enrollment university at the center of this study has a tendency to attract students who are mathematically weaker than the campus average. While these students might experience more success in a College Algebra course in a face-to-face format, for whatever reason they are choosing to enroll in the online course. As with any course—face-to-face or online—it is the responsibility of the instructor to incorporate course design techniques and instructional activities that are likely to encourage student engagement, persistence, and learning. This study suggests instructor-generated video lectures and coordinated note-taking sheets organized within modules may increase success among mathematically unprepared students enrolled in online freshman-level mathematics courses.

Although text-based multimedia tools have much to offer students, instructors of online general studies mathematics courses that are structured around the multimedia tools accompanying course textbooks should proceed with caution. Care must be taken when designing an online course around these text-based multimedia tools to ensure that the instructor is placed prominently in the role of content provider.

About the Author

Jennifer S. Hegeman, Department of Computer Science, Mathematics, and Physics, Missouri Western State University

Correspondence concerning this article should be addressed to Jennifer Hegeman, Department of Computer Science, Mathematics, and Physics, Missouri Western State University, 4525 Downs Drive, St. Joseph, MO 64507. Contact: hegeman@missouriwestern.edu.

References

Aichele, D. B., Francisco, C., Utley, J., & Wescoatt, B. (2011). Computer-aided college algebra: Learning components that students find beneficial. *MathAMATYC Educator, 2*(2), 12-19.

ALEKS. (2014). *About Us*. McGraw-Hill Global Education Holdings, LLC. Retrieved from http://www.aleks.com/about_us

Allen, I. E., & Seaman, J. (2014). *Grade Change: Tracking Online Education in the United States.* Babson Survey Research Group. Retrieved from http://www.onlinelearningsurvey.com/reports/gradechange.pdf

Anderson, T., Rourke, L., Garrison, D. R., & Archer, W. (2001). Assessing teaching presence in a computer conferencing context. *Journal of Asynchronous Learning Networks, 5*(2), 1-17.

Baker, C. (2010). The impact of instructor immediacy and presence for online student affective learning, cognition, and motivation. *The Journal of Educators Online, 7*(1).

Bleyaert, B., & Education Partnerships. I. (2010). ACT and College Success. *Education Partnerships, Inc.* Retrieved from http://files.eric.ed.gov/fulltext/ED537914.pdf

Brecht, H. D. (2012). Learning from online video lectures. *Journal of Information Technology Education: Innovations in Practice, 11*, 227-250.

Brewer, D. S. (2009). The effects of online homework on achievement and self-efficacy of college algebra students. *All Graduate Theses and Dissertations*. Paper 407. Retrieved from http://digitalcommons.usu.edu/etd/407

Cascaval, R. C., Fogler, K. A., Abrams, G. D., & Durham, R. L. (2008). Evaluating the benefits of providing archived online lectures to in-class math students. *Journal of Asynchronous Learning Networks, 12*(3-4), 61-70.

Chen, X. (2013). *STEM Attrition: College Students' Paths Into and Out of STEM Fields* (NCES 2014-001). National Center for Education Statistics, Institute of Education Services, U.S. Department of Education. Washington, DC. Retrieved from http://nces.ed.gov/pubs2014/2014001rev.pdf

Finnegan, C., Morris, L., & Lee, K. (2009). Differences by course discipline on student behavior, persistence, and achievement in online courses of undergraduate general education. *Journal of College Student Retention: Research, Theory and Practice, 10*(1), 39-54.

Fish, W., & Wickersham, L. (2009). Best practices for online instructors: Reminders. *The Quarterly Review of Distance Education, 10*(3), 279-284.

Furner, J. M. & Gonzalez-DeHass, A. (2011). How do students' mastery and performance goals relate to math anxiety? *Eurasia Journal of Mathematics, Science, & Technology Education, 7*(4), 227-242.

Hosler, K. A. & Arend, B. D. (2012). The importance of course design, feedback, and facilitation: Student perceptions of the relationship between teaching presence and cognitive presence. *Educational Media International, 49*(3), 217-229.

Jaggars, S., Edgecombe, N., Stacey, G., & Columbia University, C. (2013). Creating an effective online instructor presence. *Community College Research Center, Columbia University*. Retrieved from http://files.eric.ed.gov/fulltext/ED542146.pdf

Klein, A. M. (2005). The effects of computer assisted instruction on college algebra students at Texas Tech University (master's thesis). Retrieved from Texas Tech University Electronic Theses and Dissertations Library Database.

Lehman, R., & Conceição, S. (2014). *Motivating and Retaining Online Students: Research-Based Strategies that Work*. San Francisco, CA: Jossey-Bass.

MyLab and Mastering. (2014). *Break Through to Improving Results*. Pearson Higher Education. Retrieved from www.pearsonmylabandmastering.com/northamerica

Nunez-Pena, M. I., Suarez-Pellicioni, M. M., & Bono, R. R. (2013). Effects of math anxiety on student success in higher education. *International Journal of Educational Research, 58,* 36-43.

Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university students' academic performance: A systematic review and meta-analysis. *Psychological Bulletin, 138*(2), 353-387. doi:10.1037/a0026838

Shea, P., Pickett, A., & Pelz, W. (2003). A follow-up investigation of "Teaching Presence" in the SUNY Learning Network. *Journal of Asynchronous Learning Networks, 7*(2), 61-80.

Simonds, T. A., & Brock, B. L. (2014). Relationship between age, experience, and student preference for types of learning activities in online courses. *Journal of Educators Online, 11*(1).

Stone, S. J., & Chapman, D.D. (2006). Instructor presence in the online classroom. *Proceedings of the 2006 Academy of Human Resource Development International Research Conference*, Columbus, OH.

Taylor, J. M. (2008). The effects of a computerized-algebra program on mathematics achievement of college and university freshmen enrolled in a developmental mathematics course. *Journal of College Reading and Learning, 39*(1), 35-53.

WebAssign. (2014). *About Us*. Advanced Instructional Systems, Inc. Retrieved from https://webassign.com/corporate/about-us/

Xu, D. & Jaggars, S. (2011). The effectiveness of distance education across Virginia's community colleges: Evidence from introductory college-level math and English courses. *Educational Evaluation and Policy Analysis, 33*(3), 360-377.

Xu, Y. J., Meyer, K. A., & Morgan, D. (2008). Piloting a blended approach to teaching statistics in a college of education: Lessons learned. *The Journal of Educators Online, 5*(2).

Zavarella, C. A. & Ignash, J. (2009). Instructional delivery in developmental mathematics: Impact on retention. *Journal of Developmental Education, 32*(3), 2-13.

Section II: Blended and Experiential Learning

The Impact of Online or F2F Lecture Choice on Student Achievement and Engagement in a Large Lecture-Based Science Course: Closing the Gap

Cheryl A. Murphy
University of Arkansas

John C. Stewart
West Virginia University

Abstract

Blended learning options vary and universities are exploring an assortment of instructional combinations, some involving video lectures as a replacement for face-to-face (f2f) lectures. This methodological study investigates the impact of the provision of lecture choice (online or f2f) on overall student achievement and course engagement. This research uses a within-group design to obtain baseline data on a single set of physics students (n=168), and investigates the impact of providing a lecture viewing choice (online, f2f) mid-semester on student achievement (tests, homework, and standardized conceptual evaluation scores), and course engagement (student lecture viewing, homework submissions, bonus project submissions, and note taking behaviors). The study reveals that the type of lecture does not serve to significantly impact overall student achievement or engagement. However, although recorded and f2f lectures demonstrate an overall educationally equivalent impact, students who elect a high level of recorded lecture use were significantly lower performing and less engaged before the option to watch recorded lectures was introduced and largely continued to be so after the option was introduced, but there was evidence of a reduction in achievement and engagement differences after the option is introduced. Therefore, results of this study suggest weaker performing students self-select higher levels of recorded lecture use, and the use of these video lectures may assist this specific group of students in closing the gap between themselves and students who were initially higher performing and more engaged.

Introduction

Web-based lecture technologies have been available for over fifteen years, and usage has increased greatly in the past decade. In a push to provide blended learning options, higher education institutions are increasingly adopting technologies such as lecture capture, webcasting, and video podcasting to supplement and even replace face-to-face (f2f) lectures (Danielson, Preast, Bender, & Hassall, 2014). Video lectures are viewed as a way to extend classroom instruction to online learning (Brecht, 2012), and are also touted for the ability to provide flexibility to students who are juggling competing demands for their time (Gysbers, Johnston, Hancock, & Denyer, 2011).

Although reported use of video lectures is increasing, our knowledge about the impact of recorded video lecture access on academic achievement and student engagement is limited. As acknowledged by Gorissen, Van Bruggen, and Jochems (2012), "Most studies are limited to the overall opinions and perceptions of students and lecturers about the usefulness of the recorded lectures" (p. 298). Additionally, studies that have investigated the impact of recorded video lecture access on achievement and student engagement have resulted in mixed findings with a lack of consensus regarding the relationship between recorded video lecture use and learning outcomes (Danielson et al., 2014).

This study furthers the research literature on video lecture use by providing a robust examination of the impact of the provision of recorded video lectures on academic achievement and student engagement. While previous video lecture research has been conducted, many of these studies have relied on perception and self-report data, which have limitations (Stone, Bachrach, Jobe, Kurtzman, & Cain, 1999). Other studies have used self-selection and/or randomized research designs in which students are placed into groups, with each group given differing levels of access to recorded video lectures. Although these designs allow for an exploration of the impact of video lecture use, they fail to take into account self-selection biases or student differences that may exist prior to the beginning of the research treatment.

To address the aforementioned issues, the current study utilizes a within-subjects design that allows for the gathering of student baseline data prior to the provision of video lecture options within a large lecture-based course, and collection of data during and after optional video lecture use. This design affords the current researchers the opportunity to fully explore the impact of optional recorded video lectures on academic achievement and student engagement.

Review of Related Literature

Lecture Attendance and Achievement

According to Behr (1988), the most common teaching method used in higher education is the lecture, and lecture attendance has been shown to have a positive impact on student achievement (Budig, 1991; Jenne, 1973; Kantartzi, Allen, Lokhi, Grier, & Abdelmajid, 2010; Moore, 2003; Nist, 1995; Slem, 1983; Van Blerkom, 1996). In fact, a recent meta-analysis by Credé, Roch, and Kieszczynka (2010) reports attendance to be the best predictor of academic achievement, including attendance in classrooms that predominantly incorporate lecture methods.

However, previous studies have failed to determine whether increased achievement associated with lecture attendance is related to the act of viewing the lecture, or if other social presence factors are involved (Credé et al., 2010). The use of technologies which allow recorded video lectures to act as a replacement for f2f lectures offers researchers the opportunity to more closely explore relationships between lecture viewing (f2f or online) and student achievement.

Student Absenteeism

Despite the plethora of research supporting the relationship between lecture attendance and higher academic achievement, student absenteeism remains an issue (Barlow & Fleischer, 2011; Bati,

Mandiracioglu, Orgun, & Govsa, 2013; Gump, 2005; MacFarlane, 2013). Students report preparation for another course, lack of interest in the lecture topic, inferior teaching style or quality, conflicting deadlines for other courses, lack of relevant examples, and the availability of lecture materials outside of class as reasons they voluntarily do not attend class (Clay & Breslow, 2006; Desalegn, Berhan, & Berhan, 2014). Students also cite illness, death, personal emergencies, external commitments such as work or child care, poor weather conditions, distance to campus, and distracting lecture environments as involuntary reasons for missing class (Bati et al., 2013; Clay & Breslow, 2006; Desalegn et al., 2014).

Student absenteeism is a concern, and students have a multitude of reasons for skipping lectures. It is also clear that increased student achievement has been strongly associated with lecture attendance, and students who miss lectures are at greater risk of poor performance. To deter poor performance related to lecture absenteeism some researchers suggest the use of recorded video lectures (Borman, 2010; Gysbers et al., 2011; McElroy & Blount, 2006; Steiner & Hyman, 2010).

Recorded Video Lectures

Recorded video lectures may extend instruction and potentially address factors associated with lecture absenteeism (Brecht, 2012). Recorded video lectures offer students flexibility relative to instructional time, pace of learning, study location, and opportunities for review. More specifically, researchers report that recorded lectures give students the ability to view lectures at the time of the student's choosing; allow students to make up for unavoidable conflicts which result in missed class; enable student control of lecture delivery to fit the student's learning pace; allow students to view lectures without environmental distractions such as overcrowded classrooms; demand fewer trips to campus; and provide extra flexibility for busy students (Bati et al., 2013; Ealy, 2013; Gorissen et al., 2012; Gysbers et al., 2011; Simpson, 2006; Yudko, Hirokawa, & Chi, 2008).

Researchers argue recorded video lectures have transformed learning by extending the lecture experience and providing choice in relation to lecture. However, the use of recorded video lectures is not without concern. The use of recorded video lectures has been shown to relate to a reduction in f2f class attendance (Grabe, Christopherson, & Douglas, 2005; McKinlay, 2007; Traphagan, Kucsera, & Kishi, 2010; von Konsky, Ivins, & Gribble, 2009), and the concern for class absenteeism is a primary barrier to recorded video lecture use by faculty (Chang, 2007).

Student Lecture Viewing

Student preferences relative to live versus recorded lectures correspond to faculty concerns. Results from Artino (2010) show that although students appreciate the convenience of online options, "if given the choice, many would rather complete courses in a traditional, classroom-based format" (p. 275). Students report that live lectures provide a better learning environment than online recorded lectures because of the discipline imposed by scheduled live lectures, and suggest web based lectures may predispose students to procrastination (Gysbers et al., 2011). Students also find recorded video lectures to be of benefit. Despite a preference for f2f lectures, students believe they can learn as well from recorded lectures as from f2f lecture attendance (Gorissen et al., 2012; Gosper et al., 2008).

However, there is a concern that students may not be capable of making good decisions regarding lecture viewing and attendance, particularly if they are already struggling. While some studies suggest students may be more likely to attend lectures they perceive to be difficult (Clay & Breslow, 2006; Gysbers et al., 2011), others demonstrate that lower performing students prefer educational software or online resources to traditional lectures (Albert, 2004; Traphagan et al., 2010). Similarly, research found lower performing students are more likely to supplement attendance with web-based lectures (von Konsky et al., 2009), which raises the concern that students may choose to replace live lectures with web-based lectures to their detriment.

Recorded Video Lectures and Achievement

Investigations on the impact of recorded lectures on achievement have resulted in mixed findings. As Danielson et al. (2014) report, "We could not identify any systematic meta-analyses providing a consensus regarding the relationship between lecture-capture use and learning outcomes in a post-secondary or any other learning context" (p. 121).

To date much of the research on the relationship between recorded lecture viewing and achievement has primarily focused on student perceptions, with a few studies using self-selection or randomized research designs to investigate differences between the achievement of students receiving f2f versus recorded lectures (Gosper et. al, 2008; Hove & Corcoran, 2008; McCredden & Baldock, 2009; Owston, Lupshenyuk, & Wideman, 2011; Solomon, Ferenchick, Laird-Fick, & Kavanaugh, 2004; Traphagan et al., 2010). Findings from these studies vary, and the link between live lecture attendance versus video lecture viewing and achievement has not been strongly established. This has led to the suggestion that student achievement may be influenced more by overall engagement in the course than by f2f versus online lecture attendance (Gysbers et al., 2011; McCredden, & Baldock, 2009; von Konsky et al., 2009).

Recorded Video Lectures and Engagement

Student engagement has been touted as the single best predictor of student learning (Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008). Despite the stated importance of student engagement, researchers indicate that engagement in lecture courses can be limited, and students who do not attend lectures miss out on both social and content engagement opportunities that can enhance learning (Black, 2005; Cooper & Robinson, 2000; Massingham & Herrington, 2006; McGarr, 2009; Phillips et al., 2007).

While technologies such as recorded video can potentially increase opportunities for student engagement with the content (Laird & Kuh, 2005), there remains the concern that the incorporation of these technologies can also serve as a distractor for students (Reisberg, 2000). Thus, as within other areas of study related to video lecture research, findings are mixed regarding the relationship between recorded video lectures and student engagement.

Summary and Need for Study

There is a lack of consistent research findings identifying the impact of lecture choice (online versus f2f) on student achievement and engagement. Offering students a lecture viewing choice is lauded by some researchers since it provides busy students a means to view lectures that would have otherwise been missed, thereby potentially increasing lecture viewing. Other scholars report students are not capable of making good decisions regarding lecture viewing, particularly if they are already struggling, and raise the concern that recorded video lectures could lead to less lecture viewing. Existing research related to the use of online lectures has primarily involved self-report data gathering methods, and more study is needed to determine the overall impact of lecture choice.

Similarly, existing research demonstrates a relationship between lecture attendance and student achievement, but what remains unclear is whether the act of viewing lectures online versus attending f2f lectures impacts achievement. Some studies find the use of recorded video lectures supports increased student achievement, while others report no impact of recorded lecture viewing on student achievement. Many of these studies utilize research designs that fail to account for initial student differences or establish a baseline for student achievement prior to the introduction of video lectures. Additional research that controls for student variability while examining both f2f and recorded lecture viewing is needed to more systematically study the relationship between the types of lecture viewing (online versus f2f) and measures of student achievement.

Lastly, researchers indicate multiple forms of student engagement are critical to student success; however, findings identifying the impact of lecture choice (online versus f2f) on student engagement are mixed. Some researchers report that student engagement in a traditional lecture

course is negatively impacted by the presence of video lectures, while others indicate course engagement by students increases because video lectures allow students to stay connected to the course outside of traditional class time. Measures for student engagement within these studies vary, but in most cases include the completion of out-of-class assignments and readings. Further study is needed that includes multiple indicators of engagement to clarify the impact of the provision of recorded video lectures on student engagement within traditional lecture courses.

Research Questions

This study furthers previous research by using a within-group research design to examine the potential impacts of optional recorded video lectures on student achievement and course engagement. To guide this investigation, the following research questions are addressed: What is the impact of student lecture choice (recorded vs. f2f) on 1) achievement and 2) course engagement? More specifically, the use of this study's within-group design adds to previous research related to online versus f2f achievement by affording a pre-post controlled examination of student achievement (as measured by examinations, homework scores, and a standardized test) between those who choose to watch recorded video lectures and those who attend f2f lectures. Additionally, the study addresses researcher concerns relative to how online video lectures may impact student engagement in multiple course-related activities by measuring student lecture viewing (f2f and recorded), submission of homework assignments, completion of optional projects, and self-reported note taking behaviors both before and after the introduction of the video lecture option to determine whether those who choose to view recorded video lectures maintain the same amount of engagement in course-related activities as those who choose to watch lectures in a f2f format.

Method

Context

This study examined the effect of the mid-semester introduction of the option to either attend lectures live in the traditional f2f setting or watch recorded video lectures delivered over the internet. This research was performed in a second-semester university Physics course at a public land-grant institution serving approximately 25,000 students. The course was a required course for most of the students enrolled (n=168), and the course featured both required lecture and laboratory components so that all students were required to attend two f2f laboratory sessions each week. Students electing to watch online video lectures still had to complete on-campus laboratory requirements for the course.

The f2f lectures were given in a large lecture theater and were presented in 50-minute sessions. A total of twenty-nine lectures were given throughout the semester, approximately two per class week. The lectures were given with the lecturer working from a set of notes, using those notes to present material on a whiteboard, and then projecting the notes onto a screen above the whiteboard. The lecturer periodically solicited questions of the students, but did not perform any demonstrations; these were left for the laboratory segment of the course. The class had been presented in the same format by the same instructor for over a decade. All homework and examination materials for the course were prepared by this seasoned instructor, producing a highly stable educational setting for this research. The only substantive change to this stable class environment in the semester studied was the mid-semester introduction of the video lecture option.

Description of Experiment

At the beginning of the semester all students within the Physics course were required to attend the f2f lectures; attendance was monitored with a lecture quiz administered at the end of most lectures. In preparation for offering a future online lecture section of the course, the instructor produced video versions of the f2f lectures for the course. With knowledge of the availability of the video lecture resource, some students requested the option of viewing the recorded video lectures instead of attending the lectures in person. In response to student requests, the instructor agreed to allow students to watch lectures on video in place of attending the f2f lecture once the class reached

the mid-semester point. The class administered four in-semester examinations, and the video option was offered to students immediately after the second in-semester examination. Prior to course enrollment, no student was made aware that the option to watch the lecture on video would be available.

The video lectures were provided through the university's learning management system (LMS) course site, and requirements and instructions for watching the lectures on video were explained in the face-to-face lecture immediately following the second in-semester examination, and in an email to the class. Face-to-face lecture attendance continued to be monitored with a lecture quiz. Students electing to watch recorded video lectures were given the same lecture quizzes as those attending lectures in person through the course LMS site. The quizzes appeared at the end of the videos to encourage students to watch the entire video lecture prior to taking the quiz. Students were also asked to fill out a form on the course web site confirming that the video had been watched.

The recorded video lecture option was maintained for the remainder of the semester. Students could watch as many of the remaining lectures (12) as they wished on video or could attend f2f lectures at any time. Eight of the twelve remaining lectures were monitored with an online quiz that allowed the determination of lecture viewing choice. The other four remaining lectures were monitored with a common paper quiz because of the lecture content or the material tested. The instructor and grading structure neither encouraged, nor discouraged, the video lecture option; its election was left completely up to the individual student.

Video production. The lecture videos were recorded with the same lecturer as the f2f lecture sessions. This lecturer had taught the course many times from the same notes and, as such, was well rehearsed when the video was recorded. The lecture was given by writing on a chalkboard and recorded with a camera on a fixed tripod. The videos were presented to students in single segments of an average length of 50 minutes. Although research suggests that students learn more effectively if recorded lecture videos are broken into smaller segments (Zhang, Zhou, Briggs, & Nunamaker, 2006), single lecture-length videos were used for the semester studied to provide symmetric experiences for the f2f and recorded lecture.

To address video quality and parity with f2f lectures, the empty classroom was used during recording to reduce noise and distractions sometimes present in video that is live-captured during a large lecture class. The f2f lecture was given supported by writing on whiteboards. In the f2f lecture, each page of lecture notes from which the lecture was given was projected on a screen above the whiteboard after the material on a page had been presented. These notes were made available to all students before the lecture was given through the course LMS site. These same notes were used when recording the video lectures.

The recorded and f2f lecture were very similar with important strengths for each format. The class features careful timing between the f2f lecture and laboratory; a fixed amount of material must be covered each f2f lecture so the students have sufficient information for the upcoming laboratory. The instructor's notes, published to the students, acted as a script for each lecture and defined the information presented. As such, the f2f and recorded lectures contained nearly identical information. The camera was placed in the empty classroom in a location that gave the online viewer effectively a seat very near the front of the class. Visual aids used in the f2f lecture were also used in the recorded lecture with the proximity of the camera allowing superior viewing for online students. The recorded video was examined for both accidental misstatements and places where the board work was difficult to read and these problems corrected. This gave the online students a better viewing experience than many students in the f2f lecture theater, particularly those toward the back of the classroom. The recorded lecture had none of the distractions of a large lecture hall and included the instructor asking the questions he had come to expect from long experience teaching the class. The f2f lecture did feature the ongoing supports for engagement of instructor and student questions as well as the natural engagement of the live experience. The instructor felt the videos should be a superior learning experience for the majority of the students, particularly those with seats far from the lecturer except

for the reduced engagement of the recorded experience. There were no additional differences that would inform the results of this experiment.

Video quality survey. To address concerns regarding student perceptions of recorded video quality (Lauer, Muller, & Trahasch, 2004), the students were given a short survey about the general quality of the recorded videos approximately three-quarters of the way through the semester, or at the mid-point of the video option. This survey was given under the condition that individual student responses would remain confidential and not be communicated to course personnel. As an incentive for survey participation, all students received three bonus points for the time required to complete the survey.

Strengths and weakness of experimental design. The experimental design had important strengths and weaknesses. The within-subjects design allowed for the control of the differences between student groups with different self-selected levels of video use. While a randomized design where students were assigned video levels would also have allowed a similar determination of the efficacy of the online option, the self-selected design with the within-groups control permitted the identification of a significant self-selection effect. A primary weakness of the experiment was that a 2x2 design was not possible. It would have been beneficial to split the class into two groups; one group which received all f2f instruction for the first half of the semester and f2f/online instruction in the second half and a second group which receive f2f/online instruction in the first half of the semester and all f2f instruction in the second half. This design would have allowed for superior control of the semester-long evolution effects that had to be removed mathematically. However, implementing a 2x2 design would have been difficult because it would have required the removal of a popular resource from some students mid-semester.

Measures of Student Achievement

The class evaluated student learning and encouraged behaviors conducive to learning through a number of required and optional assignments. Student achievement was measured by homework grades, scores on four in-semester examinations, and the score on a standardized conceptual evaluation.

Homework grades. Outside homework was assigned each week; this homework was split into a set of multiple-choice problems whose answers were entered online through the course's LMS, and a set of open-response homework problems that the student worked on paper. The students were to complete 23 multiple-choice homework assignments and 21 open-response homework assignments over the course of the semester. The multiple-choice homework was due online at the beginning of the f2f lecture at 10:30am Monday and Wednesday. Before the introduction of the video option, the open-response paper-based homework was collected at the beginning of the f2f lecture. After the introduction of the video lecture option, the open-response homework was due at the end of the last laboratory session on Tuesday/Thursday afternoon. This change was made to provide students electing the video lecture option the flexibility of not having to attend the beginning of the f2f lecture to turn in paper-based homework. All outside homework assignments received a grade.

Examination scores. Students were given four in-semester examinations; each examination covered the readings and activities of the previous four weeks and was not comprehensive. Two of the examinations occurred prior to the introduction of the video lecture option, while the last two examinations occurred after the video lecture option was made available to students. Each examination consisted of ten multiple-choice and two open-response questions.

Conceptual evaluation scores. In addition to in-semester examinations, students' overall conceptual learning for the semester was measured with the nationally recognized Conceptual Survey of Electricity and Magnetism (CSEM) (Maloney, O'Kuma, Hieggelke, & Van Heuvelen, 2001). The test was administered as a pretest and posttest in the laboratory. This instrument features 32 conceptual questions covering the major topics in electricity and magnetism, and has been widely used to measure conceptual understanding in introductory physics classes. The pretest was given

during the first laboratory meeting in the first week of class, while the posttest was administered in three segments in the laboratory meetings after each of the first three in-semester examinations.

Measures of Student Engagement

Within this study, student engagement was measured through the number of lectures viewed, the rate at which assignments (optional and required) were submitted for grading, and student self-report information regarding note taking behaviors.

Lecture viewing. Student engagement with the lecture portion of the class was measured by the number of lectures viewed, either f2f or online. Lecture viewing was monitored by a one-question quiz at the end of each lecture called a lecture quiz. The lecture quiz was administered and hand-recorded by the instructor after every f2f lecture, and was administered online and graded by the LMS after students viewed recorded video lectures.

Homework submission rates. In addition to lecture viewing as a determinant of student engagement, the submission of homework assignments outside of the classroom was also examined. While homework assignment grades were previously described in relation to measures of achievement, submission rates for these out-of-class assignments were also calculated and used as a measure of student engagement.

Laboratory submission rates. Students were required to attend 28 f2f laboratory sessions, two per class week, during the semester and received credit for completing each of 28 lab activities. The completion rate of these laboratory activities was calculated as an indicator of student engagement.

Optional assignment completion. Students were also given two optional assignments that could be completed for bonus points; each assignment required the construction of a simple physical device—a leaf electroscope and an electric motor. The election to complete either or both of these optional assignments was also used as a measure of student engagement.

Note taking. Student note taking behaviors were measured with a self-report survey item immediately after the first and third in-semester examinations. The survey question was answered in the laboratory and asked students to identify the method that best described how lecture notes for the class were obtained. As previously indicated, the instructor's lecture notes for the class were published in the class' LMS site. Therefore, the students could take their own lecture notes, use the instructor's published lecture notes, or use some combination of both methods. All students were given three bonus points for the time required for the survey. Answers to this survey item were used as a measure of student engagement.

Analyses and Results

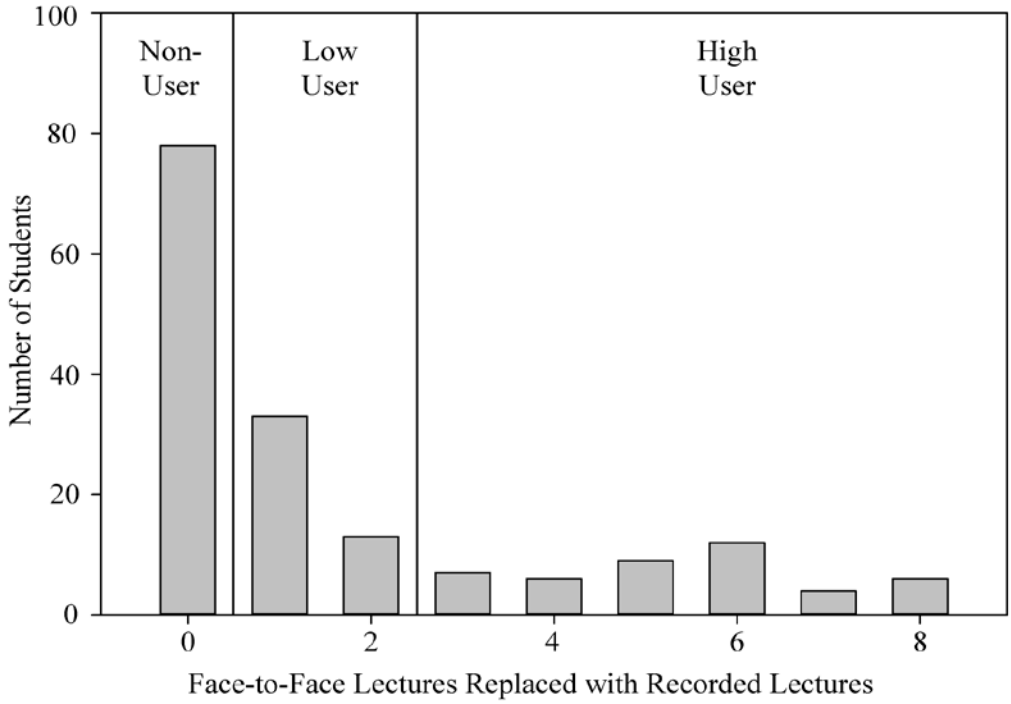
To provide for appropriate and meaningful analyses, categories representative of the amount of student video lecture use were created. Additionally, to address potentially confounding variables associated with perceptions and lecture video quality, students were asked to self-report on the quality of recorded lecture.

Video Usage Categories

The use of the option to watch the recorded video lectures rather than attending f2f lectures was elected to differing degrees by different students. The number of students choosing different levels of video use is shown in Figure 1. As a reminder, there were eight lectures where the use of the video option was monitored. Many students made no use of the video option with 46.4% (n = 78) of the students attending only f2f lectures; these students were categorized as "Non-User" students. Some students used the option sparingly with 27.4% (n = 46) of the students watching one to two recorded lectures rather than attending f2f; these students were categorized as "Low User" students. Other students made stronger use of the video option with 26.2% (n = 44) of students replacing f2f

lecture with video three or more times; these students were categorized as "High User" students. These categorizations were chosen because they represented a natural division of the features of Figure 1, a strong peak at zero, a decay from this peak at video use levels one and two, then relatively constant frequency from three to eight. This choice also balanced the sizes of the Low and High User groups while leaving the groups of sufficient size for meaningful statistical analyses.

Figure 1. The Categorization of Student Levels of Video Use.



Perceived Quality of Video Lectures

The students were surveyed about the quality of the video lectures near the midpoint of the time the video option was available. Students who reported watching at least part of one video were asked to rate video quality on a four-point scale from excellent to poor. Of the 107 students who reported watching at least part of one video, 88% reported the quality of the videos was above average with only one student rating the video as poor. A chi-squared test for independence found the differences between Non-Users and users of some video (Low Users + High Users) was not significant (this test eliminated the single "poor" response because of the inflated influence of small response counts on the chi-squared test). Although video quality was reported as a substantial barrier to the use of recorded lectures in some studies (Lauer et al., 2004), results suggested that the quality of the online videos in this study was not a factor in the choice to watch the lecture on video rather than attending in person.

Achievement

Analyses of student achievement data involved multiple statistical procedures to determine if the provision of the video lecture option impacted measures of achievement for the class as a whole, and in relation to the three levels of student video lecture use (Non-, Low, and High). It should be noted that lab assignments and lecture quizzes were not used as measures of achievement within this study. Students received either full or no credit for complete/incomplete laboratory activities, and were encouraged to work together on f2f lecture quizzes; therefore scores on these assignments were not appropriate measures of individual achievement. One student, who did not take one of the in-semester examinations, was eliminated from the achievement analyses.

Homework grades. Although 23 multiple-choice homework assignments and 21 open-response homework assignments were assigned, the first two and the last three homework assignments of the semester were not as mathematically or conceptually challenging as the remainder of the homework assignments. Due to the differences in rigor and focus of the beginning and ending homework assignments, these 5 specific assignments were eliminated from homework grade analyses. The mean score on assignments given before the introduction of the video policy (BV) and after its introduction (AV), as well as the change in assignment average AV-BV (□), are presented in Table 1. T-tests were performed for each □, and none of the changes in assignment averages were significant at the p = .05 level. As indicated in Table 1, assignment scores were approximately constant over the course of the semester. This is contrary to a semester-long decrease in assignment submission rates which will be discussed as part of the investigation of engagement.

Table 1 *Means and Changes in Averages on Measures of Achievement Overall and By Levels of Video Use.*

Measure	Overall			Non-User			Low User			High User		
	BV	AV	□	BV	AV	□	BV	AV	□	BV	AV	□
Exams	73.7	74.8	1.1	76.4	77.0	0.6	73.1	74.3	1.3	69.5	71.4	1.8
OR	68.7	70.2	1.6	72.3	74.1	1.8	71.2	70.5	-0.7	59.5	63.0	3.5
MC	58.5	58.4	-0.1	60.8	61.4	0.6	59.7	60.7	1.0	53.0	50.5	-2.6

Notes. BV = before video option. AV = after video option. □□□ change in averages. OR = Open Response Homework. MC = Multiple-Choice Homework. None of the presented changes (□) are significant at the p = .05 level

The degree to which the level of video use affected homework grades before and after implementation of the video option was investigated by performing an analysis of variance. Analysis of variance will be used throughout this study to determine the significance of video use level as a treatment effect. The level of video use was a significant treatment effect in the open-response homework average $F(2, 164) = 6.86$, $p < .00$ and the multiple-choice homework average $F(2, 164) = 3.32$, $p = .04$ before the introduction of the video policy; High-User students scored lower than Non-Users and Low Users on both types of homework assignments before the introduction of the video option. The video policy could not affect students before its introduction; therefore these differences represent pre-existing differences in homework performance for student populations electing different levels of video use before the introduction of the policy.

After the introduction of the video lecture policy, the level of video use was also a significant treatment effect in the open-response homework average $F(2, 164) = 3.07$, $p = .05$ and the multiple-choice homework average $F(2, 164) = 4.46$, $p = .01$. Consistent with the BV findings, students electing a high level of video use scored lower than the other two levels on all homework assignment types after the introduction of the video option.

The level of video use was not a significant treatment effect in the change in open-response homework averages nor the multiple-choice homework average; the video policy did not have a statistically significant impact on the change in student performance on homework assignments for any group. Rather, students who chose to view a high level of recorded video lectures scored lower than students electing low or no video lecture viewing both before the video option was introduced and continued to score lower after its introduction.

Examination scores. Mean scores on examinations are also presented in Table 1. Examination averages increased slightly (□□□□□□□□□) for the class as a whole after the introduction of the video policy, but a t-test of the change in exam average showed the change was not statistically significant. As was found with homework grades, the introduction of the video policy had little effect on student achievement overall as measured by examination scores.

Before the introduction of the video policy, the level of video use was a significant treatment effect in the average on the first two tests $F(2, 164) = 3.77$, $p = .03$. Post hoc analyses indicated those

students electing a High level of video use (M = 69.5, SD = 13.4) scored significantly lower than Non-User students (M = 76.4, SD = 13.6) and lower, but not significantly lower, than Low User (M = 73.1, SD = 12.7) students on exams taken before the introduction of the video option. These differences suggest that weaker performing students before the introduction of the video policy elected higher levels of video lecture replacement. After the introduction of the video policy, an analysis of variance showed the level of video use was not a significant treatment effect for exam scores. Post-hoc analysis found no significant difference between the video use groups AV; while High User students did not surpass Non-User students on exams AV, they did close the gap sufficiently so differences were no longer significant. Table 1 also shows a consistent decrease in AV examination scores with increasing levels of video use.

The level of video use was not a significant treatment effect for the change in exam average (AV-BV), indicating that the video policy did not have a statistically significant impact on exam scores. Students who chose to view a higher level of recorded video lectures scored lower on exams before the video option was introduced; they also scored lower on exams after the video policy was introduced. This observation seems to contradict that of the previous paragraph—the High User group did have a larger change in examination average than other groups as seen in Table 1, but the degree they caught up was not sufficient to change all statistical measures of significance. The primary effect of the introduction of the video option was educationally neutral.

Conceptual evaluation scores. Conceptual learning was monitored with the Conceptual Survey in Electricity and Magnetism (CSEM). A total of 153 students who took both the pretest and posttest were included in this analysis. Very little difference was found in either the pretest or posttest scores for students with differing levels of video use. The level of video use was not a significant treatment effect for pretest score, posttest score, or the change from pretest to posttest. These results suggest that watching the lectures on video neither damaged nor enhanced the conceptual learning of the students.

Engagement

Analyses of student engagement data examined if the provision of the video lecture option impacted measures of engagement for the class as a whole, and in relation to the three levels of student video lecture use.

Lecture viewing. Lecture viewing was measured for both f2f and video lectures through the submission of a required lecture quiz. As such, lecture viewing was analyzed by examining the submission rates of lecture quizzes. The average lecture quiz submission rates are presented in Table 2. The results were constructed by first finding an average lecture quiz submission rate for each lecture, then an overall average for all lectures BV and AV. The statistical significance of the effect of the introduction of the video policy was evaluated using a t-test on the collection of lecture quiz submission rate averages BV and AV and is presented in the □column which reports the change AV-BV. A t-test showed overall lecture viewing decreased significantly after the introduction of the video policy $t(19) = -4.42$, $p < .00$.

The submission rates of the lecture quizzes showed a pattern of continuous decline as the semester progressed. This pattern was well established before the introduction of the video option in the 9th week of class; student lecture viewing was decreasing prior to the introduction of the video lecture option, and continued to decline for the remainder of the semester. This pattern of declining lecture attendance is evident in data for semesters previous to the studied semester where no video option was available and has been observed in other research (Van Blerkhom, 1992). To further explore this pattern of decline, a linear regression was used to extract the linear equation satisfied by the submission rates BV for lecture quizzes. The linear trend was then subtracted from the lecture quiz averages to produce a more accurate measure of the change in submission rate due to the video policy, as opposed to the naturally occurring decline. The submission rates with the linear trend removed are also presented in Table 2. A t-test using lecture submission rates with the linear trend

removed showed lecture viewing decreased significantly, but not as significantly, after the introduction of the video policy $t(19) = -2.48$, $p = .02$.

Table 2 *Class Submission Rates on Changes in Measures of Engagement Before and After the Video Option.*

Engagement Measures	Submission Rate BV (%)	Submission Rate AV (%)	□ Rate (%)
LQuiz	92.0 (94.3)	85.1 (90.9)	-7.0[b] (-3.3[a])
OR	91.8 (91.7)	88.8 (88.7)	-3.0[a] (-3.0[a])
MC	94.7 (94.2)	89.8 (88.5)	-4.9[b] (-5.8[b])
Lab	98.0 (97.9)	97.2 (96.9)	-0.8 (-1.0)
Optional *	30.4	26.2	-4.2

Notes. BV = before video option. AV = after video option. □□□□change in averages. LQuiz = Lecture Quiz. OR = Open Response Homework. MC = Multiple-Choice Homework. [a] = significant at the p < .05 level; [b] = significant at the p < .01 level. () = rate subtracting linear trends. * = Since only one optional assignment was given BV and AV, the significance of the difference for optional assignments could not be tested.

To investigate the change in submission rates by individual students and explore potential differences in submission rates within different levels of video use, individual student averages were examined and paired t-tests performed. Lecture quiz submissions significantly decreased for all three groups of video users (see Table 3) after the introduction of the video option. The High User's lecture quiz submission rate decreased slightly less than the other groups; however, post-hoc analysis showed the differences in the changes of lecture submission rate between the High-User group and the Non-User group ($t(120) = .56$, $p = .58$) and the Low User group ($t(88) = .75$, $p = .46$) were not significant. Because of the increased variation in the individual student data, a linear trend could not be subtracted from the data. As such, some of the change observed in Table 3 may result from the semester long decrease in lecture quiz submission rates established BV.

Table 3 *Means and Changes in Averages on Measures of Engagement by Levels of Video Use.*

Measures	Non-User			Low User			High User		
	BV	AV	□	BV	AV	□	BV	AV	□
LQuiz	95.1	85.5	-9.6[b]	93.8	83.5	-10.3[b]	84.4	76.8	-7.6[a]
OR	93.0	90.0	-3.0	92.5	92.0	-0.4	85.0	83.7	-1.3
MC	94.3	90.8	-3.5[b]	94.2	91.7	-2.6	90.8	87.1	-3.7
Lab	98.6	97.4	-1.2[a]	98.5	96.8	-1.6[a]	95.3	94.8	-0.5
Optional	33.3	23.1	-10.3	39.1	30.4	-8.7	15.9	27.3	11.4

Notes. BV = before video option. AV = after video option. □□□□change in averages.. LQuiz = Lecture Quiz. OR = Open Response Homework. MC = Multiple-Choice Homework. [a] = significant at the p < .05 level; [b] = significant at the p < .01 level.

Before the introduction of the video policy, the level of video use was a significant treatment effect on the rate of lecture quiz submissions $F(2, 165) = 8.43$, $p < .00$, with those students electing a High level of video use ($M = 84.4$, $SD = 14.6$) submitting fewer lecture quizzes BV than Low ($M = 93.8$, $SD = 11.2$) or Non-User ($M = 95.1$, $SD = 15.5$) students. Video use was not a significant treatment effect AV nor was it a significant treatment effect in the change in lecture quiz submission rate. While Table 3 shows a consistent decrease in the number of lectures watched both BV and AV, t-tests examining pairs of video use groups found no significant difference between the groups either BV or AV.

Homework submission rates. Homework assignment submission rates were also used as a measure of engagement as shown in Table 2. Submissions rates did not contain a measure of the completeness or correctness of the submitted assignment. Both the open-response homework submission rate and the multiple-choice homework submission rates significantly declined after the introduction of the video policy. Homework submission rates demonstrated a weaker declining evolution than lecture viewing over the course of the semester, but a pattern of ongoing decline was

present. As was done with lecture quizzes, the linear trend established BV was subtracted from the data and is presented in parentheses in Table 2. These declines in submission rates changed as the linear trend established BV was removed but remained significant.

Paired t-tests were used to investigate the changes in submission rates for the class overall and within video use groups as presented in Table 3. While all groups declined in the amount of homework submitted, the only significant decline within any group was found in Non-Users, who submitted significantly fewer multiple-choice homework assignments AV than BV.

Before the introduction of the video policy, the level of video use was a significant treatment effect for the rate of homework submissions for open-response homework, $F(2, 165) = 4.87$, $p < .00$, but not multiple-choice homework, with those students electing a High level of video use ($M = 85.0$, $SD = 15.4$) submitting open-response homework at lower rates before the introduction of the video option than Low ($M = 92.5$, $SD = 11.4$) or Non-User ($M = 93.0$, $SD = 15.1$) students. After the introduction of the video lecture policy, the level of video use was not a significant treatment effect for the rate of homework submissions of open-response homework or multiple-choice homework. The level of video use was also not a significant treatment effect for either the change in open-response homework submission rates or the multiple-choice homework submission rate for the class as a whole. Thus, results of homework submission rate analyses indicated that all students decreased slightly in the amount of homework submitted, with the only significant decline in submission rates shown by the Non-User group on multiple-choice homework. As with exam averages, Table 3 shows a generally decreasing pattern of homework submission rates with High Users submitting less homework than Non-Users both BV and AV; however, t-tests comparing pairs of video use groups were not significant.

Laboratory submission rates. The laboratory submission rate (Table 2) was a measure of whether the students attended and completed the f2f laboratory portion of the class, a primary form of course engagement. The level of video use was a significant treatment effect BV, $F(2,165) = 7.36$, $p < .00$, with those students electing a High level of video use ($M = 95.3$, $SD = 7.1$) submitting lab assignments at lower rates before the introduction of the video option than Low ($M = 98.5$, $SD = 3.6$) or Non-User ($M = 98.6$, $SD = 3.8$) students. No significant differences were found between the groups AV. The level of video use was also not a significant treatment effect for the change in laboratory submission rates AV-BV. As with other results, there was a general but slight pattern of decline in laboratory completion with video use level, but t-tests examining pairs of video use groups were not significant.

Optional assignment completion. A chi-square test of independence was performed to examine the relationship between submitting optional assignments and the level of video use, and found a significant relationship between these variables BV, $\chi^2(2,168) = 6.35$, $p = .04$, but not AV; the change in optional assignment submission rates was also not significant. For this analysis, the four possible combinations of submitting or not submitting assignments BV and AV were coded into a single four level variable. The students using High levels of video ($M = 15.9\%$) turned in fewer optional assignments than Low ($M = 39.1\%$) or Non- video users ($M = 33.3\%$) BV, but increased their rate of turning in optional assignments AV to close the gap with other students, and actually turned in more optional assignments than the Non-User students AV.

Note taking. One of the many ways students interact with a lecture is by taking lecture notes. Instructor-annotated lecture slides for the class under study were published in electronic form at the beginning of the semester providing the students with many options for the taking and use of lecture notes. The students were surveyed about their note taking and use behavior after the first and third in-semester examinations with the question "Circle ONE of the following that best describes how you obtain lecture notes." The responses to this question are summarized in Table 4.

Results indicated the pattern of note taking for the class overall changed with the introduction of the video policy. The difference in overall note taking behaviors after the introduction of the video policy was statistically significant $\chi^2(4,319) = 9.66$, $p = .05$, with students taking their own lecture

notes or adding to provided notes less frequently after the video option was introduced. Similarly, students printed or read the lectures at the website after a lecture, and printed and followed notes during or after lecture (without adding their own notes) more frequently after the video option was in place than before it was available. In other words, a significant number of students replaced taking their own lecture notes with printing and following printed notes during or after lectures once the video option was provided.

Table 4 *Note-taking Behaviors Reported as Percentages Overall and By Levels of Video Use.*

Lecture Note Behavior	Overall %		Non-User %		Low User %		High User %	
	BV	AV	BV	AV	BV	AV	BV	AV
I take my own lecture notes.	67.7	59.6	78.7	74.0	65.1	59.1	50.0	36.4
I print or read the lecture notes at the website after lecture.	8.2	13.0	4.0	11.0	14.0	4.6	10.0	25.0
I print the lecture notes from the website before lecture and follow along during lecture.	3.2	10.6	1.3	5.5	0.0	15.9	10.0	13.6
I print the lecture notes from the website before lecture, follow along during lecture, and add my own notes.	19.0	14.9	14.7	9.6	18.6	20.5	27.5	18.2
I do not take lecture notes nor do I read the lecture notes at the website.	1.9	1.9	1.3	0.0	2.3	0.0	2.5	6.8

Notes. BV = before video option. AV = after video option.

A chi-squared test for independence showed that the level of video use had a significant relationship with the way students took notes previous to the introduction of the video policy, $\chi^2(8, N = 158) = 17.29$, $p = .03$. Because some entries were small, Fisher's Exact Test was also used yielding $p = .02$. Those students classified as High video users were found to be associated with less personal note taking than Low or Non-Users BV. The students most likely to elect to watch the lecture on video were also students least likely to take their own lecture notes before the introduction of the video policy.

Level of video use was also significantly related to note taking after the introduction of the video policy, $\chi^2(8, N = 161) = 27.98$, $p = .00$. Similar to the previous finding, students who chose to view more video lectures were the students least likely to take their own lecture notes, and also more likely to not take or read the lecture notes from the website at all.

Discussion

This study sought to determine the relationship between student lecture choice (recorded vs. f2f) and 1) achievement and 2) forms of course engagement when students in a large introductory science class were given the option to either attend f2f lecture or watch recorded lectures online.

The lecture viewing choice was left to the student's discretion, with neither f2f nor online encouraged. Since the f2f lecture was not encouraged, this study cannot inform the discussion of whether optional recorded lectures negatively impact required f2f attendance (Gysbers et al., 2011; Hove & Corcoran, 2008; Traphagan et al., 2010; von Konsky et al., 2009), but can inform the discussion of the level of recorded lecture use that would be experienced if f2f attendance was not mandatory.

Based on the results of this study, the impact of offering a lecture choice to students in a large lecture course is minimal when considering the class as a whole; offering students the lecture option had a small negative effect on engagement, but no effect on achievement, which supports the findings

of Solomon et al. (2004). Those students who elected High use of the video option experienced several minor beneficial impacts on engagement and achievement, corresponding to the findings of Traphagan et al. (2010). The following sections explore these findings in more detail.

Effect of Choice on Overall Lecture Viewing

Students elected the recorded option in varying degrees; 46% of the students continued to exclusively use f2f lecture while 26% replaced three or more f2f lectures with video. Overall average lecture attendance was lower by 3.3% after the introduction of the video lecture option, after a linear trend identified BV was removed. All video use groups experienced a decline in lecture viewing with the High User group declining somewhat less than the other groups. While some of the reduction of lecture viewing is attributable to the natural decline in class attendance from the beginning to the end of a semester as identified in the classic research of Van Blerkom (1992), a statistically significant proportion of the decline resulted from the video option. While significant, the 3.3% decline attributable to the video option is small, and this additional decline did not result in lowered achievement on examinations.

While the introduction of the video option had a small, but significant, negative impact on the number of lectures viewed overall, the level of recorded videos viewed was a significant treatment effect before the introduction of the video policy, but ceased to be significant after the introduction of the policy. A smaller decline in lecture viewing by the High video users contributed to the reduction of the lecture viewing differences between the video-use groups to a non-significant level. Students self-selecting the video option were already watching fewer lectures before the option was made available and continued to watch fewer lectures after the policy was enacted; however, the decline in lecture viewing of High User students was smaller than other students. The election of the video option by less engaged students aligns with assertions by researchers (Albert, 2004; Traphagan et al., 2010) who suggested that lower performing students gravitate toward electronic or web-based instruction, but does not support the warnings from Brecht (2012) who suggested that students may adopt bad lecture viewing habits with the introduction of an online video option. Rather, this finding suggests that the video option was used by the High viewing group to reduce the differences in the number of lectures viewed between themselves and other students; thus supporting researchers such as Ealy (2013) and Gosper et al. (2010) who report on the benefits of video lectures which can afford students who need them more options and opportunities for engagement.

Effect of Choice on Other Forms of Engagement

The level of f2f lecture replacement had a similar effect on most other measures of course engagement. The level of video lecture use was a significant treatment effect for open-response homework submission rates BV, but not multiple-choice homework, with High User students submitting both assignments at lower rates than Non-video users; however, the level of video use was not significant for either assignment type AV. The High User group demonstrated lower rates of decline in the submission rate of open-response homework as compared to other groups, which contributed to closing the gap between assignment submission rates of the three video use groups. Thus, the results of this study suggest the introduction of the video lecture option did have an impact on engagement as measured by open-response homework submission rates. This effect was complicated with the class as a whole experiencing a small, but significant, decline in homework submission rates AV, but the differences in the three video use groups ceasing to be significant AV.

Students watching a High level of video actually increased the number of optional assignments completed where Non- or Low Users decreased their completion of optional assignments. This willingness to invest extra out-of-class effort was a strong indication that High video use students were still engaged in the class, and contradicted suggestions made by Phillips et al. (2007), who predicted less participation in other components of a course by students who do not attend classroom lectures.

The pattern of High Users either increasing engagement or showing a lower decline in engagement was consistent across assignment types except for multiple-choice homework where the High User group showed the largest decline of any group. This decline was unusual because students were strongly penalized for not turning in assignments and the multiple-choice homework was the easiest assignment to submit. While many causes are possible, it seems likely that the combination of having the multiple-choice homework due before the f2f lecture and the structure that attending lecture imposed on Non- and Low User students conspired to create this effect. This conceivably supports the work of Phillips et al. (2007) who identify the potential for negative impacts of recorded lecture related to the removal of the fixed schedule imposed by f2f lecture.

A significant change in note taking behavior was observed with the introduction of the video policy for all students, with High User students reporting less engaged note taking behavior both BV and AV. High User students were less likely to take their own lecture notes before the introduction of the video option, further supporting the conclusion that High User students were less engaged than other students before the video option was made available. All student note taking behaviors degraded slightly as the semester progressed, but High User students showed a greater transition to less engaged behaviors by preferring to read and possibly augment published notes, a more passive and less engaged means of interacting with lecture, than taking their own lecture notes. Unlike lecture viewing and assignment submission rates, differences in note taking habits were not reduced by the flexibility, privacy, and replay features of video. This provides evidence that students' note taking interactions with video lectures were different than their note taking interactions within a f2f lecture. It should be observed, however, that despite the deterioration of personal note taking behaviors, this change did not result in a corresponding decrease in achievement as predicted by Reisberg (2000) and Phillips et al. (2007).

Effect of Choice on Achievement

Results from the current investigation on measures of achievement were similar to engagement except that the assignment averages did not show a progressive decline over the course of the semester. The change in assignment average BV to AV was not statistically significant for either the class as a whole or for any video use level; thus, the results of this study align with Solomon et al. (2004) who also found no achievement differences based on f2f versus video lecture viewing, but contradict the findings of Traphagan et al. (2010) who reported improved achievement with video lecture viewing. While changes in assignment average were not significant, the change in examination average BV to AV allowed the Low User and High User groups to catch up sufficiently that the level of video use was not a significant treatment effect AV. This effect was subtle with High Users statistically significantly weaker than Non-Users but not Low Users BV, but with no statistical differences AV.

A statistically significant self-selection effect was identified where students electing high levels of the replacement of f2f lectures with video lectures were performing more weakly in the class before the video option was made available; the level of video use was a significant treatment effect on all assignment averages before the video policy was introduced. This result is consistent with the lower levels of engagement measured for Low and High Users, and supports previous research showing weaker performing students prefer electronic educational options (Albert, 2004; Traphagan et al., 2010) and stronger performing students watch less video if given the choice (Artino, 2010; Gysbers et al., 2011).

The achievement findings also demonstrate that even though the lower performing students were more likely to use web-based lectures (von Konsky et al., 2009), the concern that these students would choose to replace live lectures with web-based lectures to their detriment (Brecht, 2012) was unsupported by this study. The results of this within-subjects study demonstrated that the preferential election of the video lecture option by weaker performing students did not further degrade their performance in the class as suggested by Brecht (2012). Rather, it seemed to slightly mitigate differences in achievement between the different video use groups. The negative effects cited for recorded lecture, the lack of social interaction, inability to ask questions, and the lack of temporal

structure, were insufficient to lower student achievement on examinations and open-response homework. Neither, however, did the various positive aspects cited for recorded lectures, such as temporal flexibility, lack of classroom distraction, and pause and replay (Borman, 2010; Ealy, 2013; Gysbers et al., 2011), serve to significantly improve the performance of High video use students; however, the introduction of a lecture option was sufficient to allow the High user group to close the achievement gap such that the level of video use was no longer a significant treatment effect after the introduction of the video option.

Outcomes of students electing to use either of the two modes of lecture delivery were consistent with achievement outcomes that would be expected based on student achievement prior to the provision of lecture viewing options; students who began the study as high achieving students remained high achieving, while those who began as lower achieving continued to struggle. However, the differences between the groups reduced sufficiently AV so that the level of video use was no longer a significant treatment effect.

Conclusion

The within-group research design allowed this study to provide strong support for the efficacy of video lectures, even in the most demanding of introductory science classes. This study was able to control for confounding variables found in previous video lecture research (Harmon, Alpert, & Lambrinos, 2014; Lauer et al., 2004) by ensuring high quality video, as evaluated by student surveys, and video that contained a high fidelity reproduction of the content delivered in the f2f lecture.

The instructional implications of this study show that a direct replacement of lecture with high quality video has a small negative effect on engagement but no effect on achievement overall, with a suggestion of a slight benefit to achievement and engagement for students self-selecting higher levels of use of the video option. Students self-selecting high levels of video lecture were lower achieving and less engaged before the lecture could be replaced by video and somewhat less so after the video option was made available. While the positive aspects cited for video lecture were insufficient to raise High video user achievement to the class average, some narrowing of the gap in performance was evidenced. Thus, even though the delivery of lecture over the internet was largely an instructionally neutral change to the class as a whole, it assisted lower performing students who elected higher uses of the video option to more closely resemble other students at the end of the semester on measures of performance and engagement.

Limitations

This study was performed at a single institution for a single semester. Therefore, the above conclusions may not be representative of all classes or student populations. Unfortunately, once an online option was available, it could not be temporarily discontinued to repeat the experiment. The experiment was performed in a class that had been instructed in the same format by the same instructor for many semesters and the video lectures carefully reflected the presentation delivered in the f2f lectures. As such, this study cannot inform the discussion of the effect of replacing a f2f lecture with video lectures that are either superior or inferior in content to the f2f lecture.

References

Albert, J. (2004). The effectiveness of innovative approaches to CSI: Comparing opinion to outcome. *Proceedings of the 27th Australasian Conference on Computer science, 26*, 151-157.

Artino Jr, A. R. (2010). Online or face-to-face learning? Exploring the personal factors that predict students' choice of instructional format. *The Internet and Higher Education, 13*(4), 272-276. doi:10.1016/j.iheduc.2010.07.005

Barlow, J., & Fleischer, S. (2011). Student absenteeism: Whose responsibility? *Innovations in Education and Teaching International, 48*(3), 227-237. doi:10.1080/14703297.2011.593700

Bati, A. H., Mandiracioglu, A., Orgun, F., & Govsa, F. (2013). Why do students miss lectures? A study of lecture attendance amongst students of health science. *Nurse Education Today, 33*(6), 596-601. doi:10.1016/j.nedt.2012.07.010

Behr, A. L. (1988). Exploring the lecture method: An empirical study. *Studies in Higher Education, 13*, 189-200. doi:10.1080/03075078812331377866

Black, L. W. (2005). Dialogue in the lecture hall: Teacher–student communication and students' perceptions of their learning. *Qualitative Research Reports in Communication, 6*(1), 31-40. doi: 10.1080/17459430500262125

Borman, M. (2010). Web-Based Lecture Technologies (WBLT): Contributing to learning and control. *Research and Development in Higher Education: Reshaping Higher Education, 33*, 93-103. doi:10.1007/s10734-009-9292-z

Brecht, H. (2012). Learning from online video lectures. *Journal of Information Technology Education: Innovations in Practice, 11*(1), 227-250.

Budig, J. E. (1991). Improving student success and retention: Attendance notification system. *Annual Forum of the Association for Institutional Research, San Francisco, California*.

Chang, S. (2007). Academic perceptions of the use of *Lectopia*: A University of Melbourne example. In ICT: Providing choices for learners and learning. *Proceedings from ascilite*. Singapore. Retrieved from http://www.ascilite.org.au/conferences/singapore07/procs/chang.pdf

Clay, T. & Breslow, L. (2006). Why students don't attend class. *MIT Faculty Newsletter XVIII* (4). Retrieved from http://web.mit.edu/fnl/volume/184/breslow.html#top

Cooper, J. L., & Robinson, P. (2000). The argument for making large classes seem small. *New Directions for Teaching and Learning, 2000*(81), 5-16. doi:10.1002/tl.8101

Credé, M., Roch, S. G., & Kieszczynka, U. M. (2010). Class attendance in college a meta-analytic review of the relationship of class attendance with grades and student characteristics. *Review of Educational Research, 80*(2), 272-295. doi:10.3102/0034654310362998

Danielson, J., Preast, V., Bender, H., & Hassall, L. (2014). Is the effectiveness of lecture capture related to teaching approach or content type? *Computers & Education, 72*, 121-131. doi:10.1016/j.compedu.2013.10.016

Desalegn, A. A., Berhan, A., & Berhan, Y. (2014). Absenteeism among medical and health science undergraduate students at Hawassa University, Ethiopia. *BMC Medical Education, 14*(1), 81. doi:10.1186/1472-6920-14-81

Ealy, J. B. (2013). Development and implementation of a first-semester hybrid organic chemistry course: Yielding advantages for educators and students. *Journal of Chemical Education, 90*(3), 303-307. doi:10.1021/ed200858p

Gorissen, P., Van Bruggen, J., & Jochems, W. (2012). Students and recorded lectures: Survey on current use and demands for higher education. *Research in Learning Technology, 20*(3). doi:10.3402/rlt.v20i0.17299

Gosper, M., Green, D., McNeill, M., Phillips, R., Preston, G. & Woo, K. (2008). The impact of web-based lecture technologies on current and future practices in learning and teaching. *Australian Learning and Teaching Council*. Retrieved from http://www.tandfonline.com/doi/abs/10.1080/09687760802315895

Grabe, M., Christopherson, K., & Douglas, J. (2005). Providing introductory psychology students access to online lecture notes: The relationship of note use to performance and class

attendance. *Journal of Educational Technology Systems*, *33*(3), 295-308. doi:10.2190/G5RF-DMWG-WV1G-TMGG

Gump, S. *(*2005*).* The cost of cutting class: Attendance as a predictor of success. *College Teaching, 53(1), p.* 21-26. doi:10.3200/CTCH.53.1.21-26

Gysbers, V., Johnston, J., Hancock, D., & Denyer, G. (2011). Why do students still bother coming to lectures, when everything is available online? *International Journal of Innovation in Science and Mathematics Education (formerly CAL-laborate International)*, *19*(2), 20-36.

Harmon, O. R., Alpert, W. T., Lambrinos, J. (2014). Testing the effect of hybrid lecture delivery on learning outcomes. *MERLOT Journal of Online Learning and Teaching*, *10*(1), 112-121. Retrieved from http://jolt.merlot.org/vol10no1/harmon_0314.pdf

Hove, M. & Corcoran, K. (2008). If you post it, will they come? Lecture availability in introductory psychology. *Teaching of Psychology*, *35*(2), 91-95. doi:10.1080/00986280802004560

Jenne, F. H. (1973). Attendance and student proficiency change in a health science class. *Journal of School Health*, *43*(2), 125-126.

Kuh, G. D., Cruce, T. M., Shoup, R., Kinzie, J., & Gonyea, R. M. (2008). Unmasking the effects of student engagement on first-year college grades and persistence. *The Journal of Higher Education*, *79*(5), 540-563.

Lauer, T., Muller, R., & Trahasch, S. (2004, August). Learning with lecture recordings: Key issues for end-users. *Proceedings of the IEEE International Conference on Advanced Learning Technologies*, 741-743. doi:10.1109/ICALT.2004.1357642

Laird, T. F. N., & Kuh, G. D. (2005). Student experiences with information technology and their relationship to other aspects of student engagement. *Research in Higher Education*, *46*(2), 211-233. doi:10.1007/s11162-004-1600-y

Macfarlane, B. (2013). The surveillance of learning: a critical analysis of university attendance policies. *Higher Education Quarterly*, *67*(4), 358-373. doi:10.1111/hequ.12016

Maloney D., O'Kuma T., Heiggelke, C., & Van Heuvelen A. (2001). Surveying students' conceptual knowledge of electricity and magnetism. *Physics Education Research, American Journal of Physics Supplement*, *69*(7), S12-S23. doi:10.1119/1.1371296

Massingham, P. & Herrington, T. (2006). Does attendance matter? An examination of student attitudes, participation, performance and attendance. *Journal of University Teaching and Learning Practice*, *3*(2), 82-103. Retrieved from http://jutlp.uow.edu.au/2006_v03_i02/pdf/massingham_008.pdf

McCredden, J. & Baldock, T. (2009). More than one pathway to success: Lecture attendance, *Lectopia* viewing and exam performance in large engineering classes. *20th Australasian Association for Engineering Education Conference*, 986-991.

McElroy, J. & Blount, Y. (2006). You, me and iLecture: Who's learning? Whose technology? *Proceedings from ascilite*. Singapore. Retrieved from http://www.ascilite.org.au/conferences/sydney06/proceeding/pdf_papers/p87.pdf

McGarr, O. (2009). A review of podcasting in higher education: Its influence on the traditional lecture. *Australasian Journal of Educational Technology*, *25*(3), 309-321.

McKinlay, N. (2007). The vanishing student trick — the trouble with recording lectures. *Paper presented at the 6th Teaching Matters Conference Showcasing Innovation, University of Tasmania, Hobart*. Retrieved from http://www.utas.edu.au/arts/flexarts/vanishing.pdf

Moore, R. (2003). Attendance and performance: How important is it for students to attend class? *Journal of College Science Teaching, 32*(6), 367-71.

Nist, S. L. (1995). *Making the grade in undergraduate biology courses: Factors that distinguish high and low achievers*. Retrieved from http://eric.ed.gov/?id=ED390934

Owston, R., Lupshenyuk, D., & Wideman, H. (2011). Lecture capture in large undergraduate classes: Student perceptions and academic performance. *The Internet and Higher Education, 14*(4), 262-268. doi:10.1016/j.iheduc.2011.05.006

Phillips, R., Gosper, M., McNeill, M., Woo, K., Preston, G. & Green, D. (2007). Staff and student perspectives on web-based lecture technologies: Insights into the great divide. In *ICT: Providing choices for learners and learning. Proceedings from ascilite*. Singapore. http://www.ascilite.org.au/conferences/singapore07/procs/phillips.pdf

Reisberg, L. (2000). 10% of students may spend too much time online. *Chronicle of Higher Education, 46*(41), A43.

Simpson, N. (2006). Asynchronous access to conventional course delivery: A pilot project. *British Journal of Educational Technology, 37*(4), 527-537. doi:10.1111/j.1467-8535.2006.00534.x

Slem, C. M. (1983). *Relationship between classroom absenteeism and stress risk/buffer factors, depressogenic attributional style, depression and classroom academic performance.* Retrieved from http://eric.ed.gov/?id=ED240474

Solomon, D. J., Ferenchick, G. S., Laird-Fick, H. S., & Kavanaugh, K. (2004). A randomized trial comparing digital and live lecture formats. *BMC Medical Education, 4*, 27-32. doi:10.1186/1472-6920-4-27

Steiner, S. D., & Hyman, M. R. (2010). Improving the student experience: Allowing students enrolled in a required course to select online or face-to-face instruction. *Marketing Education Review, 20*(1), 29-34. doi:10.2753/MER1052-8008200105

Stone, A. A., Bachrach, C. A., Jobe, J. B., Kurtzman, H. S., & Cain, V. S. (Eds.). (1999). *The science of self-report: Implications for research and practice*. Mahwah, NJ: Lawrence Erlbaum Associates.

Traphagan, T., Kucsera, J. & Kishi, K. (2010) Impact of class lecture webcasting on attendance and learning. *Educational Technology Research and Development, 58*, 19-37. http://dx.doi.org/10.1007/s11423-009-9128-7

Van Blerkom, M. L. (1992). Class attendance in undergraduate courses. *The Journal of psychology, 126*(5), 487-494. http://dx.doi.org/10.1080/00223980.1992.10543382

Van Blerkom, M. L. (1996). *Academic perseverance, class attendance, and performance in the college classroom*. http://eric.ed.gov/?id=ED407618

von Konsky, B. R., Ivins, J., & Gribble, S. J. (2009). Lecture attendance and web based lecture technologies: A comparison of student perceptions and usage patterns. *Australasian Journal of Educational Technology, 25*(4), 581-595.

Yudko, E., Hirokawa, R., & Chi, R. (2008). Attitudes, beliefs and attendance in a hybrid course. *Computers & Education, 5*0, 1217-1227. doi:10.1016/j.compedu.2006.11.005

Zhang, D., Zhou, L., Briggs, R. O., & Nunamaker Jr, J. F. (2006). Instructional video in e-learning: Assessing the impact of interactive video on learning effectiveness. *Information & Management, 43*(1), 15-27. doi:10.1016/j.im.2005.01.004

Blended Learning at the Boundary: Designing a New Internship

Robert Heckman, Carsten S. Østerlund, Jeffrey Saltz
School of Information Studies, Syracuse University

Abstract

This paper explores how blended learning can enhance learning at the boundary between academia and industry, and make possible the design of a new kind of internship. Boundary theory proposes that socio-cultural discontinuities between different environments create opportunities for learning. Blended learning pedagogy makes it possible to make the boundary between the classroom and the work place more salient and continuous. We present principles for designing internships that leverage blended learning to exploit boundaries, and describe an internship program based on these principles. Finally, we reflect on what we have learned through two years experience offering the program to students and employers.

Introduction

The idea that work can provide a suitable context for learning is deeply rooted in experiential learning theory. Among others, Dewey (1986) and Kolb and Kolb (2005) have systematically explored a philosophy of experience and the impact of experience on lasting, meaningful learning. One of the best-known manifestations of experiential learning, the traditional college-student internship, has a number of widely acknowledged benefits. It typically leads to improved employability and a higher salary after graduation (Callanan & Benzing, 2004; Gault, Leach, & Duey, 2010; Gault, Redington, & Schlager, 2000), higher career satisfaction and faster promotion rates (D'Abate, 2010), and improvement in domain specific knowledge (O'Connor MDa, Mahvi MD, Foley MD FACSa, Lund MD, & McDonald PhDa, 2010; Ogrinc et al., 2007; Pedro, 1984). Internships also build important non-cognitive skills such as time management, self-discipline, communication, information literacy, listening skills, and collaboration skills (Falconer & Pettigrew, 2002; Moser & Elbert, 2007; Zucchermaglio & Alby, 2009).

Despite these benefits, this paper questions whether the traditional internship fully leverages the educational technologies and the evolving modern workplace that are available today. Two issues stand out: first, abundant open educational resources generate rich opportunities for individualized, contextualized, blended learning that was not previously available. Second, many of today's workplaces operate globally and on a scale that was previously unimaginable. These extended enterprises often cross traditional organizational boundaries to include customers, suppliers, and contractors. This flexing of typical chains of interaction result in boundaries that are fluid and constantly changing, and which require continual recalibration on the part of the employees (including interns) who must span them. The increasing need for adaptability in the work place may be straining the traditional internship model, which relies on clear-cut hierarchies and predetermined responsibilities. Indeed, as information technology disrupts the higher education ecosystem and extends today's workplaces, the work-based learning literature hints that the traditional internship model may no longer be the best interface between these two environments.

For example, Eraut (2004) calls for a new type of internship—one that is carefully designed to refine the oversimplified concept of "knowledge transfer" with an integration of knowledge that embraces both workplace and academy. In "Transfer of knowledge between education and the workplace," Eraut agrees learning in new situations happens through "knowledge transfer," or "the learning process involved when a person learns to use previously acquired knowledge/skills/competence/expertise in a new situation" (2004, p. 58). However, he adds two new dimensions to that process: learners must not only recognize what previously acquired knowledge and skills are needed, they must also have the ability to *transform* them and *integrate* them in order to successfully navigate the new situation (Eraut, 2004). Based on this process, he concludes learning in both education settings and workplace settings is essential because the learner acquires different types of knowledge in each. Bridging these two types of knowledge and bringing them together "requires both time and support," which our blended learning internship model provides (Eraut, 2004, p. 72).

Akkerman and Bakker (2011) describe the difference between "transfer" and "boundary" models in a related critique of the traditional internship model. Boundary theory proposes that there are socio-cultural discontinuities between different environments which, when crossed (or spanned, or blurred), require individuals to reformulate their thinking (Akkerman & Bakker, 2011), creating opportunities for learning to occur. Hence, instead of considering the boundary between academia and industry that Eraut identified as posing a knowledge transfer problem, we approach it as a unique opportunity for enriched, situated learning. We propose that beneficial boundary effects can be substantially enhanced during an internship by leveraging a blended learning model and the technological tools that support it.

Student interns are typically required to cross the boundary between work and school, but too often such crossings are infrequent, brief, and unsupervised. The skills required to succeed in the two environments often remain compartmentalized as a student shifts from 'work mode' to 'school mode.' A blended learning pedagogy can address these shortcomings and can make the boundary between the classroom and the work place more salient to students. Over time, the conceptualization of blended learning has evolved from a framework for integrating online lesson delivery into traditional classrooms, to a more nuanced view that mixes different learning environments to create an integrated, individualized educational experience (R. Garrison & Kanuka, 2004a). From this perspective, an internship provides the perfect opportunity for blended learning to occur; during an internship, students are presented with numerous opportunities to learn in various settings, with support from the academy. Yet surprisingly, there has been little work exploring blended learning within an internship context.

Therefore, this paper addresses a specific question: How should we use blended pedagogy to design an internship that fully exploits the learning potential of boundaries? Eraut (2004) points out that

in order to maximize the learning potential of any boundary, there is a critical need for careful design, facilitation, and reflection. Thus we will explore specific principles for designing and executing an internship program that uses blended learning techniques to facilitate reflection across the boundary between the workplace and the academy. In the following section, we present a review of relevant previous research that has guided this work. Next, we describe an *immersive-boundary internship model* and the blended learning design principles derived from the model. We then present a case study of an actual internship program that was designed and executed based on these principles We conclude by describing how we evaluated this program, and finally, reflect on what we have learned to date from offering it.

Background

Two streams of literature have influenced our thinking about optimizing the learning opportunities provided by the academy-workplace boundary: (1) boundary theory and learning, and (2) blended learning.

Learning Opportunities Created by Boundaries

While the benefits of work-based learning have been identified, there has been less attention paid to the mechanisms by which these positive outcomes are realized. There is a broad educational assumption (little explored) that knowledge transfer takes place automatically as students move from the formal educational environment to the work setting (Eraut, 2004). The pedagogical strategies in many work-based learning (WBL) programs are consistent with learning theories that assume this kind of knowledge transfer. Transfer is promoted by emphasizing similarities between school and work environments, and such similarities are often expressed in the form of abstract principles. In this way, educators hope to bridge the many differences between university and workplace through abstract models that can be widely applied to many different contexts (Eraut, 2004).

Säljö (2003) has suggested that the concept of transfer of knowledge has endured in educational theory because it is a metaphor that generalizes easily across many disciplines. He argues that the concept of transfer is a detour that does little to contribute to the understanding of learning (Säljö, 2003). To address these limitations we turn to a learning theory that moves beyond the notion of knowledge transfer across boundaries, and instead focuses on the learning potential created by the boundaries themselves.

Scholars have observed that boundaries carry learning potential, and that boundary crossing and boundary spanning are activities that are conducive to the construction of new knowledge. This idea has been derived from a rapidly growing literature on knowledge sharing across boundaries in organizational and community contexts (Carlile, 2002; Levina & Vaast, 2005; Orlikowski, 2002; Østerlund, 1997; Østerlund & Carlile, 2005; Star & Griesemer, 1989; Wenger, 1998). Some of this research has attended to the ways in which individual learning involves boundaries. Specifically, the theory of situated learning in communities of practice (Wenger, 1998) introduced the notion of legitimate peripheral participation where a novice learns by crossing several boundaries, first from outside the community to the periphery, and then successive crossings approaching the core. Akkerman and Bakker define a boundary as a "sociocultural difference leading to discontinuity in action or interaction" (2011, p. 133). Such discontinuities create fertile ground for learning because existing knowledge and familiar response patterns may prove ineffective in the new context. Boundaries also connote commonality “in the sense that within discontinuity two or more sites are relevant to one another in a particular way" (Akkerman & Bakker, 2011, p. 133). The simultaneous coexistence of difference and similarity allows for the creation of useful artifacts that carry meaning in two sites on either side of a boundary and can be shared between them – boundary objects – and, as we will see below, these play a pivotal role in learning.

Researchers have begun to explore how industry-academia discontinuities can be leveraged to facilitate professional growth. Harreveld and Singh (2009) identified the importance of contextualization of learning when spanning the boundary between work and school. Smeby and Vågan (2008) focused on differences between the classroom education of nurses and physicians and the knowledge required on the job, and explored the idea that these gaps promoted constructive learning opportunities. But as Eraut (2004) notes, the intentional facilitation of boundary spanning between school and work has largely been absent, and for that reason, the full learning potential of boundary-spanning remains unrealized. A blended learning pedagogy can provide the ideal foundation for designing internships that maximize the learning potential of the academic-industry boundary.

Blended Learning

Graham *et al*. (2014) have pointed out that while interest in blended learning is high, efforts are just beginning to apply and integrate models and theories to the blended learning domain (Drysdale et al., 2013; Graham, 2013; Halverson *et al.*, 2012). Early waves of blended learning research explored best practices for designing web-based interactions (Bersin, 2004; Stacey & Gerbic, 2009; Tsai, Shen, & Tsai, 2011), incorporating web learning management systems into traditional curricula (Keengwe & Kang, 2011; Tamim, Bernard, Borokhovski, Abrami, & Schmid, 2011), and discovering the role that technology-based learning plays in facilitating different modes of cognition (R. Garrison & Kanuka, 2004b; Mayer & Moreno, 2003; Tamim et al., 2011). Research often focused on the time and place in which content delivery and interaction occurred, and this approach still has utility in a number of settings (e.g. Staker and Horn (2012) in their classification of K-12 blended learning models). Blended learning frameworks were often plotted on a two by two grid and anchored by the dimensions of ***time*** and ***place***, describing interaction modes as either same time or different time, and either same place or different place. (See Figure 1.) But such a focus on delivery mode could sometimes run the risk of being instructor-centered or content-centered, rather than student-centered.

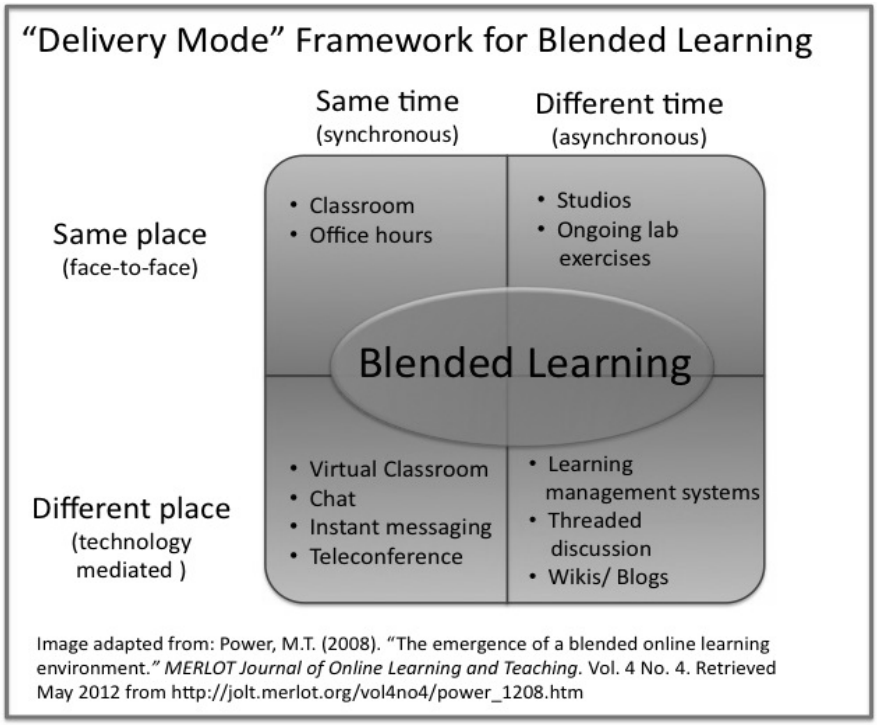


Figure 1. A "Delivery Mode" Framework for Blended Learning

More recently, researchers have been less interested in how to use technology to manage delivery modes, and more interested in how a blended learning experience works from a student's perspective—a student-centered model of blended learning. In a *student-centered blended learning framework*, designers create opportunities for a self-directed student to construct an individualized learning environment that draws on a rich array of learning resources and assets. The *delivery mode* framework provides a foundation for exploring the possibilities afforded by new technologies, but the newer conceptualization enriches that model by viewing the student experience as a multi-modal opportunity for learning. This conceptualization of a blend is more holistic, focusing on the variety of experience available to the learner afforded by multiple channels of interaction. This shift was championed by authors like R. Garrison and Kanuka (2004a), and Oliver and Trigwell (2005), who argued that the definition of blended learning must be rooted in the experience of the student, rather than the content and technology design decisions made by the teacher. Picciano's (2009) multimodal, "Blending with Purpose" model recognizes that learners represent different personality types and learning styles, and thus advises instructional designers to use multiple approaches that meet the needs of a wide spectrum of students. The shift also leverages the social landscape resulting from the so-called Web 2.0 technologies (D. Randy Garrison & Vaughan, 2007), and expands even further the possibilities for rich interactions in web-based learning environments (R. Garrison & Kanuka, 2004a).

The student-centered model recognizes that there is potential value in all available learning assets, even informal and serendipitous interactions. From this perspective, the 'blend' is more complex than just *online* or *in person.* The rich variety of mediated experiences provided by today's open educational resources, combined with the face-to-face interactions, both formal and informal, provide a range of opportunities to reinforce theoretical knowledge *and* practical application, as well as evaluation, facilitation and support (Rossett & Frazee, 2006). As R. Garrison and Kanuka (2004a) argued, the best use of blended learning effectively integrates all student experiences to achieve instructional goals, rather than supplementing old models of instruction with new technologies.

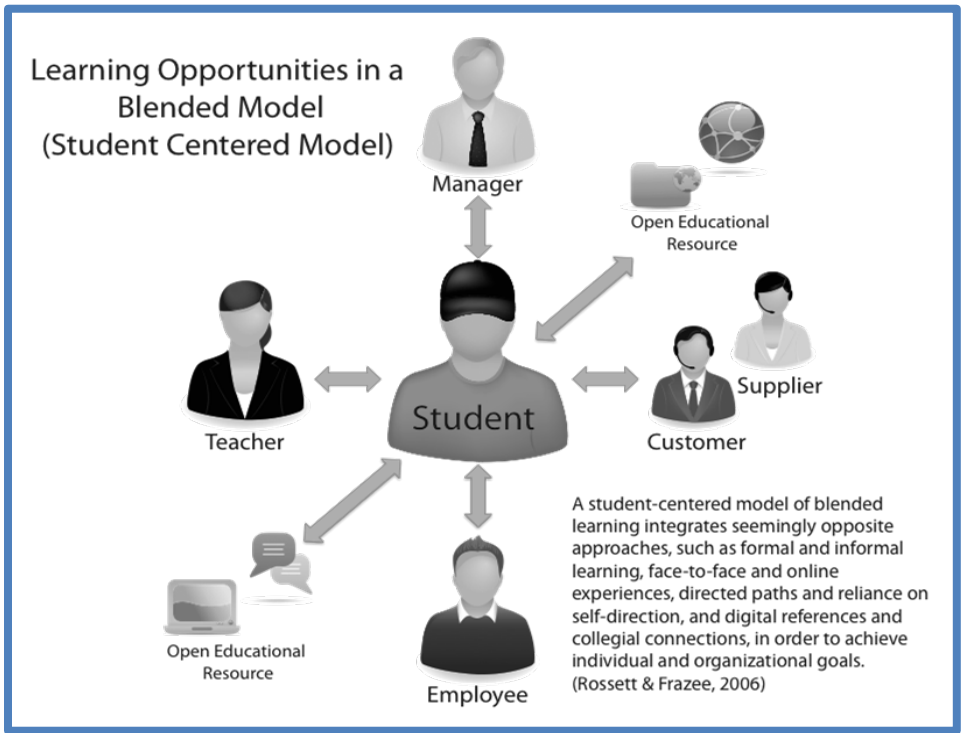


Figure 2. A Student Centered Model of Blended Learning in the Workplace

Figure 2 (previous page) illustrates the student-centered model of blended learning in an internship context. Here, the learner is a student intern. In addition to the traditional learning opportunities and resources provided by a teacher, there are a rich array of opportunities that arise from boundary-spanning interactions between the student-employee and managers, co-workers, customers and suppliers. In addition, an appropriately mentored, self-directed employee-learner has access to a wide variety of open educational resources that can be used to support learning on the job. Such a learner-centered model of blended learning "integrates seemingly opposite approaches, such as formal and informal learning, face-to-face and online experiences, directed paths and reliance on self-direction, and digital references and collegial connections, in order to achieve individual and organizational goals" (Rossett & Frazee, 2006, p. 2)

Graham et.al (2014) suggest that core attributes of blended learning models are not always clearly articulated. In the *immersive boundary* internship model described below, the core attributes are *boundaries*; *boundary interventions*; and *the respective roles of faculty and corporate managers*. These core attributes are part of what Graham et al., in an adaptation of Gibbons and Rogers (2009), call the pedagogical layer of the design model. In the discussion that follows, we focus more on the pedagogical layer of our model than on the physical layer. That is, we focus more on the strategy involved in exploiting boundaries than on the specific delivery systems used to accomplish the strategy.

Creating Blended Learning Opportunities at the Boundary

The intersection of boundary theory and blended learning makes possible a previously unavailable pedagogy for internships. Rather than relying on the transfer paradigm of traditional internships, it is possible to leverage the opportunities afforded by blended learning to create an *immersive boundary* between the workplace and the classroom (Figure 3).

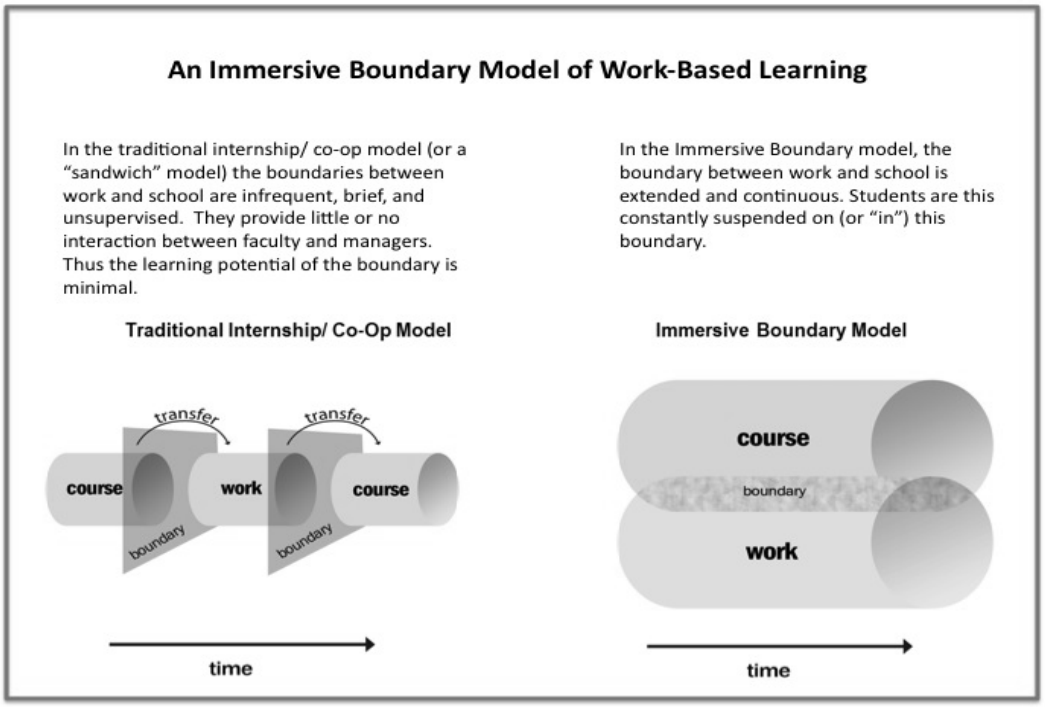


Figure 3. An Immersive Boundary Work-Based Learning Model

We have designed and implemented an internship program based on this principle, the Boundary Learning Internship (BLI) program at a mid-sized private university in the northeastern United States**.** The program allows students to take courses while simultaneously working full-time in a large global enterprise. The internship experience is comprised of a carefully selected internship position and a set of related courses that are delivered through blended learning pedagogy. The program's blended learning approach uses a range of techniques including interaction with instructors, fellow students, managers and senior organizational mentors. These interactions occur asynchronously online and synchronously in workplaces, face-to-face residencies, teleconferences, and through telepresence meetings. Course instructors are aware of and involved in the students' work, and they incorporate student experiences at work into the subject matter of their academic courses. The courses are specifically structured to integrate academic content with the real-world challenges the students face in their internship. This approach is illustrated in Figure 3 which demonstrates graphically how blended learning strategies make the boundary-spanning experience continuous during internships, allowing students to be immersed in the boundary.

We have used this program over the past two years (2011 and 2012) as a concrete test case to experiment with the immersive boundary approach. The rest of this section describes the program, and presents design principles based on immersive boundary and blended learning concepts suggested in the literature review.

The Program

The BLI Program is open to students from any university, and enables a broad range of internship companies to hire BLI students. Over the past several years, students have participated from eight schools, including large public and private universities as well as several small colleges. Companies that provided internship positions included large, global corporations in the financial services, technology, and consulting sectors.

Students applied to the program in the Fall semester of their junior year. The program was open to students from any major, but most students were from information technology programs (e.g. computer science, information systems, information management, etc.). After a rigorous selection process, successful candidates were awarded an eight-month, full-time position within one of the companies. The length of the internship provides a rich opportunity for learning, since students can work on longer term, more complex projects. Participating companies find the extended time allows students to become more productive and integrated into the company than they would be in a summer internship.

Students began the program with a synchronous intensive residency class designed to prepare them for the months ahead at work. During the residency, students who would be working in the same organization were placed into project teams. Almost all teams had members who would not be co-located with other team members in their fulltime assignments. This configuration would require them to work virtually on academic team projects throughout their internships. The face-to-face residency allowed such teams an opportunity to bond before beginning their distributed work assignments.

After the residency, students dispersed to their employing organizations, where they continued taking asynchronous online courses and worked with team members on their major course project. Each student was assigned a senior industry mentor who collaborated with the workplace manager and faculty team to provide guidance to the student. The course concluded with an Innovation Project, developing an IT-enabled innovation proposal and a project plan to implement the proposal, which was presented to and evaluated by senior managers and mentors in the host organization. The BLI Program included three required courses plus 3-6 internship credits for a total of 12-15 semester credits, a full course load.

Three Design Principles and Their Application

Building on the concepts identified above, we identified three principles for a pedagogy that would maximize the learning potential of boundaries in internships. In this section we present each design concept, and describe its implementation in the BLI Program.

Make the boundary between work and school continuously salient. Suspend students in the boundary between school and work for the duration of their internship experience. In order for this to happen, the student must participate in work and school simultaneously. Blended learning strategies make it possible for students to take courses while they are working. Such courses should be relevant to the work assignment and be integrated with it.

In the BLI Program, students are accountable for their workplace deliverables and their course requirements simultaneously. Thus, they never abandon their school or work frame of mind, but must employ (and often combine) both to deliver the work they are responsible for. This creates a fertile ground for learning because immersion in the boundary renders existing knowledge and familiar response patterns ineffectual in the new, hybrid environment.

Introduce purposefully designed boundary interventions. Beyond suspending students in the boundary between school and work, there should be designed interventions requiring students to span boundaries. In other words, there should be a specific assignment to push students into boundary spanning situations. This idea is expressed as the final Innovation Project for the BLI Program, which is a technology innovation proposal for the employing organization. The project design and requirements are made clear to managers, mentors, and senior executives as well as to the students. After several months of simultaneous intern work and academic courses within a blended learning environment, the student teams present their proposal to senior organizational leaders, and the project is evaluated by course instructors, senior leaders, and their managers at work.

The project thus serves as an artifact that carries meaning and value in both corporate and academic organizational contexts. The Innovation Project clearly leverages the distinct boundary between work and school, but it also capitalizes on other boundaries within the work organization that carry learning potential. The boundaries between mid-level and senior management, between functional areas of business, and between managers and technical workers are all examples of boundaries that naturally occur within a firm. Taking advantage of these boundaries requires deliberate program decisions that will make these boundaries salient and useful in course work.

Involve teachers in students' work; involve managers in students' courses. Teachers and workplace supervisors often have different frames of reference when assessing performance, and they often complement each other in terms of knowledge that the other might not use on a regular basis. Involving teachers in the students' workplace and managers in the students' courses can make the industry-academia boundary more salient. For example, a student might be a member of a project team that has just handed over an important deliverable, subsequently evaluated by a supervisor. A teacher might assess the same work from a theoretical perspective, or ask students to reflect on the experience in relationship to their course work. There is value in both perspectives, and by engaging in discussion with the student, the salience of the boundary is maximized.

Because BLI Program teachers are aware of and involved with their students' activities at work, they can provide targeted opportunities for reflection, discussion and comparison of those activities. Likewise, a manager's assessment of a course assignment may often be different from a teacher's, so we have made an effort to ensure managers are involved in several aspects of students' course work. First,

managers and instructors collaborate closely to create course material that is relevant to issues in the work place. Second, managers and company leaders are an integral part of the evaluation of the final Innovation Project.

Evaluating the Program

In this section we reflect on what we learned about the application of these principles as we offered the BLI Program in 2011 and 2012. As described above, we used this program over the past two years as a case study to explore the immersive boundary approach. The case study is an accepted method for studying complex contemporary phenomena. Yin (2002) suggests that the case study is appropriate for a study that asks a "how" question about a contemporary set of events, occurring in their natural setting, where principles of experimental control are not desirable. In this study, we explored how three design principles derived from the literature would perform in a natural internship setting.

To evaluate the program, we applied a multi-method approach appropriate to the case study, one that used quantitative surveys, open ended surveys, and interviews. We first created an instrument to assess perceptions of program learning outcomes by three sets of stakeholders. At the end of the 2011 and 2012 BLI Program we surveyed students, managers, and senior mentors from the program's largest employer on their perceptions of each student's progress on the program's eight primary learning outcomes. Respondents were asked to evaluate (on a five point Likert-type scale) a student's level of skill on each learning outcome at the beginning of the program, and at the end of the program. They were also asked open-ended questions about which aspects of the program were most valuable, and which needed improvement. Thirty-five students were surveyed. Twenty-seven of their managers and sixteen of their senior mentors responded. Table 1 shows substantial perceived improvement in all eight learning outcomes as independently perceived by students, managers, and mentors. While all three groups perceived substantial and statistically significant improvements from the start of the program, not surprisingly, students thought they had improved more than did managers, and the senior mentors were more critical than managers. While student self-reports of learning can be biased, we regard the independent assessments of managers and senior mentors as better evidence of student progress.

Table 1 Perceived Student Improvement on Learning Outcomes During BLI

Learning Outcomes		1	2	3	4	5	6	7	8
	Students Before	2.6	2.5	2.2	1.8	2.1	2.1	1.9	2.1
	Students After	4.1	4.1	4	3.5	3.7	4	3.8	4.1
Student Scores	Difference	1.4*	1.6*	1.7*	1.7*	1.7*	1.8*	1.9*	1.9*
	Managers Before	2.3	2.5	2	1.7	1.8	1.8	1.7	2
	Managers After	3.5	3.7	3.2	3	3	3.4	3.1	3.6
Managers Scores	Difference	1.2*	1.1*	1.2*	1.3*	1.2*	1.6*	1.5*	1.6*
	Senior Mentors Before	1.9	1.8	1.4	1.5	1.5	1.6	1.3	1.8
	Senior Mentors After	3	3	2.6	2.6	2.8	2.9	2.6	2.9
Senior Mentor Scores	Difference	1.1*	1.2**	1.2***	1.1**	1.3**	1.3**	1.3**	1.2**

Legend

Statistical Sig	** p < .0001*
	*** p < .001*
	**** p < .01*
Learning Outcome 1	*Ability to present effective, well organized material*
Learning Outcome 2	*Ability to communicate & collaborate*
Learning Outcome 3	*Understand how scale impacts the team*
Learning Outcome 4	*Understand enterprise architectures*
Learning Outcome 5	*Understand how scale impacts the solution*
Learning Outcome 6	*Understand how to achieve IT-enabled innovation*
Learning Outcome 7	*Understand how to propose a large innovative IT project*
Learning Outcome 8	*Understand corporate culture & organizational context*

Faculty and staff who participated in the program met after each year's BLI Program to review survey results and reflect on program successes and areas for improvement. Below we present reflections on the three design principles described above.

1. **Make the boundary between work and school continuously salient.** We found that continual immersion in the industry-academic boundary had a number of positive effects. Student impressions of the BLI Program were overwhelmingly positive, and open-ended comments from the 2011 and 2012 surveys show that they valued the experience. As can be seen from a typical selection of student comments, they recognize and appreciate the integration of school and workplace:

   I love the idea of taking classes during an extended internship. I can't imagine many internships being better than this one.

   I have learned more here than I ever will in the classroom.

   It has been one of the most amazing experiences of my life to date. Our ability to network and learn is far better than being trapped in a college classroom.

   We found that spanning boundaries put students into difficult situations that are impossible to simulate in the classroom. Immersion in the two worlds means the students need to understand both, communicate in both, and integrate both into a coherent framework. Spanning boundaries accelerates the student maturation process forcing students to synthesize what they are learning with how to apply that knowledge (with faculty and mentor support).

   Our industry partners observed an unexpected benefit: students not only created a bridge between academia and industry work, they also made existing organizational boundaries more salient. Several mentors commented that they often do not have the time to make connections across the business units (within the company), but the students make the time (as part of their course assignments). So interns span business-unit boundaries and have identified best practices that can be shared across the firm. In another example, students in the BLI Program acted as a conceptual and relational bridge between faculty and managers/mentors. Several quotes from industry managers and mentors illustrate these ideas:

   Great opportunity for both the business and the intern – we get innovative ideas and the intern has the opportunity to learn about technology and the business we support.

   The interns bring a fresh look at the way business is done, a new perspective.

   What we learned: The continuous immersion in school and work was not without challenges. Some students struggled to find the right balance between courses and internship work demands. When job pressures mounted, students sometimes found it difficult to focus on school work. Some reflected that this pressure was the stimulus for improving time management skills:

   I had a large work load. It helped me learn how to balance many different projects going on at once.

   Others found it stressful and overwhelming. In the design of future BLI Programs, we have created a more complementary rhythm between courses and work by offering students the opportunity to work part-time when course demands are heaviest.

2. **Introduce purposefully designed boundary interventions.** The final Innovation Project not only required students to work across the academic-industry boundary, but also created opportunities to encounter unexpected boundaries. The project was a naturally occurring nexus of boundaries, spanning multiple business units, hierarchical levels, geographical locations, and disciplinary cohorts. For example, one student worked on a co-located team responsible for launching an internal application for an organization's accounting function. This required the student to interact with managers in corporate, accounting, and IT functions to coordinate the project, communicate with project managers, engineers, and end-users to design, build, and implement the project at locations across the country. BLI Program positions are designed specifically to allow these complex relationships to arise when students are at work. Typical manager-mentor comments were:

   The integration of the intern working, learning and contributing to a functional area, while also working separately with other interns allowed them to look for innovative solutions to better the technology of the firm.

   Having the interns work across LOBs and sites for the team project is a terrific experience, as many of the jobs that they will be placed in if they stay with the company will require the same kind of coordination.

   The senior mentor role also provided a structured opportunity for students to cross hierarchical boundaries in a way unavailable to most interns (and most regular employees for that matter). Students wrote:

   Another positive aspect was the contact with all of these execs….I was able to see how they act, what their work practices are, and learn how they got to where they are.

   The exposure to mentors and senior leadership is 100% the greatest thing about BLI.

   What we learned: We recognized a need to find additional ways to make the many diverse, naturally occurring organizational boundaries even more salient to students. We believe that there is much untapped learning potential that can be released in guided student reflection on the boundary structures of large global enterprises. For the future, we have redesigned faculty mentorship interactions to provide even more opportunities for guided reflection on organizational boundary structures.

3. **Involve teachers in students' work; involve managers in students' courses.** As we have discussed above, there is often conflict at the boundary—and this conflict provides a rich opportunity for learning**.** One example is the simultaneous evaluation of student performance by faculty and managers. Often the expectations and priorities of these interest groups differ, and when both are simultaneously involved in assessment, the student is placed in an uncomfortable, but highly formative, position of creating a deliverable that will fulfill the expectations of both. In order to navigate through the conflicting advice, students are required to integrate foundational academic learning with the "real world" insight from managers and mentors. By leaving the students to wrestle with this boundary issue, students have the opportunity to develop non-cognitive skills such as navigating the system, conflict resolution, prioritizing, and negotiating. Students recognized the value of faculty mentoring in the work world:

   The program has provided an excellent way to transition into the corporate world with support from academics and faculty for students.

> *The program provided an almost perfect combination of school work and "work work." The ability to work alongside company personnel and be treated as one of their own, while still being able to take classes is just amazing.*

And senior mentors' input and assessment of projects was also highly valued by students:

> [X] *was the best senior mentor in the program. Without her my project would not have been half as good as it was. She put us in touch with contacts, reviewed our deck, and always made time to go over any problems I was having.*

What we learned: In the future, we will create even more opportunities for faculty, managers and mentors to collaborate in the evaluation of student work.

Discussion and Conclusion

In this paper, we have proposed a new kind of internship that fully exploits the learning potential of boundaries by immersing students continuously "within" the boundary between industry and academia. We have presented three principles for designing an immersive boundary internship program, and the theoretical rationale that led to the development of those principles. A two-year case study describes our experience in applying the principles, and we have reflected on what we learned from their application. An internship that fully exploits the learning potential afforded by spanning boundaries is only possible through the affordances of blended learning. Blended learning makes it feasible for students to work in globally distributed organizations and take courses at the same time, to encounter a variety of boundary-oriented interventions, and to involve both faculty and managers in work and school simultaneously.

But how, specifically, should we think of blended learning in this context? We observed above that the conceptualization of blended learning has evolved from a focus on lesson delivery mode into a broader view of student opportunities to learn. Championed by authors like Oliver and Trigwell (2005) and Rossett and Frazee (2006), the student-centered approach is rooted in the experience of the student rather than the content and technology design decisions made by the teacher. The blend of learning assets thus becomes more complex than simply "online" or "in person"—the individualized interplay between learning assets and each student becomes primary. Each interaction creates different opportunities for different types of learning to occur and will naturally fit some students better than others. A blended-learning pedagogy for internships must strive to effectively integrate all student experiences rather than supplement old models of instruction with new technologies (R. Garrison & Kanuka, 2004a). The new internship thus calls for teachers to abandon a "cover-the-material," content-delivery instructional approach in favor of *opportunistic instruction*.

Opportunistic Instruction. Opportunistic instruction requires teachers to embrace a much broader array of potential learning resources. In addition to content directly selected by the instructor, an appropriately mentored, self-directed employee-learner has access to a wide variety of open educational resources (OER). These might include the company's online, self-paced training modules, technology vendor educational resources, MOOCs, and rapidly proliferating free learning resources such as YouTube Edu, Kahn Academy, Treehouse, Lynda, CodeAcademy and iTunes U. In student-centered blended learning, instructors will be sensitized to help interns undertake "just-in-time" learning projects occasioned by the immediate job context. In addition, students should be encouraged to take advantage of the human resources available to them in the internship experience to create personal learning networks. Goodman called them "learning webs" of colleagues, supervisors, mentors, customers and suppliers (Goodman, 1960; Kamenetz, 2010). Opportunistic instruction will integrate seemingly opposite

approaches—didactic and experiential learning, formal and informal learning, planned and serendipitous learning (Rossett & Frazee, 2006).

We learned that the *immersive boundary* model creates rich opportunities for serendipitous and informal learning. As students become part of the organization's ecosystem, they experience its informal happenings. By employing a full blend of instructional technologies, instructors can quickly help students take advantage of such opportunities. Because students were regularly sharing their experience through both synchronous media (conference calls, telepresence meetings, face-to-face residencies) and asynchronous media (discussion boards, email, blogs), opportunities to discuss and reflect on the serendipitous were plentiful. However, to fully leverage these opportunities, instructors need an opportunistic mindset, one that emphasizes reflection on action (Schön, 1983) rather than delivery of content. We recognize that we must learn more about how instructors can best be sensitized to take advantage of the serendipitous. For future versions of the BLI Program, we have restructured the student-faculty relationship to allow faculty members to work more deeply with fewer students.

Self-Directed Learning (SDL). At the heart of this blended approach to internships is the expectation that student learning be increasingly self-directed and autonomous. Immersion in the industry-academia boundary creates unique opportunities and demands for developing self-directed learning skills. Students placed in a work environment are immediately expected to perform and contribute. Work projects often include tasks that are ambiguous and far-separated from a student's prior experience. Thus they must adapt quickly, and this adaptation requires development of self-directed learning skills.

Self-directed learning has been defined as "a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes" (Knowles, 1975, p. 18). SDL is closely intertwined with the concept of "learning-to-learn" (D. R. Garrison, 1992), and has been considered "the single most important outcome of formal education" (Grow, 1991, p. 135). Despite the high desirability of SDL skills, developing self-determined, self-directed learners in the formal university setting has remained challenging and elusive. Some argue that "fully self-directed learning is not possible in an institutional setting" (Grow, 1991, p. 135). We recognize the need to better learn how instructors can encourage and reward self-directed learning skills during internships. Students must be presented with the expectation that they will candidly assess the state of their current knowledge and develop a plan to learn what they need to know to succeed. Because blended learning technologies allow them to be in school as well as at work, it is possible to help them find resources to carry out effective, mentored self-directed learning.

Broader impact. The *immersive boundary* internship model, while extremely useful for the study of information technology, can be adapted for other professional fields of study, ranging from engineering to marketing. Hence a future area of exploration might be to adapt our model to other fields. Central to such progress will be the ongoing work to formally assess the immersive-boundary model. We have begun a project that will provide a longitudinal assessment of the BLI Program. It will include assessment of learning outcomes at the end of each cycle as described above, and also longitudinal assessment of students as they progress throughout their subsequent school and professional careers. The longitudinal assessment will measure how the outcomes from participation persist and evolve over time. Results of these assessments will provide empirical input to the ongoing process of updating and designing future versions of the programs. We have developed instruments designed to evaluate program learning outcomes, and to monitor graduates' career progress.

We believe work-based learning should be a central component in the disruptive re-imagining of higher education that is currently taking place. In order for workplace experiences to make an essential

contribution, however, there is a need for a new kind of internship. This new internship will be highly situated, individualized, and context dependent. It will fully exploit the boundary between industry and academia. It will simultaneously demand and nurture high levels of self-direction in students, and it will be enriched by a diverse set of open learning assets that self directed students will exploit. Student-centered blended learning makes this new internship possible.

References

Akkerman, Sanne F., & Bakker, Arthur. (2011). Boundary Crossing and Boundary Objects. *Review of Educational Research, 81*(2), 132-169. doi: 10.3102/0034654311404435

Bersin, Josh. (2004). *The Blended Learning Book: Best Practices, Proven Methodologies, and Lessons Learned*: John Wiley & Sons.

Callanan, Gerard, & Benzing, Cynthia. (2004). Assessing the role of internships in the career-oriented employment of graduating college students. *Education + Training, 46*(2), 82-89. doi: 10.1108/00400910410525261

Carlile, Paul R. (2002). A Pragmatic View of Knowledge and Boundaries: Boundary Objects in New Product Development. *Organization Science, 13*(4), 442-455.

D'Abate, Caroline. (2010). Developmental Interactions for Business Students: Do They Make a Difference? *Journal of Leadership & Organizational Studies, 17*(2), 143-155.

Dewey, John. (1986). Experience and Education. *The Educational Forum, 50*(3), 241-252. doi: 10.1080/00131728609335764

Drysdale, J. S., Graham, C. R., Spring, K. A., & Halverson, L. (2013). An analysis of research trends in dissertations and theses studying blended learning. *The Internet and Higher Education, 17*, 90-100. doi:10.1016/j.iheduc.2012.11.003

Eraut, Michael. (2004). Transfer of knowledge between education and workplace settings. In H. Rainbird, A. Fuller & A. Munro (Eds.), Workplace Learning in Context (pp. 53-73): Psychology Press.

Falconer, S, & Pettigrew, M. (2002). Developing Added Value Skills Within an Academic Program Through Work Based Learning. *Educational Innovation in Economics and Business V*, 3-15.

Garrison, D. R. (1992). Critical Thinking and Self-Directed Learning in Adult Education: An Analysis of Responsibility and Control Issues. *Adult Education Quarterly, 42*(3), 136-148.

Garrison, D. Randy, & Vaughan, Norman D. (2007). The Future *Blended Learning in Higher Education* (pp. 143-155): Jossey-Bass.

Garrison, Randy, & Kanuka, Heather. (2004a). Blended learning: Incovering its transformative potential in higher education. *Internet and Higher Education, 7*, 95-105.

Gault, Jack, Leach, Evan, & Duey, Marc. (2010). Effects of business internships on job marketability: the employers' perspective. *Education + Training, 52*(1), 76-88. doi: 10.1108/00400911011017690

Gault, Jack, Redington, John, & Schlager, Tammy. (2000). Undergraduate business internships and career success: Are they related? *Journal of Marketing Education, 22*(1), 45-53.

Gibbons, A. S., & Rogers, P. C. (2009). The architecture of instructional theory. In C. M. Reigeluth & A. Carr-Chellman (Eds.), *Instructional-Design Theories and Models*, (Vol. III, p. 305-326). Mahwah, NJ: Lawrence Earlbaum Associates.

Goodman, Paul. (1960). *Growing up absurd; problems of youth in the organized system*. New York,: Random House.

Graham, C. R., Henrie, C. R., & Gibbons, A. S. (2014). Developing models and theory for blended learning research. In A. G. Picciano, C. D. Dziuban, & C. R. Graham (Eds.), *Blended learning: Research perspectives, volume 2* (pp. 13-33). New York, NY: Routledge.

Graham, C. R. (2013). Emerging practice and research in blended learning. In M. G. Moore (Ed.), *Handbook of Distance Education* (3rd ed. pp. 333-350). New York, NY: Routledge.

Grow, Gerald O. (1991). Teaching Learners to Be Self-Directed. *Adult Education Quarterly, 41*(3), 125-149.

Halverson, L. R., Graham, C. R., Spring, K. J., & Drysdale, J. S. (2012). An analysis of high impact scholarship and publication trends in blended learning. *Distance Education, 33*(3), 381-413. doi:10.1080/01587919.2012.723166

Harreveld, R. E., & Singh, Michael. (2009). Contextualising learning at the education-training-work interface. *Education + Training, 51*(2), 92-107.

Kamenetz, Anya. (2010). *DIY U : edupunks, edupreneurs, and the coming transformation of higher education*. White River Junction, Vt.: Chelsea Green Pub.

Keengwe, Jared, & Kang, Jung-Jin. (2011). A review of empirical research on blended learning in teacher education programs. *Education and Information Technologies*, 1-15. doi: 10.1007/s10639-011-9182-8

Knowles, Malcolm S. (1975). *Self-Directed Learning*. Chicago: Association Press Follett Publishing Company.

Kolb, Alice Y., & Kolb, D. A. (2005). Learning Styles and Learning Spaces: Enhancing Experiential Learning in Higher Education. *Academy of Management Learning & Education, 4*(2), 193-121.

Levina, Natalia, & Vaast, Emmanuelle. (2005). The Emergence of Boundary Spanning Competence in Practice: Implications for Implementation and Use of Information Systems. *MIS Quarterly, 29*(2), 335-363.

Mayer, Richard E., & Moreno, Roxana. (2003). Nine Ways to Reduce Cognitive Load in Multimedia Learning. *Educational Psychologist, 38*(1), 43-52. doi: 10.1207/s15326985ep3801_6

Moser, Steve, & Elbert, Dennis. (2007). Expanding Field Experience and Internship Partnerships: Foundations, City Government, and Corporate Options. *Journal of Business and Training Education, 16*, 55-60.

O'Connor MDa, Erin S., Mahvi MD, FACSb, David M., Foley MD FACSa, Eugene F, Lund MD, FACSa, Dennis, & McDonald PhDa, Robert. (2010). Developing a practice-based learning and improvement curriculum for an academic general surgery residency *Journal of the American College of Surgeons, 210*(4), 411-417.

Ogrinc, Greg , West, Alan, Eliassen, M. Scottie, Liuw, Stephen, Schiffman, Jennifer, & Cochran, Nan (2007). Integrating practice-based learning and improvement into medical student learning: Evaluating complex curricular innovations *Teaching and Learning in Medicine, 19*(3), 221-229.

Oliver, Martin, & Trigwell, Keith. (2005). Can "Blended Learning" Be Redeemed? *E-Learning, 2*(1), 17-26.

Orlikowski, Wanda J. (2002). Knowing in Practice: Enacting a Collective Capability in Distributed Organizing. *Organization Science, 13Knowledge, Knowing, and Organizations (May - Jun., 2002)*(3), pp. 249-273.

Østerlund, Carsten. (1997). Sales Apprentices on the Move: A multi-contextual perspective on Situated Learning. *Journal of Nordic Educational Research, 17*(3), 169-178.

Østerlund, Carsten, & Carlile, Paul. (2005). Relations in Practice: Sorting Through Practice Theories on Knowledge Sharing in Complex Organizations. *The Information Society, 21*(2), 91-107. doi: 10.1080/01972240590925294

Pedro, Joan Daniels. (1984). Induction into the workplace: The impact of internships. *Journal of Vocational Behavior, 25*(1), 80-95.

Picciano, A. G. (2009). Blending with purpose: The mutimodal model. *Journal of Asynchronous Learning Networks, 13*(1), 7-18.

Power, Michael. (2008). The emergence of a blended online learning environment. *MERLOT Journal of Online Learning and Teaching, 4*(4), 503-514.

Rossett, Allison, & Frazee, Rebecca Vaughan. (2006). Blended Learning Opportunities. *AMA Special Report*. www.amanet.org

Säljö, Roger. (2003). Epilogue: From transfer to boundary-crossing. In T. Tuomi-Gröhn (Ed.), Between school and work: new perspectives on transfer and boundary-crossing. Oxford: Emerald Group Publishing.

Schön, Donald A. (1983). *The reflective practitioner: how professionals think in action*. New York: Basic Books.

Smeby, Jens-Christian, & Vågan, André. (2008). Recontextualising professional knowledge—newly qualified nurses and physicians 1. *Journal of Education and work, 21*(2), 159-173. doi: 10.1080/13639080802018014

Education for the 21st Century—Impact of ICT and Digital Resources. In D. Kumar & J. Turner (Eds.), (Vol. 210, pp. 225-234): Springer Boston.

Stacey, Elizabeth, & Gerbic, Philippa. (2009). *Effective Blended Learning Practices: Evidence-Based Perspectives in ICT*. Hershey, PA: IGI Global.

Staker, H., & Horn, M. B. (2012). *Classifying K-12 blended learning*. Innosight Institute, Inc. Retrieved from http://www.innosightinstitute.org/innosight/wpcontent/ uploads/2012/05/Classifying-K-12-blended-learning2.pdf

Star, Susan Leigh, & Griesemer, James R. (1989). Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. *Social Studies of Science, 19*(3), 387-420.

Tamim, Rana M., Bernard, Robert M., Borokhovski, Eugene, Abrami, Philip C., & Schmid, Richard F. (2011). What Forty Years of Research Says About the Impact of Technology on Learning. *Review of Educational Research, 81*(1), 4-28. doi: 10.3102/0034654310393361

Tsai, Chia-Wen, Shen, Pei-Di, & Tsai, Meng-Chuan. (2011). Developing an appropriate design of blended learning with web-enabled self-regulated learning to enhance students' learning and thoughts regarding online learning. *Behaviour & Information Technology, 30*(2), 261-271. doi: 10.1080/0144929x.2010.514359

Wenger, Etienne. (1998). *Communities of practice : learning, meaning, and identity*. Cambridge, U.K. ; New York, N.Y.: Cambridge University Press.

Yin, R. K. (2002). Case study research: Design and methods (3rd ed. Vol. 5). Thousand Oaks, CA: Sage Publications.

Zucchermaglio, Cristina, & Alby, Francesca. (2009). Learning to Work or Working to Learn? A university-work transition case study. *Learning Inquiry, 3*, 79-95.

Design of an Online Curriculum Promoting Transformative Learning in Post Professional Doctoral Students

Ingrid Provident Ed.D, OTR/L, FAOTA, Joyce Salls OTD, OTR/L, Cathy Dolhi OTD, OTR/L, FAOTA
Jodi Schreiber OTD, OTR/L, Amy Mattila MS. OTR/L, Emily Eckel OTD, OTR/L

Chatham University in Pittsburgh PA

Abstract

Written reflections of 113 occupational therapy clinical doctoral students who graduated from an online program between 2007 and 2013 were analyzed for themes which reflected transformative learning and characteristics of curricular design which promoted transformative learning. Qualitative analyses of written reflections were performed. Several themes emerged which are presented using the framework of Person/Learner, Environment/Learning Context, and Occupation/Engagement in Learning Activities. Strategies such as active learning; assignments that directly apply to students' work settings; implementation of a cohort model; and use of reflection, dialog, and project implementation appear to be effective in facilitating transformative learning in an online clinical doctoral program.

Introduction

Allied health professionals who are working in professions such as nursing, physical or occupational therapy have many choices in today's educational environment when considering options for advanced degrees. For example, if one chooses to enter a traditional Doctor of Philosophy program (i.e. face to face coursework, comprehensive exams, writing/defending a research dissertation, etc.), the educational experience will be significantly different than enrollment in a clinical doctorate delivered in an online format. In an online clinical doctoral program, communication between instructors and students

is mediated through technology rather than traditional classroom interactions. Dialogue in online educational environments may be conducted asynchronously—i.e., postings on a course website can be read at a different time by each party—or in synchronous formats—i.e., auditory and/or written words are heard or read in real time. As a result, student learning in clinical and online doctoral programs will be affected by the structure of online curricula and instructors' abilities to guide student learning (Simons, Baron, Knicely, & Richardson, 2001).

For students pursuing a post-professional degree online, there are both benefits and drawbacks. Hollis and Madill (2006) described the perceived advantages of online learning as increased choice and flexibility, less disruption to personal lives, and decreased travel time. In a study of nursing students in a hybrid post-professional program, Smyth, Houghton, Cooney, and Casey (2012) found online learning—in addition to its advantages—posed a number of challenges. These included a sense of isolation and lack of community, a lack of feedback, technical problems, and a sense of invasiveness.

Online university courses and programs are increasingly available. Over six million students took an online university level course in 2010. This is a 10% increase from the previous year (Statistic Brain Research Institute, 2013). Availability of online education and enrollment is expected to continue to increase. Given the growth of online educational opportunities it is important to understand what educational practices effectively enable doctoral students to develop and learn. Additionally, if transformative learning is a desired outcome, understanding the theory and its relationship to the structure of a curriculum to foster the perspective shift and preparation of doctoral students is imperative. The study of transformative learning in the online environment is a focus for contemporary research. Specifically, the aim of this paper is to further the understanding of how the curricular structure of an online post professional occupational therapy doctoral program contributed to the transformative learning experiences of students enrolled in the program.

Literature Review

Transformative learning theory focuses on an adult learner's ability to reflect and make new meaning of experiences and environments (Allen, 2007). The theory has evolved over the past three decades as others (Benson, Hewitt, Heagney, Devos, & Crosling, 2010; Boyd, 2009; Matthew-Maich, Ploeg, Jack, & Dobbins, 2010; Taylor, 2007) have expanded upon the seminal work of Mezirow (1997). Guided by this theory, the student often experiences change as the result of a multiple step process frequently characterized by a disorienting dilemma, followed by the use of active learning, and reflection. The dilemma can serve as a catalyst for learners to examine their assumptions and beliefs through engagement in self-reflection and discourse with others related to changing their view. According to transformative learning theory, this process results in the reorganization of perspective with action to promote change (Santalucia & Johnson, 2010). The product is a learner who emerges with skills to effect broader change.

The scientific literature includes outcome studies of doctoral students' transformative learning experiences. Boyer, Maher, and Kirkman (2006) identified evidence of transformative learning in an online graduate course by using systematic content analysis of students' written reflections. Their findings suggested that phases of transformative learning were evident in student comments and that fundamental changes in ideas, beliefs, habits, or assumptions occurred for approximately one-fourth of students in relation to course workload, competence with technology, social role priorities, and collaborative learning. The role of the instructor was identified as vital to facilitation of transformative learning.

According to Henderson (2010) in a synthesis of research related to transformative learning in the online environment, critical reflection, discourse, trusting relationships, and support are the main components in fostering student progression towards transformative learning. The learner experiencing a dilemma is challenged to question previously held assumptions and to consider alternatives through exploratory prompts and critical reflection (Matthew-Maich, et al., 2010; Mezirow, 2000). The role of the online educator using critical reflection and facilitating discourse is to foster the development of the learner by creating opportunity for the inquiry process, thus enabling the student to move beyond technical procedures. This critical reflection provides an opportunity for learners to reflect on experiences and assumptions resulting in a shift in thinking, or transformation (Mezirow, 1997). It is postulated that reflective writing can facilitate introspection and thoughtful consideration of new ideas and can be a strategy to promote reflective practice (Langley & Brown, 2010; Schön, 1987). Other authors consider discourse with peers related to self-reflection on beliefs, feelings, and values an essential component of critical self-reflection and promotion of transformative learning (Meyers, 2008; Olaniran, 2005).

Trusting relationships and establishing support have been cited as important elements in facilitating transformative learning processes in online environments. In a survey of 59 doctoral graduates, Stevens-Long, et al. (2012) reported transformative learning outcomes that surpassed intellectual growth. Participants identified key experiences perceived to be linked to these outcomes as "...interpersonal relationships (faculty-student and student-student) characterized by community support, collegial relations with faculty, inclusion of diverse people and perspectives, and bonding with fellow students: curricular content and structure that lead to a transformation in perspective and worldview" (p. 191).

While not cited in the literature related to online learning environments, Cranton and Carusetta, (2004), state:

> In the final phases of transformation, the learner tries out new roles in an attempt to test and validate new frames of reference. The learner can only achieve this role-playing by engaging in critical discourse with others and then reflecting on that discourse. Once a new role has been tried and validated, learners can then reintegrate the new learning and way of knowing into their previous understanding, reconciling the old and new. (p. 24)

The literature related to online learning seems to be lacking with regard to the final step of the transformative process, trying new roles and taking action. Specifically how can an online program foster the ability of students to take action and try out new roles while receiving the critical reflection, discourse, trusting relationships, and support from their peers and instructors?

In an effort to understand the effects of an online program's curricular sequence and the ability of the instructors to promote transformative learning, the following questions were used to guide the research:

> Question 1: What is the evidence of transformative learning in the written reflections of occupational therapy students upon completion of a post-professional online doctoral program?
>
> Question 2: How does the design of an online doctoral program facilitate a student's progression through the stages of transformative learning?

Educational Context of the OTD Program

In 1994, the post-professional clinical doctorate in occupational therapy (OTD) emerged as an option for credentialed occupational therapists to advance their understanding of the profession. The doctoral program at this university is an online post-professional OTD which is designed as a cohort model for professionals working in the field. New cohorts begin each fall and spring term, with students assigned to their cohort upon admission to the program. Each cohort is maximized at 15 students. In circumstances where more than 15 students are accepted for a start term, two cohorts are created with equal numbers of students. When two cohorts exist in a term, consideration is given to dividing the students to maximize diversity in terms of practice settings, years of experience, and writing proficiency as demonstrated in the application essay. A cohort model was chosen in an effort to create a community of learners from geographically and professionally diverse areas. The cohort group of students remains together throughout the program, which includes ten courses over a 16-month time frame. Each course in the curriculum is linked and courses are delivered asynchronously through the Moodle web-based platform. The majority of the OTD students are employed full time and work in a variety of settings including academia, community, and hospital based facilities. Each course in the OTD curriculum is designed to foster active learning by including assignments that can be applied directly to each student's area of professional interest/practice. All courses include ongoing discussion forums facilitated by instructors and multiple opportunities for students to engage in reflective writing activities and peer review processes. Students are enrolled in two or three courses per semester with two visits to campus required over the entire program—one visit occurs during a leadership course, and the second visit occurs at the conclusion of students' capstone projects. The visits are intended to facilitate a sense of community among the cohort members as well as to provide a connection to the university.

The OTD program was purposely designed to facilitate a change in the learner to enable each student to translate the best available evidence to occupational therapy practice. As part of the doctoral requirements, OTD students are required to complete a capstone project, which includes development, implementation, and evaluation of an evidence-based project. This process occurs over four academic semesters and culminates in an on campus visit where students present their capstone projects via both oral and poster presentation.

During the first evidence-based practice course which occurs in the first semester of the program, students propose a focused question that addresses a dilemma in their workplace and each student performs an independent preliminary search of the evidence. In the next semester, students systematically gather literature that provides possible resolutions to their dilemma and complete assignments that begin to allow them to demonstrate skill in understanding the scientific literature. While completing these assignments, students engage in facilitated discussions related to the new skill set of obtaining, understanding, and translating the research to resolve their workplace issue. Students write a synthesis of this body of evidence and engage in a formal peer review and feedback process with students in their cohort. Thus, critical reflection and discourse are inherent in the program design through both the writing assignments and interaction with peers and instructors. The curricular intention is to promote habit formation in critical reflection, and the practice of sending the student back to the published literature and guiding him or her to articulate newly acquired knowledge and shifting perspective.

The culmination of this first part of the transformative process results in the development of the action plan for an individualized capstone project to be carried out in the student's workplace. The specific objective of this early portion of the online program is the development of professional habits and behavior patterns within a culture of support and trust. In the remainder of the online program, student capstone projects are implemented in their unique work context. Students continue to be supported by their peers in the cohort as well as the instructor who continues to require online participation through discussion prompts. This active discussion and reflection is designed to have students share their

experiences in trying out their new roles in their worksites. As the outcomes of their individual projects are shared online with their trusted peers, students have the opportunity to integrate this new learning into their previous ways of understanding their role in their own workplace. This process culminates with students formally sharing both the process and results of their implemented project during the second on-campus visit.

Method

Participants

One hundred thirteen occupational therapy doctoral students graduated from the post-professional OTD program from April 2007 to April 2013 and were included in this study. This university's Institutional Review Board (IRB) reviewed and approved the research proposal for this project. Student identifiers were removed from students' reflections and replaced with a code number to ensure confidentiality. Retrospective review of the data was considered ethical in protection of human subjects and approval was granted through exempt level review.

Data Collection

As part of the capstone project, students wrote reflections about their experiences in the program. These reflections were published in their capstone manuscripts. Their reflective writing was the last section of their capstone project and was written in fulfillment of an open ended writing prompt requesting students write an epilogue of their journey. As a way of having students critically reflect, a portion of the last chapter of the written capstone project is titled "Final Reflections" in which students reflect on their experience in the program. Review of these written reflections formed the basis for this current study exploring transformative learning in this online doctoral program.

Members of the program faculty familiar with transformative learning theory noticed that some students described experiences suggestive of disorienting dilemmas, critical self-reflection, altered perspectives, and plans for acting differently in the world and their workplace. This recognition led members of the faculty to methodically analyze the reflections for themes related to transformative learning.

Data Analysis

The framework of the Person-Environment-Occupation (PEO) Model (Law et al., 1996) was used as the first level of systematically categorizing the written reflections considering the elements that impacted the students' performance. This occupational therapy model asserts an individual's performance emerges as the result of the "transaction that occurs among the person, environment, and occupation in which the person engages" (p. 17). In doing so, the framework of the model also offers concrete parameters for defining each of the three components (person, environment, and occupation).

The *person* in the PEO model is considered to be a composite of physical, cognitive, and affective components that enable the individual to do, think, and feel. The *person* in this study is the OTD student (*learner)* who can be described as being a "dynamic, motivated and an ever-developing being, constantly interacting with the environment" (Law et al., 1996, p. 17).

The PEO model characterizes the *environment*, as "the context within which the occupational performance of the person takes place" (Law et al., 1996, p. 17). In this study, the *environment* is the *online learning context*. The environment (learning context) includes consideration of cultural, institutional, physical, and social elements that have the potential to impact one's performance.

Occupations in the PEO model "include activities and tasks done to complete a purpose" (Law et al., 1996, p. 17). Amidst a variety of formal definitions in the occupational therapy literature, occupations have been defined as "…activities that bring meaning to the daily lives of individuals…and enable them to participate in society" (American Occupational Therapy Association, 2011). The *occupation* of interest in this study is the *student's active participation and learning* in the OTD program.

The theoretical thinking behind using the PEO model for categorizing the student reflections is that when the three components of the model are working in synchrony, the individual is able to successfully engage in desired occupations within the contextual confines associated with the occupation. This engagement is referred to as *occupational performance*. In this study, the online OTD program, a deliberately structured learning process, is intended to influence the way the student thinks about and engages in new ways of providing evidence-based occupational therapy services at the student's worksite. The PEO model further asserts if one or more of the three components (Person, Environment or Occupation) negatively impacts the "fit" with the others in some way, occupational performance may be impacted. If the three components are working together with good "fit" the authors assert that transformative learning may result.

Student reflections were analyzed and categorized into reflections about the Person/Learner, Environment/Learning Context, and the Occupation/Student Engagement with the Curriculum/Active Learning. These three distinct areas allowed for the thematic analysis of student reflections as pertaining to: a) statements which reflected transformative learning experiences through the unique perspective changes in person (Learner), b) comments about the online curriculum (Learning Context), and c) what the students did as a result of the design of the online curriculum (Active Learning).

Of the 113 reflections which ranged in length from one to four pages, 79 (70%) revealed reflective writings that were independently judged by five faculty members to include statements of transformative learning. These student reflections contained unsolicited evidence, which revealed a shift in thoughts and/or feelings demonstrating the student's transformative learning as a result of the educational process of the online doctoral program. These statements included newly revised understandings of self and/or relationships with others as well as a plan to apply new perspectives to their professional activities. The 34 student reflections (30%) that did not contain evidence of transformative learning were excluded from further analysis. These student reflections were primarily descriptions of the education process and lacked personal connection. For example, they concretely outlined the sequence of their projects and acknowledged participants and instructors.

Codes were collapsed into themes during a secondary qualitative analysis which kept the PEO distinctions intact while integrating the steps of the transformative learning process and highlighting the curriculum strategies which facilitated student change. Illustrative statements within the Person, Environment, and Occupation were independently re-read and analyzed by the authors resulting in the themes presented in the results section. The purpose of this stage of analysis was to ensure all themes related to transformative learning in the students' reflections emerged. Statements suggestive of transformative learning were compared and contrasted to clarify emerging patterns and then entered into Atlas software (ATLAS.ti Qualitative Data Analysis, 2013).

The codes were defined as part of the data analysis and organized into themes. These themes are presented in the results section. The final codes and their definitions which resulted during data analyses are included in Tables 1, 2, and 3.

Table 1 *Person/Learner Related Codes*

Code	Definition
Early Positive Feelings	statements that indicate positive emotions at the beginning of the program prior to implementation of project, energized, intellectually engaged, the Ah ha! moment
Late Positive Feelings	statements that indicate positive emotions occurring during or after implementation of project (energized, intellectually engaged, the Ah ha ! moment) related to the OTD program
Early Negative Feelings	statements that indicate negative emotions at the beginning of the program prior to implementation of project, frustration, disappointment, anger, hopelessness
Late Negative Feeling	statements that indicate negative emotions during or after implementation of project, frustration, disappointment, anger, hopelessness
Awareness/Beliefs	statements that reflect awareness of one's own existence, sensations, thoughts, surroundings, fund of knowledge, spiritual feelings, possession of qualifications to perform professional role, having suitable or sufficient skill; statements about the person's worldview, opinion or conviction about their view of the profession, external to the person - connections to people or concepts
Individual Growth	statements that reflect development of capacity, integrating new knowledge with prior knowledge, gaining insight, the I learned statements
Professional Goals	setting or having plans for one's future as an occupational therapist, professional agenda
Personal Goals	setting or having plans for one's future as a human being not related to role as an OT

Reliability

To ensure reliability, the authors developed preliminary code definitions and re-examined the statements against these definitions. Codes were subsequently revised for the purpose of independent sorting into three categories; person/learner, environment/learning context, and occupation/active learning. Some codes were combined, and others deleted in this process as faculty met and discussed their independent results. This discussion continued until the faculty agreed upon the placement of the codes within the three categories. To establish rigor, graduate students were also trained in the coding process and their results were compared to those of the faculty. When discrepancies were identified they were discussed until consensus emerged among the authors.

Table 2 *Environment/Learning Context Related Codes*

Codes	Definition
Job Supports	people or situations at the person's work environment that enhance or assist the participation of their role as an OTD student
Family	people or situations in the person's family (mother, father, spouse sister, brother, etc.)

Supports	that enhance or assist the participation of their role as an OTD student
Faculty Supports	people teaching in the OTD Program that enhance or assist the participation of their role as an OTD student
Cohort Supports	peers in the OTD Program that enhance or assist the participation of their role as an OTD student
Evidence Supports	content of peer reviewed literature that enhance or assist actualization of the Capstone project
Job Barriers	people or situations at the person's work environment that detract from the person's ability to participate in their role as an OTD student
Family Barriers	people or situations in the person's family (mother, father, spouse sister, brother, etc.) that detract from the participation of their role as an OTD student
Faculty Barriers	people teaching in the OTD Program that detract from the participation of their role as an OTD student
Cohort Barriers	peers in the OTD Program that detract from the participation of their role as an OTD student

Table 3 *Occupation/Active Learning Related Codes*

Codes	Definition
Student Roles & Responsibilities	statements indicating performance of assignments the rights, obligations, and expected behavior patterns associated with the OTD Program. Statements indicating performance of tasks required by the program, factual statements about required expectations.
Worker Roles & Responsibilities	statements indicating performance of job duties, the rights, obligations, and expected behavior patterns associated with carrying out the role of an occupational therapist. Statements indicating action of presently doing, and/or engagement in current actions in work setting

Results

The results of the secondary qualitative analysis of the OTD students' reflections were synthesized to reflect the steps of transformative learning and to address the two research questions that guided this inquiry. Multiple themes emerged and are presented in Table 4.

Table 4 *PEO Themes*

PEO	Themes
Person/Learner	Disorienting Dilemma Critical Reflection
Environment/Learning Context	Cohort and Dialog Experience of Curriculum
Occupation/Engagement/Active learning	Action on New Meaning Perspectives

Person/Learner

Disorienting Dilemma and Critical Reflection

For working professionals, deciding to take on the role of student, while employed full time, is a significant undertaking. Many students reflected upon why they made the decision to enroll in an online post professional doctoral program and what they hoped to gain. As in the theory of transformative learning, students often make a deliberate choice as a result of some dilemma they are facing. Over 50% of students identified some struggle they were facing which resulted in their pursuit of a doctoral program. Some students looked to the program to expand their general knowledge base; some noted the specific purpose of becoming an evidence-based practitioner, while others were looking to further their teaching skills. The following quotes illustrate the dilemmas encountered by some of the OTD students:

- "I recognized that I was at a crossroads in my career as an occupational therapist. I needed to expand my knowledge in order to be the best practitioner I could be."

- "Having recently been downsized from a 20 year OT director role due to corporate cost cutting, I was working to re-engineer my professional occupations and stability. I had combined practitioner, manager, and educator roles throughout my career, and had always hoped to try full-time teaching before I retired."

- "Before I embarked on this doctoral journey, many people would ask me why I wanted to pursue it. And although I always offered some reasonable answer, I really wasn't altogether sure myself. I enjoyed my job and was successful at it, but something was missing. I needed more."

While engaged in the classes during the 16-month process of formulating and implementing their individual capstone projects, students reflected on their experiences. Thirty-eight students contributed phrases that illustrated self-awareness and critical reflection such as needing to find balance, direction for their projects, mastery of the process and stress management. It was clear in the written reflections that students experienced several disorienting dilemmas during the process, and that while fully engaged in

the curriculum they acquired the knowledge and skills to move through the disorienting dilemma into a transformed practitioner as a result of designing and implementing their capstone projects. For example:

- "The early stages of the journey were filled with trepidation and uncertainty – was the topic worthy of intense study; did I have the skills to find and analyze the evidence; would I be able to make correlations between the literature and what I was seeing in my work setting; would I be able to draw conclusions and make recommendations based on the evidence? Over the past year, my knowledge base has expanded and my skills have been honed – both of these factors have led to feelings of increased competence and confidence."

- "This doctoral journey has been an experience that was full of anxiety and uncertainty at times, but also brought a great deal of excitement with every element of new learning. I was encouraged by the expertise of the OTD faculty at…to go beyond my comfort zone and embrace the challenges that brought me to the finish line of becoming a doctoral level occupational therapist."

As can be seen in the above passages, students verbalized professional uneasiness or a dilemma that propelled them toward doctoral education. Once they were in the program, students reflected upon continued anxiety and uncertainty that was part of their experience. These comments are reflective of the first step in the transformative learning process.

Environment/Learning Context

Cohort and Dialog

Students reflected on the importance of the program's cohort structure, which provided shared experiences and ongoing opportunities to interact with course instructors and other students. All ten courses in the curriculum required students to articulate their developing knowledge and make critical reflections in both written assignments as well as in interactions with peers and instructors. Online discussion often focused on having students synthesize course content and relevant literature with their existing skill set and knowledge base. Fifty-eight students wrote about the importance of the cohort as a source of support during personal triumphs and challenges as evidenced by the following reflections:

- "As a cohort we have supported and encouraged one another."

- "With these early ideas and the nurturing of class discussions, I had an idea that I was passionate about and a topic on which to focus my capstone project."

- "The gifts I have received from the Program, the faculty, and the students in the cohort far outweigh those that I have provided. At no time during this process did I ever feel alone or did I ever feel like I could not reach out to someone in the class."

These quotes parallel the findings of previous literature (Gilly, 2004; Stevens-Long, Schapiro, & McClintock, 2012) that found peer and instructor relationships as crucial supports in the transformational process.

Experience of Curriculum

Another theme that emerged was how students experienced the program's curriculum and how students became more focused and engaged in the learning process as they developed their capstone

project as oppose to focusing on the outcome of their project. Students wrote about how the structure and sequence of the online program was leading to changes in how they think:

- "Overall, this process of developing a [focused question], researching the studies that provide support to the question, developing an implementation method and writing down all this information in a smooth organized manner has been very rewarding."

- "This process has taught me the importance of looking towards the evidence and using it in making decisions in how I practice occupational therapy in both the school setting and the outpatient arena. To complete this project, I have stepped outside of my traditional method for delivering occupational therapy services and have introduced a novel technique for providing services to students."

Students transformed into more discerning professionals with an enhanced self-awareness as a result of their engagement with the educational process. Forty-two statements were coded and contributed to this theme. For example, several students self-identified perfectionist qualities and wrote about a transition in the way they thought about these tendencies. They described how they were learning to incorporate self-perceived imperfections into a larger perspective and fund of knowledge.

- "I am a perfectionist and in my eyes achieving less than perfect would mean failure. I realized if I went through this [educational] journey and aimed for perfection I was genuinely missing the big picture. It was at this moment when I realized I had changed through this journey."

- "Pursuing a doctoral degree was not about getting A's anymore, it was about self-actualization – the process of improving myself as an OT, clinician, student, mentor, colleague, friend, and person. I've always strived for self-improvement and never a moment settled on complacency. This [educational] journey has certainly proved to me that I still have the essential tools to be anything that I want to be and pursue my dreams where my mind will take me."

Finally students reflected on how they gained new perspectives for addressing the professional dilemma that was the focus of their capstone projects. They described how they acquired needed information and critically incorporated it into their professional plans and activities.

- "This information [acquired during the capstone process] confirmed my interest and emerging passion for reaching out to families. Although it seemed a tremendous task to live up to their expectations and provide them with the assistance and information for which they seemed desperate, I soon realized that the most important thing I was providing the participant with was an opportunity to develop relationships with one another."

- "A sense of enthusiasm and confidence was reignited. This was what the whole process was supposed to be about. The final semester flew by, and what a different mindset I was in. I could hardly wait to implement my intervention, document results and then share them with anyone who would listen."

In these quotes students acknowledged a shift in personal perspectives from the time they began the program. These can be seen on both a personal and professional level, with comments related to changes in confidence and self-awareness. Within transformational learning theory, this constitutes the

middle to latter stages of the process, where students develop revised self-concepts, and a readiness for change.

Occupation/Active Learning

Action on New Meaning Perspectives

Many students commented on new directions for their career as a result of being changed by their engagement in the online doctoral learning process. Forty-seven different students' reflections revealed a reorganized and re-energized view of their ability to contribute to the profession as well as a significant gain in their unique skill sets that will allow them to practice differently. For example:

- "This entire process has made me aware of the duty and responsibility that I have as an occupational therapist to physically, socially, morally, and financially support our professional organizations. Knowing what evidence-based practice is has changed the way that I reason in the clinical setting. This process has taught me the importance of seeking definitive answers as I implement occupational therapy interventions to consumers."

- "This doctoral journey has been a process not solely a destination. It was filled with many struggles and triumphs; experiences that have made this process more fulfilling and rich. I am a different clinician and person as a result of this process. I am different because I have changed and without change there is no growth. I am fortunate for this experience, as it has shaped my professional and personal life in an intangible way. It has changed me in a manner in which cannot be fully explained but must be experienced."

The above quotes reflect students' increased confidence in their new roles and awareness of positive change. Comments no longer relate to the dilemma of the early stages of the process, but rather indicate a stronger sense of professional identity and a belief in the capacity to use the skills fostered in the program to effect positive change moving forward.

Discussion

The qualitative analysis of students' written reflections provides valuable evidence related to the transformative learning process of adult learners in an online doctoral program to answer the first research question that guided this study. In reviewing and coding data, the authors gained an acute awareness that inherent to the transformative process, the students experienced an internal struggle/dilemma that prompted them to intentionally engage in the process of pursuing the clinical doctorate. This dilemma varied by student but was commonly associated with a feeling of professional uneasiness such as experiencing a clinical dilemma, being at a career crossroads, working with peers who had acquired a clinical doctorate, and academicians seeking a terminal degree. Students wrote about their experiences of critical self-reflection, acquiring and synthesizing new knowledge, relationships, and interactions triggered by planning and implementing of their capstone project within the program. A theme that emerged from the majority of their statements was the formation of new professional goals and plans based on their transformed perspectives. In summary there is evidence of transformative learning in the written reflections of occupational therapy students upon completion of the online OTD program. These changes described by the OTD students in this study were similar to those described by Stevens-Long, et al. (2012) in that they reflected changes in personal, cognitive, and behavioral development and were focused at the *person or learner* level.

The intention of the second study question was to learn how the design of an online doctoral program might facilitate a student's progression through the stages of transformative learning. Student references to growth experiences in the curricular context of the program were classified in the environment/learning context category. Recognition of supports and barriers experienced during the OTD program are consistent with Taylor's (2007) description of the role of context in transformational learning. One of the most frequently noted components of support was students within the cohort. The program was intentionally designed with the expectation that the cohort model would facilitate sharing and comparing of information as well as peer support. Additionally, structuring the program so that the students continue with the support of their peers and instructor while in the implementation phase of the program allowed students to try out their roles in their workplace whereby completing the process of transformative learning. Students did not just intellectually understand the role of becoming an evidence-based practitioner, they remained supported by their peers in the program who challenged them to reflect while they were actively engaged in the process. This important curricular intention of keeping students engaged with the instructor and their peers while implementing their capstone projects supports the final phase of transformative learning shared by Cranton and Carusetta (2004), who propose the critical value in allowing students to try out the new role and integrate the new learning. The transformative learning process was fostered through to the final stage as students continued online engagement with their supportive peers and were challenged to make sense of the new experiences in the facilitated online discussions. Upon completion of the capstone implementation, a final seven week online course where students analyze, reflect on and discuss the outcomes of their capstone projects occurs. This final round of critical reflection and dialog with the cohort enables the students to take ownership of their transformed abilities and action in the world.

In the present study, the investigators noted that the OTD students who experienced a transformation in their learning reported that being part of an interacting cohort had a positive impact on their learning. This positive effect of the cohort model is consistent with transformative learning literature. Eisen (2001) regarded peer dynamics as an important component in transformative learning. Taylor (2007) reported the establishment of relationships and dialog with others as essential to the transformative experience. This study validates and adds to the existing literature the necessary and important element of online curriculum design that supports students through the implementation of doctoral projects. The online support provided to the students through their peers in the cohort particularly during the final phase of the program allows them to experience and reflect on their new way of viewing their transformed perspectives.

Through the process of coding, the authors noted disparity in the frequency of responses illustrating the three aspects of the PEO model. There were significantly more reflective quotes that supported the Person/Learner and Environment/Learning Context categories. The reason for this may be that the prompt for guiding the reflection was open ended and did not direct the student to share reflection on active learning. The reason for this disparity is beyond the scope of this article but may be a topic of interest for those researching student reflection and online learning.

Limitations

The results of this study are a reflection of the perspectives of a limited number of students from one university's program, and therefore may not be generalizable to other online post-professional programs. Variations in curricular focus and sequence may further restrict the generalizability of this research to other online programs. Additionally, the participants were a highly motivated group of individuals seeking further professional development, which may have accounted for their readiness for transformative learning.

Furthermore, students were prompted to reflect on their experience in the program within the context of a course assignment and were aware that the primary instructor, possibly influencing their responses, would read their reflections. The reflection prompt did not directly guide the students to reflect on their OTD experience within the lens of transformative learning.

Future studies should include a larger sample size from a variety of online post-professional programs throughout the country. An opportunity to reflect on the experience should be available to students outside of the structure of a class assignment.

Conclusion

This study supports the notion that transformative learning occurred in a cohort of online doctoral students as evidenced by their written reflections. Students reported individual growth, increased self-awareness, and an acknowledgement of the transition from early feelings of apprehension and self-doubt to increased confidence and comfort with the concept of change. Students also reported the impact of the program on their professional trajectory by describing their commitment to engagement in evidence-based practice and leadership within their professional roles.

The qualitative analysis demonstrated that the multiple steps of the transformative process occurred in the online environment. The majority of students experienced a disorienting dilemma, and had multiple opportunities for critical reflection and discourse throughout the program. The situated capstone portion of the program provided active learning in each student's unique worksite making the personal transformation more evident to the student.

Purposeful curriculum design further contributed to transformative learning of students. The sequence of course delivery guided the students through the transformative process and allowed for individual growth. The findings of this study have implications for both educators and students. Although the study was conducted with post-professional occupational therapy doctoral students, it is anticipated that other professional educational programs and students may benefit from utilizing strategies employed by the authors to promote transformative learning. Strategies such as active learning, assignments that directly apply to and allow students to carry out their new roles in their work settings, implementation of a cohort model, and use of critical reflection have been shown to be effective in facilitating transformative learning in an on-line learning environment.

References

Allen, S.J. (2007). Adult learning theory & leadership development. *Leadership Review, 7*, 26-36.

American Occupational Therapy Association. (2011). The philosophical base of occupational therapy. *American Journal of Occupational Therapy, 65*(Suppl.), S65. doi: 10.5014/ajot.2011.65S65.

ATLAS.ti Qualitative Data Analysis. (2013). A world of data in your hand ATLAS.ti. Retrieved from http://www.atlasti.com/index.html

Benson, R., Hewitt, L., Heagney, M., Devos, A., & Crosling, G. (2010). Diverse pathways in higher education: Using students' stories to identify transformational experiences. *Australian Journal of Adult Learning, 50*, 26-53.

Boyd, B. (2009). Using a case study to develop the transformational teaching theory. *Journal of Leadership Education, 7*(3), 50-58.

Boyer, N., Maher, P., & Kirkman, S. (2006). Transformative learning in online settings: The use of self-direction, metacognition, and collaborative learning. *Journal of Transformative Education, 4*(4), 335-360.

Cranton, P., & Carusetta, E. (2004). Perspectives on authenticity in teaching. *Adult Education Quarterly, 55*(5). DOI: 10.1177/0741713604268894

Eisen, M.J. (2001). Peer-based professional development viewed through the lens of transformative learning. *Holistic Nursing Practice, 16*, 30-42.

Gilly, M. (2004). Experiencing transformative education in the "corridors" of a nontraditional doctoral program. *Journal of Transformative Education 2*(3), 231-241.

Henderson, J. (2010). Transformative learning: Four activities that set the stage. *Online Education.* Retrieved from http://www.uwex.edu/disted/conference/Resource_library/proceedings/28439_10.pdf

Hollis, V., & Madill, H. (2006). Online learning: The potential for occupational therapy education. *Occupational Therapy International, 13*, 61-78.

Law, M., Cooper, B., Strong, S., Stewart, D., Rigby, P., & Letts, L. (1996). The person-environment-occupation model: A transactive approach to occupational performance. *Canadian Journal of Occupational Therapy, 63*(1), 9-23.

Langley, M.A., & Brown, S.T. (2010). Perceptions of the use of reflective journals in online graduate nursing education. *Nursing Education Perspectives, 31*(1), 12-17.

Matthew-Maich, N., Ploeg, J., Jack, S., & Dobbins, M. (2010). Transformative learning and research utilization in nursing practice: A missing link? *Worldviews on Evidence- based Nursing, 1*, 25-35.

Meyers, S. (2008). Using transformative pedagogy when teaching online. *College Teaching, 56, 4*, 219-224.

Mezirow, J. (1997). Transformative learning: Theory to practice. *New Directions in Adult Continuing Education, 74*, 5-12.

Mezirow, J. & Associates. (2000). *Fostering critical reflection in adulthood.* San Francisco, CA: Jossey-Bass.

Olaniran, B. A. (2005). Computer-mediated communication as an instructional learning tool: A course evaluation. In P. Comeaux (Ed.), *Assessing Online Learning (pp. 144-158).* Massachusetts: Anker Publishing Co.

Santalucia, S., & Johnson, C.R. (2010). Transformative learning: Facilitating growth and change through fieldwork. *OT Practice, 15*(19), CE1-CE7.

Schön, D. A. (1987). *Educating the reflective practitioner: Toward a new design for teaching and learning in the professions.* San Francisco: Jossey-Bass.

Simons, D., Baron J., Knicely, K., & Richardson, J. (2001). Online learning: Perspectives of students and faculty in two disciplines—occupational therapy and teacher education. *Occupational Therapy in Health Care, 14*, 21-53.

Smyth, S., Houghton, C., Cooney A., & Casey D. (2012). Students' experiences of blended learning across a range of postgraduate programmes. *Nurse Education Today 32*(4), 464-468.Statistic Brain Research Institute (2013), Retrieved from http://www.statisticbrain.com/online-university-statistics/

Stevens-Long, J., Schapiro, S. A., & McClintock, C. (2012). Passionate scholars: Transformative learning in doctoral education. *Adult Education Quarterly, 62*, 180-198.

Taylor, E. W. (2007). An update of transformative learning theory: A critical review of the empirical research (1999-2005). *International Journal of Lifelong Education, 26*, 173-191.

SECTION III: Faculty Issues

Supporting Online Faculty through a Sense of Community and Collegiality

Aimee LaPointe Terosky
Saint Joseph's University

Chris Heasley
Drexel University

Abstract

In this qualitative study, we examine the experiences of seven tenure-track and non-tenure track current/future online faculty through the conceptual lenses of sense of community (McMillan & Chavis, 1986) and collegiality (Gappa, Austin, & Trice, 2007). We found: (1) participants reported that their sense of community and collegiality around online course development and teaching was lacking, (2) participants' communities for online teaching, if available, primarily focused on technical support, and (3) participants desired greater community and collegiality for philosophical and psychological concerns with the medium of online teaching. We conclude with recommendations for practice for online faculty professional growth.

Introduction

With an increase in the number of online courses being offered in higher education, college and university faculty face growing pressure to develop and teach online courses (Allen & Seaman, 2011, 2013). As a result, we ask 'How are faculty being prepared for this professional endeavor?' The past two decades have seen significant growth in the creation of teaching and learning centers and professional development offerings for online faculty, as well as knowledge-sharing consortiums, recognition programs for exemplary models (e.g., Sloan-C Excellence in Faculty Development for Online Teaching), and scholar/practitioner journals dedicated to online education (Meyer & Murrell, 2014). Yet, despite this noted progress, a majority of faculty remains dissatisfied with their institution's support for professional development in online teaching. In a survey of 10,700 faculty members from 69 colleges and universities

across the United States, Seaman (2009) reports that the vast majority of faculty participants described their institutions as below average in providing support and incentives for online teaching (see Herman, 2012) and 19% of the institutions had no professional development offerings specific to online teaching (see Allen & Seaman, 2010). Moreover, scholars and practitioners in the field of faculty development question the effectiveness of some of the current approaches to professional development for online teaching along three lines: its reliance on "one-shot" workshops, its focus on content-neutral training on technology tools, and its lack of collaborative learning communities (Hollenshead, Waltman, August, Miller, Smith, & Bell, 2007; Koehler, Mishra, Hershey, & Peruski, 2004; Sherer, Shea, & Kristensen, 2003). The latter is the focus of this article.

To define a collaborative learning community, we borrow from Fulton and Riel: "a group of individuals who are interested in a common topic or area and who engage in knowledge-related transactions as well as transformations within it" (1999, p. 8). Extant literature on academic careers highlights the significance of collaborative learning communities for faculty professional growth, motivation, teaching effectiveness, job satisfaction, and retention (Cox, 2004; Gappa, Austin, & Trice, 2007; Haviland, 2011; Neumann, 2009; O'Meara, Terosky, & Neumann, 2008; Puzziferro & Shelton, 2009; Rice, Sorcinelli, & Austin, 2000). In their faculty professional growth model, O'Meara, Terosky, and Neumann (2008) include professional relationships as one of four key tenets, largely because professional relationships "stimulate, facilitate, and shape learning" and "strengthen[s] faculty capacity to bring the best of their talents to their work roles" (p. 29). Specific to online education, studies on faculty preferences for professional development for online teaching highlight that community/collegiality-related offerings ranked high among faculty, in particular opportunities for mentoring and learning with peers (Gilbert, 1995; Herman, 2012; Kinuthia, 2005). A study of 328 online professors at 12 randomly selected community and technical colleges in the state of Washington found 87% of participants (regardless of gender, appointment type, age, experience with online teaching, and discipline) ranked interacting with other faculty on issues around online teaching as valuable (Maier, 2012). Similarly, work by Lu, Todd, and Miller (2011) highlighted that learning communities created supportive environments for faculty experimentation with teaching with technology.

Although institutions, especially research/doctoral universities and community colleges, are increasingly offering professional development opportunities geared toward learning communities (Meyer & Murrell, 2014), collaborative learning communities are not a common practice on higher education campuses (Velez, 2009), largely due to time- and resource-related constraints. As such, the majority of faculty report unsatisfactory levels of collegial interaction at their institutions (Gappa et al., 2007; Haviland, 2011; Helms, 2010; Kezar, 2012), especially online faculty who are often physically separated from colleagues and students due to the nature of online courses (Dolan, 2011; Glass 2012; Haber & Mills, 2008; McLean 2006; Maier, 2012) and non-tenure track/adjunct faculty who garner fewer professional networks because of their lack of involvement in shared governance, reduced time on campus (Kezar, 2012; Maier, 2012), and high teaching loads (Meyer & Murrell, 2014).

In light of expert recommendations for promoting collaborative learning communities among faculty, as well as the challenges of doing just that among online faculty, we turn to two conceptual frameworks, sense of community and collegiality, to better understand the perspectives and experiences of faculty who currently teach online courses or who indicate an interest in learning more about online education. Specifically we asked two questions:

1. Do participants perceive a sense of community and collegiality around online course development and teaching?
    - If yes, in participants' perspectives, what does the community provide in terms of online course development and teaching?

2. According to participants' points of view and experiences, would they benefit from a sense of community/collegiality around their current/future/potential online course development and teaching?
    - If yes, how so?

Conceptual Frameworks

This study is grounded in the conceptual frameworks of sense of community and collegiality. Sarason (1974) defined sense of community as the sense that one is a part of a larger "mutually supportive network of relationships" (p. 1). McMillan and Chavis (1986), whose framework remains the most widely used for sense of community research, defined it as "a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together" (p. 9).

Operationally, the McMillian and Chavis (1986) framework is comprised of four elements: membership, influence, reinforcement of needs, and shared emotional connection. The first element, *membership*, is grounded in personal ownership and investment with the community, thereby establishing boundaries that provide a safe environment in which members are able to be emotionally vulnerable. The second element, *influence*, is defined as a reciprocal relationship that provides a sense of mattering, in which members feel as though they are contributing to the community while the community is also influencing them. The third element, *reinforcement of needs*, highlights that the integration and fulfillment of individual and community needs is a requirement for a sense of togetherness within a community construct. The last element, *shared emotional connection*, is the "commitment and belief that members have shared and will share history, common places, time together, and similar experiences" (McMillan & Chavis, 1986, p. 9).

A second conceptual framework guiding our study is collegiality, which is a commonly used construct in the higher education literature. In defining collegiality, we rely on Gappa, Austin, and Trice (2007): collegiality is faculty members' ability to belong to a community of colleagues who value their contributions to the institution. It highlights opportunities for faculty members to learn from one another by having a sense of belonging and inclusion (see also Kezar, 2012). Resonating with the conceptual framework of community of practice, learning is viewed as a cognitive act situated within social interactions and communities rather than individually acquired (Brown, Collins, & Duguid, 1989; Lave, 1997; Vygotsky, 1978; Wenger, 1999). "Social interactions with significant others and membership in groups" writes Glass, "are not peripheral forces influencing a person's actions; they are generative forces involved in the very production of a person's activities and ways of making meaning of the world" (2013, p. 6).

In their research-based framework for essential elements for effective faculty work, Gappa et al. (2007) included collegiality alongside equity in academic appointments, academic freedom, ensuring flexibility in academic appointments, and professional growth. They argue that if these five essential elements are in place, there are numerous positive outcomes for faculty work, including: "increased satisfaction, a sense of meaningfulness, increased commitment to organization, enhanced recruitment and retention, broader spectrum of individuals represented on the faculty and more strategic utilization of intellectual capital" (in Kezar, 2012, p. 10).

The complementary conceptual frameworks of sense of community and collegiality ground this study of current and future online faculty members as we strive to better understand how to support all faculty engaging in online education. We use the concept of sense of community to concentrate on faculty perceptions around their network of supportive relationships, while the concept of collegiality hones in on faculty-to-faculty interactions, which is a shared value in academia.

Methods

This qualitative study follows in the tradition of narrative inquiry (Vogt, Gardner, & Haeffele, 2012). We examined seven faculty members' perceptions of sense of community and collegiality around online course development and teaching. The research site, Metropolitan University (MU) (a pseudonym), is a private university located in a major metropolitan area. With an undergraduate and graduate student population in excess of 7,000, MU employs more than 300 tenure-track faculty and 350 non-tenure track faculty. We selected MU for a number of reasons: (a) its significant increase (approximately 100 percent growth) in online course offerings over the past five years due to market forces and/or mandates from upper-and-middle level administrators, (b) its mission statement and institutional culture prioritizing and rewarding effective teaching and concern for students, (c) its historical and rigorous face-to-face liberal arts education program, (d) its reliance on faculty to develop and teach online courses in a relatively limited academic technology infrastructure, and (e) its desire to evolve its faculty development program to better support online faculty.[1] We believe that MU contains characteristics relevant to other institutions of higher education, especially institutions with limited resources (i.e., budgets, personnel) for faculty development in online teaching and/or institutions without a history in online education.

Participants and Data Collection

Although MU has significantly increased its online offerings over the past five years, the majority of faculty are characterized as cautious about online education and only approximately 15% have developed or taught an online course. With continued pressure on MU faculty to develop and/or teach online courses, we decided to follow purposeful sampling methods (Creswell, 2012) by targeting faculty members indicating experience or interest in online education in hopes of learning if and how they feel supported in their online efforts. As such, we drew our participant sample from a list of 12 faculty members who attended a voluntary MU sponsored professional development workshop on best practices in online education[2] offered two weeks after the end of a spring semester. We emailed all 12 faculty members in attendance inviting them to participate in our research study and seven agreed to participate. Our sample of seven includes a diverse range in appointment type (three full-time faculty and four part-time/adjunct faculty), experience in teaching at the higher education level (ranging from one to more than 25 years), and experience with online course development and teaching (ranging from zero to six years) (See Table 1 below for participant demographics). Except for an annual one-day conference on teaching with technology that draws a larger crowd, the sample size of this study is representative of the typical attendance at MU's online faculty development workshops and programs.

Analysis and Trustworthiness

We followed a manual coding process (Saldaña, 2012) through which we read transcripts independently and identified relevant areas of the transcripts where faculty spoke about sense of community/collegiality in online course development and teaching. Throughout our reading of the

[1] At the time of data collection, MU's faculty development offerings for online teaching primarily included: half-day workshops and online modules on the course management system and its tools, instructional design consultations, annual (one day) conference on teaching and learning with technology, innovation grants, and support for technology in the face-to-face classroom setting.

[2] The one-day workshop agenda covered the following topics: instructional design, strategies for online course management, online tools and best practices, and support services for online education at MU.

transcripts, we asked ourselves the following analytical questions: (a) Do faculty members talk about a sense of community/collegiality around online course development and teaching, and if so, how do they do so? (b) If applicable, what do faculty discuss as sources of support (or lack of support) for their current or future involvement in online education? (c) Do faculty share what areas of online education they feel the most in need of support through a sense of community/collegiality? We developed a list of potential code names to describe common ideas and actions. After reading and notating transcripts independently, we jointly developed a master code-list that we used for subsequent coding cycles. In latter coding cycles, we read across the transcripts to combine common codes in order to develop more robust themes. The final step in our analysis was to examine our codes and themes according to variables among our participant pool, including appointment type, gender, and years of experience with teaching and online education.

We used five strategies to enhance the trustworthiness of this work (Vogt et al., 2012). First, two of us (multiple investigators) were involved in conceptualizing this study. Second, a graduate research assistant, who transcribed the interviews, acted as a critical friend in the analysis. Third, we shared our work with three noted scholars and/or practitioners of online education during our analysis stage. Lastly, we displayed quotes from the participants, as much as possible based on page limitations, in order to allow readers to develop a sense of the data and participants. Despite our focus on trustworthiness, this study has limitations related to sample size and therefore we do not strive for generalizability. Instead, we strive for a discussion of meaningful concepts (Erickson, 1985) that emerged from the perspectives and actions of a group of faculty characterized as engaged in online education—or those with a willingness to learn more about online education—in hopes of creating valuable frameworks that may guide scholars, practitioners, faculty members, and staff developers of online education.

Findings

Participant Variables

As previously mentioned, we followed purposeful sampling methods in that we invited faculty members who demonstrated an interest in online education by their attendance at a voluntary workshop. Our sample of participants held a number of variables in terms of discipline, years of experience, and appointment type. Following our analysis, we noted that the most consistent variation in responses among the participants related to appointment type, specifically differences about perceived sense of community/collegiality between those employed full-time and those employed part-time, as well as those with more years of experience with online education. Throughout our findings, we note variations among participant sample variables when highlighting the themes that emerged from our analysis.

Perceptions of Sense of Community and Collegiality

In this study, we had two inquiries. The first questioned if participants perceived a sense of community and collegiality around online course development and teaching, and if they did, in what ways did they benefit. In response, both the full-time and part-time participants noted that a sense of community and collegiality around online teaching was lacking. Full-time faculty described their current online course development process as one in which they are primarily "on [their] own." However, they noted that, if desired and self-initiated, they could leverage their established networks of colleagues for assistance with their online courses, albeit this assistance typically revolved around "technology help."

Part-time participants not only felt that a sense of community and collegiality around online teaching was lacking, but argued it was essentially non-existent. When asked to describe their process for their current/future online course preparation, part-time participants used language such as "left to your own devices," "trial by fire," "sink or swim," and "out of the loop." "I don't think" shared Ben, a part-

time faculty member with experience teaching online, "there is a great community of online people that I could turn to." Evident in the voices of part-time participants is a frustration with the lack of even a minimal level of support from their colleagues, similar to trends in the extant literature on the experiences of non-tenure track/adjunct faculty (Kezar, 2012).

Table 1 *Demographics of Participants*

Pseudonym	Gender	Discipline	Appointment Type	Years of Teaching (f2f) Experience	Number of Online Courses Developed	Number of Online Courses Taught
Charlie	Male	Humanities/Social Sciences	Full-time, Non-tenure track	25+ years	One	Zero
Ben	Male	Applied	Part-time adjunct, Non-tenure track	5-9 years	One	One course for one year
Leslie	Female	Humanities/Social Sciences	Full-time, tenure track, Associate Professor	10-14 years	One	One course for six years
Maggie	Female	Sciences	Part-time adjunct, Non-tenure track	1-4 years	Zero	Zero
Nolan	Male	Humanities/Social Sciences	Part-time adjunct, Non-tenure track	25+ years	Zero	Zero
Olivia	Female	Applied	Part-time adjunct, Non-tenure track	1-4 years	Zero	Zero
Thomas	Male	Humanities/Social Sciences	Full-time, tenure track, Associate Professor	25+ years	Two	Two courses for five years

For data collection, we conducted 60-90 minute semi-structured interviews with each of the seven participants. The interviews consisted of four major sections. First, we began conversationally with "grand-tour questions" (Spradley, 1976) concerning the faculty members' entrances into higher education and face-to-face, hybrid, and/or online teaching. Then, we inquired about their philosophy of education, before moving on to how each develops their face-to-face, hybrid, and/or online courses. We concluded with questions related to their assessment of support and sense of community/collegiality around online course development and teaching. All interviews were recorded and transcribed. In addition, we reviewed relevant documents when made available by the participants, including curricula vitae, syllabi, and face-to-face or online course materials.

Like the full-time faculty, the onus rested with the part-time faculty members, and in turn, they had to self-initiate pathways to learn about and/or improve their skill set around online teaching, with the most common strategies being personally paying for and completing courses on online pedagogy and technology, reading books about online pedagogy and technology, seeking feedback from external networks or students, and attending technology workshops sponsored by MU.

In summary of our study's first question, all of the participants agreed that a sense of community and collegiality around online course development and teaching was lacking, especially so for part-time participants. If participants received support in regard to their current/future online development and teaching experience, it was self-initiated and focused on technology skills. Despite the limited range of perceived support, participants welcomed opportunities for increased interactions with colleagues around online teaching. Next, we share findings on our study's second question, which directly and indirectly explored participants' perspectives on how they might benefit from a sense of community around online teaching.

Perceived Benefits of a Sense of Community/Collegiality

In-depth analysis of participants' narratives revealed that areas beyond technical skills—needs of a philosophical or psychological nature—were pressing in their reflections about online teaching. As such, participants significantly desired a community of colleagues in which to grapple with these issues, challenges, and opportunities. This is not to suggest participants did not value the available technical assistance, largely in part because technology skills are such a basic need for an online educator, but it does suggest participants had other needs that warranted attention. In this next section, we lay out our key findings in this regard, which included: (a) philosophical questions around the nature of online courses, and (b) professional work and identity issues regarding the changing nature of the teaching aspect of professorial work.

Philosophical questions around the nature of online courses. All participants except one were willing to teach online. The lone outlier, Nolan, a part-time faculty member, conducted extensive research on online courses (e.g., attended professional development workshops on online education, read books and articles about online education, audited a colleague's online course) and determined that at his "stage of life" he had the option to refuse to move his teaching to an online format. Despite their willing dispositions (and unwillingness in the case of Nolan) toward online course development and teaching, participants commonly questioned online teaching at a philosophical level.

This questioning can first be seen in the origins of participants' involvement in online courses. They became interested in online education or began developing and teaching online courses for pragmatic reasons, such as current economic contexts and/or student trends, rather than viewing it as a superior form of teaching or as a "burning desire" to engage in this method of instructional delivery. Most of the participants realized online courses were the "way of the future" and therefore decided to "get on the train" out of necessity. "I see a lot of the education here [at MU] going online," reflected Olivia, a part-time faculty member, "So I didn't want to become a dinosaur teaching a class." Similarly, Thomas explained his reasons for adopting online education by sharing, "It's the way of the future in adult education and it is an accommodation to the kinds of students that need the convenience of online education because of their lifestyles." Leslie, a full-time faculty member, explained, "Online is here to stay and there is not really a choice per se and I don't think departments and the university [are] doing enough on sending that message to teachers." The impetus for participants' involvement in online education is important; their initial reasons for adopting online education speaks to pragmatics rather than to philosophical alignment. More so than traditional, face-to-face teaching, most participants were still in flux as to whether their educational philosophies were in agreement with the structure of online teaching,

and therefore they were in the process of reconciling their own preconceived notions about the value of such.

Charlie's case speaks clearly to this issue. Charlie, a full-time faculty member who is currently developing his first online course, values multi-sensory and multi-modality forms of teaching and he greatly questions if the atmosphere created in his classroom could be projected online. Moreover, he contends that it is challenging to re-create the "organic" and "spontaneous" nature of face-to-face discussion sessions. In face-to-face classes, Charlie explains:

> Say you were talking about this idea. "Could you explain this a little further?" And then that bounces to somebody else so you have a sense of what everyone in the classroom has done and what grows out of that is something…like a symphony. And technology gets in the way of that, rather than expediting that. Because when one idea clicks off another and you see people and you see and feel their reactions, there is emotion involved that I don't think is easy to capture online.

In addition to his concerns around face-to-face and online interactions, Charlie also presumes that "it may take longer to develop the trust factor" among the students and between student and teacher. Because his assignments are often structured to push people's thinking on sensitive issues, he takes very seriously the quality of interactions and trust among and with his students.

Beyond concerns around the nature of online versus face-to-face interactions, most participants questioned the academic quality and rigor of online courses. This finding mirrors the results of a recent national survey of approximately 2,500 faculty members and technology administrators which found that 85% of faculty believe the quality of online courses is lower than face-to-face courses (Jaschik & Lederman, 2013; see also Herman, 2012) and less than one third of academic officers believe their faculty are accepting of the value and legitimacy of online education (Allen & Seaman, 2010). Although stating that there are "good things about online teaching," Nolan, the part-time participant who opted out of online teaching, lays out key questions for institutions of higher education:

> So a lot of universities are putting stuff online. Is it valid? Is it driven by the buck? Is it something worthwhile? Is it something that is good to do? Well that kind of gets lost in the profitability and revenue because once the revenue comes through, it's like, "Holy mackerel, look at what we're making here." …[T]he [university's] philosophy could easily get lost someplace…I would want to see valid data, valid statistics that say, "Yes, online training, learning wise and application wise, is as good as the classroom."

As if reflecting on Nolan's questions, Ben, a participant with face-to-face and online teaching experience, would respond that elements of online education are not as good as the classroom. For example, he questions the rigor of online discussion boards because they "lack critical thinking." As a workaround, Ben assigns simulations and critical reflection papers in which he provides feedback and grades in lieu of discussion boards. Moreover, Ben and others question the students' attention and/or intentions within online courses. In comparing and contrasting his face-to-face and online students, Ben notes "I think it is extremely challenging to get the same quality into the online situation. I don't feel like I can get as much quality time with [the students] because I think they're distracted doing other things and what-not." In agreement, Nolan, the faculty member who has decided to forego online teaching, argues that the type of student drawn to online education is interested in quickly "getting the task done, the course done" and "learning may not necessarily be [his/her] goal."

In sum, five of the seven participants could be described as extremely skeptical about the alignment between their current educational philosophy and practices and/or the academic quality of online education. In the case of one outlier, Thomas, a full-time faculty member with experience teaching

online courses, shared that he still prefers a face-to-face classroom setting, but as a pragmatist, he remains positive and "makes the best of online education." The second outlier, Leslie, another full-time faculty member, views teaching, whether it is face-to-face or online, through an outcomes approach. "For me," Leslie shared, "online is not different teaching, it uses different tools to work toward the same goal." She recognizes that "online gives you some really good tools" even if it also "makes some things more difficult." Importantly, among the participants of this study, Thomas and Leslie have the most years of experience with online education, and have, in time, grown more comfortable with it. Moreover, both reported the highest levels of sense of community and collegiality around online course development and teaching and have begun utilizing time and dialogue to work through some of their concerns, such that they see possibilities within online education.

Professional identity issues regarding the changing nature of the teaching aspect of professorial work. Second to philosophical questions on the alignment between one's educational philosophy and online education, another key theme in the data concerned participants' perceived identities as teachers. Extant research notes that change, especially role changes and technology, affects professional identity (Glass, 2012; Menzies & Newson, 2007; Turkle, Gusterson, Dumit, Mindell, & Silbey, 2005) and increases anxiety among faculty (Maier, 2012). As such, faculty members may struggle with learning a different set of skills for online teaching, especially facilitation skills due to the emphasis on student-directed/self-directed learning within online courses (Palloff & Pratt 2007). Although many of the participants already shifted from traditional notions of teacher as a "sage on the stage" to more experiential pedagogies, participants still grappled with their identities as teachers in this new format, primarily around the absence of, or reduction in, the "human-to-human interactive elements" they were accustomed to in face-to-face classroom settings. This finding matches previous research highlighting that the loss of face-to-face contact with students is a leading concern among online faculty (Conrad, 2004; McQuiggan, 2012). In the previous section, participants questioned if the lack of live engagement in online education hinders academic quality. Here, participants questioned if they, as teachers, could find meaning and satisfaction in their online coursework without the live interactions. "I would prefer the live [course] because it has all to do with personality and interpersonal interaction," shares Thomas, a full-time faculty member. He continued, "[y]ou [the teacher] get more out of that because of the nature of live versus online." In agreement, Nolan compares the role of the teacher in face-to-face versus online courses: "I love teaching. I'm not sure online is teaching to be honest with you. I think it is a structured syllabus, students teaching and learning on their own, of which you have some guidance." Thomas and Nolan's concerns around their role as the teacher in online settings agrees with previous work by Glass (2012; 2013) which studies the emotional effects of online teaching on faculty, with an emphasis on how faculty work is a social endeavor in search of meaning. Glass (2013) found that his participants were not "just learning to teach online, they were learning about themselves as a teacher and discovering what they care deeply about as it relates to teaching" (p. 26).

In the case of all but one of the study's participants, faculty-to-faculty interactions around teaching and faculty-to-student interactions in the classroom were areas of dissonance between online teaching and what they care deeply about in relation to their identity as a teacher. Participants talked extensively about their internal struggles with the different role of the teacher in an online course, largely related to the real or perceived loss of interactions with students. As a reoccurring theme in our data, participants do not appear to have an outlet or supportive community to fully reflect on one's transition from a face-to-face to an online paradigm of teacher identity.

Discussion

Our finding to our first research question—that participants reported wanting a greater sense of community and collegiality around online teaching—did not particularly surprise us based on the literature on faculty work and on the current constraints facing faculty development programs (i.e.,

budgets, personnel, faculty time). However, our findings to our second research question drew more attention: participants primarily desired a sense of community and collegiality around issues related to philosophy and professional identity; issues related to technical skills and pedagogical tools were infrequently mentioned even when prompted in interviews. In other words, it appears participants needed to grapple with the value of online education and their role in this medium of teaching prior to addressing other concerns with online education, such as mastering technology skills or revamping face-to-face lessons for online courses. As such, the nature of participants' needs—alignment between teaching philosophy/professional identity and online education—speaks to a model that promotes dialogue with a community of peers, which unfortunately was not provided for this study's participants despite MU's attempts to support online faculty.

As a case study, MU and our seven participants serve as a reflective example for other institutions and faculty development programs. Due to the qualitative nature of our research and the size of our sample, we do not strive to generalize that our participants' perceptions directly translate to the experiences and needs of all faculty, especially when considering contextual and demographic differences among institutions and faculty members. However, we do believe the insights garnered from our participants—faculty members who expressed an interest in learning more about online education at a university noted for faculty reluctance to online education and with limited resources for online faculty development—highlight two important considerations and reminders for faculty development practice, which we will discuss next.

First, faculty development programs for online education should be guided by faculty members' needs, both in content and in format. Although this suggestion is not new to the field of professional development, many campus programs continue to struggle with low faculty satisfaction levels around online faculty development. We suggest that this disconnect might be related to the challenging and time-consuming task of uncovering a faculty member's needs around online professional development content and preferred formats, especially in light of the current higher education context of resource scarcity and accountability for action. If campuses hope to ground their online development programs in faculty needs, a commitment on the part of the institution to develop an awareness of online faculty members' needs and a willingness to realign resources to meet those needs is required. For example, one of our participants suggested that he would be better served if MU focused less on adding "bells and whistles" to the course management system that add "slim to [no] value" and instead concentrated their online education budgets and faculty development personnel's time on promoting a sense of community among faculty around the value, shape, and direction of online education at MU. If the goal is faculty buy-in and engagement with the improvement and future of online education, it remains essential that all faculty development programs assess faculty needs and align their resources accordingly.

As mentioned before, it is not an easy task to assess faculty needs and align resources within the complex realities of contemporary higher education. Fortunately, there are exemplary practices across campuses that serve as catalysts for this type of change, including: conducting formal and informal needs assessments of faculty concerns with online education, for example, the Penn State World Campus integrates a self-assessment readiness tool for online faculty (Ragan, Bigatel, Kennan, & Dillion, 2012); providing opportunities for reflective exercises in which faculty-chosen issues around teaching and learning are explored in communities, for example, the State University of New York's Learning Network explores faculty needs through reflection exercises (McQuiggan, 2012); reviewing exemplary student-readiness models (that assist students in assessing their own preparedness for online learning) and adapting relevant elements to fit faculty-readiness models (Dray, Lowenthal, Miszkiewicz, Ruiz-Primo, & Marczynski, 2011; Smith, 2005); and developing action research projects that apply faculty data to professional development reforms, to name a few.

Beyond grounding online professional development in faculty needs, the case of MU and its participants also highlights the need for institutions to support a sense of community and collegiality around online education when applicable. As noted earlier, the extant literature illustrates that despite the benefits of learning communities and the efforts by some institutions to promote them, most faculty report dissatisfaction with their institutions' sense of community and collegiality around online education. As our participants' experiences demonstrate, some topics or concerns held by faculty regarding online education are not conducive to a "one-shot" format or a structure that does not sufficiently build trust and connections among faculty. To engage in the kind of mind-work needed to reflect on issues of philosophy and identity in online education, faculty members need to critically examine and expand upon their perspectives and assumptions about teaching and learning. Research highlights that a sense of community and collegiality is particularly helpful with this type of thinking and transformation (McQuiggan, 2012; Sorcinelli, Austin, Eddy, & Beach, 2006). To that effect, McQuiggan (2012) writes, "Faculty preparation for online teaching must be conceptualized as a process of transformation rather than simply translation" (p.56).

Although institutions are increasingly offering mentoring and collaborative programming for online faculty, there continues to be room for growth in learning communities, as noted in research highlighting that the most common online faculty development offerings followed a "one-shot" format and the most common content area was the course management system/technical services (Herman, 2012; see also Meyer & Murrell, 2014). Moreover, private institutions, such as MU, were found to be 20% less likely to offer mentoring and peer collaborations than public institutions (Meyer & Murrell, 2014). Again, fortunately there are several exemplary faculty development programs designed to promote a sense of community and collegiality among online faculty that can serve as models that include integrating community building elements into current professional development offerings; initiating cohort models based on a sustained, inquiry-based learning approach; developing orientation and mentoring programs for faculty new to online teaching; creating spaces for sharing examples of faculty members' online courses; facilitating ongoing opportunities for faculty to interact with experienced online colleagues; and providing access to peers' online courses, to name a few (Gappa et al., 2007; Glass, 2012; McQuiggan, 2012). We do acknowledge that all of these efforts require time and resources, which might be scarce in faculty and staff members' schedules and budgets. However, in today's competitive and accountability-driven educational marketplace, institutions that invest in professional development that fosters a sense of community/collegiality around online education, when applicable based on faculty needs, will likely reap rewards in terms of faculty retention, engagement, effectiveness, and productivity.

Concluding Thoughts

"I think online is definitely the way people are going," reflected one participant, Charlie. He continued: "And I think if we're really serious about online, then we have to be a model to make it the best. So I'm thinking it is the way of the future and we need to not only get on board, but get out front." Although often overlooked, the online course movement is increasingly impacting faculty and their work. Turkle (2004; 2011), a leading scholar on technology-and-the-self, recognizes this impact by noting, "behind every instrumental technology (what the technology does *for* you), there is another technology, the subjective technology (what the technology does *to* you)" (2004, p.26). Online education is "doing" something to faculty, and the challenge for faculty development programs on today's campuses is to uncover how online education is impacting faculty (i.e., assessing faculty need) and to develop relevant faculty development programs, both in content and format, based on those needs. If colleges and universities hope to construct online teaching as meaningful academic work rather than something that requires resistance or mere resignation, we believe the effort will be worth the investment.

Acknowledgements

We gratefully acknowledge the thoughtful insight and helpful comments provided by Leslie Gonzales and Christopher Glass and the anonymous reviewers on earlier drafts of this manuscript.

References

Allen, I.E. & Seaman, J. (2010). *Class differences: Online education in the United States, 2010*. Needham, MA: Babson Survey Research Group.

Allen, I. E. & Seaman, J. (2011). *Online education in the United States 2011: Going the distance*. Newburyport, MA: Sloan Consortium.

Allen, I. E. & Seaman, J. (2013). *Changing Course: Ten Years of Tracking Online Education in the United States*. Newburyport, MA: Sloan Consortium.

Brown, J.S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*(1), 32-42.

Conrad, D. (2004). University instructors' reflections on their first online teaching experiences. *Journal of Asynchronous Learning Networks, 8*(2): 31-44.

Cox, M.D. (2004) Introduction to faculty learning communities. *New Directions for Teaching and Learning, 97*, 5-23.

Creswell, J.W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research, 4th edition*. Boston, MA: Pearson.

Dolan, V. (2011). The isolation of online adjunct faculty and its impact on their performance. *International Review of Research in Open and Distance Learning, 12*(2).

Dray, B.J., Lowenthal, P.R., Miszkiewicz, M.J., Ruiz-Primo, M.A., & Marczynski, K. (2011). Developing an instrument to assess student readiness for online learning: A validation study. *Distance Education, 32*(1), 29-47.

Erickson, F. (1985). Qualitative methods in research on teaching. In M. Wittrock (Ed.), *Handbook of research on teaching, 3rd Ed*. (pp. 119-161). New York, NY: Macmillan.

Fulton, K., & Riel, M. (1999). Professional development through learning communities. *Edutopia, 6*(2), 8-10.

Gappa, J.M., Austin, A.E., & Trice, A.G. (2007). *Rethinking faculty work: Higher education's strategic imperative.* New York, NY: Nolan Wiley & Sons, Inc.

Gilbert, S. (1995). Teaching, learning and technology: The need for campus wide planning and faculty support services. *Change 27*(2): 46-52.

Glass, C.R. (2012). *Digitally-mediated teaching and professors' professional worlds and identities: A faculty learning and professional growth perspective*. Paper presented at the annual meeting of the Association for the Study of Higher Education, Las Vegas, NV.

Glass, C.R. (2013). *Beyond luddites and laggards: The latent social functions that motivate professors to teach (or not teach) online.* Manuscript submitted for publication.

Haber, J., & Mills, M. (2008). Perceptions of barriers concerning effective online teaching and policies: Florida community college faculty. *Community College Journal of Research and Practice, 32*(4/6), 266-283.

Haviland, D. (2011). *Pre-tenure faculty members' experiences and expectations: Challenges, frustrations…and growth*. Paper presented at the annual meeting of the Association of the Study of Higher Education, Charlotte, N.C.

Helms, R.M. (2010). *New challenges, new priorities: The experience of Generation X faculty*. Cambridge, MA: The Collaborative on Academic Careers in Higher Education, Harvard University Graduate School of Education.

Herman, J.H. (2012). Faculty development programs: The frequency and variety of professional development programs available to online instructors. *Journal of Asynchronous Learning Networks, 16*(5), 87-106.

Hollenshead, C., Waltman, J., August, L., Miller, J., Smith, G., & Bell, A. (2007). *Making the best of both worlds: Findings from a national institution-level survey on non-tenure track faculty*. Ann Arbor, MI: Center for the Education of Women.

Jaschik, S. & Lederman, D. (2013). The 2012 *Inside Higher Ed* survey of faculty attitudes on technology. Washington DC: *Inside Higher Ed*.

Kezar, A.J. (2012). Needed policies, practices, and values: Creating a culture to support and professionalize non-tenure track faculty. In A.J. Kezar (Ed.), *Embracing non-tenure track faculty: Changing campuses for the new faculty majority*. New York, NY: Routledge.

Kinuthia, W. (2005). Planning faculty development for successful implementation of web-based instruction. *Campus-Wide Information Systems 22*(4): 189-200.

Koehler, M. J., Mishra, P., Hershey, K., and Peruski, L. (2004). With a little help from your students: A new model for faculty development and online course design. *Journal of Technology and Teacher Education, 12*(1) 25-55.

Lave, J. (1997). The culture of acquisition and the practice of understanding. In D. Kirshner & J.A. Whitson (Eds.), *Situated cognition: Social, semiotic, and psychological perspectives* (pp. 63-82). Mahwah, NJ: Erlbaum.

Lu, M., Todd, A.M., & Miller, M.T. (2011, Fall). Creating a supportive culture for online teaching: A case study of a faculty learning community. *Online Journal of Distance Learning Administration, XIV*(III).

Maier, L. (2012). What are online teaching faculty telling us about building community? *Community College Journal of Research and Practice, 36*(11), 884-896.

McLean, J. (2006). Forgotten faculty: Stress and job satisfaction among distance educators. *Online Journal of Distance Learning Administration, 9*(2).

McMillan, D., & Chavis, D. (1986). Sense of community: A definition and theory. *Journal of Community Psychology, 14*(1), 6-23.

McQuiggan, C.A. (2012). Faculty development for online teaching as a catalyst for change. *Journal of Asynchronous Learning Networks, 16*(2), 27-61.

Menzies, H., & Newson, J. (2007). No Time to Think: Academics' life in the globally wired university. *Time & Society, 16*(1), 83-98. doi:10.1177/0961463X07074103

Meyer, K.A. & Murrell, V.S. (2014). A national study of training content and activities for faculty development for online teaching. *Journal of Asynchronous Learning Networks, 18*(1), 3-18.

Neumann, A. (2009). *Professing to learn: Creating tenured lives and careers in the American research university.* Baltimore, MD: Nolans Hopkins University Press.

O'Meara, K., Terosky, A. L., & Neumann, A. (2008). *Faculty careers and work lives: A professional growth perspective.* ASHE Higher Education Report, 34(3).

Palloff, R.M. & Pratt, K. (2007). *Building online learning communities*. San Francisco, CA: Jossey-Bass.

Puzziferro, M.&., & Shelton, K. (2009). Supporting online faculty—Revisiting the seven principles (a few years later). *Online Journal of Distance Learning Administration, 12*(3).

Ragan, L.C., Bigatel, P.M., Kennan, S.S., & Dillion, J.M. (2012). From research to practice: Towards an integrated and comprehensive faculty development program. *Journal of Asynchronous Learning Networks, 16*(5), 71-86.

Rice, R.E., Sorcinelli, M.D., & Austin, A.E. (2000). Heeding new voices: Academic careers for a new generation. *New Pathways Working Paper Series* (Vol. 7). Washington, D.C.: American Association of Higher Education.

Sarason, S. B., (1974). *The psychological sense of community: Prospects for a community psychology.* San Francisco, CA: Jossey-Bass.

Seaman, J., (2009). *Online learning as a strategic asset. Volume II: The paradox of faculty voices: Views and experiences with online learning*, Washington, D.C.: Association of Public and Land-grant Universities.

Sherer, P., Shea, P., & Kristensen, E. (2003). Online communities of practice: A catalyst for faculty development. *Innovative Higher Education, 27*(3), 183-194.

Smith, P.J. (2005). Learning preferences and readiness for online learning. *Educational Psychology, 25*(1), 3–12.

Sorcinelli, M.D., Austin, A.E., Eddy, P.L., and Beach, A.L. (2006). *Creating the future of faculty development: Learning from the past, understanding the present*. Bolton, MA: Anker Publishing Company.

Spradley, J. P. (1979). *The ethnographic interview*. New York: Holt, Rinehart and Winston.

Turkle, S. (2011). *Alone together: Why we expect more from technology and less from each other.* Cambridge, MA: MIT Press.

Turkle, S. (2004). How Computers Change Way We Think. *The Chronicle of Higher Education*, B26. Retrieved March 4, 2013.

Turkle, S., Gusterson, H., Dumit, J., Mindell, D., & Silbey, S. (2005). *Information technologies and professional identity: A comparative study of the effects of virtuality*. Washington, D.C.: National Science Foundation.

Velez, A.M. (2009). The ties that bind: How faculty learning communities connect online adjuncts to their virtual institutions. *Online Journal of Distance Learning Administration, 12*(2).

Vogt, W. P., Gardner, D. C., & Haeffele, L. M. (2012). *When to use what research design*. Guilford Press.

Vygotsky, L. S. (1978). *Mind and society: The development of higher mental processes*. Cambridge, MA: Harvard University Press.

Wenger, E. (1999). *Communities of practice: Learning, meaning, and identity*. Cambridge, MA: Cambridge University Press.

Implicit Bias and First Name Stereotypes: What are the Implications for Online Instruction?

Wendy Conaway, Ph.D. and Sonja Bethune, Psy.D.

Ashford University

Abstract

The online classroom is perceived as being a non-threatening, unbiased, safe environment due to the lack of visual cues that normally trigger hidden attitudes and biases. However, it is possible that stereotypical student names often trigger implicit bias in instructors leading to group expectations that can often manifest in a variety of ways including lack of attention or negative evaluations. In this study, we explored the relationship of underlying attitudes and biases of online instructors with respect to racially or ethnically identifiable student first names using the Brief Implicit Attitudes Test (BIAT) instrument specifically designed for this purpose. Participants included 147 online instructors with at least a Master's degree in their given field of expertise. Using an experimental research design, we found that to a small degree, implicit bias does exist with respect to stereotypical student names. This study also found that instructors consciously believed themselves to be warm and accepting of stereotypical names. In other words, what instructors say they feel and what they really feel are distinctly different?

Introduction

When students attend college (traditional or online), they expect to be treated fairly regardless of their race, gender, or belief system. However, we do not live in a perfect world and racism as well as stereotyping does exist even at the collegiate level. This can be more evident in traditional educational environments (face to face), where instructors use clear visual or verbal cues as signals to identify racial and ethnic identities and use them as barriers to avoid the appearance and application of bias. In online education, the absence of these signals removes the barriers used to self-monitor attitudes and allows subconscious, internal attitudes to drive behavior (Chugh, 2004). Because it is assumed the online environment provides a safe, objective climate for learning, the idea that implicit attitudes could impact

student learning is important with respect to raising awareness in online instructors. Therefore, students who are identifiable by race or ethnicity due to name association can be targets of implicit bias by online instructors, possibly having an adverse effect on evaluations of student work or the amount of attention an instructor provides to the student.

The aim of this study is to investigate whether there is a relationship between racial or ethnic implicit bias with student first names in the online instructional environment. This study will help contribute to the significant research/literature gap with respect to the effectiveness of distance learning instruction and self-monitoring of online instructor attitudes. An additional goal is to promote awareness of one's own biases when operating in an online platform.

Literature Review

Development of Perceptions, Judgments, and Biases

It is important to first discuss how perceptions, judgments and biases develop. Over the past several decades, researchers have attempted to establish a better understanding regarding a person's motivation and cognitive thought processes that trigger negative judgments about others. However, up until recently there has been limited effort in discovering where these biases come from in the first place. Some researchers have looked at the nature versus nurture approach to the development of biases. Mahajan et al. (2001), support the argument that nature is the determining factor in that biases are programmed within us. This belief came from their research with nonhuman species in which implicit in-group preferences were identified. Of course, some may legitimately argue that one's environment has a larger influence on how biases are developed. Personal experience can often contribute to negative views of others.

Oftentimes people make immediate assumptions of others simply based on outward appearance only. This would include the color of one's skin, gender, the way one dresses and so on. We are all guilty of this, but where does this knee-jerk, internal reaction come from? If someone were to ask you blatantly if you have racist tendencies or tend to stereotype others based on appearance, you may adamantly say you do not. But if you take a closer look and became more insightful to your own biases and prejudices, you might surprise yourself.

Even though research has demonstrated that people are typically unaware of their own biases and racial prejudice, it is also indicated that a person's own experience and internalized thoughts can cause the development of racial biases (Banaji, 2001, as cited in Uhlmann & Nosek, 2012). Alternatively, some people experience implicit social cognition which is the tendency to develop biases without the influence of a previous experience, but just based on family history of experiences (Greenwald & Banaji, 1995). One example of this might be a young African American person in the present day having an ethnic bias towards Caucasians due to their family history in relation to slavery. With this in mind, it is necessary to discuss how people relate or identify with their own group and the various other groups they encounter.

Turner, Brown, and Tajfel (1979) developed the Social Identity Theory which specifically addressed how people relate to their own group (in-group) as well as outside groups (out-group). The first cognitive process is called Social Categorization in which a person makes the decision of which group they "belong" to as well as to which group others belong. Social Identification is another process in which a person relates more overtly with the in-group. In other words, there is more compatibility in regards to similar attitudes and values with those of the same group (Turner, et al., 1979). The third and most important cognitive process of the social identity theory as it pertains to this study is Social

Comparison. This process describes how a person normally perceives appropriate versus inappropriate behaviors exhibited by the in-group and the out-group (Turner, et al., 1979). Essentially, we judge how specific groups are measured in society. It is inevitable that prior to facilitating an online course, instructors have made some firm decisions regarding their own personal and social identity. Through life experiences, biases, judgments and stereotypes of different groups are developed. The social identity theory asserts that the human race naturally has the desire to favor their own groups "believing that group to be superior to others" (Tajfel, 1978; as cited in Axt, Ebersole, and Nosek, n.d., p. 3).

According to Alicke and Govorun (2005), most people would say they are above par or even better than others when it comes to "positive characteristics such as leadership ability, intelligence, and social skills" (as cited in Uhlmann & Nosek, 2012, p. 108). This can be seen as an inflated self-esteem or "self-enhancing biases" (2012, p. 108). When a person's self-worth is questioned, they are more likely to defend their position as a way to re-establish their level of integrity. For example, individuals might defend a negative evaluation from their employer by redefining a measure of outstanding performance in order to put a positive emphasis on their distinctive characteristics in relation to the duties required. In regard to specific race and performance evaluations, when Black people knew that a White person was evaluating them, their level of confidence in ability was not affected when they received a poor performance review (Crocker & Major, 2003). They immediately thought that their evaluation had no significance based on the assumption White people would be biased and would rate them lower due to their race and not their performance.

The question that Ulhmann and Nosek (2012) attempted to answer was whether or not our culture is to blame for immediate negative assumptions of those of a different race. Furthermore, they examined how people explained their own influences when it came to their prejudices (2012). People essentially can arrive at their own conclusions about racial biases without having any sound proof or rational explanation. For example, you might tell your friend a story of a co-worker who is not performing the tasks given. Your friend then asks a straightforward question, "What race is he?" It is as if the person's race would explain the reason why the co-worker is not performing well when in fact, it could be due to the lack of skills or training rather than one's culture. Ulhmann and Nosek (2012) explain that people tend to put more blame on culture to explain biases which doesn't indicate that a valid thought process was established to arrive at that conclusion.

Implicit Bias in the Classroom

Since the goal of this study is to examine the implicit bias of online instructors in the classroom, it is important to compare and define both explicit bias as well as implicit bias. Explicit bias occurs when someone outwardly expresses their negative stereotypes and beliefs and is very conscious of these judgments (Boysen, 2009). Implicit bias consists of "actions or judgments that are under the control of automatically activated evaluation, without the performer's awareness of that causation" (Greenwald, McGhee, & Schwartz, 1998, p. 1464). This means that a person could be biased yet remain unaware they are projecting their judgments towards others. The literature suggests that these biases are displayed "actively unconsciously, involuntarily, and/or without one's awareness or intentional control" (Staats & Patton, 2013, p. 7).

There are a significant number of studies that correlate attitudes with race and ethnicity. However, few studies exist that explore the effect of instructor bias within the traditional classroom. An analysis of research by Ferguson (2003) regarding bias in the traditional classroom revealed that instructors are indeed biased and tend to develop preconceived sets of expectations of particular students based on group membership such as race, ethnicity, and gender. It was found that instructor expectations can have a profound effect on student performance and achievement (Babad; Brophy; Cooper & Good; Good Jussim, Smith, Madon, & Palumbo; Weinstein, as cited in Rubie-Davies, Hattie, & Hamilton 2006) and a number of characteristics have been identified as having an influence on shaping teacher

expectations including but not limited to ethnicity, stereotypes, and names. The primary reason this study by Ferguson was first implemented was due to the consistent gap in test scores of Black and White students. Some interesting observations were made such as teachers calling on white students to read in class or to answer questions more often than asking the black students to participate. The teachers already lay down the groundwork on making even the students perceive who the teacher thinks is a smarter race within the classroom.

An instructor's perception of performance is one thing to take into account when it comes to the behavior of stereotyping. Shauki, Alagiah, Fielder, and Sawon (2009) stated that perception isn't only based on physical encounters but also "through information about non-physical reality" (p. 29). Steele (1997) noted that the mere mention of a gender difference triggered women to perform less effectively than men in math assessments based on the stereotypical belief that men perform better at math, and similar results were obtained with assessments that focused on race rather than gender. Therefore, an instructor's perceptions are essentially based on assumptions that are viewed as being true and thereby lead to stereotyping (2009). Other studies (Alexander-Snow, 2004; Prato & Espinoza, 2001) have illustrated that cultural stereotypes do in fact have an influence on perceptions in the classroom by both the student and instructor (as cited in Shauki, et al., 2009).

When it comes to grading assignments, there are several extraneous influences which can be interpreted as a result of biases. Malouff (2008) gave several examples of grading biases including but not limited to the niceness of the student, prior good performance on previous course assignments, a higher level of student interest in the course, the gender and/or appearance of the student, and the depth of connection the student has made with the instructor. Some of these biases can also be applied in the online classroom environment such as assuming the student's gender based on their first name, established good grade history since the beginning of the course, and the connection the student has made with the instructor based on the informal introduction forum established the first week of the course. In previous studies, there have been some limitations in providing evidence of these biases without having the instructors know the purpose of the study. As suggested by Archer and McCarthy (2008), blind grading would be preferable to diminish the obvious biases whenever possible (as cited in Malouff, 2008). This would prevent the instructor from knowing the name of the student when grading. Of course this would not be very feasible in the online classroom environment or even in a traditional classroom setting, but for research purposes this method might be acceptable.

According to social psychological research as performed by Biernat, Eagly and Karau, Phelan, Moss, and Racusin, and Rudman (as cited in Basow, Codos, & Martin, 2013), how we perceive and react to others is not only consciously but also unconsciously affected by bias. Considering that the only identifying characteristic that is involuntarily disclosed by students is his/her name, the impact of implicit bias and resulting stereotypical behavior on student achievement cannot be ignored. As noted by Peterson, Van Dam, and Wheeler (2009), educators tend to make assumptions about students that can have a detrimental effect on their learning experience, and personal names may well induce instructors to relegate a student to a particular racial or ethnic category which "can be unfairly used to make further assumptions about students based on stereotype rather than ability" (p. 2). Therefore, there is a responsibility for online instructors to recognize and address any bias that might be triggered based on stereotypical name recognition in order to promote fairness and objectivity in grading as well as overall student-instructor relationships.

Student Identification Bias

Thinking back to our years in elementary school, we may not have considered that our social status as children could have been influenced by the first name given to us. It is quite apparent that judgments are made against people based on physical attributes as well as a person's relationship to an

ethnic or minority group, but judgments are also made towards a person's first name. According to Erwin (2006), common or more familiar names were viewed in a more positive light, whereas people with unique or unusual names are likely to change their names or even give themselves a nickname to replace the one given at birth. One thing to keep in mind though is gender differences of first names. Studies have shown that common, male names are more positively rated than common, female names. This means that uncommon or unusual female names were more positively rated (West & Shults, 1976, as cited in Erwin, 2006). Earlier studies have indicated that popularity status in elementary-school children was highly correlated with the "social-desirability value of the individual's first name" as regarded by peers in the same group as well as groups that were unfamiliar with the individual that possessed the specific name" (McDavid & Harari, 1966, p. 454). This supports the idea that people tend to judge others by their labels (names).

According to Dinur, Beit-Hallahmi and Hofman (1996), the first name given to any person is a representation of their identity. While family names (last names) stay consistent from generation to generation, the first name tends to change given the time period and trends within that given culture. "Semantic associations of names elicited from various age groups…have intended to be invariant across samples (Darden & Robinson, 1976), suggesting that first names have a stereotypic nature" (Dinur et al., 1996, p. 191). Oftentimes, the first name has an underlying meaning which usually reflects the parents' hopes and desires for their child. For instance, a child can be given a name of their father by tradition or could be given the name of a historical figure that produced an important change in this world. It is also important to note that some cultures provide a first name that isn't phonetically correct meaning that it may not sound the way it appears.

Furthermore, Erwin (1993, 1999) and Seraydarian and Busse (1981) strongly support the idea that a first name can elicit a stereotypical perception and suggest that first name stereotypes elicit consequences including an impact on academic achievement. Recent research by Jae and Cowling (2009) suggests there is a growing concern regarding fairness and objectivity in the grading process which can be affected by bias. In academia, bias can cause instructors to react in predisposed ways that can have an adverse effect on the measurement of student progress as well as the health of the student-instructor relationship and in the online delivery system; bias can be triggered by name identification. Therefore, the purpose of this study is to determine whether there is a relationship between implicit bias and the first name of the online student.

Method

Participants

The number of measurable participants in this study consisted of 147 online instructors over 26 years of age with a minimum of a Master's degree. Due to the nature of the questions, face to face instructors in brick and mortar institutions were excluded from participating in this study. Of the 349 participants who began the study, 228 completed the demographic survey, but only 151 completed the entire experiment. Four cases were rejected due to extreme scores, resulting in a final participant sample of 147 online instructors. The participants ranged in age from 26 years to over 56 years of age (M=3.65, SD=1.078). The number of participants in the 36-45 and over 56 years of age groups were identical (28.6% each), and 66.7% of the participants in this study were female (n=98). Of particular importance for this study is the breakdown by race/ethnicity: 82.1% (n=119) identified as Caucasian (White), 8.3% (n=12) as African American (Black), 4.1% (n=6) as Hispanic, 3.4% (n=5) as Asian, and 2.0% (n=3) reported as other. The actual sample size of 147 exceeded the ideal sample of 100 suggested by the designers of the experimental instrument based on past, similarly designed experiments.

Participants were approached via electronic means (email and social media i.e. LinkedIn, online instructor websites). Participation was completely voluntary and confidential. The opportunity to give informed consent was provided prior to beginning the study, and only after providing consent were participants able to enter the study website. To ensure that ethical standards were met, Institutional Review Board approval by Ashford University was obtained and documented.

Materials

To effectively predict the relationship between stereotyped names and implicit bias, a unique experimental instrument was designed by the Project Implicit team of Harvard University. Project Implicit, under the direction of Dr. Brian Nosek, has created and successfully demonstrated the use of several instruments to measure implicit bias by measuring timed reactions to visual stimuli such as facial images or representative words for emotionally charged categories (i.e. race, ethnicity, gender, age, weight, etc.). The unique design for this study measured timed reactions to names of racial and ethnic origins.

There is a significant amount of research to support the use of the Implicit Attitudes Test (IAT) as a viable instrument to measure implicit bias. Fazio and Olson (2003), Barnhardt and Geraci (2008), and Monteith, Voils, and Ashburn-Nardo (2001) supported the Implicit Attitudes Test (IAT) as a reliable resource to detect implicit biases and stereotypes. Considering that implicit behavior is subconsciously motivated, the IAT measures response times when viewing words and faces. The first task upon accessing the Project Implicit website is for participants to select the type of test they wish to take in order to measure their own level of implicit bias. Selecting from a number of categories—such as race, gender, age and weight—triggers a set of images, faces, or words representative of that category. Upon viewing the image, face, or word, participants then associate it with words that are negatively or positively oriented to the image as quickly as possible. For example, the category of weight uses silhouette images of body size rather than actual human faces or bodies. The task is to sort the silhouette into one of two categories: thin people or fat people. Participants experience several test blocks, each of which a number of images or words. At the end of the original IAT instrument, participants learn their level of bias toward (or against) the selected category.

Time is the key factor with this instrument, as the trials are fast paced so that conscious consideration to respond favorably is rendered difficult if not impossible. As a result, the lack of time allows subconscious, implicit motivation to drive behavior (Chugh, 2004). In other words, the longer it takes for a participant to react to the word or image, the more the association is cognitively processed and the higher the risk of a socially desirable response. As a chronometric assessment tool, the IAT reported bias as a final score which was the average difference of the log latency (delayed responses) between the constructs or items being measured (Nosek, Bar-Anan, Sriram, & Greenwald, 2013). Whereas the IAT continued to be a viable experimental tool, the length of time it took to complete began to be an issue.

Over time, the Brief Implicit Attitudes Test (BIAT) was developed in order to shorten the time for completion "while retaining some of the valuable design properties of the IAT" (Nosek, et al., 2013, p. 4). Both the IAT and the BIAT measure the same variables: attitudes, identities and stereotypes associated with any given category, such as race, gender, politics, religion, age, etc. (Sriram & Greenwald, 2009 as cited in Nosek et al., 2013, p. 5). The BIAT D score was developed to improve the power (it resulted in a 38% smaller required sample size) and the sensitivity of the outcomes or measures (Greenwald as cited in Nosek et al., 2013). Whereas the formula for calculating the D score is somewhat complex, the resulting score is indicative as to whether or not bias exists. The assessment tool used for this study was a Brief Implicit Attitudes Test (a shorter variation of the original Implicit Attitudes Test) accessible by participants from any computer with internet access.

Procedure

Immediately prior to entering the experimental phase of the study, participants completed a brief, internet-based nine item demographic questionnaire to assess basic information including gender, race/ethnicity, age range, level of education, online teaching time and venue, and geographic location. Also included were three items to measure each participant's attitudinal preferences (explicit bias) toward African American people, Caucasian people, and Hispanic people by responding to a six point Likert scale ranging from "very warm" to "very cold." Both demographic and attitudinal responses were entered by clicking on a radio button to indicate responses to each individual item. Participants then continued to a three category Brief Implicit Association Test (BIAT) that provided an interactive, timed response to visual stimulation of carefully chosen words and three categories of stereotypical names designed to elicit an implicit reaction based on speed of cognitive recognition.

The experimental phase of the BIAT consisted of six total blocks, the first three of which were "test" blocks to familiarize the participant with the process. Each block consisted of eight trials of names and words to match the categories and each race/ethnicity was represented in three of the six blocks. In each block, participants engaged in eight experimental trials in which they were presented with three items: a categorical identification of the race/ethnicity being addressed, either the word 'good' or the word 'bad,' and a first name or word. The activity for participants was to sort the name or the word according to either category. For the category of good and bad, the association words used in this study were either negatively or positively oriented in general knowledge. Positive or 'good' words included good, love, pleasant, happy, peace, and wonderful. Negative or 'bad' words included bad, hate, horrible, angry, terrible, and nasty. In most cultures that use English as a first language, these words are easily recognized and elicit a fairly uniform response. The names used in this research design included names of racial and ethnic origin, mainly Caucasian, Hispanic, and African American and were carefully researched as far as stereotypical recognition to avoid the perception of bias on behalf of the researchers. Names of each origin were gathered from common websites that provided stereotypical names based on race.

African American names included Jamal, Tyrell, LaTonya, Shamika, Kameshia, Tyrone, Trevon, Ebony, Darnell, and LaShonda. Hispanic names included Maria, Javier, Julio, Juanita, Enrique, Catalina, Lupita, Pablo, Jose, and Consuelo. Caucasian names used in this study were Steven, Jennifer, Diana, Bradley, Cody, Wyatt, Susan, Hunter, Allison, and Wendy.

By pressing the space bar, a name or word item would be displayed on the screen requiring the participant to determine whether the name or word 'matched' either category identified by the word or the race/ethnicity. Participants used two keys as sorting devices, the "I" key and the "E" key. For each trial, the upper part of the screen reflected the two selected categories and the lower part of the screen systematically displayed different names or words (see Appendix A). If the word or name displayed matched either of the categories, participants were to press the "I" key. If the word or name displayed did not match either of the categories, participants were to press the "E" key. Correct categorization advanced the participant to the next word/name combination, whereas incorrect categorizations (displayed by a red "X") required correction in order to advance. As suggested by Nosek et al. (2013), each block had a focal category of 'good' due to a stronger internal consistency as compared to using 'bad' as the focal category in BIAT instruments. Finally, participants' experiences differed due to the randomization of names/words and categories per trial per block.

Results

To obtain accuracy in scoring, Nosek et al. (2013) recommended excluding cases where response rates were either two fast or participants encountered too many errors. Therefore, four cases were excluded due to extreme responses which were identified as having an error rate higher than 30% or fast response rate higher than 10%, resulting in 147 measurable participants. Of the remaining 147 participants, only twelve were African American, six were Hispanic, five self-reported as Asian, and three indicated other. According to a U.S. Department of Education report on the percentage of race/ethnicity of full-time faculty in 2011, Caucasians accounted for 81% of instructors (of which 44% were male and 37% were female) , 6% were African American, 4% were Hispanic and 9% reported as Asian (see Figure 1). Although these statistics validate the sample size of minorities in this study, to avoid generalizing results and interpretation regarding African American and Hispanic populations based on such a small sample, from this point on, this study will report and interpret only the results as pertinent to Caucasian online instructors (*n*=119).

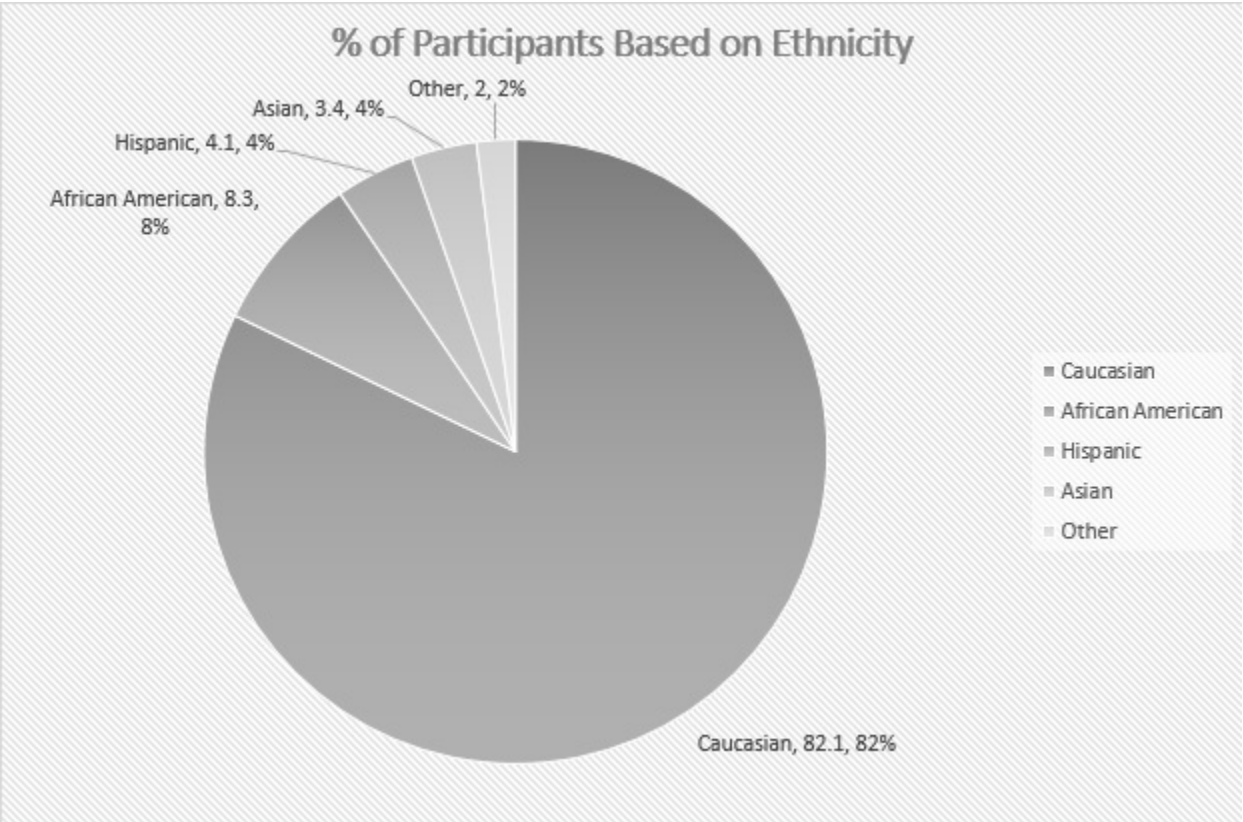


Figure 1. Breakdown of participants based on race/ethnicity.

Among the Caucasian participants, males constituted 36.1% of the sample (*n*=43) and females represented 63.9% of the sample (*n*=76). The largest age group was 56 years and older (31.1%), followed by the 36-45 year group (29.4%), then 46-55 and 26-35 (22.7% and 16.8% respectively). Most participants had a PhD (31.9%), followed by a MS, MA, and EdD (26.1%, 23.5%, and 6.7% respectively). The most seasoned instructors had over ten years' experience teaching online (35.3%). The next largest group had only taught from 1-3 years (26.9%) whereas the 4-6 year group comprised 22.7% and the 7-9 year group made up 15.1% of the participant sample. Most instructors represented four-year universities (77.3%), with community college and liberal arts filling in a distant second at 21%.

The BIAT scores were calculated according to the guidelines provided by Nosek et al. (2013) through two two-category contrast D scores, Caucasian versus African American and Caucasian versus Hispanic. From these two categories, an aggregate score for each comparison was obtained. D scores function similarly to Cohen's d as an effect size except D scores range from a minimum of -2 to a maximum of +2 (Nosek et al., 2013). Scores trending toward +2 indicate strong bias preference for the target group whereas scores trending toward -2 indicate weak bias preference for the target group. Considering that internal consistency for and validity of the BIAT was found to be higher when warm-up trials were excluded, scores for statistical interpretation in this study were taken only from the last three of the six trial blocks.

In reviewing Caucasian versus Hispanic names, overall D score results indicated a weak implicit bias against Hispanic names (M=.1071, SD=.409), and the comparison between Caucasian names and African American names indicated an even stronger (albeit still somewhat weak) implicit bias against African American names (M=.2381, SD=.448). Caucasian responders also indicated a preference for Hispanic over African American names (M=.0987, SD=.3485).

To measure explicit bias, a self-report survey was completed where the participant indicated his/her attitude toward a specific race/ethnicity. The survey was a Likert scale with the following levels: 1=very warm, 2=warm, 3=somewhat warm, 4=somewhat cold, 5=cold, 6=very cold. To be consistent with the direction of the BIAT, scores were reverse-coded to indicate 1=very cold and 6=very warm. Overall, all Caucasian participants in this study felt a high level of warmth toward the three target categories (African American M=4.81, SD=.787; Hispanics M=4.82, SD=.78; Caucasian M=5.0, SD=.725). A Pearson analysis revealed no statistical significance between the explicit and implicit bias scores for each comparison: Caucasian/African American (r=.025, $p > .05$), Caucasian/Hispanic (r=.161, $p > .05$), or Hispanic/African American (r=-.022, $p > .05$).

Several comparisons of means were conducted comparing various demographic variables with implicit and explicit bias scores. Sorting data by gender revealed that males had a higher level of implicit bias against African American (M=.2705, SD=.454) and Hispanic names (M=.1119, SD=.422) than by females (M=.2199, SD=.447 and M=.1042, SD=.404 respectively). In self reports, both males and females reported feeling a high level of warmth toward each category. Toward African American names, males reported M=4.71, SD=.805 and M=4.85, SD=.718 toward Hispanic names, whereas females scored M=4.86, SD=.776 toward African American names and M=4.81, SD=.816 toward Hispanic names.

Age range comparisons revealed that the 46-55 year group was the least biased of all. The scores for this group indicated a slight bias against African American names (M=.099, SD=.509) and an even smaller bias against Hispanic names (M=.0554, SD=.446). The 26-35 year group reported a similar level of bias against both African American names and Hispanic names, respectively (M=.1420, SD=.587 and M=.1133, SD=.456). The 36-45 year group had a greater difference between the two, as the bias against Hispanic names reflected a score of M=.1716, SD=.379 and against African American names with M=.2306, SD=.354. Finally, the Caucasian participants in the 56+ age range indicated a slight bias against Hispanic names (M=.0781, SD=.390), but a much stronger bias against African American names (M=.391, SD=.362). The self-reports for explicit bias were very similar for all age ranges, closer to warm than somewhat warm (M=4.80) (see Figure 2, next page).

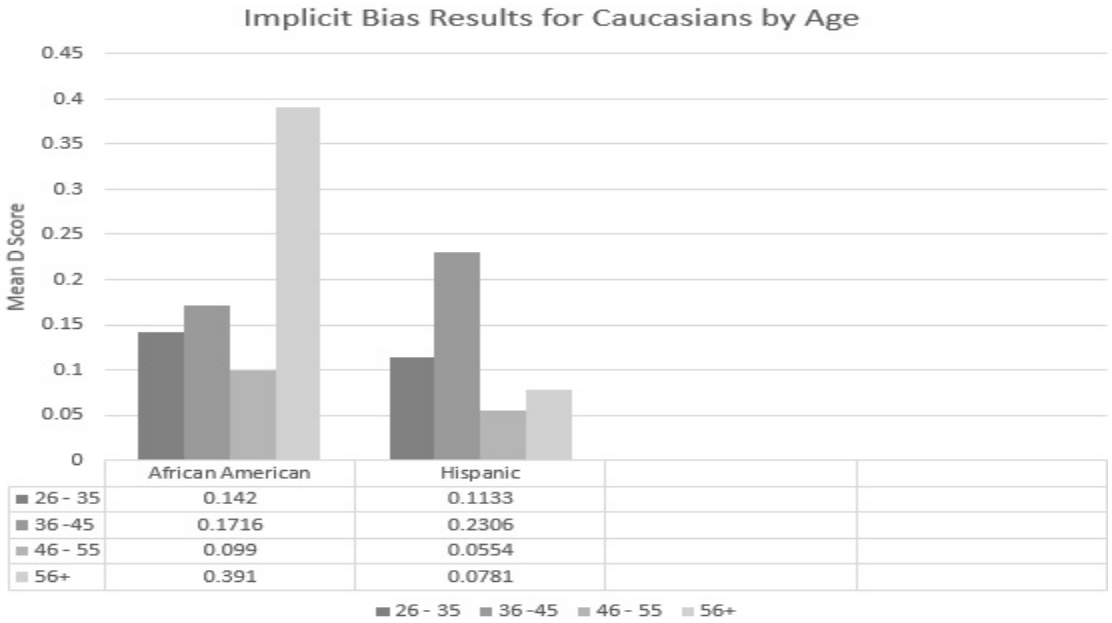


Figure 2. Breakdown of Explicit Bias for Caucasians by Age

BIAT implicit bias scores for the degree of education held by Caucasian participants were diverse. A bias against African American names was reflected mostly by those holding a Master of Arts degree (*M*=.3199, *SD*=.421), followed by a Master of Science degree (*M*=.2454, *SD*=.410), and PhD (*M*=.225, *SD*=.463). Bias against Hispanic names was again reflected by those holding a Master of Arts degree (*M*=.1852, *SD*=.329), and as expected, the Master of Science was next (*M*=.0984, *SD*=.389) followed by those holding a PhD (*M*=.0812, *SD*=.433). Also as expected, the explicit bias self-reported scores were reflected as high somewhat warm with an average mean of 4.81 (see Figure 3).

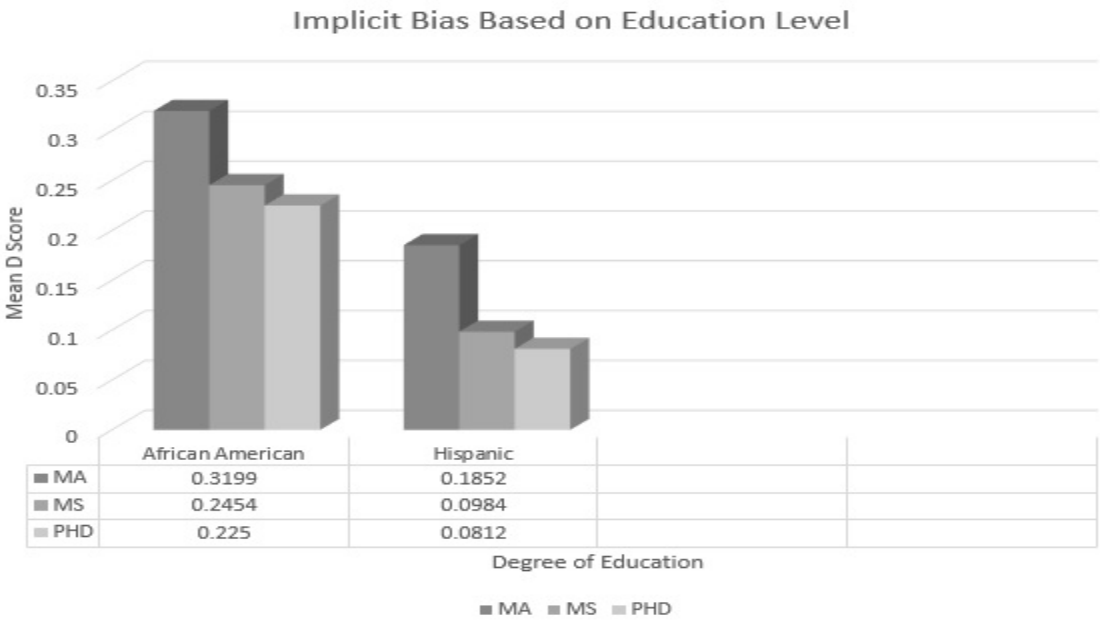


Figure 3. Breakdown of Explicit Bias Based on Education Level.

The final set of scores related to length of online teaching experience for Caucasian participants. Higher levels of implicit bias were detected across every teaching range against African American names than Hispanic names. Reflecting bias against African American names, participants having 1-3 years of experience reflected a mean of .2042 (*SD*=.479); 4-6 years a mean of .2161 (*SD*=.446); 7-9 years a mean of .2630 (*SD*=.336); and over ten years of experience reflected a mean of .2672 (*SD*=.480). Scores for Caucasian participants reflecting bias against Hispanic names ranged from a mean of .0504 (*SD*=.444) for 1-3 years of experience; a mean of .1375 (*SD*=.396) for 4-6 years; a mean of .1842 (*SD*=.281) for 7-9 years; and a mean of .0971 (*SD*=.441) for over ten years of experience. Whereas the explicit bias survey scores for age, degree held, and gender were fairly stable across all variables, the explicit bias survey scores for teaching experience were more diverse. The 7-9 year experience group expressed more warmth toward African American names (*M*=5.05, *SD*=.725) than the other groups—the 1-3 year experience group (*M*=4.8, *SD*=.792); the 4-6 year group (*M*=4.69, *SD*=.884); and the 10+ group (*M*=4.78, *SD*=.75). The 1-3 year experience group expressed more warmth toward Hispanic names (*M*=4.9, *SD*=.70) than the other groups—4-6 years (*M*=4.73, *SD*=.874); 7-9 years (*M*=4.84, *SD*=.857); and 10+ years (*M*=4.84, *SD*=.762).

Discussion

To address the question whether a relationship exists between implicit bias and student names, the simple answer is yes, however the degree to which bias exists differs. Across the board, the results reflected a weak implicit bias against Hispanic names and a stronger implicit bias against African American names when compared to Caucasian names. This trend was reiterated when Caucasians compared Hispanic names to African American names. The strong trend to be twice as biased against African Americans leads one to consider whether cultural biases based on geographic location might be a factor. Breaking down the geographic location of the Caucasian participants, 9% were from the northwestern part of the United States, 10% responded from the southeast, 30% were from the southwestern states, and 48% of the participants indicated a northeastern location. Five percent of responses were located outside of the United States. Another possible reason to consider was the ratio of African American students to Hispanic students enrolled in four-year universities. If more African Americans were enrolled than Hispanic students, it would explain the difference. However, according to the U.S. Census Bureau's 2012 Statistical Abstract, approximately 11% of students in four year institutions are Hispanic compared to 14% African American. Therefore, the obvious reasons for such a difference in bias cannot conclusively be explained.

Explicit bias based on self-reported surveys clearly indicated a high level of warmth by Caucasians toward both Hispanic and African American names. It was expected that some level of variation between scores would surface but the absence of any score lower than the midpoint between somewhat warm and warm can only be interpreted as a fear of disclosure of true feelings based on social pressure to be perceived as tolerant and accepting. The appearance of uniformity across gender, age group, degree type indicates that even when confidentiality is guaranteed and possibility of judgment or retribution is eliminated, respondents still prefer to answer in a 'safe' mode. The difference between what instructors *say they feel* and what they *actually feel* is of concern. Being honest with oneself with respect to true feelings, whether acceptable or unacceptable, is the first step to addressing them. Once instructors admit to harboring any bias, correcting the issue can begin. These researchers believe that if an instructor cognitively realizes his/her limitations, s/he is already self-aware enough to self-monitor his/her behaviors to ensure fair application toward students. The second step can be addressed by social psychological research regarding changing behaviors to affect attitudes. Changing behaviors through self-awareness can lead to a change in attitudes. This was demonstrated by Kawakami, Phills, Steele, and Dovidio (2007) in a study that focused on training participants to physically react in certain ways to black and white images prior to taking a similar IAT test as was used in the current study. They found that conscious focus on

behaviors led to a decrease in implicit bias scores. If instructors consciously focus on their own behaviors in grading or responding to minority students, then attitudes will begin to improve as well.

Among instructors by age group, the 46-55 year age group was the least biased of all. It was expected that the younger age group would have been much less biased based on changing social norms. Not surprisingly, the age group over 56 years was least accepting of African American names. Participants ranging from 56 to 60 years were born in the late 50s which was at the height of civil rights and segregation issues with African Americans. Individuals in the 46-55 year age group were born just as the civil rights movements went into full swing, so it is no surprise that they would be raised to be more tolerant and understanding based on social events.

The level of education attained by instructors produced an interesting revelation in that the most bias was displayed by instructors with Master's degrees. As the level of education rose, the detection of bias for both types of names decreased supporting the idea that the more educated a person becomes, the more accepting and tolerant s/he becomes. This can be due in part by the enriched critical thought gained by higher levels of education as well as the opportunity to be increasingly more exposed to voluntary and often mandatory diversity training provided by educational institutions. When investigating the level of bias with respect to teaching experience, evidence of bias existed across all categories. Bias against African American names increased with the length of teaching for all four duration categories. Bias against Hispanic names increased for the first three levels then dropped off significantly after reaching the tenth teaching year. Again, D scores indicating bias against African American names were nearly twice as much as Hispanic names.

Based on the results of this study, it is useful to create a profile to understand the characteristics of instructors who are more or less likely to be biased against African American or Hispanic students in the online classroom. The profile for an instructor who is most likely to be biased against African American names (students) is a Caucasian male over 56 years of age who holds a Master of Arts degree and has taught for at least ten years. The profile for an instructor who is most likely to exhibit bias against Hispanic names (students) would also be a Caucasian male between 36 and 45 years of age who holds a Master of Arts degree, but has only taught between 7-9 years. The profile of an online instructor who is most likely to be accepting of African American names (students) and Hispanic names is a Caucasian female between the ages of 46 and 55 years who holds a PhD and is relatively new to teaching (1-3 years).

What we have learned from this study is invaluable toward enhancing and promoting a positive experience for all students. Evidence to support the fact that although instructors overtly state and even believe themselves to be unbiased, implicit bias *does* exist and must be addressed so that students are no longer in danger of receiving unconsciously motivated, prejudicial behaviors. Such behaviors can be subtly displayed by avoiding student inquiries, latent responses to student questions, unfair grading practices, and an unwillingness to offer assistance. Raising awareness of this important issue using this research as support is the primary goal of the researchers. Hopefully, the information in this study and in future studies will be implemented by educational institutions to train online instructors to recognize and deal with their own biases so that *all* students can benefit.

Limitations and Recommendations

Although it is clear that the BIAT does measure what it is supposed to measure which are implicit attitudes based on response latency, there were some areas of the test that could not be measured. For instance, when comparing the speed of male to female responses, how often would a person associate a 'bad' word with a name of a different culture? To take this a step further for clarification purposes, how

often would a participant associate the word “nasty” with the name “Tyrell”? Of course this would be seen as an error, and when someone produces too many errors, their results are deleted from the study because of the “extreme scores” factor. In this study, the BIAT is merely just measuring the latency effect when someone is expected to associate a good word with a specific type of name. But knowing both the speed and the type of error might pose a clearer picture of actual implicit bias.

One specific limitation that we came across from the study was the complexity of the instructions to complete the BIAT. For this reason, the first set of blocks on the test weren’t included in the results of the study. This was due to the understanding that it can take some time to understand what keys you press and for which association of words. We speculated that while there were several more participants who started the study, these participants may have terminated their session due to this reason.

Another limitation to consider with respect to gathering data regarding geographic location is that where one lives and works as an adult is not necessarily reflective of the culture in which one was raised. History tells us biased attitudes toward African Americans have existed longer and with more emphasis in southern states than in northern states; yet the results of this study reflected a larger sample from the northeastern area of the United States. Since people often migrate to other areas for career and job opportunities, it is not feasible to assume that where one lives has had more of an effect than where one was raised.

When it came to finding the most common names that represent a specific culture, we had to utilize an internet search. Our goal was to gain access to our own university database and gather names of real students who disclosed their actual ethnicity in their school records. As this was not possible, we therefore had to resort to different methods of discerning common Caucasian, African-American and Hispanic names.

As with most studies, gathering participants can be an arduous task without help from colleagues, colleges, organizations, or other affiliations of the researchers. Although we were able to exceed our desired sample size of participants, we had to be rather resourceful. By collecting e-mails from conferences and utilizing personal connections with other online instructors, we were able to gather enough participants for the study.

The main problem in our sample was the lack of diversity. In our recommendation for future studies of implicit bias, we believe that it will be important to have a sample that reflects more of the general population. Two significant issues in this study were clearly raised with respect to diversity. The first issue was the fact that our sample was overwhelmingly female. Nearly two thirds of the respondents were female, yet the results clearly indicated that males were the most likely to be biased against African American and Hispanic names. More research needs to be conducted to determine whether this is a true reflection of bias *or* whether it is a reflection of the more nurturing, bonding approach consistent with the female gender. The second issue of concern was the lack of diversity within the sample itself of African American and Hispanic participants as described in depth in the results section.

After reflecting on this present study, whereas we are comfortable reporting the outcomes of this study with respect to the a larger female to male ratio in the sample, we do not feel that we can make sophisticated claims of the results based on the small percentage of African American and Hispanic participants involved. Had the sample size been larger, we would be more comfortable with generalizing the results to the normal population regarding implicit bias. An additional possibility would be to limit the participants to solely African American instructors or Hispanic instructors as the target population for more conclusive results.

The main goal of this study is to raise awareness in online instructors as they interact with their students without "faces." Our study concludes that whereas instructors *believe* themselves to be unbiased, they still demonstrate a tendency to harbor implicit bias against names representative of different races and ethnicities. We hope that by bringing the results of this study to an instructor's awareness it may prompt self-reflection so that when they become aware that they hold implicit racial/ethnic biases, they may make an effort to restrain their own biased thoughts (Staats & Patton, 2013). Further to address issues of bias, additional studies have demonstrated that it is better to openly acknowledge one's own biases and stereotypes and thereby challenge themselves in order to curb their influence on behavior (Blair & Banaji, 1996; Bstan-dzin-rgya-mtsho & Cutler, 2009).

Once instructors face and acknowledge their own attitudes, they can then self-monitor for their influence on performance. For example, if an instructor finds that s/he has an implicit bias against African American names, that instructor has the ability to ensure in several ways that s/he does not allow that bias to interfere with objective judgment of student work or interactions. Hyper-awareness and vigilance then occurs so that fair equitable treatment of all students occurs. Setting monitoring habits to respond to all student communications in a timely manner lowers the risk of not responding to students at risk for instructor bias. Double checking feedback for depth, validity, and warmth on assignments is yet another way to ensure unbiased feedback.

Whereas this study was unique in that it was linked to a specially designed BIAT instrument, we recommend that instructors who recognize the importance of determining one's own biases visit the Harvard University Project Implicit site to take the full Implicit Attitude Test free of charge. It is a lengthy process but the self-awareness that is gained from testing oneself in a variety of categories is well worth the time (as this study has noted). The link to this site is https://implicit.harvard.edu/implicit/takeatest.html. The ability to first possess awareness and then acknowledge existence of personal biases is essential toward moving forward in embracing students with a new perspective without judgment or criticism. In doing so, instructors will avoid behaviors negatively motivated by implicit bias that can affect grading or personal interactions. We do not want these students to fail before they even get started. Setting them up for success includes promoting a safe, comfortable environment for all.

Appendix A

References

Axt, J., Ebersole, C. R. & Nosek, B. A. (under review). The rules of implicit evaluation by race, religion and age. University of Virginia.

Barnhardt, T., & Geraci, L. (2008). Are awareness questionnaires valid? Investigating the use of posttest questionnaires for assessing awareness in implicit memory tests. *Memory & Cognition, 36*(1), 53-64. doi:10.3758/MC.36.1.53

Basow, S., Codos, S., & Martin, J. (2013). The effects of professor's race and gender on student evaluations and performance. *College Student Journal, 47*(2), 352-363.

Blair, I. V., & Banaji, M. R. (1996). Automatic and controlled processes in stereotype priming. *Journal of Personality and Social Psychology, 70*(6), 1142-1163.

Boysen, G. A. (2009). A review of experimental studies of explicit and implicit bias among counselors. *Journal of Multicultural Counseling and Development, 37*, p. 240-249.

Bstan-dzin-rgya-mtsho, & Cuttler, H. C. (2009). *The art of happiness: A handbook for living*. New York, NY: Penguin Group.

Chugh, D. (2004). Societal and managerial implications of implicit social cognition: Why milliseconds matter. *Social Justice Research, 17*(2), 203-222.

Crocker, J. & Major, B. (2003). The self-protective properties of stigma: Evolution of a modern classic. Psychological Inquiry, 14(3-4), 232-237.

Dinur, R., Beit-Hallahmi, B., & Hofman, J. E. (1996). First names as identity stereotypes. *The Journal of Social Psychology, 136* (2), 191-200.

Erwin, P. G. (1993). First names and perceptions of physical attractiveness. *The Journal of Psychology, 127*(6), 625-631. doi:10.1080/00223980.1993.9914901

Erwin, P. G. (1999). Attractiveness of first names and academic achievement. *The Journal of Psychology, 133*(6), 617-620. doi:10.1080/00223989909599767

Erwin, P. G. (2006). Children's evaluative stereotypes of masculine, feminine, and androgynous first names. *The Psychological Record, 56*, 513-519.

Fazio, R., & Olson, M. (2003). Implicit measures in social cognition research: their meaning and use. *Annual Review of Psychology, 54*, 297-327. doi:10.1146/annurev.psych.54.101601.145225

Furguson, R. F. (2003). Teachers' perceptions and expectations and the black-white test score gap. *Urban Education, 38*, 460-507. doi:10.1177/0042085903038004006

Greenwald, A. G., & Banaji, M. R. (1995). Implicit social cognition: Attitudes, self-esteem, and stereotypes. *Psychological Review, 102*(1), 4-27.

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology, 74*(6), 1464-1480.

Jae, H., & Cowling, J. (2009). Objectivity in grading: The promise of bar codes. *College Teaching, 57*(1), 51-55.

Kawakami, K., Phills, C., Steele, J., & Dovidio, J. (2007). (Close) distance makes the heart grow fonder: Improving implicit racial attitudes and interracial interactions through approach behaviors. *Journal of Personality and Social Psychology, 92*(6), 957-971. doi:10.1037/t03782-000

Mahajan, N., Martinez, M. A., Guiterrez, N. L., Diesendruck, G., Banaji, M. R., & Santos, L. R. (2011). The evolution of intergroup bias: Perceptions and attitudes in Rhesus Macaques. *Journal of Personality and Social Psychology, 100*(3), 387-405.

Malouff, J. (2008). Bias in grading. *College Teaching, 56*(3), 191-192. doi:10.3200/CTCH.56.3.191-192

McDavid, J. W., & Harari, H. (1966). Stereotyping of names and popularity in grade-school children. *Child Development, 37* (2), 453-459.

Monteith, M., Voils, C., & Ashburn-Nardo, L. (2001). Taking a look underground: Detecting, interpreting, and reacting to implicit racial biases. *Social Cognition, 19*(4), 395-417. Retrieved from http://search.proquest.com.proxy-library.ashford.edu/docview/229661679?accountid=32521

Nosek, B. A., Bar-Anan, Y. Sriram, N., & Greenwald, A. G., (2013). Understanding and using the brief implicit association test: I. Recommended scoring procedures. Retrieved from http://ssrn.com/abstract=2196002

Peterson, T., VanDam, K., & Wheeler, L. (2009). Who do we think we are? Dismantling educators' assumptions in the online classroom. In T. Bastiaens et al. (Eds.), *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2009* (2227-2231). Chesapeake, VA: AACE.

Rubie-Davies, C., Hattie, J., & Hamilton, R. (2006). Expecting the best for students: Teacher expectations and academic outcomes. *British Journal of Educational Psychology, 76*, 429-444. doi:10.1348/000709905X53589

Seraydarian, L., & Busse, T. (1981). First-name stereotypes and essay grading. *The Journal of Psychology, 108*, 253-257.

Shauki, E., Alagiah, R., Fiedler, B., & Sawon, K. (2009). Do learner's gender and ethnicity really matter for academic performance evaluation. *Journal of International Education in Business, 2*(2), 28-51.

Sriram, N., & Greenwald, A. G. (2009). The brief implicit association test. *Experimental Psychology, 56*(4), 283-294. doi: 10.1037/t03782-000

Staats, C., & Patton, C. (2013). *State of the science: Implicit bias review 2013*. Columbus, OH. Retrieved from http://kirwaninstitute.osu.edu/docs/SOTS-Implicit_Bias.pdf

Steele, C. (1997). A threat in the air: How stereotypes shape intellectual activity and performance. *American Psychologist, 52*(6), 613-629.

Turner, J. C., Brown, R. J., & Tajfel, H. (1979). Social comparison and group interest in ingroup favouritism. *European Journal of Social Psychology, 9*, 187-204.

Uhlmann, E. L., & Nosek, B. A. (2012). My culture made me do it: Lay theories of responsibility for automatic prejudice. *Social Psychology, 43*(2), 108-113. doi:10.1027/1864-9335/a000089

United States Census Bureau. (n.d.). *The 2012 statistical abstract: Education: Higher Education: Institutions and enrollment.* Retrieved from http://www.census.gov/compendia/statab/cats/education/higher_education_institutions_and_enrollment.html

U. S. Department of Education, National Center for Education Statistics. (2013). *The condition of education 2013* (NCES 2013-037). Retrieved from http://nces.ed.gov/fastfacts/display.asp?id=61

SECTION IV: Review of Literature

A Systematic Review of Empirical Studies on Participants' Interactions in Internet-Mediated Discussion Boards as a Course Component in Formal Higher Education Setting

Hong Zhou

A Systematic Review of Empirical Studies on Participants' Interactions in Internet-Mediated Discussion Boards as a Course Component in Formal Higher Education Settings

Hong Zhou

University of Texas at San Antonio

Abstract

This systematic review and synthesis of existing empirical studies examines peer-reviewed research articles published between January 2000 and May 2014 on the use of Internet-mediated discussion boards in higher education settings with a specific interest in the participants' interactions. Forty-two primary studies were examined after a systematic search and full text review. The findings from the primary studies regarding participants' interactions were analyzed using constant comparison coding techniques. The analysis and its results indicate several potential directions for future research, and connect the primary studies to provide a more holistic understanding of the participants' interactions in Internet-mediated discussions in the higher education setting.

Introduction

The research regarding online discussion in higher education settings has developed substantially since the 1990s. Learning and teaching in Internet-mediated discussions has been examined in many studies, with foci including participation (Brooks & Bippus, 2012; Topper, 2005), experiences (Gerbic, 2006; Milman, Hillarious, & Walker, 2012), interactions (Çelik, 2013; Light, Nesbitt, Light, & Burns, 2000), community building (Guilar & Loring, 2008; Lee, Carterwells, Glaeser, & Ivers, 2006), learning

outcomes (Zhan, Xu, & Ye, 2011), identities (Bryce, 2007), gender differences (Cheng, Liu, Chen, Shih, & Chang, 2012). Contexts have included distance education (Exter, Korkmaz, Harlin, & Bichelmeyer, 2009; Shackelford & Maxwell, 2012), professional development (Ekong, 2006), and accredited college courses (Lapadat, 2007). As course management systems and learning management systems become commonplace in colleges and universities, Internet-mediated discussions are increasingly utilized to supplement courses in higher education settings. Consequently, the appropriate and meaningful use of such tools has significant educational and fiscal implications.

Purpose of Review and Research Questions

As Internet-mediated discussion gains popularity within higher education and attention from researchers, the number of studies on this topic has also grown rapidly to cover various aspects such as contexts, perspectives, and participant groups. The diversity among the foci of the studies is significant, but together as a group these studies have covered many aspects to be researched. This accumulated knowledge has provided a solid foundation for a more holistic representation of Internet-mediated discussion as part of higher education course settings. However, an extensive search for studies on this topic yielded many results in examining some specific aspects of the participants' interaction, some studies quantitatively analyzing the effectiveness of some contributing factors affecting the participants' interaction, and some reviews of literature describing the interaction patterns, but no empirical-based study describing an overall understanding of the phenomenon. The main objective of this systematic review is to fill this gap by constructing a comprehensive understanding toward participants' interactions in Internet-mediated discussion when such discussions were utilized as components of formal courses in higher education settings. The questions guiding this review are:

1. What groups of participants have been studied for their interactions in online discussion?
2. What are the methods applied in studying the participants' interactions?
3. What have the existing studies found about the participants' interactions?
4. How do these findings connect with each other to form a holistic representation of the participants' interactions?

Key Concepts

Before delving into these research questions, it is necessary to clarify several key concepts based on past and current literature. The common understanding of discussion is a conversation or exchange of information on given topics. Thurlow, Lengel, & Tomic's (2004) widely accepted definition of computer-mediated communication describes it as "a process of human communication via computers, involving people, situated in particular contexts, engaging in processes to shape media for a variety of purposes" (p.15). Based on this definition and extending the context to the Internet, Internet-mediated discussion can be viewed as computer-mediated exchange of information that occurs only on the Internet under a hierarchical structure. For the purpose of this review, an Internet-mediated discussion forum is defined as a virtual platform for people to exchange information on given topics in a hierarchical or threaded structure. More specifically, it is situated in the context of coursework in higher education settings for the purpose of fulfilling the requirements of the course. Communication includes both sending and receiving information, and the Internet-mediated discussion forum supports both.

The term "participation" is largely understood as "being part of," referring to the voluntary presence in an environment, with or without further actions involving other humans or objects. In this review, the term "participation" is defined as presence in the Internet-mediated discussion, including both voluntary and mandatory presence under the course requirements.

Interactions have been defined as "reciprocal events that require at least two objects and two actions," and they "occur when these objects and events mutually influence one another" (Wagner, 1994,

p. 8). In the context of computer-mediated environments, the meaning of "objects" expands to include the computers, the human beings operating the computers, the platform supporting the reciprocal events, and the content produced during such events. For example, one person writing an email to another person is one action involving multiple objects, thus not an interaction; however, once the recipient reads this email, another action is carried out, and an interaction is formed. Since the focus of this review is Internet-mediated discussion, interaction is defined here as an event involving two parties' actions, including both reading and posting messages during online discussions. This review follows the well-accepted model of interaction in distance learning proposed by Moore (1989) in which interactions are categorized as student-student, student-teacher, and student-content. The learner-interface interaction proposed by Hillman, Willis, and Gunawardena (1994) is also included because of its relevance to this review's area of focus.

For the purpose of this review, participation and interaction are both viewed as part of communication with distinguishing differences. One instance of interaction must involve the participation of at least two parties each carrying out at least one action. When one party sends information, this action is part of the communication; however, without another party's response, this first action is considered as an instance of participation by the first party, which may or may not generate interaction. Once a response occurs, an instance of interaction is achieved.

Methodology

Inclusion Criteria

This review included studies conducted since 2000 with an interest in participants' interactions in Internet-mediated discussion boards in higher education settings. Eligible studies included those conducted within higher education settings, with the participants taking formal courses using Internet-mediated discussion as part of the coursework, and with findings including quantitative or qualitative analyses of at least one aspect of participants' interactions.

Eight criteria were considered for inclusion of the primary studies:

1. Publication date: from January 2000 to May 2014
2. Publication type: peer-reviewed journal articles
3. Language of publication: English
4. Setting of study: accredited courses in higher education
5. Utilization of online discussion: part of coursework, synchronous or asynchronous
6. Participants: students (undergraduate and graduate), with or without data regarding the instructor
7. Key terms definition alignment: the definition or description of the key terms – computer-mediated communication, Internet-mediated discussion, participation, and interaction, align with the conceptual definition used for this study
8. Qualifying findings of study: some aspects of the interactions involving the participants reported in the findings

Search Strategy

Studies were located for this review via two steps:

- A key word search in the electronic databases of ERIC, Education Abstracts Full Text, PsycInfo, Social Science Citations Index, Academic Search Complete, ScienceDirect, and Google scholar (Table 1).
- A manual review of the reference lists of the literature review articles on similar topics and the reference lists of the primary studies located via the first step.

Table 1 *Electronic database and search terms*

Database	Search terms	Other search filters
ERIC via EBSCO	(college OR universit* OR "higher education" OR *graduate) in title AND (online OR Internet OR "computer-mediated communication" OR CMC) in title AND (discussion AND participant) in text	Date published from: January 2000 – May 2014 Educational level: Higher Education
Education Full Text via EBSCO	(college OR universit* OR "higher education" OR *graduate) in title AND (online OR Internet OR "computer-mediated communication" OR CMC) in title AND (discussion AND participant) in text	Date published from: January 2000 – May 2014
Web of Science (SSCI)	(TI=(college OR universit* OR higher education OR *graduate) AND TI=(online OR Internet OR "computer-mediated communication" OR CMC)) AND LANGUAGE: (English) Refined by: WEB OF SCIENCE CATEGORIES: (EDUCATION EDUCATIONAL RESEARCH) AND DOCUMENT TYPES: (ARTICLE OR PROCEEDINGS PAPER) Timespan: 2000-2014. Indexes: SSCI.	Date published from: January 2000 – May 2014, Limit to Social Sciences Citation Index (SSCI)
Academic Search Complete via EBSCO	(college OR universit* OR "higher education" OR *graduate) in title AND (online OR Internet OR "computer-mediated communication" OR CMC) in title AND (discussion AND participant AND course) in text	Date published from: January 2000 – May 2014, Language: English limit: Peer Reviewed Journal
PsychINFO via Ovid	((college or universit or higher education or graduate) and (online or Internet or computer mediated communication or CMC)).ti. and course.ab.	Publication year: 2000 – 2014, Languages: English, limit: Peer Reviewed Journal
ScienceDirect	(college OR universit* OR "higher education" OR *graduate) in title AND (online OR Internet OR "computer-mediated communication" OR CMC) in title AND (discussion, participant, course) in Abstract, Title, or Keywords	Publication year: 2000 – 2014, limit: Computer Science, Social Science, Journal article
Google scholar	search article title for all words in one of these groups: "higher education" + online + discussion "higher education" + Internet + discussion "higher education" + "computer-mediated communication" College + online + discussion College + Internet + discussion College + "computer-mediated communication" Universit + online + discussion Universit + Internet + discussion Universit + computer-mediated communication	Date published from: 2000 – 2014

Table 2 *Constant comparison matrix (partial)*

Study	methodology	setting	participants	main findings	analytical tool
6	case study, coding system based on previous studies	10-week course, eLearning design topic, online Master's program, instructor provide weekly topics, 20% of final grade	16 graduate students,	significant difference between the overall and weekly learner–learner and learner–instructor interaction levels; no significant difference on learners' interaction level from all paired comparisons; Interaction level between learners and the instructor significant decreasing from Week 1-8.	survey with modification for inquiry on interaction level, 7-point Likert scale;
8	case study, descriptive analysis at group level,	undergraduate course, UK, weekly lecture, tutor set up discussion and posted one articles for open group discussions students had 5 weeks to respond	10female 19male, third year undergradua te	students' strong tendency to address contributions to the tutor; good deal of off-task communications and personal abuse without tutor; disruption occurred in all 4 groups; different interactive levels among groups; netiquette as social rules	post frequency counts, task-focus vs. partial-focus vs. off-task,
9	qualitative, coding, quantifying counts of codes	online course, group of three, project-based, assigned group leader, required posts	graduate students, 10male 20female	most frequent interaction type is mutually constructing knowledge; students rarely challenge others; all collaborative interactions in face-to-face situations are identified in synchronous discussion	eight types of collaborative interactions
10	quantitative, DV=SoC (sense of community), SPSS, Chi-square, correlations, regression,	South Central U.S., online graduate course,	n=381	All interaction items were fairly to moderately correlated, with higher CCS total scores; learner–learner interactions regression model was significant ($F = 62.861$, $p < .05$, R2 46%) by the five predictors; the other items were excluded from the model due to their non-significant impact; for each type of learner–learner interaction, frequency was significantly related to importance; for all types of interaction, the relationship was positive in direction.	classroom community scale; nine learner–learner interactions
11	content analysis	two graduate courses, hybrid, group discussion, group project,	graduate students, curriculum and instruction (Midwest Case) and the other in counseling (Southeast Case)	initiating and supporting communication patterns dominated the online discussions; challenging and monitoring patterns were exhibited lower overall; summarizing occurred in only one of the cases; responses to a posting patterns of interaction were high in both cases; reply to a response patterns tended to be lower in occurrence compared to RP patterns; only in the Southeast case did students use level 4 replies; certain topics seemed to generate higher levels of interactivity; time to complete an activity or discussion affected the interaction patterns with a positive relationship between level of interaction and time	categories of communication interaction level

The search yielded 514 articles. The titles and abstracts of these articles were reviewed to eliminate articles not fitting the inclusion criteria. The most common exclusions were articles reporting the development or evaluation of Internet-mediated learning management systems in higher education settings. Some articles were excluded because they have "online" and "higher education" in the title but do not report students' participation in online discussion forums. Other studies reporting computer-mediated communications in higher education settings but not as part of a course were also excluded. Of the remaining 116 articles, 26 were duplicates from multiple electronic databases, and were removed from the list. The abstracts and full texts of the remaining 90 studies were obtained and evaluated using the inclusion criteria. After a closer examination of the full text, 42 studies meeting all inclusive criteria were included in this review.

Analytic Procedure

All primary studies were examined for their findings and the contexts in which they were conducted.. Constant comparison was the main approach to this examination and synthesis. Constant comparison is "an analytic process of comparing different pieces of data for similarities and differences" (Corbin & Strauss, 2008, p.65) commonly applied to analyzing data of a qualitative nature. Taking this approach, all primary findings were extracted and listed in a matrix (partially shown in Table 2) along with the various aspects of the context where each study was conducted. These aspects include the setting of the study, the demographic of the participants, the data collecting and analysis instruments used, and the data analysis methods.

Each primary finding was compared to all other primary findings in an attempt to identify the similarities and/or differences among them. Conceptually similar primary findings were grouped together under a broader description. For example, a primary finding from one study reported having 31 posts for the semester and 15 of them came from one participant (Gerbic, 2006); another study reported a few students dominating the discussion (Giannini-Gachago & Seleka, 2005); and another study reported that in the online discussion 19 students posted 20-50 posts, one posted nine, and three posted 60 and above (Picciano, 2002). These three primary findings are similar in that they all describe that a small number of participants dominated the discussion. Therefore, a broader concept of "a few students dominate the discussion" is established to describe one of the characteristics of the online discussion.

Although each the primary finding was compared to the others, not all of them are reported in the synthesis. Since the main objective of this review is to construct a comprehensive understanding of the participants' interactions in general, only traits that are reflected in multiple primary findings are considered potential candidates for further generalization. A characteristic of the online discussion reflected in more primary findings is considered stronger than a characteristic reflected in fewer primary findings. Many primary findings are unique to the reporting study, thus not considered as part of the general understanding of participants' interactions in online discussion.

Findings and Discussion

The primary findings were examined as well as the context in which the study was conducted. Variables including the setting, participants, and instruments were compared across multiple primary studies. The findings from this review and synthesis are reported in the nextsection addressing each of the guiding questions.

Groups of Participants Studied

The first question guiding this review asks about participant groups that have been studied. The findings are as follows. The 42 primary studies were conducted in eight countries, representing cultures from both developed and developing nations in North America, Africa, Europe, and Asia. Twenty studies

were conducted in the United States, and the others in Australia, Botswana, Canada, China, South Korea, Turkey, and the United Kingdom. These studies were conducted in various settings including traditional residential campuses, virtual universities, and face-to-face courses with supplemental online components. Such broad diversity adds to the validity of the findings from this synthesis of literature.

Within the 42 primary studies, three did not specify whether the participants were undergraduate or graduate students. Of the 39 studies reporting participants' academic levels, 24 were conducted with graduate participants, and 15 were conducted with undergraduate participants.

Courses that employed Internet-mediated discussion were specified in 30 studies, and ranged across the fields of business, communication, digital design, education, environmental studies, healthcare, information science, journaling, liberal arts, literacy, mathematics, organizational behavior, psychology, social science, and technology (see Table 3). The most heavily represented field of study was education which was reported in thirteen studies, while 22 studies were conducted in various disciplines in the social sciences. Communication and technology courses were each reported in three studies. Healthcare and mathematics were reported in only one study each, while some popular academic disciplines were not represented at all, such as law, the arts, political science, and engineering. Such distribution could be interpreted in two ways, either the Internet-mediated discussion component has not been widely applied in certain academic disciplines in higher education settings, or researchers have not paid adequate attention to certain areas.

Table 3 *Summary of participants, environments, and methodologies of the primary studies*

Authors	**Year**	**Methodology**	**Course & Field of Study**	**Country**	**Participants**
Ahern, T. C. & El-Hindi, A. E.	2000	quantitative, qualitative	learning and instructional theory / education	n/a	post baccalaureate
Davidson-Shivers, G. V., Luyegu, E., & Kimble, B. E.	2000	descriptive	n/a	U.S.	graduate
Light, V., Nesbitt, E., Light, P., & Burns, J. R.	2000	case study, descriptive analysis	communication / communication	UK	undergraduate
Poole, D. M.	2000	qualitative	social perspectives of technology in education / education	U.S.	graduate
Larson, B. E. & T. A. Keiper	2002	qualitative, constant comparison	social studies methods / Social science	U.S.	n/a
Mäkitalo, K., Häkkinen, P., Leinonen, P., & Järvelä, S.	2002	qualitative	n/a	Finland	Pre-service teachers
Picciano, A. G.	2002	descriptive analysis	education administration / education	U.S.	graduate
Thomas, M. J. W.	2002	quantitative, qualitative, content analysis	Environmental Studies / Environmental	n/a	undergraduate

			Studies		
Cifuentes, L. J.	2003	quantitative	educational technology / education	n/a	undergraduate
Jeong, A. C.	2003	content analysis	Business Ethics / Business	U.S.	graduate
Lee, J. & C. C. Gibson	2003	quantitative, qualitative, content analysis	adult distance learning / education	n/a	graduate
Pilkington, R. M., & Walker, S. A.	2003	descriptive, qualitative	education / education	n/a	graduate
Christopher, M. M., Thomas, J. A., & Tallent-Runnels, M. K.	2004	naturalistic inquiry, qualitative	social and emotional needs of gifted learners / education	U.S.	graduate
Cunningham-Atkins, H., Powell, N., Moore, D., Hobbs, D., & Sharpe, S.	2004	quantitative	technology courses / technology courses	UK	undergraduate
Im, Y. L.	2004	quantitative, descriptive	pedagogy of web-based instruction / education	South Korea	n/a
Sorensen, Christine K. & Baylen, Danilo M.	2004	content analysis	n/a	U.S.	graduate
Brannan, T. A.	2005	quantitative, qualitative	n/a	U.S.	n/a
Giannini-Gachago, Daniela & Seleka, Geoffrey	2005	quantitative, t-test; qualitative, content analysis	n/a	Botswana	graduate
Lobel, M., Neubauer, M., & Swedburg, R.	2005	qualitative	interpersonal communication and relationships / communication	Canada	undergraduate
Dawson, S.	2006	quantitative	education discipline / education	Australia	undergraduate, graduate
Ellis, R. A., Goodyear, P., Prosser, M., & O'Hara, A.	2006	qualitative, descriptive	psychology / psychology	Australia	undergraduate
Gerbic, P.	2006	case study	business law / business	Australia	undergraduate
Lee, J., Carter-Wells, J., Glaeser, B., Ivers, K., & Street, C.	2006	longitudinal case study	n/a	U.S.	graduate
Bryce, N.	2007	discourse analysis	journaling / literacy	U.S.	graduate
Fernandez, Maria L.	2007	discourse analysis; quantitative	multicultural mathematics education / education	n/a	graduate
Lapadat, Judith C.	2007	case study, discourse analysis	n/a	Canada	graduate

Maushak, Nancy J. & Ou, Chaohua	2007	qualitative, quantifying counts of codes	n/a	U.S.	graduate
Campbell, M., Gibson, W., Hall, A., Richards, D., & Callery, P.	2008	quasi-experimental, quantitative	healthcare research methods / healthcare	UK	postgraduate
Exter, M. E., Korkmaz, N., Harlin, N. M., & Bichelmeyer, B. A.	2009	quantitative, t-test, qualitative interview	multiple courses / multiple courses	U.S.	graduate
Huang, Wen-Hao David & Nakazawa, Kazuaki	2010	case study	elearning / education	U.S.	graduate
Morris, T. A.	2010	qualitative	liberal arts, social science, information / liberal arts, social science, information	U.S.	undergraduate
Xie, Kui & Ke, F.	2011	quantitative, qualitative, content analysis	IST / education	U.S.	n/a
Zhan, Z. H., Xu, F. Y., & Ye, H. W.	2011	quantitative, t-test, MANOVA, ANOVA	digital design / digital design	China	undergraduate
Brooks, Catherine F. & Bippus, Amy M.	2012	qualitative, case study	communication / communication	n/a	undergraduate
Cheng, S. S., Liu, E. Z. F., Chen, N. S., Shih, R. C., & Chang, C. S.	2012	quantitative	English test prep / literacy	China	undergraduate
Du, Jianxia & Xu, Jianzhong	2012	descriptive stats	multimedia and hypermedia design / digital design	U.S.	graduate
Shackelford, J. L. & Maxwell, M.	2012	quantitative, Chi-sq, correlations, regression,	n/a	U.S.	graduate
Wise, A. F., Perera, N., Hsiao, Y. T., Speer, J., & Marbouti, F.	2012	micro analytic case study, descriptive	organizational behavior / organizational behavior	Canada	undergraduate
Wuttikietpaiboon, K.	2012	case study, content analysis	literacy / literacy	U.S.	graduate
Akarasriworn, C., & Ku, H.	2013	quantitative	mathematics modeling / mathematics modeling	U.S.	graduate
Çelik, Servet	2013	discourse; lexis analysis	English Language teaching methods / education	Turkey	graduate
Xie, K., Yu, C., & Bradshaw, A. C.	2014	quantitative, learning analytics, social network analysis, qualitative	n/a	U.S.	undergraduate

Methods Applied

The second question asks about methods applied in the included studies. As shown in Table 3, nine of the 42 studies used only quantitative methods, sixteen used only qualitative methods, and 17 used both quantitative and qualitative methods. A closer examination revealed the most commonly used forms of quantitative analyses to be t-tests, analysis of variance, and regression modeling; the most frequent methods of qualitative analyses included content analysis, case studies, and discourse analysis.

In these 42 studies, quantitative methods were applied to examine gender differences in online behaviors (Cheng et al., 2012), major source of engagement (Morris, 2010), various levels of participation (Cunningham-Atkins et al., 2004), the correlation between the quantity of discussion forum contributions and sense of community (Dawson, 2006), the difference in course grade between face-to-face and online discussion group members (Cifuentes, 2003), stages of interaction demonstrated in the discussion messages (Akarasriworn & Ku, 2013), the correlations between various interaction items on the classroom community scale (Shackelford & Maxwell, 2012), the difference in participation levels of students from different cultural backgrounds (Giannini-Gachago & Seleka, 2005), the correlations between students' perceptions of online discussion quality and contributing factors (Du & Xu, 2012), and other variables appropriate for numerical measurements.

Qualitative methods were applied to investigate discursive political moves such as establishing status and building solidarity during collaborative asynchronous online dialogue journaling (Bryce, 2007), the theoretical constructs demonstrated in developing an effective online learning community (Lee et al., 2006), the types of interaction that occurred among the students (Sorensen & Baylen, 2004), the levels of thinking exhibited in a graduate course-required online discussion (Christopher et al., 2004), events to follow each type of interaction (Jeong, 2003), the potential differences between similar online courses and face-to-face courses (Lobel et al., 2005), the mechanisms of establishing and maintaining common ground in electronic discussion (Mäkitalo et al., 2002), types of conditions that are likely to lead to a higher level of performance and a higher quality of understanding (Ellis, et al., 2006), the social dynamics in an online discussion group (Çelik, 2013), and other discursive and thematic topics.

The fact that qualitative methods were applied in more studies than quantitative methods could be an indication of the complexity of the topic. In many studies, the qualitative data were quantified for analysis and presentation of the findings (Ahern & El-Hindi, 2000; Brooks & Bippus, 2012; Fernandez, 2007; Huang & Nakazawa, 2010; Lapadat, 2007; Maushak & Ou, 2007; Pilkington & Walker, 2003; Thomas, 2002; Xie & Ke, 2011); however, only one mixed-methods study (Exter et al., 2009) was found during the search, indicating a potential direction for future research. In many recent studies, social network analysis was applied to generate findings from a new perspective. This could also be a new direction for future research.

Participants' Interactions

Regarding the third research question, the primary findings were extracted, summarized, and analyzed using constant comparison coding technique. Through such process, four main categories and eight sub-categories of interaction aspects emerged from the comparison. Although the primary studies were conducted over a range of more than fifteen years, many of the findings complemented or echoed each other, indicating that the characteristics and patterns of the participation and interactions changed little over time, as did the major contributing factors.

In order to synthesize the findings from various studies, "participation" is defined as voluntary presence in an Internet-mediated discussion, including the mandatory presence under a course requirement. Twenty-two studies reported findings related to students' participation. These findings were categorized as related to participation instead of interaction because the measurements in these studies were largely

taken by counting the number of messages read and/or posted during the online discussions, the length of messages, and frequency of participants logging into the supporting platforms. These actions typically involved only one participant and did not consider any reaction to the action, which was the distinguishing difference between participation and interaction. Eleven of the 22 studies described characteristics of participation. Some of the examples of these characteristics included:

- A few students dominate the discussion (Çelik, 2013; Gerbic, 2006; Giannini-Gachago & Seleka, 2005; Picciano, 2002);
- The students who do not often talk in face-to-face classroom participated more in online discussion (Ahern & El-Hindi, 2000; Larson & Keiper, 2002);
- Limited and low level participation at the beginning of the online discussion (Gerbic, 2006; Giannini-Gachago & Seleka, 2005; Thomas, 2002);
- Increasing participation as the online discussion progressed (Bryce, 2007; Cunningham-Atkins et al., 2004; Thomas, 2002);
- The participation level varied widely among the participants (Çelik, 2013; Cunningham-Atkins et al., 2004; Giannini-Gachago & Seleka, 2005; Poole, 2000).

In addition, eighteen studies tested or analyzed contributing factors related to the measurements of participation. Examples of the contributing factors include:

- The most influential factor for participation was the connection to grades (Gerbic, 2006) ;
- Students in online classes participated more actively than students in face-to-face classes (Lobel, 2005; Pilkington & Walker, 2003)
- Students with previous or current face-to-face experience with peers participated more actively in online discussion than those without face-to-face experience with such peers (Brooks & Bippus, 2012)
- Feedback and involvement from the instructor and teaching assistant were related to higher levels of student participation (Wuttikietpaiboon, 2012);
- Participation varied by gender (Cheng et al., 2012; Im, 2004);
- Participants taking assigned or predetermined roles such as moderator or manager showed higher levels of participation (Pilkington & Walker, 2003; Poole, 2000; Xie et al., 2014);
- The mix of cognitive styles in a group might influence activity level (Cunningham-Atkins et al., 2004).

Interaction is defined in this synthesis as events involving two parties' actions, including both reading and posting messages during the online discussions. Measurements of interactions were largely taken by the following two methods: one approach used was to count the layers of the messages responding to each other, similar to the methods utilized by Sorensen & Baylen (2004); the other trend was to analyze the meanings demonstrated in the posted text to the degree of thinking and/or cognition, similar to the methods proposed and utilized by Gunawardena (1997) and Bloom's (1956) taxonomy. Although these two methods of measuring are rather different, they could both be translated to degrees or levels categorized as "low," "medium," and "high." The findings related to the content of the interactions from the primary studies were coded into reflecting "low," "medium," or "high" interaction before synthesizing.

Twenty-one of the 42 primary studies described characteristics of participants' interactions. These characteristics formed a sketch of the "reciprocal events" (Wagner, 1994) in the particular context of coursework in higher education settings. Some examples of such found characteristics include:

- The interactions were generally collaborative and constructive (Giannini-Gachago & Seleka, 2005; Maushak & Ou, 2007) with some off-topic messages (Cifuentes, 2003; Light et al., 2000);
- Low to medium level interactions dominated the discussion with some high level evolving later (Akarasriworn & Ku, 2013; Davidson-Shivers et al., 2000; Fernandez, 2007; Gerbic, 2006; Im, 2004; Jeong, 2003; Larson & Keiper, 2002; Mäkitalo et al., 2002; Poole, 2000; Sorensen & Baylen, 2004; Thomas, 2002; Xie & Ke, 2011);
- More interaction in the form of response than initiation, but some initiations received no response (Jeong, 2003; Larson & Keiper, 2002; Lee et al., 2006; Poole, 2000; Thomas, 2002);
- The interactions rarely indicated challenging, disagreeing, or evaluating arguments (Jeong, 2003; Maushak & Ou, 2007; Sorensen & Baylen, 2004);
- Some degree of social bond dominated synchronous chat but was rarely observed in asynchronous discussion (Im, 2004);
- Some participants dominated higher level interactions, while other participants remained at lower level interactions (Christopher et al., 2004);
- Interactions with supportive messages dominated the discussions (Jeong, 2003; Sorensen & Baylen, 2004);
- The participants tended to give direct answers (Lee et al., 2006);
- It was difficult to detect emotion during the discussion (Larson & Keiper, 2002; Poole, 2000).

Seventeen studies reported contributing factors promoting higher degree or level of interaction. Regarding Wagner's (1994) definition of interaction, these contributing factors outlined how the involving parties "mutually influence one another" (p.8). Examples of such found characteristics include:

- Asynchronous discussions were more structured and cohesive than synchronous discussions (Bryce, 2007; Fernandez, 2007; Im, 2004);
- The instructor's involvement was related to higher levels of interaction (Light et al., 2000; Xie & Ke, 2011);
- Intrinsic motivation influenced the individual's level of interaction (Xie & Ke, 2011);
- There was a relationship between the degree of learner-learner interactions and students' perceived sense of community (Dawson, 2006);
- Arguments were likely to generate additional arguments and disagreement and then lead to higher levels of interaction (Jeong, 2003);
- Understanding the purpose of the discussion and posting questions promoted higher level interactions (Ellis et al., 2006; Lapadat, 2007);
- There was a positive relationship between level of interaction and time spent on discussion (Sorensen & Baylen, 2004).

Eight studies analyzed student-students interactions and/or student-instructor interactions following Moore's (1989) model of interaction in distance learning. The other two categories, student-content interaction and learner-interface interaction, were not reported in these primary studies. Two main themes emerged from findings across these studies:

- Student-teacher interactions dominated at the beginning of the discussion but decreased over the course of the discussion (Huang et al., 2010; Light et al., 2000; Pilkington & Walker, 2003);
- The frequency of student-student interactions may have been low at the beginning but increased significantly over the course of the discussion to surpass student-teacher interactions (Ahern & El-Hindi, 2000; Exter et al., 2009; Huang et al., 2010; Poole, 2000)

It is worth noticing that the numbers of studies investigating students' perceptions and performances are both relatively low, indicating a need for more empirical studies on these topics. Students' perceptions regarding online discussion were reported in eight studies. Several similar findings from multiple studies showed the contributing factors for students' positive perception toward online discussion and/or online course. Some examples include the sense of community (Exter et al., 2009; Fernandez, 2007; Lee et al., 2006), constructivist environment (Exter et al., 2009; Lapadat, 2007), supportiveness (Çelik, 2013; Lapadat, 2007), evaluation (Lee et al., 2006; Morris, 2010), and instructor involvement and support (Lee et al., 2006; Morris, 2010). Students' course performances during and after the online discussion experience were reported in five studies. The findings include:

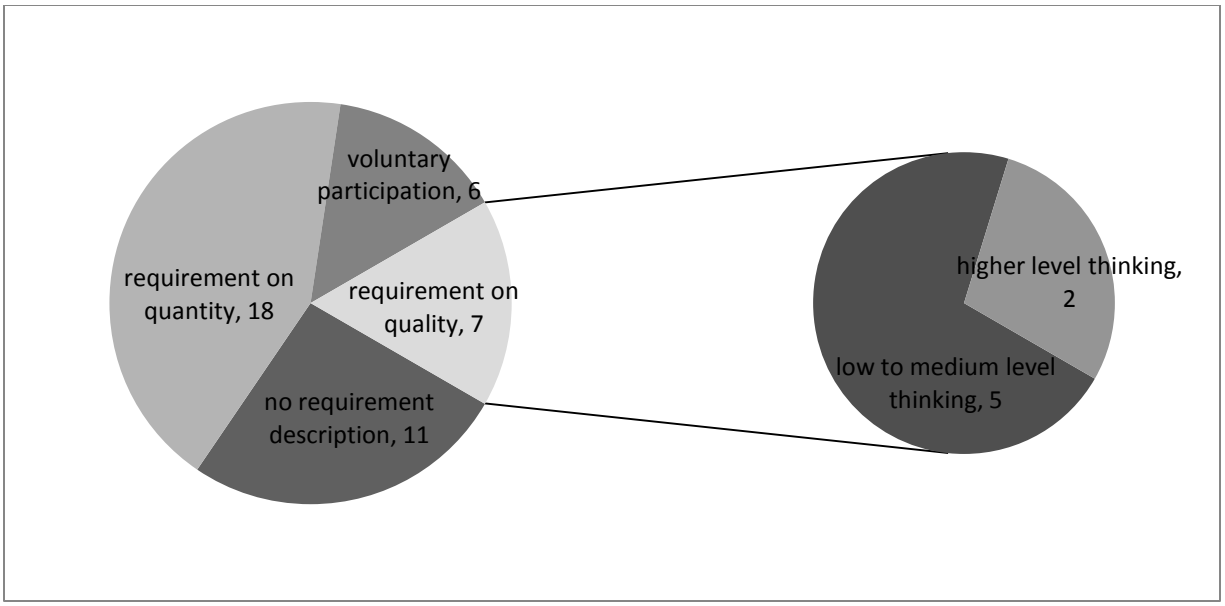
- The use of assessment rubrics encouraged students' participation and achievement (Wuttikietpaiboon, 2012);
- Students participating in online discussion outperformed those participating only in face-to-face discussion (Campbell et al., 2008);
- Participation in online discussion promoted writing performance (Picciano, 2002);
- Both active and reflective learners performed better as a result of participation in online discussion (Zhan et al., 2011);
- Kinesthetic intelligence and interpersonal intelligence were negatively affected by online discussion (Cifuentes, 2003).

In addition to the four main categories and eight sub-categories of interaction aspects, one subtle pattern also emerged among the selected primary studies—the potential relationship between the specificity of the discussion instruction and the quality of the discussion. In 36 of the 42 primary studies, online discussion participation was reported to be mandatory. Among these 36 studies, twenty-five reported discussion requirements on participation quantity, e.g., frequency and length of discussion posts, and/or grading scale of participation. Seven of the 25 studies reported various degrees of requirement and/or instruction on the quality of discussion, e.g., the content expectation and indicators of critical thinking. Within the 18 studies reporting requirements only on participation quantity, two reported higher level of critical thinking or cognitive engagement; within the seven studies reporting requirements on both participation quantity and quality, two reported higher level of critical thinking or cognitive engagement. This distribution and comparison is illustrated in Figure 1 (next page). Such contrast seems to indicate a potential relationship between specific instructions and/or requirements on the quality of discussion and higher levels of critical thinking or cognitive engagement as demonstrated in the discussion.

Holistic Representation of the Participants' Interactions

To answer the last research question, the coded findings were connected back to other parameters reported in the primary studies, such as course topic, format, grouping scale, instructor involvement, grading, and participants. Similar and contradicting findings from different studies were compared for potentially related parameters. Several noteworthy points emerged from this comparison:

- Studies conducted in undergraduate courses generated more findings on participation and lower level peer interaction, while studies conducted in graduate courses generated more findings on interaction levels and predictors;
- All but one study were conducted within one academic year, which might have limited the potential for more higher level interactions to emerge;
- Five studies reported that learner-instructor interactions were highly valued, indicating potential interventions for future research.



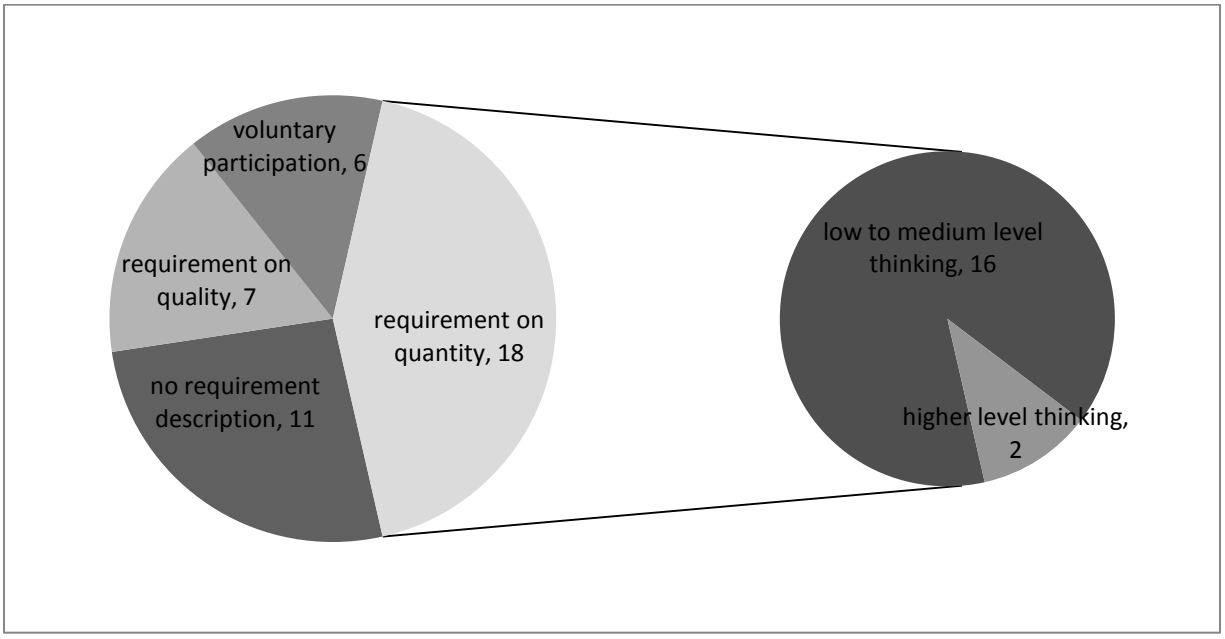


Figure 1. Comparison of levels of thinking following different levels of discussion requirement

The next step of synthesis took into consideration all of the reported parameters. Similar and complementary findings from multiple studies conducted in various contexts were compared and connected. For example, 12 studies reported to varying degrees that the online discussion being examined began with low- to medium-level interactions while higher level interactions were observed in the later stage of the discussions (Akarasriworn & Ku, 2013; Davidson-Shivers et al., 2000; Fernandez, 2007; Gerbic, 2006; Im, 2004; Jeong, 2003; Larson & Keiper, 2002; Mäkitalo et al., 2002; Poole, 2000; Sorensen & Baylen, 2004; Thomas, 2002; Xie & Ke, 2011). A closer examination of the contexts of these studies revealed that these 12 studies spanned a 14-year range, from 2000 to 2013, in four different countries with undergraduate and graduate students in five different academic disciplines. When studies conducted in such diverse contexts report similar findings, it is reasonable to consider that similar

findings have a high probability of existing in other contexts. Nine such themes from similar or complementary findings emerged from the synthesis:

- Participation was the foundation for interaction;
- Instructor support and feedback (including assessment) was highly valued, and over time affected students' participation and peer interaction quality and quantity;
- Peer interactions started slowly with frequent off-task and disruptive posts;
- The majority of peer interactions initially involved responding to an assignment, followed by supporting and constructive posts, with less dialogue and, rarely, challenging posts;
- Interactions between students and instructor were overall less than peer interactions, and decreased over time while peer interactions stayed consistent;
- Assigned student leaders and/or moderators affected the quality and quantity of discussion;
- Perceived self-competency and intrinsic motivation led to higher quantity and quality interaction, which might relate to taking a dominating or leading role;
- Level of familiarity and relatedness to peers, environment, and discussion topics led to higher-level peer interaction;
- The dynamics of interaction varied among groups, and was related to collaborative assignments, the existence of highly motivated members and higher-level elaboration, and the opportunity for members to contribute.

These themes illustrate a progression of Internet-mediated discussion as part of coursework in higher education settings. Such progress can be represented in the following figure.

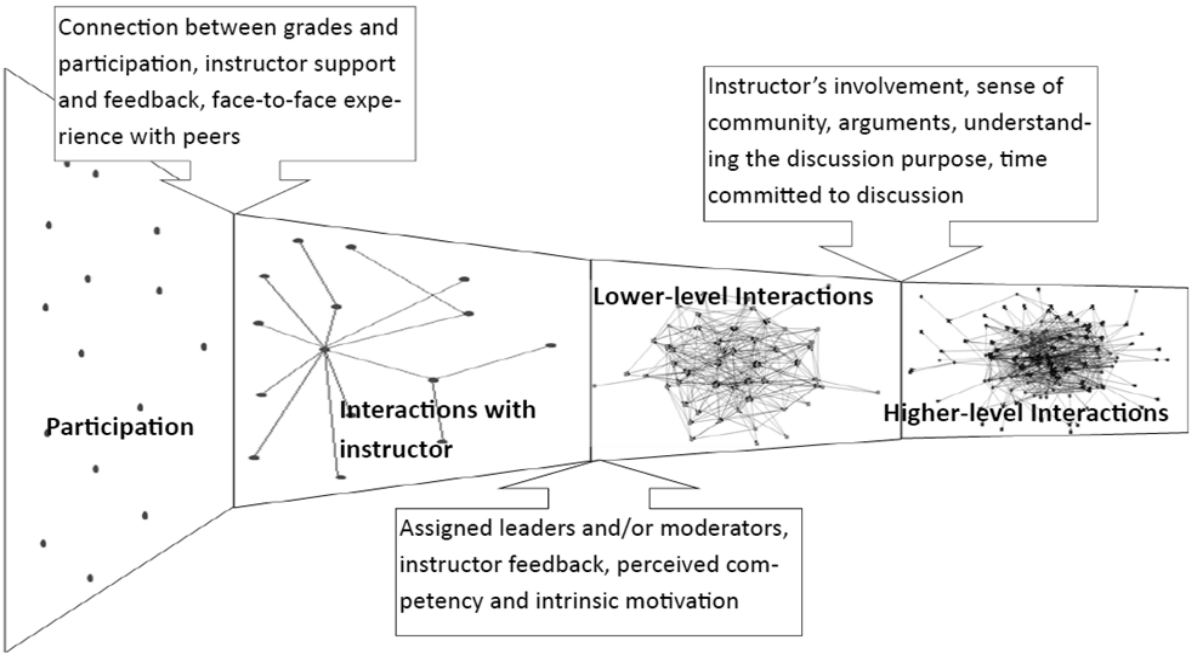


Figure 2. Illustration of a holistic process of Internet-mediated discussion

As a form of computer-mediated communication, Internet-mediated discussion showed its unique characteristics when utilized in higher education settings as part of coursework. Two stages of communication are clearly present. The first stage is participation, which is a one-way communication. The second stage is interaction, which is a two-way communication. The development of these two stages is based on student participation, which begins with interactions with the instructors or assigned leaders, increases to more lower-level peer interactions with support and feedback from the instructors and/or leaders/moderators, and gradually progresses to more higher-level interactions with several core participants and fading instructor support.

Summary

The process of synthesizing current research about online discussion in higher education settings revealed several key findings:

- The most heavily represented academic field where the primary studies were conducted was education, as reported in thirteen studies; healthcare and mathematics were each reported in only one study; and some commonly offered academic disciplines were not represented in the body of research, such as law, arts, political science, and engineering. This distribution could mean that either the Internet-mediated discussion component had not been widely applied in some of the academic disciplines in higher education settings, or that researchers had not paid adequate attention to certain areas.
- The fact that qualitative methods were applied in more studies than quantitative methods could be an indication of the complexity of the topic. There was only one mixed-methods study (Exter et al., 2009) in the 42 primary studies, indicating a potential direction for future research. Social network analysis was applied in many recent studies to generate findings from a new perspective. This could also be a new direction for future research.
- It is worth noting that the numbers of studies investigating students' perceptions and performances are both relatively low, indicating a need for more empirical studies on these topics.
- The contrast of higher level critical thinking and cognitive engagement in online discussion with different degree of specificity seems to indicate a potential relationship between the instructions and/or requirements on the quality of discussion and level of critical thinking or cognitive engagement demonstrated in the discussion.

Discussions

Limitation

There are three limitations to this review. Although the search for the empirical studies was systematic and extensive, it was not exhaustive. It is reasonable to assume that many studies qualifying for inclusion in this analysis have not been located. However, the included 42 studies show a vast diversity in the time of publication, geological location, participants' academic level and discipline area, and the analysis methodologies applied. Therefore, it is reasonable to assume that the included pool of studies is representative of the body of existing literature.

Such diversity of the primary studies also makes it difficult to find multiple studies reporting similar or complementary findings from various contexts. The numerous and diverse variables addressed in these studies precluded the direct comparison and analysis of conflicting findings. For this reason, some findings reported in only one study versus conflicting findings from two studies conducted in different contexts were not considered as thematic findings in this review.

The objective of this review was to construct a more comprehensive understanding of the participants' interactions in Internet-mediated discussion when such discussions were utilized as components of formal courses in higher education settings. Such an objective requires a certain degree of generalization from the primary studies. However, only three primary studies were conducted within quasi-experimental settings (Campbell et al., 2008; Cifuentes, 2003; Exter et al., 2009) to warrant generalizability, while the majority of the primary studies should be interpreted with careful consideration of their different contexts. In order to reach the objective of this review, findings from the primary studies had to be examined closely along with the contextual data accompanying each finding. Such constraints limited findings from the primary studies that could be weighted in the findings of this review.

Strength and significance

This systematic review and synthesis is based on over 14 years of high quality empirical research that covers a diverse range of perspectives. Many of the findings from one study can be compared to or connected with findings from other studies to generate new meanings and to promote further interpretation. This process is similar to constructing a building with various blocks. By doing so, this review extends the implications of all included primary studies to a broader context.

Even with the aforementioned limitations, this review achieved its main objective of developing a foundation for comprehensive understanding of participants' interactions in Internet-mediated discussion, thus filling a gap in existing literature. Meanwhile, this review also points to several potential directions for future research, which can be beneficial to researchers as well as practitioners in the field of higher education.

Conclusion

This systematic review synthesizes findings from primary studies on participants' interactions in Internet-mediated discussions as higher education course components. Four categories and eight sub-categories emerged from the analysis, indicating several potential directions for future research. The findings from the primary studies were connected to illustrate the progress of interactions developing in the course of the discussion. Such an illustration provides a comprehensive understanding on the overall phenomena of utilizing online discussion as a course component in higher education settings. Researchers, practitioners, students, and administrators may all benefit from this newly constructed understanding.

References

References marked with an asterisk indicate studies included in the synthesis.

*Ahern, T. C. & El-Hindi, A. E. (2000). Improving the instructional congruency of a computer-mediated small-group discussion: A case study in design and delivery. *Journal of Research on Computing in Education, 32*(3), 385-400.

*Akarasriworn, C., & Ku, H. (2013). Graduate students' knowledge construction and attitudes toward online synchronous videoconferencing collaborative learning environments. *Quarterly Review of Distance Education, 14*(1), 35-48.

Bates, A. T. (2004). *Technology, e-learning and distance education* (2nd ed.). London: Routledge.

Bloom, B. S. (1956). *Taxonomy of Educational Objectives: Handbook of Cognitive Domain.* New York: McKay.

*Brannan, T. A. (2005). Learner interactivity in higher education: comparing face-to-face, hybrid, and online instruction. *Distance Learning, 2*(2), 1-8.

*Brooks, C. F., & Bippus, A. M. (2012). Underscoring the social nature of classrooms by examining the amount of virtual talk across online and blended college courses. *European Journal of Open, Distance and E-Learning,* (1).

*Bryce, N. (2007). *Online dialogue journaling in graduate literacy teacher education: Identity and knowledge construction*. Orlando: Int Inst Informatics & Systemics.

*Campbell, M., Gibson, W., Hall, A., Richards, D., & Callery, P. (2008). Online vs. face-to-face discussion in a web-based research methods course for postgraduate nursing students: A quasi-experimental study. *International Journal of Nursing Studies, 45*(5), 750-759.

* Çelik, S. (2013). Unspoken social dynamics in an online discussion group: The disconnect between attitudes and overt behavior of English language teaching graduate students. *Educational Technology Research and Development, 61*(4), 665-683.

*Cheng, S. S., Liu, E. Z. F., Chen, N. S., Shih, R. C., & Chang, C. S. (2012). Gender differences in college students' behaviors in an online question-answer discussion activity. *Asia-Pacific Education Researcher, 21*(2), 244-256.

*Christopher, M. M., Thomas, J. A., & Tallent-Runnels, M. K. (2004). Raising the bar: encouraging high level thinking in onlinediscussion forums. *Roeper Review, 26*(3), 166-171.

*Cifuentes, L. J. (2003). The interactive effects of computer conferencing and multiple intelligences on expository writing. *Quarterly Review of Distance Education, 4*(1), 15-30.

Corbin, J., & Strauss, A. (Eds.). (2008). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Thousand Oaks: Sage.

*Cunningham-Atkins, H., Powell, N., Moore, D., Hobbs, D., & Sharpe, S. (2004). The role of cognitive style in educational computer conferencing. [Article]. *British Journal of Educational Technology, 35*(1), 69-80.

*Davidson-Shivers, G. V., Luyegu, E., & Kimble, B. E. (2012). An analysis of asynchronous discussions: A case study of graduate student participation in online debates. *Journal of Educational Multimedia and Hypermedia, 21*(1), 29-51.

*Dawson, S. (2006). Online forum discussion interactions as an indicator of student community. *Australasian Journal of Educational Technology, 22*(4), 495.

*Du, J., & Xu, J. (2010). The quality of online discussion reported by graduate students. *Quarterly Review of Distance Education, 11*(1), 13-61.

*Ellis, R. A., Goodyear, P., Prosser, M., & O'Hara, A. (2006). How and what university students learn through online and face-to-face discussion: conceptions, intentions and approaches. *Journal of Computer Assisted Learning, 22*(4), 244-256.

*Exter, M. E., Korkmaz, N., Harlin, N. M., & Bichelmeyer, B. A. (2009). Sense of community within a fully online program: Perspectives of graduate students. *Quarterly Review of Distance Education, 10*(2), 177-251.

*Fernandez, M. L. (2007). Communication and instruction in an online graduate education course. *Teaching Education, 18*(2), 137-150.

*Giannini-Gachago, D., & Seleka, G. (2005). Experiences with international online discussions: Participation patterns of Botswana and American students in an Adult Education and Development course at the University of Botswana. *International Journal of Education & Development using Information & Communication Technology, 1*(2), 163-184.

*Guilar, J. D., & Loring, A. (2008). Dialogue and community in online learning: lessons from Royal Roads University. *Part of a special issue on instructional design, 22*(3), 19-40.

Gunawardena, C. N., Lowe, C. A., & Anderson, T. (1997). Analysis of a global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing. *Journal of educational computing research, 17*(4), 397-431.

Hillman, D. C., Willis, D. J., & Gunawardena, C. N. (1994). Learner-interface interaction in distance education: An extension of contemporary models and strategies for practitioners. *American Journal of Distance Education, 8*(2), 30-42.

*Huang, W. D., & Nakazawa, K. (2010). An empirical analysis on how learners interact in wiki in a graduate level online course. *Interactive Learning Environments, 18*(3), 233-244.

*Im, Y. L. (2003). Pedagogical implications of online discussion for preservice teacher training. *Journal of Research on Technology in Education (International Society for Technology in Education), 36*(2), 155-170.

*Jeong, A. C. (2003). The sequential analysis of group interaction and critical thinking in online. *American Journal of Distance Education, 17*(1), 25-43.

*Lapadat, J. C. (2007). Discourse devices used to establish community, increase coherence, and negotiate agreement in an online university course. *Journal of Distance Education, 21*(3), 59-91.

*Larson, B. E., & Keiper, T. A. (2002). Classroom discussion and threaded electronic discussion: learning in two arenas. *Contemporary Issues in Technology and Teacher Education, 2*(1), 45-62.

*Lee, J., Carter-Wells, J., Glaeser, B., Ivers, K., & Street, C. (2006). Facilitating the development of a learning community in an online graduate program. *Quarterly Review of Distance Education, 7*(1), 13-33.

*Lee, J., & Gibson, C. C. (2003). Developing self-direction in an online course through computer-mediated interaction. *American Journal of Distance Education, 17*(3), 173-187.

*Light, V., Nesbitt, E., Light, P., & Burns, J. R. (2000). 'Let's you and me have a little discussion': computer mediated communication in support of campus-based university courses. *Studies in Higher Education, 25*(1), 85-96.

*Lobel, M., Neubauer, M., & Swedburg, R. (2005). Selected topics from a matched study between a face-to-face section and a real-time online section of a university course. *International Review of Research in Open & Distance Learning, 6*(2).

*Mäkitalo, K., Häkkinen, P., Leinonen, P., & Järvelä, S. (2002). Mechanisms of common ground in case-based web discussions in teacher education. *The Internet and Higher Education, 5*(3), 247-265.

*Maushak, N. J., & Ou, C. (2007). Using synchronous communication to facilitate graduate students' online collaboration. *Quarterly Review of Distance Education, 8*(2), 161-169.

Moore, M. G. (1989). Three types of interaction. *American Journal of Distance Education*, 3(2), 1–6.

*Morris, T. A. (2010). Exploring community college student perceptions of online learning. *International Journal of Instructional Technology and Distance Learning 8*(6), 31–43 (2011).

*Picciano, A. G. (2002). Beyond student perceptions: Issues of interaction, presence, and performance in an online course. *Journal of Asynchronous learning networks, 6*(1), 21-40.

*Pilkington, R. M., & Walker, S. A. (2003). Facilitating debate in networked learning: Reflecting on online synchronous discussion in higher education. *Instructional Science, 31*(1/2), 41-63.

*Poole, D. M. (2000). Student participation in a discussion-oriented online course: a case study. *Journal of research on computing in education, 33*(2), 162-177.

*Shackelford, J. L., & Maxwell, M. (2012). Sense of community in graduate online education: Contribution of learner to learner interaction. *International Review of Research in Open and Distance Learning, 13*(4), 228-249.

*Sorensen, C. K., & Baylen, D. M. (2004). Patterns of communicative and interactive behavior online: Case studies in higher education. *Quarterly Review of Distance Education, 5*(2), 117-126.

*Thomas, M. J. W. (2002). Learning within incoherent structures: the space of online discussion forums. *Journal of Computer Assisted Learning, 18*(3), 351-366.

Thurlow, C., Lengel, L., & Tomic, A. (2004). *Computer mediated communication*. London: Sage.

Wagner, E. D. (1994). In support of a functional definition of interaction. *American Journal of Distance Education, 8*(2), 6-29.

*Wise, A. F., Perera, N., Hsiao, Y. T., Speer, J., & Marbouti, F. (2012). Microanalytic case studies of individual participation patterns in an asynchronous online discussion in an undergraduate blended course. *Internet and Higher Education, 15*(2), 108-117.

*Wuttikietpaiboon, K. (2012). Engaging graduate students in rich asynchronous online discussions. In L. G. Chova, A. L. Martinez & I. C. Torres (Eds.), *Inted2012: International Technology, Education and Development Conference* (pp. 4356-4365). Valenica: Iated-Int Assoc Technology Education a& Development.

*Xie, K., & Ke, F. (2011). The role of students' motivation in peer-moderated asynchronous online discussions. *British Journal of Educational Technology, 42*(6), 916-930.

*Xie, K., Yu, C., & Bradshaw, A. C. (2014). Impacts of role assignment and participation in asynchronous discussions in college-level online classes. *Internet and Higher Education, 20*, 10-19.

*Zhan, Z. H., Xu, F. Y., & Ye, H. W. (2011). Effects of an online learning community on active and reflective learners' learning performance and attitudes in a face-to-face undergraduate course. *Computers & Education, 56*(4), 961-968.