JoTLT

Journal of Teaching and Learning with Technology

Volume 3, Number 1, June 2014

jotlt.indiana.edu

JoTLT
JOURNAL OF TEACHING AND LEARNING WITH TECHNOLOGY

Volume 3	Number 1	June 2014

Journal of Teaching and Learning with Technology, Vol. 3, No. 1, June 2014, pp. 1 – 15.
doi: 10.14434.jotlt.v3n1.4720

Examining the connection between classroom technology and student engagement

R.C. Morris[1] and Loran Carleton Parker[2]

Pedagogical strategies increasing rely on technology as a way to address challenges facing the contemporary higher education classroom. This study investigated the use of a tool designed with the specific purpose of student engagement in a large classroom. The tool allows students to post to a community based discussion in a manner similar to a Twitter feed. Despite engaging in a community dialogue, results show that as usage of the technology went up a student's sense of community learning went down. This result prompted the authors to consider how this tool was utilized in the classroom, and while implementation diverged from the original design intention the usage mirrored common technological teaching tools like a threaded discussion board. We close with a warning that adoption of a novel technology alone does not produce a greater sense of community learning.

Keywords: student engagement; learning community; constructivist pedagogy; technological pedagogy; course redesign.

Introduction

The "state of higher education" is a topic of increasing concern in the United States. Example talking points include declining performance of U.S. students in the core areas of science, technology, engineering, and mathematics, and state budget shortfalls that result in sweeping education cuts. In this often politicized and highly turbulent era, some have argued that the golden age of U.S. higher education is over (Wolin, 2012). Those less critical, when pressed, do acknowledge a general, "decline of higher education" (Goldrick-Rab, 2012). However, despite the changing landscape the *National Center for Education Statistics* (NCES) report that undergraduate, "Enrollment in degree-granting institutions increased by 11 percent between 1990 and 2000. Between 2000 and 2010, enrollment increased 37 percent, from 15.3 million to 21.0 million" (Snyder & Dillow, 2011).

NCES also reports that there are approximately 3 million graduate students enrolled in programs across the United States including public, private, and first-professional programs. This is an increase of approximately 51% over the last 30 years (Snyder & Dillow, 2011). The rhetoric regarding a "decline of higher education" seems aimed at performance outcomes and not at rates of attendance.

Individual classroom sizes have increased in concert with growing attendance and a currently depressed hiring cycle (Biemiller, 2011; Williams, 2012). As a result, instructors are teaching larger classes (Williams-June, 2009; Wolff, 2012). Technology is touted as a way to overcome the challenges associated with heavy teaching loads and large class sizes, providing instructors with the ability to engage students in their courses. This paper briefly describes the

[1] Doctoral Candidate, Purdue University, rmorris@purdue.edu
[2] Assessment Specialist, Purdue University – Discovery Learning Research Center, carleton@purdue.edu

rationale for integrating technology into the higher education classroom, presents the results of a study conducted by the authors regarding the interaction between classroom technology and student perception of the classroom environment, and discusses the study results in the context of best practices for pedagogical reform and educational technology in higher education.

Literature Review: Teaching with Technology

Research into best practices for teaching and learning in higher education indicate that effective teaching encourages students to take an active role in their learning through cooperation with their peers to meet learning goals (Peel, 2005; Carnell, 2007). Best practices also suggest that both the instructor and student need to respect multiple perspectives and ways of learning (Chickering & Gamson, 1999). Large classes present a unique set of challenges as instructors seek to create this engaged learning atmosphere. The use of technologically oriented pedagogy is becoming a “go to” method as instructors attempt to connect with students in large and small classrooms alike (Koeber, 2005). Research shows that when technology is used appropriately it can enhance student learning (Kuh & Vesper, 2001), providing a platform supporting student engagement, active learning, and cooperation (Thomas & Kuh, 2005). Many academicians view the use of technology as the future of higher education pedagogy for classrooms of all sizes and emphases (Hughes, 2007; Berrett, 2012; Young, 2012). In turn, students increasingly expect to be engaged by technology (Benson, Ore, & Haney, 2002).

Pedagogical strategies that rely on technology seek to satisfy four general goals 1) engaging students, 2) increasing learning, 3) increasing performance, and/or 4) improving classroom management/efficiency. Each goal relates to the other, but is not necessarily equivalent. Instructors may adopt a strategy to achieve one outcome and not the others. In the best practices scenario, an instructor desires the combined result of all four outcomes. Consider as an example the use of electronic response systems, or “clickers” (Persell, Pfeiffer, & Syed 2008). Clickers are a popular pedagogical tool (Mollborn & Hoekstra, 2010). Despite the popularity, it is possible to use a clicker to achieve one instructional goal at the expense of others. Having students use clickers makes it easy for them to respond quickly, efficiently, and with minimal self-identification to a variety of classroom related activities. Despite the ease of classroom management, a clicker does not inherently guarantee a higher level of learning. While this statement seems like common sense, the rhetoric and packaging accompanying many of these new technological teaching tools suggests that usage alone will increase student engagement and learning. As one set of instructional design technicians at our university remarked, “[our tools] bolster engagement inside and outside the classroom...” Statements like this are not uncommon as pedagogy in higher education continues to adopt novel technology used both inside and outside of the classroom. Email and physical in-boxes are increasingly crammed with solicitations promoting hardware, software, and techniques oriented toward greater and greater usage of technological pedagogy.

Research Questions

The challenges facing higher education have prompted instructors to turn to technological pedagogy as a way to address the contemporary demands of teaching. Likewise, students increasingly expect to be engaged by the use of technology as part of the learning process. However, does the use of novel technology positively correlate with student engagement? This is a timely question to answer given the emphasis on technology centered pedagogy in higher education. If the rhetoric and packaging of new technology are to be believed, usage alone should supplement the learning process in a way that makes the classroom experience student-centered. Proponents of technologically driven pedagogy take the argument further to suggest that the engaging student environment will result in deeper learning and higher performance (i.e., better course grades, better learning of content, and even higher retention rates). The pressing needs of contemporary higher education rely heavily on technology to achieve these goals. The research question driving this paper can simply be articulated, "Does the use of technology correspond with a greater sense of student engagement in the classroom?"

This study focuses on the use of one specific teaching tool that was developed at our university. This tool is part of a package that recently won a prestigious award at the 2012 *Campus Technology Innovators Awards* under the category for teaching and learning. The website for this tool describes it as follows, "[this tool], a social networking-powered mobile Web application, creates a collaborative classroom, allowing students to provide near real-time feedback during class and enabling professors to adjust the course content and improve the learning experience. Students can post messages to [this tool] using their Facebook or Twitter accounts, sending text messages, or logging in to the [tool] Web site." Interaction with the tool is similar to a Twitter feed. Students are able to post real-time flowing discussion in a space using hash tags and content management. The idea is to allow for an open forum of student-driven discussion fostering emergent and synergistic topics that help guide instruction. A feed can be displayed in real time on a projector during a class session. It can also be used outside of class to continue discussion. A tagline for this tool describes it as bridging the gap between instructor and student. The line reads, "Opening the back channel in large lectures."

Research Setting: Course Redesign

Following a five-year study conducted by *The National Center for Academic Transformation (NCAT)* institutions across the U.S. are examining the way course content is taught to students. Our university is engaged in a similar effort. As part of our campus redesign initiative, data are being gathered about student perceptions of engagement as well as adoption of novel technology in redesigned courses. These data make it possible to conduct a quantitative analysis of the research question guiding this study. One of the central themes of redesign initiatives currently sweeping across the U.S. places substantial emphasis on the use of technology as a part of course redesign. In fact, NCAT says there are two main goals for course redesign and that each relates to the use of technology in the classroom. The first goal is to improve the quality of teaching, and the second to reduce the costs of higher education. Their website emphasizes technology by saying, "Course redesign using information technology is key to achieving both outcomes" (Transformation, 2012). The emphasis on technology integration as a part of pedagogical reform is found on the campus where the current study takes place, making this setting an ideal place to address the research question proposed.

Student Engagement

Student perceptions of the learning environment are often studied in concert with other variables commonly associated with student success because of a demonstrated linkage between student engagement and academic integration and persistence (Kuh et al., 2008). The definition for "student engagement" varies among these studies, but the Scholarship of Teaching and Learning generally agrees that student engagement is defined by active participation in lessons through discussions between student and instructor, discussions among students, and includes an element of student ownership of course material in the learning process (Fraser, 2012; Harper & Quaye, 2010; Wolters & Taylor, 2012). A survey protocol known as the Classroom Experience Questionnaire (CEQ) was created on our campus to assess student perception of the classroom learning environment, in particular, student perceptions of active and collaborative learning (for more on the creation of this survey protocol see Morris et al., Forthcoming). The CEQ assessment tool was developed based on previous empirical work (Piburn et al., 2000) on course redesign using instruments like the Reformed Teaching Observation Protocol as a model (MacIsaac & Falconer, 2001).

An important goal of creating the CEQ protocol was the development of a valid and reliable instrument for assessing course reform using student self-reports of their experiences in the classroom, rather than those of third-party observers (MacIsaac & Falconer, 2002). As such, the CEQ was developed by modifying assessment items that appear on existing protocols making questions more easily interpretable by a diverse group of college students in an online survey format. This process involved a "deconstruction" of currently established measurement methods, translating measurement items into classroom practices that embodied common learning environment constructs such as "student engagement" (Sawada et al., 2002).

Data used for this study come from the course redesign project on our campus using the CEQ student self-report database. When this manuscript was prepared the database represented seven courses and 11 separate sections (to date the database has grown more than six-fold). As a part of the redesign one course adopted the novel technology designed to "open the back channel in a large lecture." This course is the focus of this study.

Methods

Results come from a single section of an introductory Political Science course, largely made up of first and second year students. The total course roster had 187 students. Using blinded ID numbers, students were randomly selected to participate in the online CEQ survey. No exclusion criterion was used to disqualify students from participation in the study. A total of 74 students (40%) volunteered and completed surveys. Of those, 11 students did not complete the survey after clicking on the link to begin, these empty or missing cases were dropped leaving 63 valid cases available for analysis.

Our first step determined if the CEQ instrument produced similar constructs as are present on established measurement protocols. Dimension reduction followed techniques of Confirmatory Factor Analysis (CFA) using Principle Axis Factoring (PAF). Dimension reduction included a coefficient of alienation of $\geq$ .30 to eliminate weak relationships. Cronbach's alpha was used as a measure of the internal reliability for each construct. Following dimension reduction and internal reliability analysis, CEQ items were used to create Bartlett (DiStefano, Zhu, & Mindrila, 2009) factor regression scale scores of student engagement. Scales were modeled with data related to the technological tool under investigation. Based on the cross-sectional nature of these data we have also reverse order tested the models. To account for the small sample size ($N = 63$) our final step ran a post-hoc power analysis.

Predictors and Outcome

The dependent variable tested relates to usage of the technology under investigation; usage of this tool lent itself to a count analysis. Simply put, usage can be counted because usage is equal to the number of unique postings logged into the system by each student (i.e., the technology is used in a manner similar to a Twitter feed). According to the redesign emphasis on technologically driven pedagogy (coinciding with developer selling points) frequency of posting should have a positive correlation with self-reported engagement.

Measurement of student engagement came from Likert scaled (from 5 – Strongly Agree to 1 – Strongly Disagree, with 3 – Undecided) CEQ items that were transformed into factor regression scores. We created factor scores to ascertain the correlational relationship between student engagement and usage of the novel technology adopted as a part of course redesign. The analysis we ran did not include additional control variables because there is no theoretical reason for us to believe that typical controls like age or gender significantly influence posting.[3]

Hypothesis

Previous research has shown that use of technology in the classroom produces positive results especially with respect to students' perceptions of teaching effectiveness (Pippert & Moore, 1999), active collaborative learning (Hung & Yuen, 2010; Junco, 2011), sense of engagement with course content (Persell, 2004; Pearson, 2010), academic activities (Thomas & Kuh, 2005), and increased academic achievement (Wright & Lawson, 2005). Thus, our hypothesis is: the CEQ constructs will be positively correlated with usage of technology in the classroom, as a student's number of posts increases their perceptions of engagement in the course will also increase.[4]

Results

Based on the design of the CEQ these data should produce three main factor structures for classroom culture. Existing definitions of *student engagement* include an emphasis on active participation in lessons through discussions—between student and instructor and between students—as well as a measure of student ownership of course material. Grounded in these ideas we name the three CEQ constructs: 1 – Learning Community (LC), 2 – Constructivist Pedagogy (CP), and 3 – Equity (EQ). Tables below present the questions used to create each construct. Table 1 displays the results of the first CFA showing a pattern matrix grouping around the LC construct. To augment the findings of the CFA we also included a measure of Cronbach's alpha.

Results of Table 1 show that items making up LC achieved necessary sampling strength to be modeled as a unique construct (KMO Bartlett test statistic = .753). Table 1 also shows that LC is a strong construct with good factor loadings (.585 to .895) and possesses strong internal reliability (Cronbach's alpha = .829). Table 2 displays the results of the CFA for CP.

---

[3] This should not be read as suggesting that usage of technology is unrelated to age or gender. These data also lack demographic variables such as race or nationality of student which could potentially prove to be confounding variables. This is a known limitation of these data. A further confounding variable is a person's inclination (including self-efficacy beliefs) toward usage of novel technology. However, because usage of this tool was a requirement of the class typical controls were inappropriate. More detail on how the technology was used as a requirement of the course is presented below.

[4] The hypothesis presented is based on previous research but also reflects the contemporary belief that usage of technology in the classroom is inherently beneficial to student learning.

Results of Table 2 show that items making up LC achieved necessary sampling strength to be modeled as a unique construct (KMO Bartlett test statistic = .824). Table 2 also shows that CP is a strong construct with good factor loadings (.668 to .912) with strong internal reliability (Cronbach's alpha = .906). Table 3 displays the results of the CFA for EQ.

Table 1

The Learning Community Construct, $N = 63$

KMO and Bartlett Test statistic = .753 (P = .001)	
The instructor:	Factor Loadings:
Item 1 - provided opportunities for students to challenge opinions expressed in class.	.675
Item 2 - encouraged students to participate actively in class.	.729
Item 3 - provided opportunities for students to ask questions.	.895
Item 4 - allowed students to answer a question or solve a problem in more than one way.	.654
Item 5 - maintained a climate of respect within the class for what others had to say.	.585
n = 5 items | Cronbach's α = .829	

Table 2

The Constructivist Pedagogy Construct, $N = 63$

KMO and Bartlett Test statistic = .824 (P =.001)	
The instructor:	Factor Loadings:
Item 6 - connected course content to students' experience and knowledge.	.668
Item 7 - asked students to explain their ideas.	.745
Item 8 - gave students adequate time to think about and/or discuss a new concept before moving on.	.912
Item 9 - provided opportunities for students to process new information.	.909
Item 10 - allowed students to answer a question or solve a problem in more than one way.	.829
n = 5 items | Cronbach's α = .906	

Table 3

The Equity Construct, $N = 63$

KMO and Bartlett Test statistic = .449 (P =.001)	
	Factor Loadings:
Item 11 - During the past week, who primarily guided the DISCUSSION portion of class?	.413
Item 12 - Discussion in the class generally followed which format (students or instructor)?*	.545
Item 13 - During the past week, who primarily determined the topics covered (students or instructor)?*	.288
n = 3 items | Cronbach's α = .41	

*These items were scored on a scale from 1 to 10, 1 representing complete student choice to 10 instructor choice.

The EQ construct with three items had moderate to low loadings, failed the KMO and Bartlett test (.449) and also had low Cronbach's alpha (.41). CEQ data did not adequately produce the EQ scale construct, and the EQ scale was dropped during the remainder of the analysis.

Table 4 presents the three variables that were modeled (plus a modified version of LC) to address our research questions.

Table 4

Descriptive Statistics of Variables

	N	Min	Max	Mean	Std. Dev.	Skewness	Std. Error	Kurtosis	Std. Error
Constructivist Pedagogy	57	-2.086	1.356	0	1.042	-.290	.409	-.993	.798
Learning Community	61	-3.323	1.038	0	1.056	-1.223	.403	1.537	.788
Learning Community Transformed	61	1.00	4.36	2.188	.939	.292	.403	-.725	.788
Posts	90	0 (*n* = 14)	47	5.91	8.259	2.619	.254	7.952	.503

Table 5 presents zero-order correlations between the three variables. Negative correlation was present between both measures of student engagement and usage of the technology, with a statistically significant relationship between LC and Posts. As posts increased LC decreased by .399, *P* = .019 (see Table 5, Column 1 – Row 2). This finding wholly rejects our hypothesis.

Table 5

Zero-order Correlations

	Posts	Learning Community	Constructivist Pedagogy
Posts	1.000		
Learning Community	-.399* (p = .019)	1.000	
Constructivist Pedagogy	-.331	.803**	1.000

* *P* ≤ .05 (2-tailed) ** \| *P* ≤ .001 (2-tailed).

To dig deeper into the relationships between student engagement and usage of the technology a zero inflated Poisson model with *Posts* as the outcome was run. We decided on a zero inflated model based on the correlation results of Table 5 and the presence of Poisson errors, but primarily due to the large number of 0's in these data. A Vuong test compared the zero-inflated model to the standard Poisson model and determined if the outcome should be treated as zero inflated. Results of the test showed that a standard Poisson model was a better fit for these data (Z = 1.43, *P* = .0770). We also used the Stata command "vce robust" to account for a small violation of the assumption that the distribution variance equals the mean by obtaining robust standard error estimates (Cameron and Trivedi, 2009).

Model 1 in Table 6 presents the Poisson regression model showing that for a one unit increase in the respondents *LC* score, holding the other variables constant, the difference in the log of expected posts would be expected to decrease by .476 (*P* =.011). Meaning, as the odds of posting increased a student's sense of engagement related to the learning community significantly decreased. *CP* was not a significant predictor for usage of the technology.

Table 6

Poisson Regression Estimates of Posts & OLS Regression Estimates of Learning Community

	Model 1 Poisson Regression of Posts		Model 2 OLS Regression of Learning Community	
	LR chi2(3) = 17.33 Prob > chi2 = .0002 Pseudo R2 = .169 Log likelihood = -150.620		F (2, 30) = 29.327 Prob > F = .001 R-squared = .662 Root MSE = .573	
Predictors	B	SE	β	SE
Learning Community	-.476* (P = .011)	.243		
Constructivist Pedagogy	.071	.300	-.677***	.013
Posts			.014	.013
Intercept	1.776***	.197	2.097***	.131

* $P \leq .05$ | ** $P \leq .01$ | *** $P \leq .001$

Our hypothesis assuming that students who utilize a technology designed to engage students by "open[ing] the back channel" of communication was not supported. Both correlation and regression modeling found a negative relationship between usage and sense of engagement.

The next step was to reverse order test the model to see if *Posts* would be equally predictive of students' sense of engagement. Based on the zero-order correlation *LC* was chosen as the dependent variable, with *Posts* and *CP* predicting. Table 4 displays descriptive statistics for a transformed version of *LC*. Transformation was necessary based on the skewness and kurtosis of these data points. We transformed the LC factor scores by adding a constant and then taking the square root. This modified variable produced the results of *LC Transformed,* reported in Table 4. The transformed LC was well within acceptable levels to be modeled with Ordinary Least Square (OLS) regression. Model 2 in Table 6 displays the results of this OLS regression. Again we found the strong relationship between *LC* and *CP* (negative as a result of data transformation), but specifying *LC* as the outcome as predicted by Posts produced no statistically significant result. The better model for these data is Model 1.

The final step was a post-hoc power analysis. A critical z value of 1.64 with 63 observations resulted in the power (1-β err prob) .62. The *LC* produced a Z value of |1.53|. These results suggest that these data have a moderate ability to detect significant results. McFadden's R^2 of .169 in Model 1 should be interpreted with caution given the Poisson distribution; however, this model accounts for nearly 20% of the variation of posting with only two predictors modeled. Given the strong result produced primarily by the *LC* (β = -.476, *P* = .011)*,* these findings are worthy of consideration.

Discussion

The total picture of our analysis rejects our initial hypothesis. A student's posting *is* correlated with their sense of engagement as measured by the CEQ, but in a negative direction. Additionally, we find that the appropriate ordering places a student's sense of engagement antecedent to posting. For this course, the learning atmosphere determines the amount of student usage on a technology designed to promote student engagement.

Stretched to a maximum, and admittedly a generalized claim is thin, the findings of this study cast doubt on adopting technology as *the* answer for achieving student engagement. More precisely, these findings indicate that usage of an award winning engagement tool is not enough to create a greater sense of engagement under the conditions adopted in this course. In interpreting these results, it may be helpful to consider what we mean by "adoption" or "integration" of technology in the classroom. Researchers examining information technologies in higher education have found that one of the most popular adoptions of technology into the higher education classroom is for course management (general goal 4 presented above), rather than as an aid to achieve learning objectives (Selwyn, 2007). Additionally, researchers have noted that instructors who adopt technology in their classrooms typically do not change their teaching styles to incorporate the collaborative potential of these technologies (Grasha & Yangarber-Hicks, 2000). Breen (2001) has found that the use of technology in higher education classrooms is highly variable across institutions and classrooms within institutions. In our case, further investigation into how this technology was implemented was needed to further interpret our results.

Thus, after running these analyses and discovering the negative correlation we sought additional information from the course instructor regarding the implementation of technology in the course examined, a course that this instructor has taught for many years. As a part of the redesign process the instructor had been trained in the usage of this tool. The instructor also had access to a professional development community including support staff from campus units overseeing teaching and information technology.

Upon request, it was possible to obtain a copy of the syllabus associated with the class. The focus of the course described in the syllabus states, "The course offers an understanding of the forces that influence the behavior of individuals and institutions in and around government." The social science orientation of the class is sufficiently similar to the previous research settings that provided a basis for our hypothesis (cf. Howard, 2005; Koeber, 2005; Little, Titarenko, & Bergelson, 2005; Clark-Ibáñez & Scott, 2008; Koeber & Wright, 2008; Hill, Arford, Lubitow, & Smollin, 2012; Hoop, 2012). Content related to American government, associated social structures, and individual behavior clearly has potential fodder for student engagement. The next question is then: how was the technology utilized? According to the syllabus, usage of the technology was a part of the "course requirements." The following is the instructor's expectation for use of the technology:

> *"Even though this is a fairly large class, I will strive to learn all your names…*
>
> *I must stress that participation means much more than just showing up! …After most class sessions, I will post a brief question or comment on the [name of technology] page. At least twice during the semester, you should post a response. (Note that even if you post anonymously, I will know who you are.)"*

At the beginning of the semester students were given a brief introduction to the tool during class and were then expected to use the tool based on course expectations. This is an adaptation of the originally intended usage. Recall that this tool was designed to provide an outlet for free-flowing thought so that unanticipated/emergent themes could inform the progression of a course. The implementation under review adapts the usage of this tool such that the instructor controls the topics that were to be discussed. Clearly not all adaptation of a tool improves the usage of that tool. If the instructor had allowed students to freely discuss the course material, students may have been able to interact as a community, and this may have positively influenced their perceptions of the learning environment.

However, instructors are advised to utilize technology as a tool for achieving their own goals for student learning. The CIO over information technology on our campus said the following regarding pedagogical adaptations, "For example, when we released [this same tool], our classroom discussion tool, we had our own ideas about how a faculty member might use it. But we've found that faculty are using it to engage students in ways that never occurred to us. When people invest their own creativity into a technology to make it better, that's a great sign that the technology truly is innovative" (Thomas, 2012). It would seem that there are limitations to adaptation. According to the CIO's definition of "innovation" technologically-driven pedagogy should be implemented to engage students. In the case of these data and findings, it could be argued that innovation has failed and not technology per se. However, because these data are cross-sectional, lacking a control that uses the technology in the originally intended manner it is not possible to answer this question directly.

The findings raise additional questions. Looking at how the instructor required use of technology, the requirements seem like a reasonable adaptation, especially if a classroom goal is to get students to engage with the subject matter in a novel way. The adapted usage is similar to a threaded forum discussion or blog, another popular technological course augmentation. So when is adaptation appropriate or inappropriate? Controlling the flow of conversation is an adaptation of the originally intended use for this tool but is this change the antecedent for our findings?

It is just as reasonable to assume that those who use the technology most often do so because they feel isolated from their peers in class and this isolation is what drives them to use the technology as a way to engage.[5] Isolation also speaks to the model ordering we found. Students in this class who use the technology most often feel less engaged in the classroom despite their frequent use of the technology. Whatever the explanation, it is clear that usage of this technology in this way for this class has failed to create a more engaged learning environment. Usage alone does *not* produce a community experience, as was expected by the instructor following their participation in a course redesign program focused on making learning more engaging and student-centered through technological pedagogy.

During the process of reviewing the redesign data being tracked on our campus the outcome discussed here was uncovered, and upon finding the negative correlation we began drafting this manuscript. As higher education continues to adopt more technologically driven pedagogical strategies we felt it was important to use this result as a reminder to pause and consider how a tool will be used before classroom adoption. Research has shown that technology can improve the student experience. However, implementation of any pedagogy—technologically oriented, or otherwise—should be done carefully and thoughtfully. Findings support previous research showing that the goals an instructor has for student learning outcomes

[5] Isolation itself could come from many causes including things like a language barrier challenging many contemporary international students to psychological explanations like personality or technical inclinations as mentioned in footnote 1.

should drive the use of any teaching technique and not the opposite (Cuban, 2009). This also has implications for course redesign efforts currently sweeping across the U.S. Putting redesign pedagogies before learning outcome development renders the redesign ineffectual. No matter how attractive a new tool may be, if its use does not support a learning outcome it can potentially have a negative impact on community based and student-centered learning (see Blackie, Case, & Jawitz, 2010 for more on student-centered learning).

Limitations and Suggestions for Future Research

The major limitations of this study have already been mentioned. This study followed one class for one semester. Ideally, this study would have included a control class utilizing this technology in the originally intended manner and for added strength a class not utilizing this technology at all. These data were collected to assess the effectiveness of the redesign efforts on this campus. The specific details or the ideal control scenarios needed to make definitive conclusions about the usage of the technology under investigation were not a part of the original research design. Despite these limitations, a significant outcome was uncovered within these data that should not be ignored. These data show that students who perceived a greater sense of community in this class used the technology less than peers who used the technology more often. Another potential explanation for this outcome is that students who utilized the technology frequently are high academic achievers, typically going above and beyond course requirements. Frequency of posts would then be correlated with student achievement, showing that those who post often do so primarily because it is a classroom expectation. Future data analyses will need to address this possibility.

As the trend in higher education continues to adopt technological pedagogies it is vital to pause and remember that usage of technology alone does not produce more community. As educators, the authors of this paper argue that this finding should serve both as a warning and encouragement. The warning seems clear: adoption of technologically driven pedagogy should be done to achieve previously articulated goals for student learning outcomes and not simply for the sake of implementation. The encouragement is also intuitive, though potentially less obvious: as students continue to demand engagement via technology, as more courses move to the Internet for their "classroom," and generally as future generations of students rely more heavily on technology as a medium for learning, some have feared a diminishing role for the formal educator (Healy, 1998; McCain & Jukes, 2001). These findings should put to rest some of these fears. As courses evolve to include more technology, the need for skilled teachers will not be replaced. In fact, the growing size of the pedagogical menu will increasingly require thoughtful and careful implementation of technology to achieve the desired learning outcomes.

References

Benson, D. E., T. E. Ore and W. Haney (2002). Digital Technologies and the Scholarship of Teaching and Learning in Sociology. *Teaching Sociology*, *30*, 140-157. doi: 10.2307/3211379

Berrett, D. (2012). How 'Flipping' the Classroom Can Improve the Traditional Lecture. *The Chronicle of Higher Education*. http://chronicle.com/article/How-Flipping-the-Classroom/130857/

Biemiller, L. (2011). Atlanta Colleges Strive to Outrun the Recession: Region's 11-percent unemployment means layoffs and scholarship cuts. *The Chronicle of Higher Education.* http://chronicle.com/article/article-content/129487/

Blackie, M. A. L., J. M. Case and J. Jawitz (2010). Student-centredness: the link between transforming students and transforming ourselves. *Teaching in Higher Education, 15*(6), 637-646. doi:10.1080/13562517.2010.491910

Breen, R. R. A. P. (2001). The Role of Information and Communication Technologies in a University Learning Environment. *Studies in Higher Education*, *26*(1), 95-114. doi: 10.1080/03075070123233

Cameron, A. C. and P. K. Trivedi (2009). *Microeconometrics Using Stata*. College Station, TX: Stata Press.

Carnell, E. (2007). Conceptions of effective teaching in higher education: extending the boundaries. *Teaching in Higher Education, 12*(1), 25-40. doi: 10.1080/13562510601102081

Chickering, A. W. and Z. F. Gamson (1999). Development and Adaptations of the Seven Principles for Good Practice in Undergraduate Education. *New Directions for Teaching and Learning, 80*, 75-81. doi: 10.1002/tl.8006

Clark-Ibáñez, M. and L. Scott (2008). Learning to Teach Online. *Teaching Sociology, 36*(1), 34-41. doi: 10.1177/0092055X0803600105

Cuban, L. (2009). *Oversold and Underused: Computers in the Classroom.* Harvard University Press.

DiStefano, C., M. Zhu and D. Mîndrilă (2009). Understanding and Using Factor Scores: Considerations for the Applied Researcher. *Practical Assessment, Research & Evaluation, 14*(20), 1-11.

Fraser, B. J. (2012). Classroom Learning Environments: Retrospect, Context and Prospect. In B. J. Fraser, K. Tobin & C. J. McRobbie (Eds.), *Second International Handbook of Science Education 24*, 1191-1239. doi: 10.1007/978-1-4020-9041-7_79

Goldrick-Rab, S. (2012). Renewing the Commitment. *The Chronicle of Higher Education*. http://chronicle.com/article/Renewing-the-Commitment/132645/

Grasha, A. F. and N. Yangarber-Hicks (2000). Integrating Teaching Styles and Learning Styles with Instructional Technology. *College Teaching*, *48*(1), 2-10. doi: 10.1080/87567550009596080

Harper, S. R., & Quaye, S. J. (2010). *Student Engagement in Higher Education: Theoretical Perspectives and Practical Approaches for Diverse Populations*. New York, NY: Taylor & Francis.

Healy, J. M. (1998). *Failure to connect : how computers affect our children's minds--for better and worse*. New York, NY: Simon & Schuster.

Hill, A., T. Arford, A. Lubitow and L. M. Smollin (2012). "I'm Ambivalent about It". *Teaching Sociology, 40*(3), 242-256. doi: 10.1177/0092055X12444071

Hoop, K. C. (2012). Comte Unplugged. *Teaching Sociology*, *40*(2), 158-165. doi: 10.1177/0092055X12437973

Howard, J. R. (2005). An Examination of Student Learning in Introductory Sociology at a Commuter Campus. *Teaching Sociology*, *33*(2), 195-205. doi: 10.1177/0092055X0503300206

Hughes, G. (2007). Using blended learning to increase learner support and improve retention. *Teaching in Higher Education, 12*(3), 349-363. doi: 10.1080/13562510701278690

Hung, H.-T. and S. C.-Y. Yuen (2010). Educational use of social networking technology in higher education. *Teaching in Higher Education, 15*(6), 703-714. doi: 10.1080/13562517.2010.507307

Junco, R. H. G. L. E. (2011). The effect of Twitter on college student engagement and grades. *Journal of Computer Assisted Learning*, *27*(2), 119-132. doi: 10.1111/j.1365-2729.2010.00387.x

Koeber, C. (2005). Introducing Multimedia Presentations and a Course Website to an Introductory Sociology Course: How Technology Affects Student Perceptions of Teaching Effectiveness. *Teaching Sociology, 33*(3), 285-300. doi: 10.1177/0092055X0503300309

Koeber, C. and D. W. Wright (2008). On the Outside Teaching in. *Teaching Sociology, 36(*4), 331-343. doi: 10.1177/0092055X0803600403

Kuh, G. D., T. M. Cruce, R. Shoup, J. Kinzie and R. M. Gonyea (2008). Unmasking the Effects of Student Engagement on First-Year College Grades and Persistence. *The Journal of Higher Education*, *79*(5), 540-563. doi: 10.1353/jhe.0.0019

Kuh, G. D. and N. Vesper (2001). Do Computers Enhance or Detract from Student Learning? *Research in Higher Education, 42(*1), 87-102. doi: 10.1023/A:1018768612002

Little, C. B., L. Titarenko and M. Bergelson (2005). Creating a Successful International Distance-Learning Classroom. *Teaching Sociology*, *33*(4), 355-370. doi: 10.1177/0092055X0503300402

MacIsaac, D. L. and K. A. Falconer (2001). *RTOP Workshops for Physics Teachers*. AAPT National Summer Meetings.

MacIsaac, D. L. and K. A. Falconer (2002). Reforming Physics Education Via RTOP. *The Physics Teacher, 40*(8), 479-485. doi: 10.1119/1.1526620

McCain, T. D. E. and I. Jukes (2001). *Windows on the future : education in the age of technology*. Thousand Oaks, CA: Corwin Press.

Mollborn, S. and A. Hoekstra (2010). “A Meeting of Minds”. *Teaching Sociology*, *38*(1), 18-27. doi: 10.1177/0092055X09353890

Morris, R. C., Parker, L. C., Nelson, D., Pistilli, M., Hagen, A., Levesque-Bristol, C., & Weaver, G. (Forthcoming). Development of a Student Self-Reported Instrument to Assess Course Reform.

Pearson, A. F. (2010). Real Problems, Virtual Solutions. *Teaching Sociology, 38(*3), 207-214. doi: 10.1177/0092055X10370115

Peel, D. (2005). Peer observation as a transformatory tool?1. *Teaching in Higher Education, 10*(4), 489-504. doi: 10.1080/13562510500239125

Persell, C. H. (2004). Using Focused Web-Based Discussions to Enhance Student Engagement and Deep Understanding. *Teaching Sociology*, *32*(1), 61-78. doi: 10.1177/0092055X0403200107

Persell, C. H., K. M. Pfeiffer and A. Syed (2008). How Sociological Leaders Teach. *Teaching Sociology*, *36*(2), 108-124. doi: 10.1177/0092055X0803600202

Piburn, M., D. Sawada, K. Falconer, J. Turley, R. Benford and I. Bloom (2000). Reformed Teaching Observation Protocol (RTOP).

Pippert, T. D. and H. Moore (1999). Multiple Perspectives on Multimedia in the Large Lecture. *Teaching Sociology*, 27(2), 92-109. doi: 10.2307/1318697

Sawada, D., M. Piburn, E. Judson, J. Turley, K. Falconer, R. Benford and I. Bloom (2002). Measuring Reform Practices in Science and Mathematics Classrooms: The Reformed Teaching Observation Protocol. *School Science and Mathematics*, *102*(6), 245-253. doi: 10.1111/j.1949-8594.2002.tb17883.x

Selwyn, N. (2007). The use of computer technology in university teaching and learning: a critical perspective. *Journal of Computer Assisted Learning*, *23,* 83-94.
Snyder, T. D. and S. A. Dillow (2011). Digest of Education Statistics. The National Center for Education Statistics. Retreaived from http://nces.ed.gov/pubs2012/2012001.pdf

Thomas, A. (2012). Campus Technology magazine picks Hotseat, DoubleTake and Mixable as top innovations for 2012. *Purdue Exponent*.

Thomas, F. N. L. and G. D. Kuh (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

Transformation, T. N. C. f. A. (2012). "Who We Are." Retrieved July 18, 2012, from http://www.thencat.org/whoweare.html.

Williams-June, A. (2009). Budget Cuts and 'Workload Creep'. *The Chronicle of Higher Education*. http://chronicle.com/article/More-Work-Can-Mean-Less-Joy-in/48309/

Williams, J. J. (2012). Deconstructing Academe: The birth of critical university studies. *The Chronicle of Higher Education*. http://chronicle.com/article/The-Emerging-Field-of-Critical/131158/

Wolff, J. (2012). Graduate student teachers should demand professional status. *The Guardian*. http://www.theguardian.com/education/2012/mar/26/postgraduate-grad-student-teacher-universit

Wolin, R. (2012). Fading Glory Days. *The Chronicle of Higher Education*. http://chronicle.com/article/Fading-Glory-Days/132633/

Wolters, C. A., & Taylor, D. J. (2012). A Self-regulated Learning Perspective on Student Engagement. In S. L. Christenson, A. L. Reschly & C. Wylie (Eds.), *Handbook of Research on Student Engagement* (pp. 635-651), New Yor, NY: Springer US.

Wright, E. R. and A. H. Lawson (2005). Computer Mediated Communication and Student Learning in Large Introductory Sociology Classes. *Teaching Sociology*, *33*(2), 122-135. doi: 10.1177/0092055X0503300201

Young, J. R. (2012). Customization Is the Future of Teaching, Harvard Researcher Says. *The Chronicle of Higher Education*. http://chronicle.com/article/The-Future-of-Teaching-/132493/

Journal of Teaching and Learning with Technology, Vol. 3, No. 1, June 2014, pp. 16 – 32.
doi: 10.14434.jotlt.v3n1.4093

Creating a technology-rich associate degree program in office administration

Allison White and Leanna R. Hostetler

Abstract: Providing ideas to others who wish to explore the process of making a degree program technology rich is critical to faculty who are building best practice programs. Technology rich is defined here as technology-filled environments and curriculum that include innovative hardware and software combined with technologically enhanced activities and assessments. This literature review reveals a research gap in several areas relating to best practices with respect to the impact of integrating technology into teaching and learning. More quantitative studies that discuss research methodology and professional development in technological pedagogy are needed. Often research efforts have yielded no common definitions, significant differences, or guidelines to measure effectiveness. This article posits arguments for a more systematic study of how technology integration occurs within our schools, what increases its adoption by teachers, and the long-term impacts that these investments have on both teachers and students (Lawless & Pellegrino, 2007). In addition to the program background and findings on technology in education, this article also articulates a case example of a technology implementation in an associate degree program. Concluding with the students' perspective, insight is offered into this program's continued effort to bridge the gap of the digital divide for a student population of predominantly rural, underserved, and disadvantaged through a student-focused atmosphere and curriculum (Goode, 2010). A technology transformation and semester transition of an Associate of Applied Business degree program for office administration (OA) in rural Ohio is delineated.

Keywords: technology; office administration; education; curriculum; online; faculty; students

Introduction

The use of technology is at the forefront of society and education today. Technology in education requires a thorough understanding of this dynamic environment and the cooperation of faculty, administration, community leaders, and students. It is important for any technical degree program to continually assess hardware, software, and faculty development in conjunction with community and student needs thus making a technology rich program. Technology rich is defined here as technology-filled environments and curriculums that include innovative hardware and software combined with technologically enhanced activities and assessments.

Today's college students require exposure to a variety of software applications, innovative electronic devices, alternative delivery methods, and 21st century technology, including social media as it relates to the business world. Integrating innovative software and laboratory hardware, community advisory board involvement, and faculty leadership are diverse factors and all play a role in ensuring a technology program is on track for student success. Associate degree programs are limited as to the number of courses and hardiness of course delivery. Furthermore, many technical degree programs include underutilized equipment and outdated or seldom used software. A common theme in faculty discussions reflects faculty development needs going unmet and programs in need of updating with regard to technology used in the delivery of diverse courses (Sorcinelli, 2006). Also noteworthy is the need for the students' perspective and insights, with a focus on bridging the gap to stay current with the effects of the digital divide. Faculty want to avoid perpetuating the digital divide inequalities by offering a student focused atmosphere and curriculum (Goode, 2010).

Guidelines for making an office administration (OA) program technology rich as well as applications for applying this methodology to other programs was warranted. This article outlines the way that one program was planned, analyzed, researched, designed, and implemented during a semester transition. The program outlined in this article benefitted by incorporating alternative forms of instruction, design, and delivery. Each of the 17 quarter-based core courses of a program located at a university in a rural town in Appalachia were reviewed. Some of them were altered considerably and all had prescribed changes for the transition to semesters. The technology-rich redesign followed steps similar to the Systems Development Life Cycle (IT Governance, 2014) of planning, analyzing, designing, implementing, and maintaining. Options were researched, beginning with planning and analyzing the current OA programs' content, curriculum, and technology in conjunction with faculty, community and student needs. After the design phase, the revised program was tested and implemented with emphasis on continued maintenance. The resulting student perspective concludes this research, and recommendations for maintaining a technology-rich program were made.

OA Degree Description

This Associate of Applied Business degree in office administration is geared towards those who will work in office settings as administrative assistants, office supervisors, payroll and accounting clerks, receptionists, graphic or desktop designers, and multiple areas of business support. Optional interdisciplinary tracks within the degree included medical, legal, and a newly developed business analysis set of courses. The mission of the program is to prepare students for highly technical, entry-level positions often in specialized roles. These positions are in demand and expected to grow by an average of 14% between 2010 and 2020 with growth expected for medical (41%) and legal (4%) secretaries as well (U.S. Department of Labor, 2012). Job opportunities should be best for applicants with extensive knowledge of software applications and advanced communication and computer skills (U.S. Department of Labor, 2012). This job availability presented hope and opportunity for a student population located in Appalachian territory which is a demographically disadvantaged area of south and central Ohio.

Rationale and Motivation for Program Technology Changes

A primary motivation for major transition updates to the program was change at the state level in education policy in Ohio. In 2008, new state mandates for 17 of Ohio's universities and colleges included creating similar academic calendars and courses across the system. Thousands of courses were reviewed by faculty panels to ensure all transfer classes met the high quality and rigor that Ohioans expect. A panel convened with the Ohio Board of Regents and the Department of Education to develop articulation agreements and create common career field technology content standards for Administrative and Professional Support programs to begin in fall 2012.

The establishment of the University System of Ohio in 2008 created new academic opportunities for university resources. New degree programs, distance learning, and a common calendar was the goal. A semester time period across the system would provide a longer time period for absorbing materials and more breathing room for the new traditional students that attend primarily regional campuses to complete projects while juggling home, family, and jobs (Ohio University, 2013). In addition, the academic year would end sooner providing the opportunity for longer, more meaningful internships. As a result of this move to a semester system, an opportunity was given to take a closer look at an existing program in OA.

Transitioning from a quarter to a semester system while upgrading classroom technology is a challenge for any program. Equally stimulating is the inclusion of new procedures and methodologies for a technology-rich program with a variety of delivery options (online, blended, hybrid, and traditional). Understanding the ubiquitous nature of technologies on university campuses is a catalyst for change and structure between mobile phones and iPods versus desktop computers and application software. The research began by planning the steps necessary for change and analyzing the current condition of this and other OA programs.

At the start, courses in the existing program that could benefit from the addition of technology were reviewed. Comparisons were made with like programs throughout the state in a continued effort to reduce the inequalities between universities, their programs, and their courses, keeping in mind that courses should easily transfer between institutions.

The Change Process Analysis

The program experienced a period in which only a few of the courses were being updated with the latest versions of application software. Overall, the entire program of courses required a plan to include and update technology in both the delivery and instruction as well as in the use of application software for practice, further development, and completion of assignments simulating the business support role of the administrative assistant as closely as possible. The pre-existing level of technology used by faculty in delivery of courses was limited to textbook author "canned" presentations for lecture. Prior to the transition to a semesters system with the updates described here, the Microsoft Office 2007© suite of applications was a primary portion of the curriculum in five of the core courses, missing the true university level of understanding how to communicate with these tools beyond the scope of learning these pre-packaged applications. Other courses contained the required depth of knowledge but lacked the technical aspects necessary for success beyond the classroom.

Technology and Education

Hooper and Rieber (1995) ascertained that educational technology differs in comparison to technology in education. Musawi (2011) defined educational technology as the study and ethical practice of facilitating e-learning, which is learning and improving performance by creating, using, and managing appropriate technological processes and resources. The term educational technology is often associated with instructional theory and learning theory (Musawi, 2011). Educational technology includes other systems used in the process of developing human capability to learn and complete assignments. Software, hardware, Internet applications (e.g., wikis and blogs) are included in educational technology (Musawi, 2011). There is still some debate on what these terms mean and how they are used.

Educational technology has involved applying ideas from various sources to create the best learning environments possible for students. Educational technologists also have asked questions such as how a classroom might change or adapt when hardware or software is integrated into the curriculum (Hooper & Rieber, 1995). This integration meant that the curriculum and setting may also need to change to meet the opportunities that the technology may offer (Hooper & Rieber, 1995).

Technology in education is most simply and comfortably defined as an array of tools that might prove helpful in advancing student learning (Musawi, 2011). Technology in education involves hardware and software and how they might be used to support traditional classroom activities (Musawi, 2011). Educational technology itself has consisted of two major parts: one is teaching technology and the other is learning technology (Musawi, 2011).

Revising a technology-driven program like OA required understanding how technology flows throughout the degree program. Technology is used in college courses in a three-fold method. First, technology supports teaching by aiding the organization and delivery of content. Second, it supports learning by providing software applications and Internet capabilities for extended learning opportunities for students and completion of assignments. Last, technology is at the core of what the OA program is; technology is used in the support of business to plan, produce, communicate, organize, and train. This is the role of the administrative assistant.

Teaching with technology in this program includes the opportunity to use Blackboard as a course management system for face-to-face and hybrid offerings, technical presentations for lecture, and Web-based learning and practice tools. In order to better communicate with students and organize course content, the current faculty needed to begin or further extend their use of a learning management system for all courses going beyond the basic use of email as a communication tool outside of the classroom.

Beyond uses of basic presentation software to support lecture, kinesthetic and discovery methods of learning must involve the use of computer technology. Internet and search engines, social media, student smart phones, classroom management software, tablet pcs, and other devices and applications support learning, while mimicking the business world's methodologies for producing, communicating, and training. For the purpose of this research, educational technologies involved teaching the tools of the trade (e.g., Administrative Assistant/Business Support). Both ideologies were involved in this transition plan with communication and critical thinking skills at the core.

Goals

In 2009, the existing program offered applications' skills in only five core courses. Certifications were seldom budgeted or tied to those courses. LMS software was underutilized by faculty if used at all. Connections to the community were faltering. The program lacked a full-time research focused faculty for several years. The primary goal of this renovation was to include the latest enhancements for furthering students' fundamental knowledge of technology and communicating through computers, applications, and Web 2.0 features, while increasing critical thinking and problem solving skills. Courses would be combined, removed, and replaced throughout the curriculum to create a 21st century technical model.

The revised OA program would include a rigorous technical and general educational curriculum unique only to a university experience. For example, no longer would students be taught only the basics of a packaged word processing application. The revised application course in word processing now includes all options for obtaining access to word processing (free and monetary). The course celebrates a true university level of knowledge by including elements of visual literacy, human information processing models, cognitive overload, understanding use of color, and unique business uses of word processing software not covered in the basic use of the application. As a final boost, the course now includes more than just the option to test for certification. This is more in line with the program level learning outcome of outside organization certification testing (e.g., MOS© - Microsoft Office Specialist in Microsoft WORD). This certification testing has been available off and on in the past as the budget allowed. However, more support was needed in the courses to ensure positive outcomes for the students. Additional planned changes to the application courses included new textbooks, assignments using a vendor's practice exams, and case-based problem solving activities. A better understanding of the uses of these production software applications (word processing, spreadsheets, databases, and presentations) in general has been implemented in the curriculum and repeated throughout the program.

It is important to note the student perspective and the efforts of this transition to bridge the gap, noting that the digital divide still exists. Awareness of the concept of *technology identity* as an innovative theoretical and methodological approach to studying the digital divide, reporting interviews collected from students demonstrate multiple environmental factors contribute to the development of a technology identity, highlight the role of schools and universities as institutions which are perpetuating — rather than resisting — inequalities associated with the digital divide. (Lawless, & Pellegrino, 2007). Knowing how to utilize the campus technology is critical for academic success. However, technology prerequisites and testing for technology skills for college entrance is rare. The result is a range of student technology abilities among the student population. Females, low-income students, and students of color are the ones most underprepared for the digital college environment (Goode, 2010). These are the populations primarily found in this OA program.

Program Change Rationale and Design Description

To define the critical focus areas and determine community and student needs, an analysis of the current condition of the OA programs and technical degrees including technologies being used in OA classes was conducted. The focus was on higher education courses delivered online, blended, and in traditional modes with the inclusion of social media and technology in OA classrooms.

Research and Analyses

Simulating what is often business proprietary software in the classroom was part of a new approach to a typical procedure of consulting advisory boards. A major portion of this conversion included attendance at technology-based conferences. Other similar programs were reviewed and internal conversations with faculty and the program advisory board (retired faculty, local business professionals, and program alumni) were held. The process drew attention to faculty needs and sparked their desire to be successful in the classroom. Motivated faculty made the time commitment, showed initiative, demonstrated leadership in the use of technology on campus, and collaborated on the use of technology in the program. Faculty success with technology depends upon their willingness to try new things and integrate successes in the classroom.

Students were surveyed in the entry-level courses about their expectations of the program and what they needed to be successful in their chosen careers as part of an initial research project. Pre-semester conversion testing was conducted by the program coordinator through special topic courses. Student feedback was encouraged in the courses using selected lessons and topics. Additionally, external discussions with faculty, textbook publishers, and university leadership led to a combination of effort to transition to a technology-rich model for this OA program. This process set the tone for continual tech-rich updates that will support the program through the semester transition and beyond.

Job Market

The technological advances achieved in the past few decades have brought about a revolution in the business world, affecting nearly all aspects of a working life. The result is today's heavily technical workplace, where proficiency with complex phone systems, fax machines, and often networked computers, shared file resources (e.g., digital dropbox) are basic essentials. However, these much-praised advancements imposed dramatic changes in what is expected from workers and where and how they go about their jobs.

As new technologies become standard in the workplace, administrative assistant positions are moving towards higher skilled and more adaptive workers. In service, data analysis, and engineering positions, for example, most workers clearly need to be technologically savvy, even the secretaries who might be required to use complicated accounting programs, email, and other communication devices (Stanford, 2014). Technological skills are required coupled with a fearless attitude to prevent some workers from avoiding technology. Advanced technology is making the use of it simpler and easier, but the overall ease and comfort of a skilled individual is needed.

Business Technologies

When teaching with technology in any program, it is necessary to test, implement, and constantly update curriculum, dealing with new challenges brought forth by students and modifying teaching methods to accommodate these new situations. Although other academic degree programs are involving technology in their methodology, OA students are expected to leave a technically focused program knowing the latest in application software and how to use computerized methods for solving problems and communicating in the workplace. Whereas, educational technologies might not be consistently used or minimally included in the classroom of a general education course to deliver the information or for students to present assignments. The instructor has often used presentation software slideshows for lecture and a learning management system to manage the course and little else. Students may create presentations to share research findings that explain their papers or use word processing applications to type papers. They may have created electronic portfolios or Web pages, but this OA program does all that and more. A full understanding of current word processing applications, spreadsheet applications, or database applications is required to become certified, which employers are looking for in an administrative assistant, payroll clerk, or legal secretary. These are the tools of their trade, and they will see these tools used by the instructor in a variety of situations that they can use to complete assignments or allow to spark their creativity.

Implementing and Maintaining the Technology Rich Program

Technology ushers in fundamental structural changes that can be integral to achieving significant improvements in productivity. Used to support both teaching and learning, technology infuses classrooms with digital learning tools, such as computers and hand held devices; expands course offerings, experiences, and learning materials; supports learning 24 hours a day, 7 days a week; builds 21st century skills where the rate of technology change can be faster than implementation into OA programs; increases student engagement and motivation; and accelerates learning. Technology also has the power to transform teaching by ushering in a new model of connected teaching. This model links teachers to their students and to professional content, resources, and systems to help them improve their own instruction and personalize learning (U.S. Department of Education, 2014).

Social Media in Curriculum Content

Incorporating social media elements like YouTube, Facebook, Twitter, and BlogSpot into a course not only enhances curriculum but also engages students with resources that are part of their daily routine. To ignore or disprove of the inclusion of social media and personal devices like cell phones in the classroom is a mistake in the process of creating a technology-rich program. Students must learn a balance in the use of these technologies. Asking the right questions is the beginning (Agee and Holisky, 2000) of engaging students, and our chosen research methodology focused on the following questions:

- From your experiences are you capitalizing on technological ideas for your classroom (Cohen, 2002)?
- Will the transition from a quarter's to a semester's system present opportunities and concerns that the addition of technology can resolve by adding, combining, eliminating and updating courses?

Faculty Development

The OA faculty are expected to always raise the bar for technology in education. Participating in and conducting training is part of being a leader in university settings, public presentations, and especially in the classroom. The challenges in education for the 21st Century encompass addressing a variety of pertinent questions surrounding the rapidly changing area of technology education, such as: What topics are important for the 21st Century? How does the Internet change the task of teaching? What is the role of the professor in a world of online learning? Educators in this field must be prepared to include technology (Schachter, 2009). These questions would likely be answered differently for this technology-based program than for other programs such as social sciences, yet no differences in answers not relevant to OA.

For college students the Internet is a tool for research, learning, and presentation of findings to their instructors. This program now goes a step further with the use of ePortfolios as examples of their work that can be used for employment opportunities, demonstrating their skills to future employers. In the revised program courses use the Internet to provide social media as it applies to the workplace (e.g., document sharing, communication, marketing, free apps). The OA faculty need to be exemplary in their use of technology in the classroom and beyond. All have been practitioners employed full-time in public education and businesses that use technology and Intranet capabilities for first-hand knowledge of workplace needs.

Training, motivation, and preparedness make this program's new and existing faculty ready for the challenge. Teamwork was essential as faculty met to exchange information and experiences. More faculty began to introduce students to instructional elements using a Web-based learning management system (LMS). Although learning management systems are not new to higher education, many faculty lacked the training and motivation to use the tools. Time was taken to ensure comfort with using this system *in class*, ensuring that students choosing online courses would be better prepared. Feedback on course evaluations and instant reflections face-to-face were encouraged. Tenured faculty outside the program, information technology (IT) leaders, program alumni, and advisory board members offered advice and gave suggestions for creating a successful technology-rich program that would meet the needs of the community and technological trends in education.

Hardware and Devices

Schachter concluded that as cell phones with ever-expanding possibilities of texting, Web browsing, and game playing have multiplied in recent years, so have the concerns of educators and administrators about the distractions these devices can cause; college classrooms are not exempt (Schachter, 2009). Yet, there are opportunities. This program embraced technology and consider the opportunities these new technologies can create in the classroom. Laptop and desktop screens can create a physical barrier between students and instructors in our lab classrooms during instruction despite the goal to emulate the workplace (Schachter, 2009). Classroom management tools such as teacher mobility, group exercises, and lab management software for the instructor can keep this environment technology rich while still supporting an incredible learning environment. Schools and individual instructors are banning cell phones and various handheld technologies from the classroom. However, advanced wireless devices can be used as much for learning as for entertainment. Permitting smart phones allows students to take quizzes, check schedules, and complete course work requiring pictures, videos, and research. Consideration should be given to the prevention of cheating while using the devices (Bates & Poole, 2003). For example, assessment design can accommodate the availability of such devices. These devices can become part of the curriculum by capturing sound, video, and pictures related to the course topic. Again, classroom management combined with rules for use of technology that are clearly outlined verbally and in the syllabus on day one can create an environment where students understand how these devices can be used in the educational and later the workplace environment significantly and appropriately.

Support Systems

A campus-based Technology Learning Community (TLC) comprised of faculty leaders aided in course development and was tasked with ensuring a quality product. This community's rigorous training course on development of online and blended courses aided faculty members in completing the process of blended delivery certification and online course development. Online course plans included formal written approval by the Associate Dean, approval of the LMS design, delivery of the completed course, and release of archived materials owned by the university. The community gave feedback and support to the designers throughout the process.

Maintenance

For hardware, software, people, and solutions maintenance is to be ongoing. Experience within this program has shown some textbook publisher Web sites fall short of expectations and desired reliability and should be tested or used in conjunction with a well-developed LMS. An upgrade to Blackboard version 9 was launched in the fall of 2010 with subsequent updates that afford the necessary feature-rich virtual learning environment. The OA program faculty attended one or more training sessions on course development using this system. Faculty can see students working in the business communications course online site, which is linked to the Blackboard site for the course. The cost of registration codes for publisher Web-based software was expensive and confusing for students. Packaging information needed to be accessible and easy to understand. E-books options should be considered for every course. Faculty could also see student work in the keyboarding courses.

The Technology-Rich Program

The information provided below includes details of the revised technology-rich program. Courses are aligned based on introductory, applications-based, and upper-level design.

Introductory Courses

Fundamentals of Information Technologies is a program introduction course in computer fundamentals and technology with an emphasis on computer literacy. Topics include the history of computers, computer components, software applications, operating systems, Internet research, Web 2.0, security, storage, ethics, and electronic files management. Text Web support containing activities and assessment tools from a publisher with a proven record of Web excellence is used in conjunction with the Blackboard course management system, which allows students to view presentations, upload assignments, practice with tools, and complete quizzes. Faculty for this course includes the program coordinator and a campus IT manager who have technology experience and an understandable use of computer literacy.

Keyboarding I and II is focused on keyboarding and document processing using the personal computer. Traditional software was replaced with a Web-based application available from the publisher. The courses are available online and utilize a variety of elements (chats, document sharing, podcasts, audio feedback) not previously included in a traditional keyboarding course. Online course tests and testing centers were incorporated. Two new faculty were hired with backgrounds in technology education and keyboarding instruction. In preparation for this new method of delivery, all program faculty attended an in-service training and sharing session.

Office Procedures I and II were combined into one semester course emphasizing the enhancement of office skills, best practices, and procedures as they relate to the world of work for an administrative assistant. General office routines including roles and responsibilities, as well as, electronic and paper file systems were emphasized. A new textbook was selected with enhanced Web-based assignments involving word processing, electronic files management, and e-flash cards. Electronic files management was introduced as a supplement to paper-based filing instruction. The course was moved into the computer lab for Web-based exercises. The technological changes to this introductory course required minimal development for faculty.

Applications Courses: (Word Processing, Spreadsheets, Presentations, and Databases)

These courses offer production software application instruction with an emphasis on professional communications. Creating a technology-rich curriculum meant updating software, while utilizing Blackboard for document submission and sharing. The effort to be "green" was stressed with the implementation of an electronic portfolio (ePortfolio) of assignments. These courses were also designed for online delivery with word processing leading the way. Podcasts and audio recordings are used for lecture and feedback to students. Online practice tests lead to the successful completion of MOS© (Microsoft Office Specialist) exams. A new faculty member and the program coordinator developed online versions approved by members of the TLC.

Upper-Level Courses

Business Communications I and II were combined into one course providing a review of English usage from a business office perspective. Grammar, spelling, vocabulary, word usage, sentence structure, paragraph development, capitalization, punctuation, and proofreading for more effective business writing are emphasized. Students compose a variety of business forms including email, letters, memoranda, and reports. The curriculum encourages a free subscription to a grammar basics organization. Students receive weekly emails with grammar rules and common errors in word usage, enhancing classroom discussion and supporting lessons. An electronic book (e-book) has been implemented that can be purchased by the chapter. The publishers made it easy for faculty. A specially designed Web site was created for the course by the instructor and the publisher. Additional practice modules were made accessible for individual purchase. The new focus is on professional blogs, email etiquette, and workplace instant messaging with an emphasis on maintaining professionalism regardless of the tool or method of delivery chosen.

Desktop Publishing I and II were combined into a course offering the development of skills in desktop publishing software with emphasis on graphic design basics and publishing information. Students prepare newsletters, brochures, business cards, letterheads, photos, and catalogs of professional quality. The course now incorporates applications from the Adobe Creative Suite© (Photoshop© and Dreamweaver©) and freeware along with Microsoft Publisher© to create brochures, business cards, letterheads, calendars, and Web pages. Initially, these courses focused primarily on Microsoft Publisher© and the second course fell short of the challenge to prepare students for a variety of job opportunities involving Web design and graphics. Now, new faculty members with previous professional and teaching experiences in desktop publishing bring new light to a combined course.

Dictation and Transcription is focused on the development of machine transcription skills from taped dictation, language skills, and various other methods of recording. Updates to this course include the purchase of new transcription kits in 2010, a new edition of the text with updated data files, and utilization of the latest word processing software in our computer lab. The purchase of voice recognition software for generating documents was made to give students an understanding of its value in the workplace. The course was made optional and offered in conjunction with the medical track courses. The occupation was calling for medical scribes as hospitals transition to electronic records. Students could choose this course or Keyboarding II in the semester version of the OA program. Faculty training will continue as necessary with purchases of software.

Stress Management/Time Management defines stress and discusses the seven missing pieces of managing stress that decrease productivity in the office leading to health and performance issues. The role of stress in time management is emphasized in conjunction with application software. A lesson utilizing MS Outlook for business and personal use including e-mail, calendaring, contact management, and tasks listing is included. Instructors emphasize the need for stress management as administrative assistants and business support staff prepare for added responsibilities and expanded duties required for job performance and promotion. The American Management Association (AMA) tools are examined for identification and management of stress and time to show students how to efficiently deal with the overflow of information, avoid over commitment, and still be able to produce effective results (Stroman, Wilson, & Wauson, 2011)

Information System Design offers tools for designing an optimal business system utilizing feasibility studies, process documentation, process analysis, technical writing, and ergonomics. Incorporating elements like YouTube and smart phones, students examine real work spaces. Applications like Microsoft Visio© for flowcharts, swimlanes, and floor plans, enhance this once paper-based course. Students audit work spaces and processes using audio programs such as Audacity. Videos of assessments are created, affording the opportunity to use smart phones and Web 2.0 capabilities. The instructor utilizes business analyst experiences to offer the updated version of the course.

Entry and Exit Seminars discuss special topics and problems encountered in the field. This course is a mentoring opportunity for new students and sophomores ready to graduate. Students research career options and discuss advancements in technology and applications. Development of skills was personalized for each offering. The course was an opportunity to bring current technological trends to light before graduation, requiring the instructor to be flexible and prepared. Accumulated program course work (artifacts) serve as evidence of learned skills and is required for an electronic portfolio by exit students completing a capstone project. The new Entry and Exit Seminars are built into the semester program.

Special Topics courses allow for the study of a variety of topics and new innovations. Every special topic course is designed with technology in mind. Windows 8, Intermediate Spreadsheets, Social Media in the Workplace, and Using Graphical Organizers comprise a few of today's special topics. Faculty offer courses based on expertise in various subjects and technology.

Internships are instituted for semesters. Placements are selected based on a number of factors with importance placed on the utilization of technology in the chosen setting. Students display applications skills for employers via projects. The Program Coordinator facilitates all placements. Grants from the Ohio Board of Regents and Ohio Means provide guidance and monetary compensation to students and employers.

Table 1 compares the level of technology used throughout the program prior to 2010. The program required a leader, and a new program coordinator was hired in late 2009. Prior to the initiation of these changes basic updates were needed in addition to those required to turn the program around.

Table 1

Comparison Model of Former and Revised Technology in OA

Courses	Former Technology	Revised Technology
Fundamentals of Information Technology – New Course		• Hands-on computer components – portable lab cart • Textbook Publisher Web site
Keyboarding (Keyboarding I and II)	• Server based program keyboarding software offering no measureable feedback to the student typist and lacking assessment capabilities for the instructor • Separate word processing software	• Publisher Web-based program - complete teaching and learning system accessible anywhere there is Internet • Incorporated word processing software
Office Procedures (Basic, Medical, & Legal)	None required	• Internet research • Publisher Web site • Electronic filing
Applications Courses (word processing, spreadsheets, presentations, desktop publishing & databases)	Outdated software	• Latest software • MOS© test preparation
Business Communications	Word processing application required to complete assignments	• Publisher Web site for practice, assignments, and assessment • Free email program delivers daily grammar rules and "word of the day"
Information Systems Design	None required	• Diagramming and Flowcharting software • Word processing software • Presentation software
Internship – Revised/Not previously required	None required	Must include a technical environment

It is easy to see how the inclusion of technology or enhancement of existing technology affected a change in outcomes and assignments that support the program level learning outcomes. Technology will now allow students to complete electronic portfolios and prepare for internships, and support completion of assignments in the general education area as well.

With the new level of technology in the content and maximized use of technology in the delivery of the content throughout the curriculum, courses introduce concepts, assess knowledge, and end with a mastery level of knowledge for the students. The revised program of courses easily follows the program level learning outcomes with an emphasis on technology as demonstrated in Table 2. It is also important to note that courses outside the core including mathematics, language, & social science are not listed but contribute to the achievement of the program goals and mastery level of knowledge. Conversely, program level learning outcomes directly connected to general education and other required courses in the degree program are not listed.

Table 2
Technology-Rich Program Curriculum Map and Measures

Program Learning Outcomes → Courses ↓	Technology Skills	Communication Skills	Analytical/ Critical Thinking Skills	Quantitative Skills	Evaluation of Organizational Practices and Implementation of Improvements.	Understanding of Organizational Ethics	Leadership and Supervisory Skills
Entry Seminar*	I	I	I		I	I	I
Fundamentals of Info Technology*	I	I	I		I	I	
Keyboarding I*	I	I	I				
Office Procedures*	I	I	I		I	I	I
Word Processing**	I	I	I		I	I	I
Presentations**	I	I	I		I	I	I
Keyboarding II*	A	A	A		A		
Spreadsheets**	A	A	A	I	A	I	I
Databases**	A	A	A	A	A		
Desktop Publishing**	M	M	M		M	A	
Business Communications*	M	M	M		M	A	M
Information Systems Design**	M	M	M	M	M	M	M
Internship*	M	M	M	M	M	M	M
Exit Seminar*	M	M	M		M	M	M

*Technology used in education (delivery)
**Technology in content and delivery
I=Introduce A=Assess M=Master

Student Perspectives

As changes were incorporated into former program core courses in late 2009, special topic courses were added in anticipation of becoming part of the revised program. Students in the former program began to experience the technology-rich environment as early as 2010. Students majoring in OA from 2010 through 2012 were interviewed and their perspectives were included in this research.

First impressions involved reduced expenses in conjunction with flexible scheduling and options that would enhance student employability. There was considerable cost savings on textbooks with e-book options as courses were offered in the evenings, online, hybrid, and accelerated. The associate degree was strengthened by certification options, interdisciplinary courses, and updated medical and legal tracks that became popular with students. These certifications included the National Safety Council's Airborne and Bloodborne Pathogens certification, Microsoft's MOS© certifications, course supported Notary Public commissions, and First Aid and CPR certifications. Exposure in classes and during internships to databases like LexisNexis used in the legal professions and other tools for medical and business analysis professions made the graduates with associate degrees more experienced and marketable as the job placement process began. Applying learned concepts during internship and employing students on campus proved to boost student confidence in the program. Student welcomed learning about connected fields as they shared experiences in groups during an interdisciplinary course. Of particular mention was the Medical Office Clinical Techniques course developed by the OA Program Coordinator and a nursing faculty.

Courses became "fun" as technology was introduced. The existing courses were enhanced with the addition of technology in delivery and in required content as it matched the expected learning outcomes. A variety of communication methods met every student's needs including LMS, email, and text messaging. The graduates were particularly excited about the enhancements to the desktop publishing course that would go beyond learning another basic application like MS Publisher© to teach Web design using more advanced software like Dreamweaver© and free tools like Prezi©. Students created a Web site for a local business as a project and a personal, electronic resume.

Of special note was the addition of Microsoft Outlook© to the Stress Management course. The old Stress Management course was all theory based and lacked any application software. The new Time Management course still lectures on theory, but it also teaches how to use Microsoft Outlook as an aid in balancing home and life responsibilities while in school. The transition to internships and the workplace comes with ease for new graduates who learned this type of application.

In regard to the new Fundamentals of Information Technologies program entry-level course, many students remarked in the final course evaluations that if this course would have been offered as they started college rather than halfway through sophomore year for many and as a special topic, the content really would have helped them over a few hurdles. Several did not know how to use a flash drive or what it even was when they started the program fresh from high school. Most knew nothing about Blackboard or learning management systems. This class was a great beginning class just to get familiar with new technology. Electronic assignment submissions, research papers on purchasing a home or business computer, Web 2.0 tools and other enhancements easily translated into "useful tools for work and home" as students completed this course.

Application software updates occur frequently, and students can expect changes to take place during the completion of their degree. Students appreciated the content flexibility of the new capstone seminar course, which allows for instruction on updates to software previously learned in the program. The e-portfolio and its required artifacts organized in the capstone course project left a feeling of accomplishment and "pride" by providing concrete evidence of student abilities and employability.

Technical requirements in well-placed internships gave the 2012 (revised semester program would begin fall 2012 for new and transitioning students) graduates an edge in the job market. One student remarked, "Internships had never been required by the program, and I completed mine at a local medical center. I was able to move to three different locations through the system including assistant to the nursing coordinator, the foundation, and billing and coding. Each experience was very different, but I learned the most from the assistant to the nursing coordinator. She showcased what a true administrative assistant does on a daily basis. We had to complete a project while interning, and I created spreadsheets displaying attendance and retention."

Finally, students felt more prepared for bachelor degree programs, and they began to ask about them in advising appointments. Students reported back that they saw the benefits of a technology-rich associate experience in the completion of assignments and internship goals in two bachelor programs.

Recommendations and Conclusions

One final recommendation includes keeping up with K-12 technology exposure, which would enable a university program to challenge incoming students while closely guiding non-traditional students through foreign territory. Another consideration for the revised program is a better match between the content and a new program name to include "technology" and "administration." This will enable the program similarities with other technology programs for administrative assistants to be comparable while making the program more marketable, updated, and indicative of today's job market. Keeping the goal of a truly well-rounded university degree program is at the forefront of all maintenance.

Making a program technology rich involves faculty and IT involvement, flexibility, a supportive LMS, and a student-centered approach. While keeping in mind that a technology-rich plan is a dynamic process, this program's journey suggested it is important to carefully complete an assessment as part of the planning process for major curricular changes. Technology is always changing and employer needs vary as they adapt and deploy technology. Support from a faculty development community within the university and online alternatives will secure the future of a program. Share strengths by role modeling technology in meetings. Anticipate technical glitches and be a troubleshooter. Expect the unexpected and be open to student input.

It is important to note the similarities this revised program has with other OA programs. These include a majority of the courses and a focus on technology. However, the differences are found in the inclusion of ePortfolios throughout the program, introductory and capstone courses, mandatory technology-focused internships, and innovative inclusion of technology in teaching, learning, and student certification. Monitoring of student success through grades and course evaluations will continue to measure successes and opportunities for change every term. Continued advances in technology will keep the target moving for faculty, but this new approach of planning, analyzing, designing, and maintaining will continue to keep faculty development and resources budgeted, followed, and incorporated.

Larger monitors were installed in the labs where the applications courses are taught to allow students purchasing e-books to see their book and the application used for completing assignments at the same time. Larger monitors and dual monitors are being budgeted for the next academic year. Recently, ergonomic keyboards have been provided to students in lab classrooms.

Remember, associate degree students select bachelor programs in order to use learned technology and communications skills from their technical degree, giving them a clear advantage. Technology will be at the core of student assets when pursuing employment. The approach must be student centered to be successful. Encourage student technological independence, keep current by reading the literature, and be tech savvy. Most importantly, keep the students' employment and educational needs at the forefront of any programmatic decisions.

References

Agee, A. S. & Holisky, D. A. (2000, October). Technology across the curriculum. *Educause Quarterly, 4.* Retrevied from http://net.educause.edu/ir/library/pdf/EQM0041.pdf

Bates, A. W & Poole, G. (2003) *Effective teaching with technology in higher education: foundations for success*. San Francisco, CA: Jossey-Bass.

Cohen, E. B. (2002*). Challenges of information technology education in the 21st century*. Mishawaka, IN: Idea Group Publishing IGI-Global.

Goode, J. (2010). The digital identity divide: how technology knowledge impacts college students. *New Media Society, 12*(3), 497-513. doi: 10.1177/1461444809343560

Hooper, S., & Rieber, L. P., (1995). Teaching with technology. In A. C. Ornstein. (Ed.), *Teaching:Theory into Practice* (pp. 154-170). Needham Heights, MA: Allyn and Bacon.

IT Governance, (2014). *SDLC – system development life cycle*. IT Governance Online. Retrieved from http://www.itgovernanceonline.com/it-governance/sdlc-system-development-life-cycle/

Johnson, S. D., (1992). A framework for technology education curricula which emphasizes intellectual processes. *Journal of Technology Education, 3*(2) 26-36.

Lawless, K. A., & Pellegrino, J. W. (2007). Professional development in integrating technology into teaching and learning: knowns, unknowns, and ways to pursue better questions and answers. *Review of Educational Research, 77,* 575-614. doi: 10.3102/0034654307309921

Marzano, R.J., Brandt, R.S., Hughes, C.S., Jones, B.F., Presseisen, B.Z., Rankin, S.C., Suthor, C. (1988), *Dimension of Thinking: A Framework for Curriculum and Instruction*, Association for Supervision and Curriculum Development, Alexandria, VA,

Musawi, A. S. (2011). Redefining technology role in education. *Creative Education, 2(2)*, 130-135. doi: 10.4236/ce.2011.22018

Ohio University. (2013). *Q2S: Quarters to semesters information and faqs for currently enrolled students.* Retrieved from https://www.ohio.edu/students/q2s/

Schachter, R. (2009, November). *Mobile devices in the classroom: phones, netbooks and iPods are finding a place in the curriculum and expanding student access to technology*. Professional Media Group LLC. Retrieved from http://www.districtadministration.com/article/mobile-devices-classroom

Sorcinelli, M. (2006). *Creating the future of faculty development: learning from the past, understanding the present*. Bolton, Massachusetts: Anker Publishing Company.

Stanford. (2013). *Technology in the workplace*. Retrieved from http://cs.stanford.edu/people/eroberts/cs181/projects/effect-on-interpersonal-skills/Work1.htm

Stroman, J., Wilson, K., Wauson, J. (2011). Administrative assistant's and secretary's handbook. AMACOM, 4th edition.

U.S. Department of Labor, Bureau of Labor Statistics. (2013). *Occupational outlook handbook, 2012-13: Secretaries and administrative assistants*. Retrieved from http://www.bls.gov/ooh/office-and-administrative-support/secretaries-and-administrative assistants.htm

United States Department of Education. (2014). *Use of technology in teaching and learning*. Retrieved from https://www.ed.gov/oii-news/use-technology-teaching-and-learning

Journal of Teaching and Learning with Technology, Vol. 3, No. 1, June 2014, pp. 33 – 58.
doi: 10.14434.jotlt.v3n1.3956

Teacher training in the use of a three-dimensional immersive virtual world: Building understanding through first-hand experiences

Kevin Oh[1] and Natalie Nussli[2]

Abstract: This study offers recommendations and a model for other teacher educators who are interested in training teachers in the use of three-dimensional (3D) immersive virtual worlds (IVWs) for their own teaching. Twelve special education teachers collaboratively explored the usability of Second Life (SL) for special education by completing a full inquiry cycle to develop the ability to make informed decisions about the affordances and challenges of virtual world teaching and to help identify effective components for virtual worlds teacher training. Ten educational SL islands were explored critically. Mixed-methods data analysis and triangulation were based on the analysis and synthesis of a preliminary survey, a mid-reflection after several virtual explorations, the collaborative analysis of an existing SL lesson plan, the collaborative development of a SL lesson plan, a post-reflection, and a post-survey. Several key benefits of 3D IVWs for special education students emerged from the qualitative analyses, namely social skills practice, collaborative learning towards a joint goal with a competitive element, and increased motivation to participate, especially for topics that would otherwise be perceived as boring. The qualitative data informed the development of guidelines for virtual worlds teacher training and the elements of an ideal SL island designed for special education. The change of attitude towards the usability of virtual worlds in education as a result of the workshop was not statistically significant.

Keywords: three-dimensional immersive virtual worlds; Second Life; special education; teacher training

Introduction

In recent years, educational researchers and teacher educators have shown great interest in the use of three-dimensional (3D) immersive virtual worlds (IVWs) in instructional design and assessment (e.g., Chapman & Stone, 2010; Johannesen, 2013; Mayrath, Traphagan, Heikes, & Trivedi, 2011), inquiry-based learning (e.g., Barab, Sadler, Heiselt, Hickey, & Zuiker, 2010; Good, Howland, & Thackray, 2008; Nelson & Ketelhut, 2007), inquiry-based learning in special education (e.g., Harlow & Nilsen, 2011), and language development (e.g., Balcikanli, 2012; Blasing, 2010; Grant & Clerehan, 2011; Ishizuka & Akama, 2012; Knutzen & Kennedy, 2012; Mroz, 2012; Wang, Calandra, Hibbard, & Lefaiver, 2012; Wehner, Gump, & Downey, 2013). Among these 3D IVWs, Second Life (SL) has emerged as one of the most popular platforms. Although the use of SL islands in the areas of learning has greatly varied among learning communities, the lack of research in preparing teachers to use 3D IVWs for effective teaching has been widely reported (e.g., Connor & Sakshaug, 2009; Guasch, Alvarez, & Espasa, 2010;

[1] Assistant Professor, Learning and Instruction Department, University of San Francisco, koh2@usfca.edu
[2] Doctoral student, Learning and Instruction Department, University of San Francisco, nnussli@gmail.com

Pérez-García, 2009; Storey & Wolf, 2010). Many universities have used SL to provide a platform for their students to discuss, share, and present materials to each other. But despite its potential to enhance education there are still only few empirical reports about the implementation of teacher training to incorporate this technology in teaching (Guzzetti & Stokrocki, 2013; Nussli & Oh, in press). Virtual environments may also offer interesting opportunities for people with disabilities in terms of social experiences (Stendal, Balandin, & Molka-Danielsen, 2011). Attending virtual concerts and experiencing other cultures and countries through virtual traveling are some of the benefits of the elimination of physical barriers. Other affordances, which may increase the quality of life, include the elimination of barriers to social participation, such as sharing a sense of a community (Stendal et al., 2011). The overarching goal of this study was to increase special education teachers' awareness of the potential of 3D technologies for special education purposes. The study was guided by the overall question how to train special education teachers in the use of SL so they can transfer these skills to their own teaching.

Background

Schroeder's (2008) definition of virtual reality is "a computer-generated display that allows or compels the user (or users) to have a sense of being present in an environment other than the one they are actually in, and to interact with that environment" (p. 1). Educational platforms can be found in the areas of astronomy, medicine, music, literature, biology, history, mathematics, forensic science, ecology, and tourism, to name a few. Learners can gain a greater understanding of abstract concepts; they can improve their understanding by manipulating and scaling virtual objects or environments; and they can visit places that distance, time, or safety concerns would normally prohibit (Jackson & Fagan, 2000). This means that learners can immerse themselves in situations that would be impossible in real life (e.g., exploring the surface of the moon or a strand of a DNA molecule), take advantage of 3D data visualizations (such as the Pythagorean theorem), see hidden unseen phenomena (forces directed on an object), and enjoy easy access to museum artifacts (Barab, Hay, Barnett, & Keating, 2000). Nanotechnology Island, for instance, offers an exploration of the minute details of the most miniature, microscopic technology that humans have developed. Another example of an educational space in SL is Etopia Island, which is a virtual world that emulates a socially and environmentally sustainable world. Sploland (Rothfarb & Doherty, 2007), which houses the Splo Museum with more than 100 scientific exhibits, exemplifies experiential learning in virtual worlds.

Virtual Environments for Special Education Purposes

One of the purposes of this study was to have special education teachers reflect on the potential of 3D IVWs for special education students. In their theoretical review of educational uses of SL, Salt, Atkins, and Blackall (2008) identified what it could be used for, namely: (a) enhanced reality spaces for learning, (b) metaphorical representations of abstract concepts, (c) construction of own meaning and learning through interaction with SL objects, (d) simulations of real world activities, (e) practicing life skills, and (f) foreign language acquisition. Virtual environments also allow for a simulation of situations, which makes these environments particularly interesting for special education. They have been shown to offer potential affordances to develop social and communicative skills and provide educational intervention for individuals with social skills challenges, such as autism spectrum disorders (ASD). Mitchell, Parsons, and Leonard (2006), for instance, demonstrated how virtual environments could be used to teach social understanding and empathy to adolescents with autism. Training in a virtual café led to significant improvements in the participants' judgments and explanations about where to sit. In a study by Moore, Cheng, McGrath, and Powell (2005), individuals with autism demonstrated the ability to identify emotions of avatars. Another example of positive learning gains was illustrated in Kandalaft, Didehbani, Krawczyk, Allen, and Chapman (2013), whose participants showed significant increases in real-life functioning after a virtual reality intervention.

The key advantages of a virtual environment for people with social skills challenges include: (a) anonymous interactions and high levels of interactivity without requiring the complex language and social behavior that are typically necessary for face-to-face conversations (Fusar-Poli, Cortesi, Borgwardt, & Politi, 2008); (b) a relatively safe space where social mistakes are less catastrophic than in a real environment (Strickland, 1997); (c) a space where a sense of collaboration, community, and cohesion can be developed, and where rules can be learned and tasks repeated (Fusar-Poli et al., 2008); and (d) a space that reduces the stress and sense of risk that can occur during direct interaction with another person (Smith, Swanson, Holverstott, & Duncan, 2007). Virtual environments are considered a suitable platform for the simulation of social events, potentially allowing insight into others' minds. One such example is described in DeAngelis (2009). Patients enter a protected area in SL where their avatars practice communicating in realistic settings under the guidance of a therapist. The therapist only enters the scene when needed. After practicing social skills in a safe space with therapeutic aims, for example on Brigadoon, a private SL island designed for individuals with autism, individuals can venture out to public virtual spaces and interact with anyone (Gorini, Gaggioli, Vigna, & Riva, 2008). Overall, looking across these studies suggests that virtual environments do have potential in special education, such as for the practice of social encounters (Newbutt & Donegan, 2010).

Inquiry-Based Learning

The study was set in the context of inquiry-based learning to provide the participating special education teachers with the opportunity to experience inquiry-based learning first-hand. In the National Science Education Standards (NSES), the National Research Council (1996) defined inquiry as:

> Inquiry is a multifaceted activity that involves making observations; posing questions; examining books and other sources of information to see what is already known in light of experimental evidence; using tools to gather, analyze, and interpret data; proposing answers, explanations, and predictions; and communicating the results. Inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations. (p. 23)

Figure 1 shows the inquiry cycle that was adapted from Lin and Tallman (2006) for the purposes of this study. The cycle highlights students' responsibility for their own learning and on learners' taking action with the goal of being able to make informed decisions about the potential uses of 3D IVWs for education.

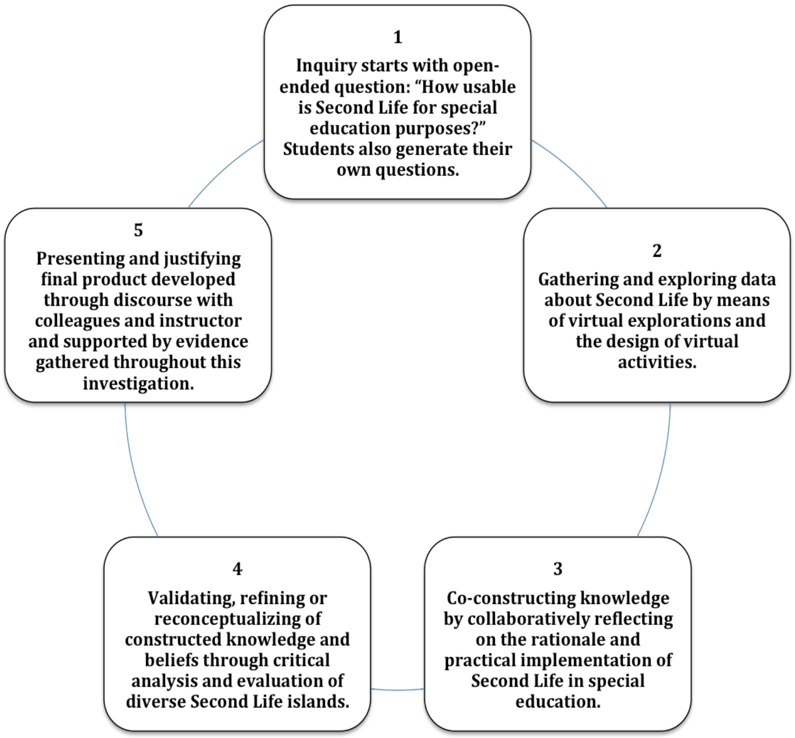


Figure 1. The inquiry cycle used for teacher training in this study (adapted from Lin & Tallman, 2006).

Purpose

The purpose of this study was to increase participants' awareness of the potential of emerging 3D technologies for learning and instruction with a focus on special education. The study was guided by the question how to train special education teachers in the use of SL so they can transfer these skills to their own teaching. The inquiry included the following steps: (a) learning to navigate in SL, (b) reading research about the unique affordances of virtual learning environments, (c) experiencing SL first-hand by exploring a variety of islands, (d) discussing these islands' educational potential, and (e) analyzing a lesson plan. Special emphasis was put on the rationale and practical implementation of using 3D IVWs for education. In other words: Why and how could virtual worlds be used in education? Are there tasks that cannot be achieved equally well in different settings? Finally, the participating special education teachers were given the opportunity to create their own lesson plans in SL and get their colleagues' and the professor's feedback with the purpose of experiencing first-hand how their pedagogical methods need to be adjusted to a different environment. In summary, the objective of this process was for special education teachers to explore one example of immersive virtual worlds, namely SL, and to come to a conclusion based on their experiences about its usability for both general and special education students. The study was guided by the following research questions:

1. How can we best train special education teachers for the use of SL in their own teaching?
2. What are some of the affordances and challenges the special education teachers encountered in this SL workshop?
3. What guidelines can be established for special and general education teachers when incorporating virtual learning environments in their own teaching?

4. What should an ideal 3D IVW platform look like to meet the needs of special education?

Methodology

An exploratory case study was used to measure the participants' attitude towards the use of virtual worlds in education before, during, and after a workshop.

Participants

Twelve (11 female, 1 male) special education teachers were enrolled in a graduate-level technology course specifically designed for special education teachers. The class met once a week for four hours during an entire semester. One of the projects in this class was for students to familiarize themselves with 3D IVWs and reflect on their experiences. All special education teachers reported having no experience using SL. They work in a wide variety of positions, including public and non-public K-12 schools as special day class teachers or as resource and inclusion specialist.

Procedures and Instruments

The participants' inquiry started with an open-ended question for investigation: "How usable is SL for general and special education purposes?" The special education teachers had to complete eleven steps during which they re-conceptualized their beliefs and refined their conclusions. The purpose of the inquiry approach was to provide the opportunity to build knowledge from first-hand collaborative experiences and reflection. Throughout the process, students were repeatedly confronted with the question of the meaningfulness of 3D IVWs for education. Appendix 1 shows an overview of all steps and how each step is framed by inquiry-based learning. The time used for the entire project was approximately 15 hours of class time including five hours of homework. The last column explains how each step fits into inquiry-based learning. Each step and instrument, including rationale, will be briefly described. The research methodology reflects that all special education teachers participating in this study were inexperienced users of 3D IVWs, similar to other studies revolving around virtual worlds teacher training (e.g., Annetta, Murray, Gull Laird, Bohr, & Park, 2008; Dickey, 2011; O'Connor, 2009-2010; Storey & Wolf, 2010). They were provided with clear guidance in the first few steps of the workshop. Once they were sufficiently familiar with both the technology and the rationale behind the workshop, that is, developing the ability to make informed decisions about the educational potential of 3D IVWs, less scaffolding was offered. The inquiry-based approach that was chosen to frame their learning supported this scaffolding process accordingly.

Preliminary survey

The initial version of the survey about teachers' perception of the usability of virtual worlds for education consisted of 49 items and was pilot-tested on 32 educators. The items were generated from the key dimensions that emerged from a review of the literature (Barbour & Reeves, 2009; Fetscherin & Lattemann, 2008; Verhagen, Feldberg, van den Hooff, Meents, & Merikivi, 2011; Warburton, 2009), thereby providing construct-related evidence of validity. The survey was constructed using declarative statements on a five-point Likert scale (1=*strongly disagree,* 2=*disagree,* 3=*don't know,* 4=*agree,* 5=*strongly agree*). Negatively keyed items were reverse scored so that higher scores indicate more agreement, that is, higher perceived usability of 3D IVWs for education. Table 1 shows the preliminary survey questions, which were also included in the post-survey.

Table 1

Survey Questions

Item	Content
1*	I am apprehensive of the thought of having to use SL for teaching.
2	I am confident that I can find someone to support me in facilitating the use of SL.
3	I like the fact that multimedia can be integrated into SL.
4*	I fear that students already spend too much time on the computer.
5*	I fear that students are already too overwhelmed with other tasks and activities to want to explore something new.
6	I think that students would enjoy the experience of a virtual learning environment.
7	SL can be used to experience content that would otherwise be inaccessible (e.g., because it is historically lost, too distant, too costly, imaginary, futuristic or impossible to see by the human eye.)
8	SL makes learning more interesting.
9*	SL is for entertainment only.
10	Working with SL looks like fun.
11*	Working with SL looks like so much fun that it will distract students from the actual learning task.
12	I cannot wait to use SL for teaching.

* Negatively keyed items were reverse coded.

Preliminary activities (steps 1-4)

In step 1, the participants' inquiry started with an open-ended question for investigation: "How usable is Second Life for general and special education purposes?" Students had to complete several steps to come to a conclusion. After watching a five-minute video on Youtube about the National Oceanographic and Atmospheric Association (NOAA) island in SL, participants completed a preliminary survey about their perceptions of the usability of SL for education. In step 2, all participants created their own SL account, downloaded Phoenix viewer, and learned basic navigation with the help of a highly pictorial SL manual created specifically for this class. Step 3 was a preliminary fieldtrip to five SL islands (Media Zoo, The Abyss Observatory, Virtual Hallucinations, Exploratorium, Genome Island) to ensure that students master the navigation skills required for the actual assignment. Figure 2 shows four of these islands.

Participants watched a 7-minute video in which the activities to be completed on each island were modeled by one of the researchers. Afterwards, they completed these preliminary tasks in a computer laboratory. One researcher was physically available for assistance on site while the second researcher was available for assistance in SL, connected through Skype for voice communication. For evidence of task completion, participants submitted screenshots to the instructor showing their avatar in each of the five SL islands. In step 4, participants read about five unique affordances of 3D IVWs in Dalgarno and Lee (2010), namely: experiential learning, spatial representation, motivation, transfer, and collaboration (Figure 3).

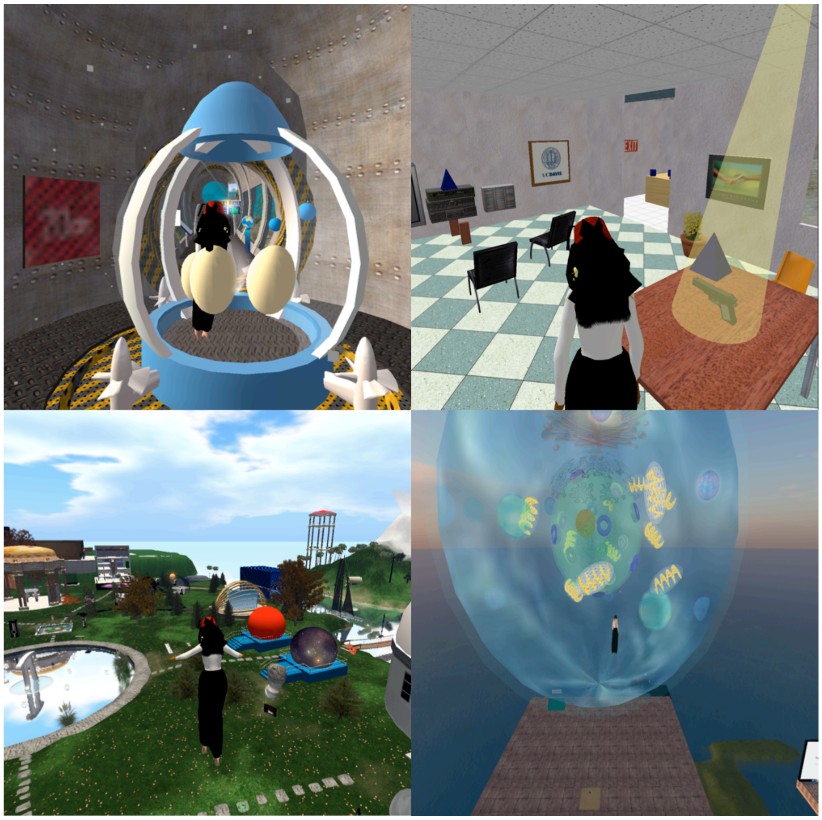


Figure 2. Preliminary fieldtrip (from upper left to lower right: Abyss Observatory, Virtual Hallucinations, Exploratorium, Genome Island).

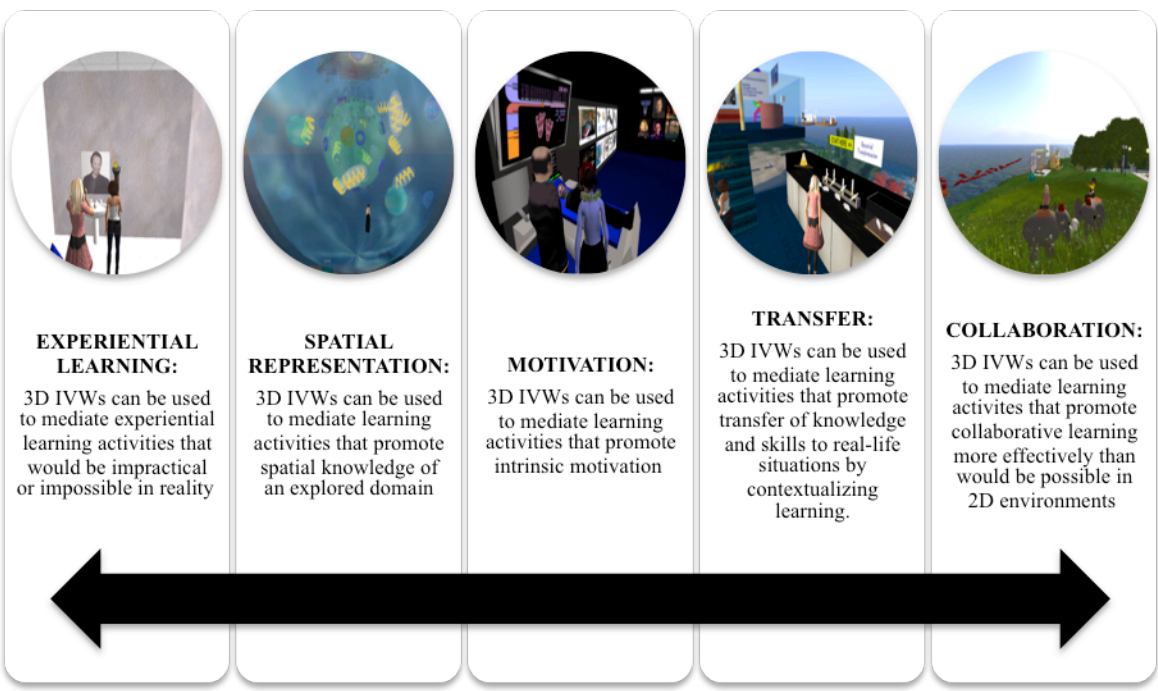


Figure 3. The five unique affordances of 3D IVWs (Dalgarno & Lee, 2010).

In step 5, participants explored SL collaboratively in groups of three. The purpose of this task was to brainstorm on potential activities and the rationale of using virtual worlds for education. Groups selected two out of five pre-selected islands to explore in depth (Figure 4).

Figure 4. Virtual exploration (from upper left to lower right: Nefertari Tomb on Sunny Breezes – Museum Island, Exploratorium, Comet Classic Paintings Art Gallery, Renaissance Island, Star Trek Museum of Space).

In step 6, participants completed a mid-reflection. Keeping a journal can help educators understand the problems that their own students will encounter in future explorations of 3D IVWs and to design assignments with these issues in mind. Participants thus had an opportunity for deep reflection about their new experiences in an entirely new learning environment. In step 7, groups debriefed their virtual experiences in class by presenting the activities developed in Step 5, including target student population, objectives, rationale, potential modifications to better suit the needs of special education, and a usability rating of each island. Step 8 required participants to analyze an existing lesson plan[3] about underwater exploration (Imzadi Island). In step 9, groups of three created their detailed special education lesson plan based on the ideas brainstormed in step 5. A lesson plan needed to have at least two elements of inquiry-based learning. Each group then presented their lesson plan to get feedback from their peers and the instructor. In step 10, individual post-reflections were written. Within a week of submitting the reflective journal, participants completed a post-survey (step 11), which included all pre-survey questions as well as 34 additional Likert-type, rating, and open-ended questions. Questions revolved around the usability of SL for education, collaborative learning in SL, and the effectiveness of the SL workshop.

Troubleshooting

Registering an entire class on SL from the same IP address, for example, is highly problematic. Storey and Wolf (2010) managed to register five students at a time, with the other

[3] A repository of SL lesson plans can be found at: http://msitsecondlife.wikispaces.com/Lesson+Plans.

participants having to log in from home or another spot. Educators who plan to take their students on virtual expeditions need to be prepared for a number of potential technical problems.

Data Analysis

The study followed a mixed-methods research design, utilizing constant comparative method of data analysis (Glaser & Strauss, 1967) as well as descriptive and inferential statistics. Data triangulation was achieved through analysis of the various instruments used in steps 1, 3, and 5 through 11. Data describing participants' (pre)conceptions about the use of 3D IVWs for education were synthesized from the instruments used in steps 1, 3, 6, 10, and 11. Data about the participants' ability to reflect critically on the potential uses of 3D IVWs in education and to devise activities and lesson plans supported by a pedagogical rationale were synthesized from steps 5, 7, 8, and 9. The qualitative data were open coded and categorized into recurring themes, which led to the separation of ideas, experiences, and concerns. To achieve investigator triangulation, the authors analyzed the data independently, compared, and ultimately amalgamated the outcomes after discussing discrepancies. The responses to the pre- and post-surveys were compared and analyzed in SPSS. Each individual participant's answers were summed to obtain a total attitude score (max. = 60) regarding their perception of the usability of SL for education. The class means in the pre- and post-surveys were calculated for each pre-survey item. To explore the difference in means, a series of dependent *t*-tests and Wilcoxon signed-rank tests were performed.

Survey Reliability

With respect to reliability, Cronbach's coefficient alpha for the pilot-survey, which was pilot tested on 32 educators, was calculated to be .92. This value indicates a high level of internal consistency among the test items.

Results

Attitude Scores and Usability Ratings

Each individual participant's answers were summed to obtain an attitude score (max. = 60) regarding their perception of the usability of SL for education. The class means in the pre- and post-survey were 42.08 ($SD = 5.14$) and 40.25 ($SD = 5.26$), respectively. To explore whether the difference in means was statistically significant and given the small sample size ($N=12$) and inability to verify the assumptions required of a parametric test, the Wilcoxon signed-rank test was performed (Table 2) in addition to a dependent-samples *t*-test. Both tests showed that there was no statistically significant difference in mean attitude towards the usability of virtual worlds in education as a result of the workshop. For five items, namely items 6 through 10, the special education teachers' attitude towards virtual worlds use in education increased. The opposite was true for the remaining seven items. Possible reasons for this outcome will be discussed in a later section.

Table 2

Means, Standard Deviations, and Results of Wilcoxon Signed-Rank Test for Differences Between Means on the Attitude Survey

	Pre-Survey		Post-Survey		
Item #	Mean	SD	Mean	SD	*z*
1	3.08	1.44	2.50	1.17	.31
2	3.08	1.31	2.92	1.08	.80
3	4.00	0.43	4.17	0.39	.16
4	2.83	1.11	3.00	1.13	.73
5	3.92	1.00	4.00	0.74	.71
6	4.00	0.85	4.25	0.45	.32
7	4.08	0.51	4.25	0.45	.42
8	3.75	0.75	3.50	0.80	.27
9	3.92	0.67	3.58	0.79	.33
10	3.67	0.78	3.25	1.14	.16
11	3.17	1.11	2.83	0.94	.35
12	2.58	0.90	2.00	0.85	.13

*Statistically significant when the error rate was controlled at the .05 level

Item 13 in the pre-survey and item 26 in the post-survey were identical and asked participants to provide an overall rating of the usability of SL for education on a 10-point rating scale. The mean ratings in the pre- and post-survey were 5.5 (*SD = 1.73*) and 5.58 (*SD = 1.51*), respectively. Although the mean rating increased slightly, a dependent-samples *t*-test did not reveal a statistically significant difference between the mean ratings ($p < .05$).

Mid-Reflection (step 6)

The responses to each of the four questions will be summarized along with the identification of key themes. *Question 1: Why and how should an immersive virtual learning environment be used in special education?* Two of the recurring themes strongly overlap with the affordances identified by Dalgarno and Lee (2010), namely *experiential* learning in situations that would be *impossible or impractical* in a real life classroom. One special education teacher expressed this thought as, “The game allows students the freedom of stepping out of their own lives and be someone else to explore freely.” Another teacher highlighted the experiential affordances of these virtual environments for special education students:

> *We were looking at the art island and it would give the students a chance to explore an art museum that would not require them to constantly be monitoring behaviors they are not always able to control.*

Half of all teachers highlighted the potential of IVWs for special education students with social skills challenges and communication deficits, such as individuals with ASD. Students who lack interactive social skills can learn to collaborate with peers in a safe environment and transfer this new skill to real life situations. It can also enable students with physical limitations to navigate the virtual world like their typically functioning peers. Further themes that emerged included multisensory input (visual, auditory, kinesthetic), which may afford better access to the material when experiencing it in a 3D IVW. Increased motivation and engagement were frequently mentioned as well: “The simple act of learning in a new, exciting way is motivating for students." The similarity to video games was pointed out as an additional motivating factor for some students. It was cautioned, however, that it must be considered carefully if content could be better explored in IVWs or the real world and that IVWs should be used to facilitate and expand instruction but not to replace real world instruction completely. Other affordances mentioned include: enhanced spatial knowledge, learning at one's own pace, and making abstract concepts more real.

Question 2: What are some practical ways to use SL for learning and instruction in special education? Creating increased motivation for the learning of topics that might otherwise be perceived as boring ("tuning into the lesson instead of tuning out") and experiencing the impossible or impractical, such as exploring foreign countries, galaxies, star constellations, under the sea environments or past time periods, emerged as the key themes.

> Instead of reading them a boring history/science book, start by letting them explore it first hand. Then when you do have to teach follow up lessons, they'll already be interested.
>
> Many of my students beg for computer time and I'd like to incorporate their interests into the learning process. So if we can get on computers and learn some cool things, that is a major bonus.

Virtual environments were considered suitable for a variety of content areas. Science experiments were frequently highlighted. Collaboration emerged as another key benefit. Special education students could use virtual worlds to learn to work collaboratively towards a common goal, namely in ways that they otherwise could not experience in the classroom and with people they otherwise could not work with. The affordances of virtual worlds were often compared with those of video games where gamers work in teams to complete missions. One teacher highlighted the benefit of stress-free collaborative excursions: "Interacting with peers in different islands can get children to explore new topics together. Second Life makes 'fieldtrips' hassle-free." Social skills and communication practice were mentioned as affordances for students with social and communicative deficits, such as individuals with severe language delay, English language learners, and shy students.

Question 3: Overall, do you think Second Life will motivate students to participate more actively, to make efforts more willingly, and to become more involved in learning activities? Please explain. Most participants agreed that anything involving computers gets students excited about learning since they think it is a game, which was perceived as being useful for topics that students are not normally interested in. Again, SL was compared with popular video games. Collaboration through technology was identified as another key benefit.

> I also think that Second Life would make group work more appealing as I have witnessed the agony of group work contrasted by how my students will help each other get a new app or to figure out the controls of a new game.

Anonymity and autonomy could be additional benefits because they might help students to participate more willingly and become more involved in learning.

> Many students would enjoy the autonomy that SL affords which they normally don't have in a regular classroom.
>
> Small things like having absolute control over your own avatar and your own actions might be an incentive for students who feel shy and insecure in the classroom.

Competition was identified as another way to take advantage of virtual environments. Cautionary comments, however, were made about the required computer literacy, the lack of which could easily lead to frustration.

> I found myself getting quite frustrated and would have easily given up on the program if I was not intrinsically motivated to succeed. Many of our students do not have that same drive.

Virtual environments could also be problematic for students with poor eye-hand coordination who may get frustrated with navigation and students with less patience may get annoyed when waiting for parts of SL to load. Continuous student support was considered a prerequisite for any successful virtual activity.

> Much guidance, assignments broken down in chunks, and very clear directions will be needed to help students navigate learning activities that incorporate Second Life.

Question 4: Overall, in your own words, how would you rate the potential of SL for learning and instruction? Fifty percent of the participants described SL as having strong potential for education while 33% rated it as moderately useful. Seventeen percent were undecided. Several concerns were voiced, such as the amount of effective teacher and student preparation and coping with accessibility issues. Some participants found the visual stimulus and the large spaces overwhelming. A lack of information, such as in the form of interactive information displays or note cards, was another concern.

> The system visually and settings-wise would be too overwhelming for students in elementary school. […] I found that a lot of time was wasted wandering around looking at places and items that had no information to explore. I would have to pick very specific worlds to use--worlds that are well-designed and highly effective in instruction.

It was mentioned that its use could be difficult for various student groups, such as those with less patience, those who dislike computers, those with physical impairments that make it difficult to see the screen or manipulate the keyboard/mouse. But once these various issues were resolved, there could be considerable potential for an engaging collaborative platform.

> It would also be a large time commitment to find the worlds that would be most beneficial to the students and to keep them away from those that are not. But once teacher and students are acclimated to the system, I think it would be a great tool for learning. It is incredibly engaging and fun just to explore with a lot of potential for motivation and collaboration. And those are two things that my students struggle with.

Lesson Plan Analysis (Step 8)

In this activity, the special education teachers analyzed an existing lesson plan revolving around Imzadi Island. After doing the virtual scuba diving tour in teams of three, they discussed four prompts. The identified four key affordances, which confirm those identified earlier, namely increased engagement/motivation, opportunities for collaboration, spatial representation, and experiential learning. Several suggestions were made how to modify the lesson plan to better accommodate the needs of special education students, namely by eliminating the text chat, replacing SL animals by real life images, having the teacher navigate so students do not get frustrated, and labeling the marine life to help with identification. Participants anticipated several challenges, such as unpleasant outside influences, difficulties with computer usage, age limits, misuse of the program and equipment, ending up in the wrong place, and difficulty navigating. One group mentioned that there was not enough to learn to justify the extensive amount of time needed to set up SL and learn to navigate it. Finally, it was feared that it would be challenging to monitor all students at the same time.

Lesson Plan Development (Step 9)

Lesson plans were developed in groups of three. Appendix 2 displays one of the lesson plans developed in the area of astronomy and chemistry for an earth science class. The topic is space and elements. The group's rationale was to provide students with an opportunity to travel in space and to explore stars, black holes, and galaxies as if they were part of the Star Trek crew. The SL location is the Star Trek Museum of Science. The lesson is intended to help students apply what they have previously learned in class and is designed as a scavenger hunt to increase student engagement.

Post-Reflection (Step 10)

The responses to each of the five prompts will be summarized along with the identification of the key themes. *Question 1: What are some of the affordances and challenges you encountered during your familiarization with Second Life?* Similar to the mid-reflection, participants agreed that virtual worlds have great potential for experiential learning and that social interaction practice would be particularly suitable for students with social issues. "Kids love technology and this type of exploration will satisfy their needs." The most frequently mentioned challenges were frustrations due to a slow internet connection, crashes/getting logged out, getting stuck, difficulties navigating, lack of user friendliness, becoming overwhelmed because there was too much to explore, and getting easily distracted from the task at hand due to visual stimuli.

Question 2 (third research question): What guidelines would you establish for teachers when they incorporate 3D IVWs in their own teaching? Understanding how Second Life works before having the students dive in was frequently mentioned. It was recommended that teachers not only try out the lesson ahead of time but also try having so many people logged in at the same time. The class should be isolated from other people's avatars to prevent unpleasant encounters.

> You would have to teach explicit steps and assess students' technological aptitude and computer literacy before proceeding with any assignments. Content filters should also be carefully looked at and appropriately set. You would also have to have an activity in clear, simple steps and give students ample time and direction to complete their work. They would also need a good amount of time to play and explore before any tasks are assigned.

Distraction was a frequent concern. One participant recommended: "Have a learning objective and stick to it." Teachers were advised to encourage creativity based on the unique affordances of virtual worlds: "This is the time for them to get creative and explore things that you wouldn't normally be able to explore because of different limitations."

Question 3 (first research question): How can we best train special education teachers for the use of Second Life in their own teaching? The following key recommendations emerged:

engage teachers in extensive virtual experience, provide sample lesson plans for different ages and subjects, analyze and develop lesson plans, learn how to locate content-specific SL islands for specific age groups, and work with a more experienced peer coach or facilitator.

> Teach how to use it as an effective supplement or alternative to direct instruction. Teach explicitly over an extended period of time so that teachers can use this with confidence and pass that on to students. This would make it time efficient and minimize frustration for students and teachers.

Question 4: What should an ideal SL island for special education look like? What features would you like to see? (Imagine making recommendations for SL designers and developers.) Again, social interaction emerged as one of the key themes, for example "a social setting that shows students how to behave would be helpful for ASD students". Practical ideas of what should be possible on a virtual island include: practicing daily tasks (e.g., going to the store), conducting job interviews, educational games (e.g., game show area for trivia and facts), social interaction game or practice area, and "online role plays similar to social stories so that kids can learn behaviors". A Career Island would be beneficial for high school students getting ready for transition. Islands should be small, streamlined, and very specific to the content covered, with things easy to find in a user-friendly environment where everything is labeled.

Question 5: Overall, if you consider the affordances and challenges of SL for educational purposes (see charts), do you consider using SL in your own classroom? The participants were equally divided into three categories: yes, maybe, and no. Reasons for those who stated they would not (currently) consider using SL included: comfort level of using SL too low, school technology insufficient, too many variables to control at once, and students lacking the prerequisite level of computer awareness. Those in the "maybe" category stated that they might use it if there was a SL "junior" version[4] or if they could "develop a structured social component to align with content we are currently studying".

Post-Survey (step 11)

The results of items 1 through 12 were equivalent to the pre-survey and have already been reported. The key responses to the remaining items will be briefly summarized. Participants agreed that learners neither had to be particularly independent (100%) nor intrinsically motivated (92%) to use SL for learning. A majority (58%), however, agreed that SL was only suitable for learners with high technology skills. Similarly, navigation was perceived as difficult by all but one (92%). Most (92%) liked that they could manipulate objects in SL and agreed that the game style (92%) and rich landscape (67%) were motivating. A majority (58%) would be willing to use SL for teaching together with an experienced SL coach, co-teacher or facilitator. A minority (25%) feared that they lacked the necessary technical skills even though they would actually like to use SL for teaching. When asked which educational activities (from a selection of options) they considered suitable for their class, treasure hunts clearly emerged as the most preferred option (67%); followed by historical recreations (58%), such as Atlantis, Land of Lincoln, Paris in 1900 as well as cultural immersion (58%), such as virtual Morocco. Data visualizations and displays/exhibits were each chosen by 50%. The least favored options (33% each) were self-paced tutorials, immersive exhibits (e.g., an exhibit that leads visitors through the minds of schizophrenic patients), language learning, and creative writing. All but one participant (92%) appreciated that the assignments were designed as collaborative events. It was suggested that

[4] Second Life Teen is no longer available.

"the assignment [in this workshop] was a little too open and may have been more beneficial if we had been grouped by grade level/subject matter." Nevertheless, having partners enhanced the experience of exploring a novel environment and helped to overcome the frequently encountered technical hurdles.

> I think that the learning experience and the outcome was much better working in groups than it would have been alone. I see the validity of the assignment but I would have been very frustrated with the experience if I had to work on it alone. SL was a little difficult for me to navigate and even logging on was tough at times. I would have not been motivated or invested without working in a group. I think this was a great group project.

Half of the participants enjoyed the partner work very much and stated that the collaboration had motivated them to put in greater efforts than if they had been working alone. The final comments addressed what could have been done to improve the workshop. First, it was suggested that the other groups try out the lesson plans developed in step 9 so that suggestions for implementation could be included in the revisions. Second, the lack of a fast and solid internet connection in the computer laboratory was frequently mentioned as making the experience less enjoyable.

Discussion

This study offered special education teachers a semester-long opportunity to engage in and familiarize with the new digital literacies of 3D IVWs while reflecting on their usability critically and purposefully. Similar to studies conducted by Campbell (2009), Dickey (2011), and Guzzetti and Stokrocki (2013), these participants became familiar with educational resources in SL and planned activities that would offer learning affordances that students could not otherwise benefit from. Based on the results, the discussion is developed around the key themes that emerged from the qualitative analysis, namely using virtual worlds as a collaborative platform for social skills practice in special education settings, the potential of virtual worlds for motivation purposes, and various challenges. The section will conclude in a comparison of the quantitative results of this study with those of a pilot study.

The current findings provide support for the notion that virtual environments are valuable for special education. Several participants pointed out the benefits of social skills practice for students with social skills challenges, such as students with autism. Using virtual worlds to practice life skills and teach empathy have been widely reported (e.g., deAngelis, 2009; Fusar-Poli et al., 2008; Mitchell et al., 2006; Moore et al., 2005; Newbutt & Donegan, 2010). The participating special education teachers suggested that educators receive extensive training in order to build enough confidence to teach in virtual worlds and to be informed about options of virtual spaces across different ages and subjects. Silva, Correia, and Pardo-Ballester (2010) may serve as a model of a semester-long collaborative effort to develop a solid understanding of how SL can be used in teacher education. Guidelines in Edirisingha, Nie, Pluciennik, and Young (2009) on how to develop learning activities that facilitate social presence and socialization among distance learners for collaborative learning in SL may also assist special educators in the design of social skills practice activities.

Visual stimuli were perceived with ambivalence. Similar to the participants in a study by Omale, Hung, Luetkehans, and Cooke-Plagwitz (2009), the special education teachers participating in the current study suggested that visual stimuli may be overwhelming and distracting from learning, possibly to the extent that "learning was not enhanced and technology became a distraction rather than an enabler" (Omale et al., 2008, p. 492). Other distractions can be the design of an avatar (Dickey, 2011). The same visual details that can be appealing to some users may be perceived as distracting by others. Which kind of experiences and perceptions enhance and distract from a positive experience in virtual worlds has been addressed in detail in Jamison (2008).

Participants frequently stated that the similarity of SL to a game might increase students' willingness to participate actively and get involved in the learning process more willingly. This similarity to a game, however, is deceiving. Despite some similarities, SL is not a game. Students might perceive virtual worlds as spaces for play rather than educational environments (Cheal, 2009) and could be disappointed when they realize that virtual worlds, such as SL, have not been designed as games and fail to offer the same affordances. Cheal (2009) also reported that students became uncomfortable with the open-ended creative potential of SL, which is also in line with the challenges identified in this study. According to the Horizon Report (2012), games offer several affordances for education, such as the feeling of working toward a goal, the possibility of attaining spectacular successes, the ability to problem solve and collaborate with others, and an interesting story line. Even though these qualities may be adapted to educational content, the design challenges may be difficult to overcome and costly (Horizon, 2012).

Several participants were concerned about their students being exposed to inappropriate content or adult content or having unpleasant encounters with griefers who irritate and harass other users. Educators' concerns about security issues have been widely reported (e.g., Cheal, 2009; Dickey, 2011, Kirriemuir, 2010). Unless an educator has access to a privately owned island, there is always a risk of unpleasant encounters, even on islands designated "General". General maturity rating means that a region is "not allowed to advertise or make available content or activity that is sexually explicit, violent, or depicts nudity" (Second Life Knowledge Base, 2013). But a general maturity rating (as opposed to moderate or adult) does not prevent griefers from harassing other users, even on islands with a clearly educational purpose. As can be seen in the Second Life Educational Directory, many educational islands have a moderate maturity rating and so do several of the islands used in this study. It is recommended that educators using SL with students continuously monitor their students' activity and virtual location. For this purpose, it is advisable to have one or two facilitators. Students should be prepared for possible instances of grieving and how to react (e.g., right-click on griefer's avatar and report to Linden Lab). Participants in this study did not report any instances of griefing or any other unpleasant experiences.

Locating appropriate and content-specific virtual spaces was another frequently raised concern. Not all educators have access to a university-owned island and may have to use public islands. Some publicly accessible but unlisted educational spaces are announced in a listserv for SL educators (SLED). One example of such a virtual space is the virtual wet lab in SL that is owned by Prince William Sound Community College[5]. Another experimental laboratory set up in SL is owned by the University of Leicester, UK[6]. Some participants in the current study doubted that the learning benefits of using virtual worlds, such as SL, justify the extensive amount of time that would be needed for teacher and student preparation. The qualitative

[5] for an overview of the lab: http://www.pwscc.edu/academics/creative-learning-in-a-virtual-wet-lab/
[6] for a tour of the lab: http://www2.le.ac.uk/projects/swift

analysis of this study revealed an almost balanced ratio between perceived affordances and challenges for both general and special education settings (Table 3).

Table 3

Perception of Affordances and Challenges of SL

Benefits	Challenges
Platform for social skills practice	Amount of teacher and student preparation
Experiential learning (e.g., science experiments, cultural immersion)	Accessibility issues (e.g., internet connection, crashes, graphic card)
Exploring the impossible/impractical	Poor eye-hand coordination impairs navigation
Increased motivation	Safety issues (exposure to strangers)
Learning at own pace/increased student autonomy	Lack of required computer literacy
Spatial representation	Deceptive similarity to video games
Making abstract concepts more real	Visually overwhelming, distracting from learning
Multi-sensory input	
Anonymity encourages shy students to participate more	

How educators perceive the usability of 3D IVWs for education will likely influence how they will implement virtual spaces into their teaching. Dickey (2011) cautioned that virtual worlds are not value-neutral, each having its affordances and drawback. Most teachers in a study by Dickey (2011) highlighted the importance of developing virtual tools to meet the needs of teachers and students rather than "forcing" teachers into using existing tools. As virtual worlds become more popular in education, more schools and colleges of education will want to offer virtual worlds teacher training. Ideally, such a workshop would not only address the rationale of using virtual worlds (i.e., their unique affordances), as was repeatedly done in the present study, but also explicitly guide educators through each step of virtual teaching, that is, how to teach in-world. Providing sample lesson plans for different ages and across subject matters might help alleviate teachers' fears of an extensive time commitment in terms of preparation.

The quantitative analyses in this study failed to show statistically significant differences between the mean attitude scores collected in the pre- and post-survey. This finding is in contrast to the results of a pilot study by the same authors (Nussli & Oh, under review), which suggested a statistically significant increase in mean attitude with a large effect size as a result of the training participants received in SL ($z = 3.30$, $p < .05$, $r = .54$). The pilot study was much shorter with fewer steps (three weeks/7 steps vs. three months/11 steps in the current study); the participants were pre-service general education teachers with some teaching experience (vs. in-service special education teachers in the current study); and the virtual explorations were done from participants' home computers with stable, fast internet access, and the use of Skype for voice communication (vs. sessions at the computer laboratory in the current study, with 12 participants logged in simultaneously, resulting in a significant slow down and numerous crashes). For some of the group work, only one participant was navigating SL while the other group members were observing and brainstorming on ideas for activities. The authors can only speculate that this combination of factors caused a failure to produce a more positive attitude change in the participants. Based on these factors, it is recommended that participants log into SL from different locations to ensure fast and stable access with use of Skype for voice communication to ensure high voice quality and that group work is designed in a way that each group member is logged in and navigating/exploring rather than having one navigator and several passive observers. If participants must log in simultaneously from the same physical location, the number of participants should be low, which clearly makes SL less practical and appealing for use with regularly sized classes. It is also recommended that a large number of avatars avoid congregating in the same area because this could cause low frame rates and unresponsive controls, as experienced in this study.

In sum, the findings of this study suggest the following components of effective virtual worlds teacher training, which are in line with the findings of Nussli & Oh (under review): (a) scaffolded introduction to a 3D IVW, (b) collaborative explorations framed by a pedagogical rationale and self-reflection, (c) identification of unique affordances, (d) having students design learning activities framed by a pedagogical rationale, (e) assistance of a more experienced in-world facilitator to help teachers acquire the unique skills required to become a successful virtual teacher, and (f) learning how to locate subject matter directories in-world. In addition, it is recommended that teacher educators model effective teaching in 3D IVWs (Nussli & Oh, in press).

There are a number of limitations to the present study. The preliminary survey did not include questions examining the participants' specific technological background and use of technology both in their teaching and at home. Collecting these data would have allowed the authors to correlate the participants' technology use and expertise with their preconceptions of 3D IVWs. Although the sample of twelve participants is small (N=12), it seems adequate compared with similar studies. The sample sizes in studies with similar purposes (e.g., Annetta et al., 2008; Blankenship & Kim, 2012; Dickey, 2011; Edirisingha et al., 2009; Gamage et al., 2011; Good et al., 2008; O'Connor, 2009-2010; O'Connor & Sakshaug, 2008-2009; Omale et al., 2009; Silva et al., 2010; Storey & Wolf, 2010) range from two to 41, with only three studies having more than 13 participants. Finally, although the special education teachers in the present study explored SL exclusively, it can be assumed that the results can be generalized to other comparable 3D immersive virtual environments due to the similarity of features, namely an interactive, open-ended environment with avatars for visual representations of the users and a chat tool for communication.

Conclusions

The overarching goal of this study was to increase special education teachers' awareness of the potential of 3D technologies for learning and instruction. The practical significance of this study is that it will assist educators and teacher educators in developing an understanding of the pragmatics of integrating 3D technology in their teaching. Throughout the study, the special education teachers were challenged with the task of transferring the skills and experiences they all encountered to the task of implementing 3D IVWs in their classrooms. Although these teachers were able to navigate through 3D IVWs after a short training session, a thorough training with more practice was expected to provide a more valuable overall experience. While immersed in a virtual world, the teachers were able to collaborate with other teachers in inquiry-based learning activities. The results revealed that these 12 teachers agreed on 3D IVWs providing experiences that their students may not be able to encounter in real life. Special potential was identified for social skills practice, observation of modeled behavior as well as collaborative and experiential learning. The potential for this technology in a classroom setting seems limitless. Its practical implementation, however, requires that teachers receive appropriate training that builds both their confidence in their virtual teaching skills and their commitment towards using 3D technology in a classroom. Overall, despite technical issues, the findings of this study suggest that 3D IVWs are a valuable tool to complement face-to-face teaching, especially in special education.

Academic professionals can be expected to have a good command of digital media literacy so that they can support learners in developing digital media literacy skills (NMC Horizon, 2012). Due to the limited amount of training, however, teachers often feel that they lack technical support, the skills, or a pedagogical rationale for using technology in their teaching (NMC Horizon, 2012). Hence, they may be entering a classroom with a pre-existing attitude toward technology that may or may not be favorable as a result of the pre-service training. It has been widely acknowledged that the transition from traditional to virtual teacher requires stamina, modeling, scaffolding, and continuous mentoring (e.g., Alvarez, Guasch, & Espasa, 2009). Colleges of Education are encouraged to consider offering innovative courses specifically targeted towards virtual education. Teachers' buy-in to the use of 3D IVWs, however, may be intricately linked with effective teacher training. Therefore, if teachers are not convinced of the need of 3D IVWs for educational purposes, even the best training is likely to fail. As a result, one of the key steps is to secure teachers' acknowledgment of the validity of 3D IVWs for education. Immersing teachers in virtual experiences will help them make informed decisions.

Future Research

The potential for future work examining effective teacher training in the use of 3D IVWs for both general and special education is striking. Researchers are encouraged to investigate the needs of special education teachers and students to improve the design of virtual spaces designed specifically around these needs. Further research into teachers' perceptions of the value of 3D IVWs for education and how these perceptions impact their virtual teaching practice will advance our understanding of the unique affordances and drawbacks and will help design these spaces in a way that they support learning. As 3D teaching is becoming increasingly popular, researchers are encouraged to continue to build on best practices of virtual worlds teacher training. More research is needed to show if and how 3D IVWs provide advantages over other pedagogical techniques and how to exploit their potential (Dalgarno & Lee, 2010). These findings will further inform effective teacher training that will enhance the learners' experience in 3D IVWs and increase their knowledge of how to implement this technology into their teaching. Currently in teacher education, 3D IVWs are used sparingly. The understanding of the technology has not been established, but once in-world teaching becomes more popular, teacher educators will develop the ability to model effective uses of 3D IVWs to pre-service and in-service teachers while sharing best practices as they continue to experiment.

Appendices

Appendix 1: Project Overview: 11 Steps

#	Description of Activity	Assessment	Inquiry-Based Learning Cycle*
1	Watch Youtube video NOAA and complete pre-survey on Survey Monkey	Preliminary survey submitted	Inquiry starts with open-ended question for investigation: "How usable is SL for general and special education purposes?" Complete all inquiry steps to come to a conclusion supported by adequate evidence.
2	SL start-up	Observation in step 3	Demonstrate personal investment and active engagement into the investigation of 3D IVWs by proactively spending time (at participants' discretion) in SL.
3	Individual fieldtrip after watching a 7-minute demo video	Screenshots submitted	Collaborate with peers and demonstrate readiness to initiate virtual experience.
4	Read about unique affordances of 3D IVWs in Dalgarno and Lee (2010)	In-class review	Acquire background knowledge to get ready for next task.
5	Virtual Exploration – Group activity	Observation of in-class participation	Engage in an extensive hands-on virtual experience by planning and conducting their own group investigation of the usefulness of SL for education.
6	Mid-reflection	Rubric	Express, clarify, justify, and represent ideas.
7	Presentation of findings (conclusions formed in Step 5)	In-class presentation	Make an informed decision about the usability of these specific islands by giving priority to evidence and formulating explanations from this evidence. Communicate and justify explanations.
8	Analyzing an existing SL lesson plan (Imzadi Island)	In-class participation	Connect previous exposure to SL and insights gained from class discussions with an analysis of an existing lesson plan based on SL. Examine and critique the rationale for the activity, the design of the lesson plan, and reflect on its usability for special education.
9	Collaborative development of a lesson	Rubric	Insights from the previous steps will culminate in the development of a final product, which should be representative of participants' revised beliefs about the educational potential of 3D IVWs. Communicate and justify final product and connect rationale with knowledge gained in this workshop. Peer feedback will be instrumental in this step.
10	Post-reflection	Rubric	Express, clarify, justify, and represent ideas. At this point, participants should be able to make an informed decision about the usability of SL for special education purposes by providing substantiated evidence. Based on their insights, participants should also be able to describe an ideal SL island, thereby completing the cycle in the investigation about the potential of SL.
11	Complete post-survey	Post-survey submitted	same as step 10

* adapted from "Essential features of classroom inquiry and their variations" (National Research Council, 2000).

Appendix 2: Lesson Plan Samples Developed by Special Education Teachers

Learning objectives

Students will be able to:

- Identify the planets in our solar system
- Identify the three closest stars to the sun
- Identify key attributes of the three closest stars to the sun (size, appearance, properties)
- Define a black hole (what it is, how big it is, how it forms, where they are in space)
- Identify properties of copper, barium, potassium, and atom
- Using the periodic table, identify element names, atomic number, and states of matter

Procedures

A. Find the hologram of our solar system. Draw a model of the planets in our solar system.
B. Name the 3 closest stars in the Milky Way Galaxy to our sun. Name each star and tell how many light years away each start is from the sun.
C. What is a black hole?
D. Name all the planets with rings.
E. What is an atom? Draw the atom model you see in SL. Name three aspects of an atom.
F. Go to Tovadock Science Institute room. Play with the Bunsen burner and elements. What color flame do the following elements create: Copper, barium, potassium?
G. In the periodic table, find the element whose symbol corresponds to Ms. N.'s first name (ask for her name nicely!). What is this element's full name? What is the atomic number? Is this element's natural state? (i.e. liquid, gas, or solid?)

After getting a 1st, 2nd, and 3rd winner, the class will re-convene and review the answers to each card. The class will then discuss which parts of the museum they liked and how it helped them understand astronomy and/or chemistry better.
Students will write a one-page reflection about what they learned about astronomy and/or chemistry.

Evaluation strategies

- Students' answer sheets
- After the lesson, students will be assigned a one-page reflection on what they have learned during the scavenger hunt.

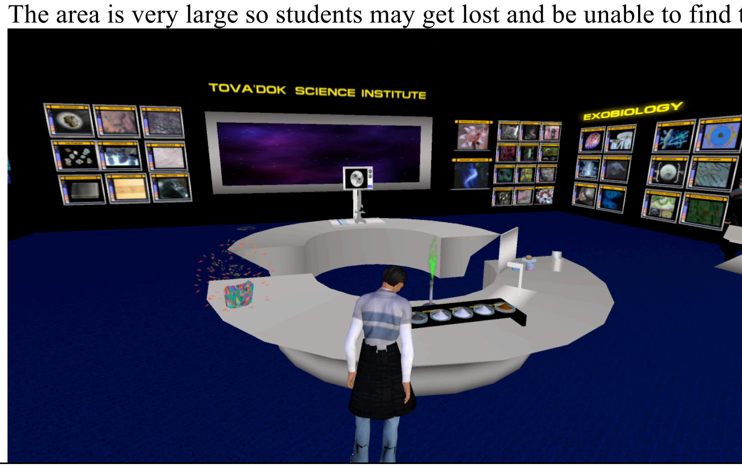
Adaptations

- Shorten the amount of objects in the scavenger hunt.
- Focus on very easy to find stations such as the telescope and Bunsen burner.
- Guide students through the lesson on own computer connected to a projector.

Anticipated challenges

- For students unfamiliar with Star Trek, it might be a bit challenging to identify the real world science scattered among "warp technology".
- The area is very large so students may get lost and be unable to find the above locations.

Screenshot



References

Alvarez, I. I., Guasch, T. T., & Espasa, A. A. (2009). University teacher roles and competencies in online learning environments: A theoretical analysis of teaching and learning practices. *European Journal of Teacher Education, 32*(3), 321-336. doi: 10.1080/02619760802624104

Baker, S. C., Wentz, R. K., & Woods, M. M. (2009). Using virtual worlds in Education: Second Life[R] as an educational tool. *Teaching of Psychology, 36*(1), 59-64. doi: 10.1080/00986280802529079

Balcikanli, C. (2012). Language learning in Second Life: American and Turkish students' experiences. *Turkish Online Journal of Distance Education, 13*(2), 131-146.

Barab, S. A., Hay, K. E., Barnett, M., & Keating, T. (2000). Virtual solar system project: Building understanding through model building. *Journal of Research in Science Teaching*, *37*(7), 719-756. doi: 10.1002/1098-2736(200009)37:7<719::AID-TEA6>3.0.CO;2-V

Barab, S. A., Sadler, T. D., Heiselt, C., Hickey, D., & Zuiker, S. (2010). Erratum to: Relating narrative, inquiry, and inscriptions: Supporting consequential play. *Journal of Science Education and Technology, 19*(4), 387-407. doi: 10.1007/s10956-010-9220-0

Barbour, M. K., & Reeves, T. C. (2009). The reality of virtual schools: A review of the literature. *Computers and Education, 52,* 402-416. doi: 10.1016/j.compedu.2008.09.009

Blankenship, R., & Kim, D. (2012). Revealing authentic teacher professional development using situated learning in virtual environments as a teaching tool. *International Forum of Teaching Studies, 8*(1), 36-53.

Blasing, M. T. (2010). Second language in Second Life: Exploring interaction, identity and pedagogical practice in a virtual world. *SEEJ, 54*(1), 96-117.

Chapman, D. D., & Stone, S. J. (2010). Measurement of outcomes in virtual environments. *Advances in Developing Human Resources, 12*(6), 665-680. doi: 10.1177/1523422310394792

DeAngelis, T. (2009): Can Second Life therapy help with autism? *American Psychological Association, 40*(8), 40.

Dalgarno, B., & Lee, M. J. W. (2010). What are the learning affordances of 3-D virtual environments? *British Journal of Educational Technology, 41*(1), 10-32. *Software: Practice and Experience, 39,* 1015-1054.

Dickey, M. D. (2011). The pragmatics of virtual worlds for K-12 educators: Investigating the affordances and constraints of Active Worlds and Second Life with K-12 in-service teachers. *Educational Technology Research Development, 59,* 1-20. doi: 10.1007/s11423-010-9163-4

Edirisingha, P., Nie, M., Pluciennik, M., & Young, R. (2009). Socialisation for learning at a distance in a 3-D multi-user virtual environment. *British Journal of Educational Technology, 40*(3), 458-479. doi: 10.1111/j.1467-8535.2009.00962.x

Fetscherin, M., & Lattemann, C. (2008). User acceptance of virtual worlds. *Journal of Electronic Commerce Research, 9,* 231-242.

Fusar-Poli, P., Cortesi, M., Borgwardt, S., & Politi, P. (2008). Second Life virtual world: A heaven for autistic people? *Medical Hypotheses, 71*(6), 980-1. doi: 10.1016/j.mehy.2008.07.024

Gamage, V., Tretiakov, A., & Crump B. (2011). Teacher perceptions of learning affordances of multi-user virtual environments. *Computers & Education, 57,* 2406-2413.

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

Grant, S., & Clerehan, R. (2011). Finding the discipline: Assessing student activity in Second Life. *Australian Journal of Educational Technology, 27*(5), 813-828.

Good, J., Howland, K., & Thackray, L. (2008). Problem-based learning spanning real and virtual worlds: A case study in Second Life. *ALT-J, Research in Learning Technology, 16*(3), 163-172. doi: 10.1080/09687760802526681

Gorini, A., Gaggioli, A., Vigna, C., & Riva, G. (2008). A Second Life for eHealth: Prospects for the use of 3-D virtual worlds in clinical psychology. *Journal of Medical Internet Research, 10*(3). doi: 10.2196/jmir.1029

Guasch, T., Alvarez, I., & Espasa, A. (2010). University teacher competencies in a virtual teaching/learning environment: Analysis of a teacher training experience. *Teaching and Teacher Education, 26,* 199-206. doi: 10.1016/j.tate.2009.02.018

Guzzetti, B., & Stokrocki, M. (2013). Teaching and Learning in a Virtual World. *E-Learning, 10*(3), 242-259.

Harlow, D., & Nilsen, K. (2011). Virtual inquiry experiences. *Science & Children, 49*(4), 42-45.

Ishizuka, H., & Akama, K. (2012). Language learning in 3D virtual world - Using Second Life as a platform. *E-learning and Education, 1*(8).

Jackson, R. L., & Fagan, E. (2000). Collaboration and learning within immersive virtual reality. *Proceedings of the third international conference on Collaborative VLEs CVE 00*, 83-92. ACM Press.

Johannesen, M. (2013). The role of virtual learning environments in a primary school context: An analysis of inscription of assessment practices. *British Journal of Educational Technology, 44*(2), 302-313. doi: 10.1111/j.1467-8535.2012.01296.x

Kandalaft, M. R., Didehbani, N., Krawczyk, D. C., Allen, T. T., & Chapman, S. B. (2013).

Virtual reality social cognition training for young adults with high-functioning autism. *Journal of Autism and Developmental Disorders, 43,* 34-44. doi: 10.1007/s10803-012-1544-6

Knutzen, B., & Kennedy, D. (2012). The global classroom project: Learning a second language in a virtual environment. *The Electronic Journal of e-learning, 10*(1), 90-106.

Lin, J., & Tallman, J. (2006). Theoretical framework for online inquiry-based learning. *Technology and Teacher Education Annual, 2,* 967-974.

Mayrath, M. C., Traphagan, T., Heikes, E. J., & Trivedi, A. (2011). Instructional design best practices for Second Life: A case study from a college-level English course. *Interactive Learning Environments, 19*(2), 125-142. doi: 10.1080/10494820802602568

Mitchell, P., Parsons, S., & Leonard, A. (2007). Using virtual environments for teaching social understanding to 6 adolescents with autistic spectrum disorders. *Journal of Autism and Developmental Disorders, 37*(3), 589-600.

Moore, D., Cheng, Y, McGrath, P., & Powell, N. (2003). Collaborative virtual environment technology for people with autism. *Focus on Autism and Other Developmental Disabilities, 20,* 231-243.

Mroz, A. (2012). Négociation et co-construction du sens en français langue étrangère (FLE) lors d'une immersion dans un environnement virutel d'apprentissage (EVA). *Canadian Modern Language Review, 68*(4), 359-392.

National Research Council. (1996). *The National Science Education Standards.* Washington, DC: The National Academy Press.

National Research Council (2000). *Inquiry and the national science education standards: A guide for teaching and learning.* Washington D.C: National Academy Press.

Nelson, B. C., & Ketelhut, D. J. (2007). Scientific inquiry in educational multi-user virtual environments. *Educational Psychogical Review, 19,* 265-283. doi: 10.1007/s10648-007-9048-1

Newbutt, N. A., & Donegan, M. (2010): *A brief review: Assistive technology and autism, a proposal for virtual tools for improved communication and emotional recognition.* In: Society for Information Technology & Teacher Education (SITE) 2010 21st International Conference, 31 March 2010, San Diego, CA, United States. (Unpublished)

Nishimura, H., Lim, K. Y. T., & Koyamada, K. (2012). The Abyss Observatory designing for remote collaboration, self-directed discovery and intuition development in multi-user interactive 3D virtual environments. *Journal of Virtual Worlds Research, 5*(2).

NMC Horizon Report (2012). Higher Education Edition. Retrieved from http://www.nmc.org/publications/horizon-report-2012-higher-ed-edition

Nussli, N., & Oh, K. (in press). The components of effective teacher training in the use of three-dimensional immersive virtual worlds for learning and instruction purposes: A literature review. *Journal of Technology and Teacher Education*.

O'Connor, E. A. (2009-2010). Instructional and design elements that support effective use of virtual worlds: What graduate student work reveals about Second Life. *Journal of Educational Technology Systems, 38*(2), 213-234.

O'Connor, E.A., & Sakshaug, L.E. (2008-2009). Preparing for Second Life: Two teacher educators reflect on their initial foray into virtual teaching and learning. *Journal of Educational Technology Systems, 37*(3), 259-271

Omale, N., Hung, W.-C., Luetkehans, L, & Cooke-Plagwitz J. (2009). Learning in 3-D multiuser virtual environments: Exploring the use of unique 3-D attributes for online problem-based learning. *British Journal of Educational Technology, 40*(3), 2009.

Pérez-García (2009). MUVEnation: A European peer-to-peer learning programme for teacher training in the use of MUVEs in education. *British Journal of Educational Technology, 40*(2), 561-567.

Rothfarb, R., & Doherty, P. (2007). Creating museum content and community in Second Life. In J. Trant and D. Bearman (Eds.), *Museums and the Web 2007: Proceedings.* Toronto: Archives & Museum Informatics. Retrieved July 20, 2013 from: http://www.archimuse.com/mw2007/papers/rothfarb/rothfarb.html

Salt, B., Atkins, C., & Blackall, L. (2008). Engaging with Second Life: real education in a virtual world. Retrieved August 27, 2013 from: http://piensl.pbworks.com/f/slliteraturereviewa1.pdf

Second Life Knowledge Base (2013). Maturity ratings. Retrieved August 14, 2013 from http://community.secondlife.com/t5/English-Knowledge-Base/Maturity-ratings/ta-p/700119#What_are_maturity_ratings.3F

Silva, K., Correia, A., & Pardo-Ballester, C. (2010). A faculty mentoring experience: learning together in Second Life. *Journal of Digital Learning in Teacher Education, 26*(4), 149-159.

SLED (2013). SL Educators. Retrieved August 14, 2013 from https://lists.secondlife.com/cgi-bin/mailman/listinfo/educators

Stendal, K., Balandin, S., & Molka-Danielsen, J. (2011). Virtual worlds: A new opportunity for people with lifelong disability? *Journal of Intellectual & Developmental Disability, 36*(1), 80-83. doi: 10.3109/13668250.2011.526597

Storey, V. A., & Wolf, A. A. (2010). Utilizing the platform of Second Life to teach future educators. *International Journal of Technology in Teaching and Learning, 6*(1), 58-70.

Strickland, D. (1996). A virtual reality application with autistic children. *Presence, 5,* 319-329.

Verhagen, T., Feldberg, F., van den Hooff, B., Meents, S., & Merikivi, J. (2011). Satisfaction with virtual worlds: An integrated model of experiential value. *Information & Management, 48,* 201-207. doi: 10.1016/j.im.2011.02.004

Wang, C. X., Calandra, B., Hibbard, S. T., & Mc Dowell Lefaiver, M. L. (2012). Learning effects of an experimental EFL program in Second Life. *Education Tech Research Dev, 60,* 943-961. doi: 10.1007/s11423-012-9259-0

Warburton, S. (2009). *MUVEs and Second Lives: Exploring education in virtual worlds.* Proceedings of the KILT Conference, March 2008. London: King's College London.

Wehner, A. K., Gump, A. W., & Downey, S. (2013). The effects of Second Life on the motivation of undergraduate students learning a foreign language. *Computer Assisted Language Learning, 24*(3), 277-289. doi: 10.1080/09588221.2010.551757

Journal of Teaching and Learning with Technology, Vol. 3, No. 1, June 2014, pp. 59 - 71.
doi: 10.14434.jotlt.v3n1.4004

Using videoconferencing mediated mentoring to support an adjunct faculty

Jale Aldemir[1] and Jillian Ardley[2]

Abstract: Mentoring is an effective way to orient new employees to an organization's work climate. Many colleges operating in multiple locations and providing programs for working adults through evening classes rely on the expertise of adjunct faculty to provide instructional methods. The research literature about mentoring in a higher education context mainly focuses on mentoring full time faculty members. Therefore, this case study is believed to address the gap as it focuses on understanding the mentoring of adjunct faculty. The researchers of the present study believe that utilizing videoconferencing as a tool to mentor new adjunct faculty could be beneficial in the context of any college serving in multiple sites. The purpose of the study is to (a) to determine if videoconferencing is an effective tool in mentoring adjunct faculty, and (b) to determine if videoconferencing mediated mentoring (VMM) is effective for full time faculty in disseminating the strategies and skills to qualified adjunct faculty. VMM implemented in the study includes essential segments – pre-course professional development section, interim course hands-on training and support section, and the post course section to evaluate findings. Data analysis through mentor and mentee logs and surveys proved that VMM is a valuable medium to utilize for training purposes. This type of technology provides a platform for the full time faculty member to build a professional relationship and share the standard of excellence for a given field of study to new adjunct faculty member.

Keywords: Videoconferencing; Teacher Education Faculty

Introduction

Mentoring a novice colleague is possibly one of the oldest educational methods that exist for supporting a new coworker. It is an effective way to coach new employees and help them orient to the organizations' work climate. In general, "… mentoring is a reciprocal learning relationship characterized by trust, respect, and commitment, in which a mentor supports the professional and personal development of another by sharing his or her life experiences, influence and expertise" (Zelles, Howard, & Barcic, 2008, p. 555). Therefore, mentoring is a viable component of professional development in an organization.

In the context of higher education, the traditional method of mentoring is to formally assign a senior faculty member who is considered to be knowledgeable, skilled, and experienced to a new faculty member in order to prepare the new colleague for the academic and research demands of the college. Although the format of this relationship is commonly structured around face to face interactions, Videoconferencing can be used as a conduit to mentor a new adjunct faculty member. Technology has already been utilized as a possible tool in the mentoring process

[1] Assistant Professor of Early Childhood Education at the University of North Carolina Wilmington, aldermirj@uncw.edu
[2] Associate Professor of ECE at Mount Olive College, jardley@moc.edu

where mentors and mentees can meet to discuss topics of interest even when they are not in the same location (Loureiro-Koechlin & Allan, 2010). Specifically, by observing, and participating with, a full time faculty member who is situated in another site and has years of experience in planning and teaching within this framework, mentoring a new faculty can transpire.

Colleges are no longer just brick and mortar with colleagues in the same building. Today, many colleges also operate in multiple locations and provide programs for working adults through evening classes that rely on the expertise of adjunct faculty to produce instructional methods to help those students reach educational goals set by the institutions. However, increasing competitiveness in serving more students in multiple sites brings the issue of having adjunct faculty who may not be familiar with program expectations, characteristics of the student body which the college serves, or content specific pedagogical strategies and college wide procedures (Anderson, 2007).

An *adjunct* is an "assistant or another; a faculty member of a college or a university" (*Merriam-Webster's Collegiate (R) Dictionary, 2004).* As a member of the teaching body of an institute of higher education, an adjunct is a crucial component to a student's higher education academic success. In fact, Meixner and Kruck (2010) showed no significant difference between full time and part-time faculty in terms of student learning outcomes and student evaluation; however, it is indicated that those two faculty bodies are separated in the area of institutional support they receive. Furthermore, research (Bergmann, 2011; Meixner & Kruck, 2010) points to the areas in which adjunct faculty need support such as utilizing technology, curriculum development, learning activities and strategies, assessing student learning, emotional connection with their respective programs, and finally, receiving mentoring from a senior faculty in their program of study.

Although the research literature includes various studies about mentoring in a higher education context (Bryant-Shanklin & Brumage, 2011; Budge, 2011; Knippelmeyer & Torraco, 2007), those studies mainly focus on mentoring full time faculty members. There is not a significant amount of research specifically focusing on mentoring adjunct faculty throughout higher education literature. Therefore, we believe that this case study contributes to the process of closing the gap in our knowledge about mentoring new adjunct faculty in a higher education context.

Videoconferencing as a Tool to Mentor

Kent and Simpson (2010) define the term videoconferencing "as a system where two or more participants in different locations can interact using specialized equipment through high-speed internet connection" (p. 13). It is a real time media platform in which all participants can share thoughts and information visually as well as verbally in a long distance format. Videoconferencing has been widely used across different disciplines for various purposes such as training of medical personnel, in-service teacher education, K to 12 students' instruction, and pre-service teacher education (Kent & Simpson, 2010; Knight, Pedersen, & Peters, 2004; Nudell, Roth, & Saxowsky, 2005; Saurino et al., 1999). For example, Hare and Eaton (2010) evaluated a training project that was conducted through videoconferencing. The project aimed to train volunteer literacy tutors for speakers of English as an additional language (EAL). The study adopted a "participatory evaluation" (PE) system in order to draw a complete picture about the success of the project, and issues, concerns, and challenges during the process. Furthermore, all stake holders (i.e., literacy tutors, site facilitators, instructors, technical support personnel, evaluators, and observers) input their evaluations about the study. The benefits the trainees gained from the study were that this method was cost and time effective because it was delivered to the tutors living in remote areas and that this strategy saved the volunteer tutors from commuting to the main location to receive the training.

Melnky (2012) reports from medical field studies that combine different technology based support systems with videoconferencing in order to promote better patient outcomes in training of medical personnel. Despite the plethora of research utilizing technology as a means to support learning, research to determine the effectiveness of using videoconferencing to train instructors to model best practices is limited. Even though various entities such as the medical field and governmental agencies are mandating the use of videoconferencing as a training tool, "the evidence on their efficacy and cost benefits is still inconclusive as to whether the cost and the benefits represent the best value for the dollars invested" (Melnky, 2012, p.63). Therefore, videoconferencing mediated mentoring (VMM) is proposed to add to the growing body of evidence.

Purpose of the Study

An efficient manner for mentoring new adjunct faculty at diverse locations of a college by a fulltime faculty member is the rationale for the study. The early childhood education (ECE) program of a southeastern North Carolina college where the first author was former faculty and the second author is currently faculty used to hold biyearly adjunct faculty meetings to orient new faculty into the college and keep existing adjunct faculty up-to-date with changes, and improvements in the college and the student body that they were serving. However, with recent changes such as the length of each course modified to five weeks, and the addition of a licensure track program to the existing non-licensure track, there is an increasing demand for more adjunct faculty to teach early childhood education courses at the multiple sites the college has throughout southeastern North Carolina. Unfortunately, due to budget cuts, bi-annual orientation meetings for adjunct faculty are no longer conducted by the college. Considering these circumstances, the researchers of the present study believe that utilizing videoconferencing as a tool to mentor new adjunct faculty could be beneficial in the context of any college serving in multiple sites. Adjunct faculty can benefit from instruction from those with expertise in their respective field via video conferencing technology.

The purpose of the study is two-fold: (a) to determine if videoconferencing is an effective system in mentoring adjunct faculty in the strategies and skills required to teach courses that they were credentialed to teach by the college, and (b) to determine if videoconferencing mediated mentoring (VMM) was an effective system for full time faculty in disseminating the strategies and skills to qualified ECE adjunct faculty.

Methodology

The researchers employed a qualitative case study method. Stake (1995) indicates that a "Case study is the study of the particularity and complexity of a single case, coming to understand its activity within important circumstances" (p. xi). In the present study, the researchers proposed to explore videoconferencing as a method for mentoring adjunct faculty, and to determine how this method can be formulated in the future to orient and mentor newly hired adjunct faculty. This case is also an "instrumental" case study (Stake, 1995) in the sense that one can a) observe and study the effects of videoconferencing on the mentoring process, and b) review and improve the orienting and mentoring procedures for adjunct faculty.

Participants

Two early childhood faculty members, one adjunct and one full time, at a Southeastern North Carolina College participated in the study. The adjunct faculty member who was new and qualified to teach educational psychology courses, was contacted via email and invited to participate in the study because he did not have prior experience in teaching in a 5-week course format or ECE students. The full time faculty member, who had expertise in teaching working adults in 5-week course model, participated in the study. This participant developed and taught the course used for the study multiple times.

Research Procedures

The study took place in the context of one of the Early Childhood Education courses, EDU 351-Psychological and Sociological Foundations of Education. Two early childhood cohorts in two sites of the college synchronously enrolled in the same course. Both cohorts were assigned to a classroom with videoconferencing capability to conduct the study. The videoconferencing equipment was Polycom Videoconferencing Codecs, which included two cameras around the room, a microphone attached to the instructor's desk, multiple microphones hanging from the ceiling to capture the sound throughout the room, and a 42" TV in the rear of the room as well as a 60" x 60" projection screen at the front of the class.

One of the data collection methods adopted in this study was weekly logs collected by the faculty mentor and the mentee. The mentee was required to write a weekly log pertaining to how VMM supported his understanding of best practices for an adjunct instructor. The faculty mentor was required to write a weekly log pertaining to her understanding of transmitting best practices to a new adjunct faculty via VMM. These logs were documented on a word processor soon after each session. The mentee delivered the weekly log at least two days prior to the next session to help the faculty mentor reassess the mentee's needs and prepare for the session accordingly. Finally, the logs were delivered to the evaluator for data analysis.

The research model also included an evaluator who did not participate in the interactions between the participants. The evaluator was a faculty member at the same college who had prior experience in videoconferencing research. The purpose of the evaluator was to observe the interactions between the participants, collect the data, and triangulate findings with the participants at the conclusion of the coursework.

Another data collection method used in this study was a two-part survey. One part consistent of a Likert scale and part two consisted of open-ended survey questions. The evaluator conducted the surveys upon the completion of the course in which the study was conducted. The evaluator also met with each participant individually and recorded the results. Data was analyzed by using the "Constant Comparative" (Glaser & Strauss, 1999) method to discover the emerging relations and issues across different data resources.

The research protocol consisted of three parts. This included, a) prior/preplanning section, b) interim/during the course section, and c) post/after the course completion section. These sections are detailed in Videoconferencing Mediated Mentoring (VMM) model in Table 1.

Table 1

Videoconferencing mediated mentoring (VMM) model

Timeline	Mentor	Mentee
Prior/preplanning section	• The experienced faculty (mentor) is assigned to their respective location. • The mentor receives a technical training from IT prior to course start to learn the features of the videoconferencing equipment in their assigned classroom. • The mentor trains the mentee on overall structure Moodle online student support system.	• The adjunct faculty (mentee) is assigned to their respective location. • The mentee receives a technical training from the mentor prior to course start to learn the features of the videoconferencing equipment in their classroom. • The mentee receives training from the mentor on overall structure of the course, syllabus, course expectations, utilizing Moodle online student support system.
Interim/during the course section	• Course agenda, lectures, handouts and tests are prepared by the mentor. • Before each session the faculty mentor communicates to the mentee via phone to discuss the session agenda, instructional strategies, and classroom activities to engage the learners in both sites. • The mentor teaches majority of the sessions to the remote site via videoconferencing. • The mentor models teaching pedagogy appropriate for early childhood education concepts in the context of the course. • The mentor and the mentee debrief after each session via phone, texting and email.	• The mentee receives the course materials from the mentor prior to each session. • The mentee receives orientation from the mentor on the session agenda prior to each class. • The mentee observes the mentor's instruction. • The mentee intermittently teaches their class and the remote site (mentor's site). • The mentor and the mentee debrief after each session via phone, texting and email.
Post/after the course completion section	• The mentor completes a survey and share their final thoughts with the mentee and the evaluator after the course ends. • The evaluator takes logs and surveys and analyzes findings from the mentor's data.	• The mentee completes a survey and share their final thoughts after the course ends with the mentor and a researcher. • The evaluator takes the logs and surveys and analyzes the findings from the mentee's data.

Upon the completion of the study, the following procedures occurred to analyze the data: First, the evaluator watched each session as well as checked each recording to ensure that each participant followed the study procedures. Second, the evaluator collected the data (e.g., logs, mentor survey and mentee survey, session recordings). Third, the evaluator and the faculty mentor independently reviewed and analyzed the data to note emerging themes. Fourth, the evaluator conferenced with the mentee to validate the emerging themes, areas of strength and needs noted from the logs and survey. Finally, the evaluator conferenced with the faculty mentor to validate the emerging themes, areas of strength and needs noted from the logs and survey. Using an evaluator ensured the triangulation of the data collected from each participant.

Findings

Videoconferencing was used as a medium to mentor a new adjunct faculty in this case study. Specifically, this technology was used to support an adjunct faculty who did not have experience in teaching an evening early childhood education course in his credentialed area by observing, and participating with, a full-time faculty member who was located in another site and had years of experience in planning and teaching within this framework. Therefore, the videoconferencing mediated mentoring (VMM) model (Table 1) was followed to mentor the new faculty. After the course completion, the mentor and the mentee completed a survey that included rating questions about teaching through videoconferencing and open-ended questions about mentoring through videoconferencing. The mentor and mentee logs and open-ended survey questions filled by the mentor and the mentee upon the completion of the study shed light on whether or not this model was effective. Table 2 shows the mentor's and mentee's responses to the open-ended questions from the survey:

Table 2

Responses to Survey Questions

Open-ended Survey Questions	**Mentor's responses**	**Mentee's responses**
Q1. Did the use of tele-education for this course offer any advantages over face-to-face training with experienced faculty? If yes, explain.	Yes I think it offered the students in the other site with the new faculty the ability to ask questions to the experienced faculty. Those questions were related to mostly the ECE profession, which the new faculty had little experience.	I must say that there wasn't much that I liked about this experience. Except, I did enjoy learning from the lead instructor because how she taught the class.
Q2. Did the use of tele-education for this course offer any disadvantages over face-to-face training with experienced faculty? If yes, explain.	The disadvantage I would mention about this is not having the face to face time to reflect on the sessions. We tried to do this through phone conversations but in my opinion face-to-face meetings would have been more productive.	I personally thought that the way the available technology was situated made it cumbersome in teaching this class.
Q3.Were you able to see enough of the other classroom setting to facilitate instruction appropriately? If no, explain.	I was partially able to see the other classroom. However, because of the limited videoconferencing technology, I was not able to hear or see the students' expressions.	Once again, due to the electronic set up, I was somewhat limited to what I could see in the other classroom.
Q4. Did the use of tele-education for this course offer any advantages over face-to-face training of faculty new to a course? If yes, explain.	Giving perspective about how this course could be taught with early childhood education emphasis Orienting an instructor whom I cannot meet personally Observing how the new faculty is teaching and offering suggestions to the instructor	The only advantage that I gleaned from this experience was viewing how the lead instructor was facilitating this class.
Q5. Did the use of tele-education for this course offer any disadvantages over face-to-face training of faculty new to a course? If yes, explain.	Because of the technology it was not possible to read the person's body language and feelings. Some Face to face training could be given effective such as for demonstrating the purpose of Moodle	I felt the disadvantages outweighed the positive points.
Q6.Other comments		If the technology that was being utilized would have been seamless, then I feel that it would have gone smoother. There was a delay in the transmission of the images and a slight delay in the sound.

One of the purposes of this study is to examine whether or not videoconferencing is an effective system in mentoring adjunct faculty in the strategies and skills required to teach courses that they were credentialed to teach by the college. Both participants expressed their frustration with the inadequate videoconferencing technology in their survey responses (Table 2). Their logs also revealed some frustration over the problems the videoconferencing equipment in their respective sites. Nevertheless, the authors conclude that the ultimate goal of the VMM model, which is to mentor a new faculty in best practices to teach a course to non-traditional student, was accomplished in spite of the technological difficulties. This point is evident in the mentee's responses to the Q1 and Q4. The faculty mentor also had many challenges with the videoconferencing equipment during the study, but the advantages of mentoring through tele-education were evident in Q4.

Emerging Trends

The data from the mentor's and mentee's logs further revealed the following important benefits of the VMM model (Table 1).

Establishing a Trustful Relationship

Given the distance between the mentor's and mentee's respective locations and the lack of funds to reimburse the faculty mentor's travel, traditional face to face meeting was not an option for both instructors to get acquainted with each other. Therefore, both parties had to rely on the technology for the first encounter. Consequently, the faculty mentor and the mentee met the first time through a videoconferencing session to orient the mentee on academic aspects as well as the technical aspects of the course. This session was very crucial to establish a relation that is based on trust and respect, and to set the tone for the remainder of the process.

During this session, each individual could see and hear the other clearly. During the introductions, similar interests and hobbies were noted which definitely established a collegial working condition. For example, the mentee noted that the faculty mentor came from a country in which he had traveled to and began introducing himself in her native language. The faculty mentor responded in the same language and applauded him on his knowledge. Next, background was given on their past experiences with the mentor's native country and a positive tone of appreciation for the other was set via video conferencing. Such an exchange helped the faculty mentor as noted in Q. 4 to develop a personal relationship with the mentee prior to working collaboratively.

According to the VMM model (Table 1), the faculty mentor had to go through a training on the videoconferencing equipment via the IT department prior to the mentee's orientation to the course. Then, the faculty mentor conducted a three-hour videoconferencing orientation session with the mentee. Both instructors documented their positive experiences in their weekly logs. For example, the faculty mentor wrote, "Overall the training went well in my opinion. Although I had only one session to learn all the features of computer and the video conferencing equipment in the class, I felt very comfortable in explaining to him all the steps to connect to the other site, using the video conferencing panel, etc." On the other hand, the mentee mentioned, "I felt the training was effective and covered the basics of how this course will be presented." Subsequently, the preplanning step of the VMM model proved to be effective in helping the mentee recognize the mentor's humanity as well as expertise in the subject matter as well as pedagogical methods to teach the course.

Mentoring to Teach Non-traditional Course Format

The program syllabi for the ECE courses taught in this institution are prepared as booklets, which are approximately 10 to 30 pages including all the assignment rubrics and supporting documents. They are developed by the full time faculty and no changes can be made without the approval of the full time faculty. Therefore, the course content and expectations can be maintained in a standard level throughout all locations of the college. But this still leaves a void in mentoring new faculty.

The ECE courses are typically provided in a one night a week manner for the duration of 5-week course in four-hour individual sessions. In order to maintain seamless course delivery practices, it is essential that the new adjunct faculty understands appropriate practices for teaching working adults as well as executing the expectations of the ECE degree program and the college for delivering these services. Therefore, it was necessary to communicate to the mentee the syllabus, course objectives, course content, nature of the assignments, and rubrics prior to course start date. The pre-course training as well as the mentee's ability to observe the duration of the course gave the mentee time to view and ask question about the nontraditional learning format. The ability to view and question the process of teaching and learning would have not been addressed if the syllabus was just transmitted in the usual format via email to the new adjunct faculty.

Mentoring to Form an Early Childhood Perspective

The second part of the VMM model aimed to mentor the mentee in instructional tasks required by the course. The faculty mentor prepared detailed agenda for each session, Power Point presentations, lecture notes, in-class activities, and tests. The mentor also modeled instructional methods that are typically utilized in early childhood program courses such as collaborative small group activities, student-led group presentations, classroom discussions and debates. All of these techniques were modeled in week one and two of the course. Then, after debriefing, the mentee was encouraged to practice and lead the activities in session four and five in order to enhance his understanding of implementing an ECE perspective in teaching adult learners.

The mentee of this course has a background in psychology, which qualified him to teach an educational psychology course in the ECE program. The fact that he does not have a background or experience in early childhood education was considered as a potential problem area that needed to be addressed during the mentoring process. Therefore, the faculty mentor showed an extra effort to make an early childhood connection in the instructional materials. This strategy proved to be one of the most effective findings of this model. After the first session, the faculty mentor wrote:

> I hope that the materials I prepared for the night and the detailed agenda, handouts were useful for [the mentee]. I also hope that he can see that although this course is a general educational psychology course, I tried to teach the concepts from early childhood perspective. I included examples from ECE in the agenda so that [the mentee] can use them in his future teaching of this course.

At the end of the course, the mentee explained, in his weekly log, that "Many of the examples that Dr. [Author] used were excellent, which in turn, gave me great insights and ideas that I will use in the future."

As the result of modeling early childhood connection, the mentee started to make referrals to the students' field observation papers during the session he taught. Finally, the faculty mentor and the mentee also corresponded after each session to debrief if the instructional materials worked well and brainstorm what they could do to improve them in the next session.

Scaffolding the Mentee

One of the purposes of mentoring a new colleague is to scaffold the individual to a level that he or she can reach an independent performance level. In this case study, the faculty mentor supported the mentee through two methods: 1) Providing the instructional materials, and 2) guiding the mentee to support students' learning.

First, the faculty mentor prepared the instructional materials in great detail so that the mentee could teach a session independently in case the connection to the remote site failed. In fact, this was experienced in one of the sessions in which the connection to the remote site was not successful and the videoconferencing equipment did not work. Both instructors had to teach off-line in their respective locations. The faculty mentor instructed the IT personnel who was present during each session of the course to record the mentee's session and sent the link to the mentee. The mentee shared the session link with his students to allow them to review the course content again. The faculty mentor documented this incident in her log as:

> We could not get any streaming. [IT personnel] played with the band width but the network in [Location 1] was very slow tonight therefore the streaming through [Location 2] was not good. I immediately called [the mentee] and told him that he needed to conduct the session by himself. I asked him if he was prepared for the night. He said yes. I gave him instructions about the test time and told him in which content we should end the night so that we could be on the same page.

Second, the faculty mentor provided guidance to the mentee to support the students' learning. Because of the modular, fast pace of the program, it was very important for the mentee to support student learning outside of the class as well as in the class. This included a multitude of strategies. For example, the faculty mentor instructed the mentee on making instructional materials available for students after each class through Moodle so that they could review them after the class and before the exams. The mentor also prepared study guides and had the mentee make it available to his students on Moodle. Finally, the mentor introduced the companion website for the book to the mentee who then uploaded the link to the companion website on his Moodle site and made it available for his students.

Because of the initial mentor/mentee relationship established, guidance process worked well. The faculty mentor stated:

> [The mentee] was to present the first agenda item. He typically followed what I prepared in the instructor's notes and the power point. Although I could not see him on the screen, he was very good at presenting the subject. Time to time, I interrupted his presentation to insert extra comments. In my opinion, he took this very constructively and I admire him for that. He did not show any resentment about this.

About the same session, the mentee wrote, “I felt this night of class went the best so far. I began the facilitation of the class tonight for both sites; then, much like a tag team, we traded off who was teaching our respective parts.”

The faculty mentor also used other means of technology to guide the mentee when videoconferencing equipment was not available.

> I am grateful for the cell phones and instant message capability. Although the videoconferencing equipment did not work, we were still able to communicate. Later in the first hour, he texted and asked if he should answer the test questions. I told him that I usually do this so that it could be another learning opportunity for the students…. In our phone conversation after the streaming was broken in [the mentor’s site] I told him to remind the students to use the companion website.

Even though the faculty mentor trained the adjunct faculty mentee on the Moodle online student support system, the mentee had some issues adjusting to the appropriate use of Moodle throughout the course sessions. The faculty mentor, in her journal, indicated that, “He had a problem in uploading the power point presentation to the Moodle site. I remember training him on this subject, but becoming proficient in technological student support systems takes time for some instructors as I experienced this with my other adjunct faculty.” The mentor helped the adjunct faculty prepare his Moodle site. The full time faculty mentor had previously trained many adjunct faculty members in using Moodle as a student support system. Therefore, she was very experienced in guiding the mentee through the shortcuts, to make his experience with Moodle easier. Also, due to the model set in place within this study, the adjunct faculty mentee had a mentor in place to support the integration of teaching tools appropriately within Moodle.

Discussion

This case study allowed researchers to determine if videoconferencing was an effective tool in (1) mentoring an adjunct faculty in the strategies and skills required to teach courses that they were credentialed to teach by the college, and (2) to determine if videoconferencing mediated mentoring (VMM) was effective for full time faculty in disseminating the strategies and skills to a qualified adjunct faculty.

The findings for research question one indicates that VMM was an effective tool for both the faculty mentor and the mentee. First, the model allowed the participants to build a relationship prior to a professional collaboration. Second, by watching the faculty mentor the mentee was able to understand how to infuse an ECE perspective in an educational psychology course even though ECE was not his area of expertise. Third, the model supported the mentee in understanding how to help ECE students within a fast-paced non-traditional teaching model.

The findings for research question two indicates that the VMM model was effective in supporting the mentoring process due to its ability to support in real time teaching demonstrations and scaffolding through debriefing sessions using technology. VMM in the pre-course training gave the mentor an opportunity to share information to the mentee. This allowed him to ask questions as they came up during the training which would have not been addressed if the syllabus was just transmitted in the usual format via email to the new adjunct faculty. VMM in the interim portion of the course allowed the mentor to set the pace and control the quality of the course through consistent feedback and modeling best practices. VMM in the post section allowed the faculty mentor to reflect on her mentoring capabilities and evaluate what worked and what needed to be improved to support mentees in the future.

Implications

Organizing training sessions through VMM for new adjunct faculty by full time faculty in individual programs at colleges or universities that consist of multiple sites can be advantageous in many ways. First, it allows the full time faculty to connect, meet, and work with new adjuncts at remote sites in a cost effective manner. Second, it can be an effective way of acclimating the new adjunct to the program by reviewing specific expectations, curriculum, and program or college policies as well as resources that they can use in their teaching. Third, VMM has the potential to support collegiality among seasoned and novice faculty members to reduce turnover rate in faculty due to lack of academic support, ultimately contributing to the consistency and quality of the education provided to students.

Videoconferencing mediated mentoring can be utilized to improve a mentee's knowledge of the area of study. For example, the mentee of this case study's professional background is in psychology, which qualifies him to teach an educational psychology course in the ECE program. However, it is beneficial to have the content specific knowledge when teaching a course. Subsequently using VMM to observe a full-time faculty mentor who has former training and experience in a specific content area allows adjunct faculty a vicarious learning experience and material that they can catalog to utilize when they teach independently.

The teaching load of the full time faculty mentor should be modified during VMM for a variety of reasons. Developing and agenda and planning for each videoconferencing session takes a great deal of preparation because the full time faculty understands that quality training for the mentee means a higher possibility of quality teaching for the present and future classes within the program of study. The full time faculty mentor also supports the mentee with materials and handouts and step by step instructions for each session, including calculation of the time that might be spent on controlling videoconferencing (e.g., switching between screens, muting and unmuting, audio control, zooming cameras, etc.) equipment. Therefore, we recommend a modified teaching schedule/load for the mentor and the addition of an hour long preplanning VMM session each week so that the mentor and mentee can work collaboratively on instructional materials to support their individual classes' learning styles and needs.

Colleges need to provide appropriate technical support and quality equipment to support successful VMM. Unstable, changing network speed could be problematic as this could seriously affect the creation of a sense of community across remote sites. The researchers concluded that VMM requires "expertise in videoconferencing and adult education, technical and troubleshooting knowledge, ability to bridge participants [in all location]…" (Hare & Eaton, 2010, p. 4). For example, because of the poor sound quality of the videoconferencing system, the students in both sites could not clearly hear or understand each other during those discussions. Therefore, in-class discussions had to be held independently in two classroom sessions. This limited the mentor's ability to model holding effective classroom discussions.

Corresponding only through videoconferencing is not sufficient during the VMM process; other means of technology could also be used by full time faculty mentor with the new adjunct faculty when one system fails or is unavailable. For example, the mentee had problems in uploading materials to the course's Moodle site prior to the second session and the videoconferencing was not on at that time or available for their use. Therefore, the full time faculty mentor instructed the adjunct faculty mentee on the phone to upload those materials to the online site.

Debriefing is an important strategy in the VMM process. The full time faculty mentor and the adjunct faculty mentee debriefed after the each session to reflect their thoughts about the session. This was very useful for the mentee as well as the mentor in terms of discussing what went well and what could be done to improve it. We recommend that the debriefing process could be improved by adding another dimension. The mentee's teaching during the VMM training period in his/her class sessions could be recorded via videoconferencing equipment and used for debriefing purposes. Recordings would allow mentor and mentee to revisit the concepts taught, instructional methods used, and overall pedagogy the mentee reflected throughout his/her teaching.

The findings of this case study can only be generalized to the context in which it was conducted. However, the researchers believe that the points discovered from the study can have implications for future efforts to mentor adjunct faculty by using videoconferencing technology through the VMM process. VMM could be a very productive time and money saving tool. It helps connect experienced faculty with novice faculty who are not able to meet physically because of their locations or budget constraints within a technological communication platform. Furthermore, it helps develop a sense of community between colleagues who previously were known only by their name and credentials within the program of study in order to standardize the quality of the instruction throughout multiple sites of a university.

References

adjunct 1 a-j(k)t. (2004). In *Merriam-Webster's Collegiate(R) Dictionary*. Retrieved from http://ezproxy.moc.edu/login?qurl=http%3A%2F%2Fwww.credoreference.com/entry/mwcollegiate/adjunct_1_a_j_k_t

Anderson, D. C. (2007). Mentoring new adjunct faculty to teach science laboratories. *Journal on Excellence in College Teaching, 18* (2), 61-78.

Bergman, D. M. (2011). A study of adjunct faculty (Doctoral dissertation). Retrieved from http://etd.lib.montana.edu/etd/2011/bergmann/BergmannD0811.pdf

Bryant-Shanklin, M., & Brumage, W. N. (2011). Collaborative responsive education mentoring: Mentoring for professional development in higher education. *Florida Journal of Educational Administration & Policy, 5*(1), 42-53.

Budge, S. (2006). Peer mentoring in post-secondary education: Implications for research and practice. *Journal of College Reading and Learning, 37*(1), 73-87.

Glaser, B. G., & Strauss, A. L. (1999). *The discovery of grounded theory: Strategies for qualitative research*. Hawthorne, NY: Aldine De Gruyter.

Hare, C., & Eaton , S. (2010, January). Evaluation of videoconferencing pilot project: Educating for volunteer literacy tutors for speakers of English as an additional language (EAL)- An ICCAN pilot project in collaboration with rural routes. Retrieved from EBSCO host.

Kent, A. M., & Simpson, J. L. (2010). Interactive videoconferencing: Connecting theory to practice for preservice teachers. *Journal of Digital Learning in Teacher Education, 27*(1), 12-21. doi:10.1080/21532974.2010.10784652

Knight, S. L., Pedersen, S., & Peters, W. (2004). Connecting the university with a professional development school: Pre-service teachers' attitudes toward the use of compressed video. *Journal of Technology and Teacher Education, 12*(1), 139-155.

Knippelmeyer, S. A., & Torraco, R. J. (2007, March). Mentoring as a developmental tool for higher education. Paper presented at the Academy of Human Resource Development International Research Conference in The Americas, Indianapolis, IN.

Loureiro-Koechlin, C., & Allan, B. (2010). Time, space and structure in an e-learning and e-mentoring project. *British Journal of Educational Technology, 41*(5), 721-735. doi:10.1111/j.1467-8535.2009.00975.x

Meixner, C., & Kruck, S. E. (2010). Inclusion of faculty for the benefit of faculty and students. *College Teaching, 58*, 141-147. doi:10.1080/87567555.2010.484032

Melnyk, B. (2012). The role of technology in enhancing evidence-based practice, education, health care quality, and patient outcomes: A call for randomized controlled trials and Comparative. effectiveness research. *Worldviews On Evidence-Based Nursing 9*(2), 63-65. doi: 10.1111/j.1741-6787.2012.00245.x

Nudell, D., Roth, B., & Saxowsky, D. (2005). Non-traditional extension education using videoconferencing. *Journal of Extension Education*, *43*(1). Retrieved from http://www.joe.org/joe/2005february/tt3.shtml

Ritzel, D. O. (2010). International videoconferencing: A reaction to Burke et al. *American Journal of Health Education*, *41*(1), 62-64. doi:10.1080/19325037.2010.10599128

Saurino, D. R. et al. (1999, March). *Preparing science teachers using distance learning: Urban and rural students collaborate using video teleconferencing (VTEL) technology*. Paper presented at the Annual Meeting of the National Association of Research in Science Teaching, Boston, MA.

Stake, R. E. (1995). *The art of case study research*. Thousand Oaks, CA: Sage.

Zelles, D. F., Howard, V. M., & Barcic, M. A. (2008). Faculty mentoring programs: Reenvisioning rather than reinventing the wheel. *Review of Educational Research, 78*(3), 552-588. doi:10.3102/0034654308320966

Journal of Teaching and Learning with Technology, Vol. 3, No. 1, June 2014, pp. 72 - 89.
doi: 10.14434.jotlt.v3n1.3944

Faculty perceptions of webcasting in health sciences education

Barbara A. Gushrowski[1] and Laura M. Romito[2]

Abstract: Pre-recorded lectures (podcasts) and recordings of live lectures (lecture-capture) are now everyday occurrences on many college campuses. Student use and opinions of these technologies have been frequently studied. However, there has been little reported on how faculty perceive these technologies. This article reports the results from a 2010 survey of dental, medical, and nursing faculty about their experiences with podcast/lecture capture technologies as teaching tools. A 46-item survey was distributed electronically to full-time faculty at the schools of Dentistry, Medicine, and Nursing on the campus of an urban university in Fall 2010 to determine their experiences and perceptions of podcast/lecture capture technologies as teaching tools. Of the 398 respondents, 32% employed lecture capture while only 2% used podcasting. Of those faculty not currently recording materials, 83 (68%) stated that they plan to do so in the next 2 years. Lack of time, 26 (24%) and training, (22%) are major reasons stated for not recording course content. Although a large number of faculty believe student learning has improved through the use of these technologies (74%, n=86), few stated that test scores have improved following implementation of electronic delivery of course materials (29%, n=34). There was no correlation between the use of podcast/lecture capture technologies and faculty gender, school, or years of teaching. A wide array of technologies to record lectures and present additional course materials electronically are in use at the health sciences programs on the campus. Overall, faculty view these technologies in a favorable light.

Keywords: podcasting, lecture capture, health sciences, faculty perceptions

Introduction

Currently the term "podcast" describes both audio and/or video files that can be downloaded and played on a personal computer or mobile device. For example, lectures, based on a Microsoft Power Point slideshow along with a recording of the instructor's lecture narration can be downloaded and played on a laptop computer. Such video podcasts can be pre-recorded and distributed in advance or in lieu of class, or they can be generated during the class session as "lecture capture" and made available subsequent to the class session. For the purposes of this paper a podcast is defined as any presentation that is pre-recorded and lecture capture refers to a presentation that is recorded live.

Pre-recorded lectures, supplemental, and study materials, as well as recordings of live lectures and streaming live video feeds of a lecture are now everyday occurrences on many college campuses (Owston, Lupshenyuk, & Wideman, 2011). The use of podcasting, lecture capture, and other electronic delivery mechanisms has, in a relatively short period of time, become an accepted practice of instructional delivery in health science programs (Nast, Schafer-

[1] Associate Librarian, Indiana University School of Dentistry, bgushrow@iu.edu
[2] Associate Professor, Department of Oral Biology, Indiana University School of Dentistry, lromitoc@iu.edu

Hesterberg, Zielke, Sterry, & Rzany, 2009; Walmsley, Lambe, Perryer, & Hill, 2009; Zanussi, Paget, Tworek, & McLaughlin, 2011). These materials are made available to students via iTunes, school websites, or proprietary courseware products. Despite the expanded use of these new technologies and their popularity with many students, there is a dearth of information regarding faculty use and perceptions of these instructional delivery methods. Thus, the purpose of this study was to gather data about how faculty across various health science professions at one large urban Midwestern university campus perceive these new technologies. Specifically, we posed the following research questions:

1. To what extent are health sciences faculty using these technologies?
2. Is there a difference in use and perceptions of webcasting technologies among faculty based on health science program, gender, or years of teaching experience?
3. What do faculty perceive to be advantages / disadvantages for themselves and for their students in using these technologies?
4. What, if anything, do faculty perceive as barriers to using these technologies?

Literature Review

The increasing use of these technologies in education is reflected in the growing number of articles devoted to the topic. Rainsbury (Rainsbury & McDonnell, 2006) reported that a search in the PubMed database in 2006 found only 3 articles about podcasting in health sciences education. In 2010, "Webcasts as Topic" was added as a MeSH term by the National Library of Medicine and 'webcast' is now listed in PubMed as a publication type. A 2011 PubMed search on podcasting in health sciences education yielded over 100 articles.

Many of the articles published over the past 5 years fall into 3 broad categories: basic how-to, student satisfaction, and student learning. Articles in the how-to category, many of which were published from 2006-2008, define key terms, describe the technologies, and outline methods of producing podcasts and distributing recordings (Cain & Fox, 2009; Corl, Johnson, Rowell, & Fishman, 2008; Elkind, 2009; Hopp, 2010; Jham, Duraes, Strassler, & Sensi, 2008; Kennedy, Gray, & Tse, 2008; Long & Edwards, 2010; McCartney, 2006; Rowell, Corl, Johnson, & Fishman, 2006; Ruiz, Mintzer, & Leipzig, 2006).

Authors have used a variety of theoretical frameworks to explain student satisfaction with the technology and the method of content delivery. Kardong-Edgren & Emerson use constructivist theory to explain that students who download and listen to a podcast may expect this activity to improve their grade, thereby making the lecture recording more meaningful. They further use five constructs to "explain a user's motivation for seeking, using, and continuing to use an electronic media technology: cognitive needs, affective needs, personal integrative needs, social integrative needs, and entertainment needs."(Kardong-Edgren & Emerson, 2010). Stiffler et al, state that educational podcasting is consistent with "…Siemens' Digital Age Orientation to Learning and other connectivism theorists." Connectivism theorists assert that knowledge exists outside the individual and in order for students to learn, this knowledge must connect "…to the right people at the right time and in the right context." (Stiffler, Stoten, & Cullen, 2010). Vogt et al., also discuss Siemans' connectivism theory along with Mayers' Multimedia Learning Theory – that students will learn through several avenues including visual and auditory – to frame their study of undergraduate nursing students' learning and satisfaction with podcasting (Vogt, Schaffner, Ribar, & Chavez, 2010). Others have reported survey results that focused on student satisfaction with the technology and the method of content delivery, though without a theoretical framework (Bollmeier, Wenger, & Forinash, 2010; Forbes & Hickey, 2008; Lymn & Bowskill, 2010; McKinney & Page, 2009; Nast et al., 2009; Patasi, Boozary, Hincke, & Jalali, 2009; Pilarski, Alan Johnstone, Pettepher, & Osheroff, 2008; Reynolds, Mason, & Eaton, 2008; Schlairet, 2010; Shantikumar, 2009; Walmsley et al., 2009).

In addition, papers have reported students' perception of the value of podcasts as learning and exam preparation tools. More recently, efforts have been undertaken to assess these technologies in light of student learning outcomes. Bollmeier et al., posit that cognitive load theory may explain why recorded lectures may improve learning. Cognitive load theory describes learning taking place at three levels – short-term, working, and long-term memory. Information is first processed through short-term memory into working memory. When too much information or poorly organized information is processed, the constraints on working memory don't allow the information to be fully processed into long-term memory. Recorded lectures allow the students to review and process the information in smaller chunks and allows time for students to reflect on the information and thus transfer it into long-term memory (Bollmeier et al., 2010). Studies by Bhatti et al, Greenfield, O'Neill et al, and Schreiber et al, demonstrated that compared to standard instructional methods such as lecture, learning outcomes for students viewing podcasts are improved (Bhatti et al., 2009; Greenfield, 2011; O'Neill, Power, Stevens, & Humphreys, 2010; Schreiber, Fukuta, & Gordon, 2010). However, Hadley et al., Nagler et al., and Vogt et al., reported no significant differences in exam scores between students receiving in-person and online content delivery. (Hadley et al., 2010; Nagler, Andolsek, Dossary, Schlueter, & Schulman, 2010; Vogt et al., 2010)

While the student viewpoint and opinions of these technologies have been frequently studied, to date there has been little reported on how faculty perceive these technologies. One faculty concern is decreased student attendance in class. Some investigators did not find this to be a significant issue (Copley, 2007; Forbes & Hickey, 2008; Lymn & Bowskill, 2010; Meade, Bowskill, & Lymn, 2009; Nast et al., 2009; Pilarski et al., 2008), however, Kardong-Edgren (Kardong-Edgren & Emerson, 2010) found that faculty reported increasing student absenteeism after increased availability of podcasts. Bhatti (Bhatti et al., 2009) discussed demands on faculty's time in learning and implementing these technologies. Another concern that has been noted is the ease with which online materials can be broadly disseminated which may result in the inadvertent or intentional violation of faculty intellectual property rights by students (Johnson & Grayden, 2006; Read, 2007).

One recent paper does report on some aspects of faculty views on webcasting in the classroom. A survey of 66 North American dental schools was conducted about the use of lecture recordings in dental education (Horvath et al., 2013). Several questions on the survey related specifically to faculty preparation for using the technologies and barriers experienced by faculty in implementation. Nearly half of those responding to questions about faculty preparation (13) reported that formal training was available for faculty on the use of the recording technology, while 26% (7) reported no preparation or training prior to implementation. The barriers most reported were faculty resistance, technology problems, concerns about intellectual property, and fears that attendance in face-to-face lectures would decline. According to adoption-diffusion theories, faculty acceptance of a new instructional technology such as webcasting is a complicated, multidimensional process involving cognitive, emotional and contextual factors. The adoption process involves the individual faculty member's decision to utilize the technology, while diffusion refers to adoption by a collective, such as at the school or campus level. A faculty member's perception of the new technology is influenced by numerous factors including their perception of whether the innovation is useful and if they would be capable of successfully employing it, as well as their observation of others' success (or failure) with use of the technology (Straub, 2009).

Our study was grounded in adoption – diffusion theories such as the Technology Acceptance Model (TAM) and the Universal Technology Adoption and Use Theory (UTAUT), which purport that a faculty member's adoption of new technology is based on his/her perceptions of the ease of use and utility of that technology. Additionally, the UTAUT also considers whether the faculty feels social / environmental pressure to use the technology and the extent to which they perceive institutional support for its use. Other factors moderating the decision to adopt a new technology such as podcasting that are also addressed by this theory are the age, gender and experience of the faculty (Straub, 2009). As such, these constructs were incorporated into our survey.

In an effort to elucidate faculty perceptions of podcast/lecture capture technologies as teaching tools in health sciences education, we conducted a campus-wide survey of dental, medical, and nursing faculty about their experiences with these technologies. This article reports on the results of the survey in which faculty were asked about the following: the extent to which they use these technologies, the system/software used, perceived advantages and disadvantages for themselves and their students, and the effects on student learning outcomes.

Methods

Study Population

The study participants were comprised of full-time faculty from the Schools of Dentistry, Medicine, and Nursing on the campus of an urban Midwestern university. This campus is predominantly a health sciences campus. Courses in health sciences programs such as medicine, dentistry, and nursing tend to have traditional content-dense lectures which would be amenable to these webcasting technologies.

Upon our request, a list of names and campus email addresses of all full-time health sciences faculty were compiled by each of the respective schools and sent us. A total of 1454 names and email addresses were submitted and all were contacted by email and asked to participate in the voluntary, confidential survey.

Survey Instrument

In 2009, we conducted a pilot survey at the School of Dentistry and many of the items from that survey were included in the current study. The 2009 survey consisted of 37 items including multiple-choice and yes/no questions as well as open-ended questions that focused on the following: advantages and disadvantages for students and faculty in employing podcasts and lecture capture, barriers to implementation, future interest in using these technologies, and student learning outcomes. In the current study, additional yes/no questions were added such as "Does your school use any type of lecture capture or podcasting system?" Additional multiple choice questions asked about the specific technology systems available at the schools and how these systems are managed. Demographic questions about the number of years of teaching experience and number of years teaching at this campus were also included. With these additions, the current survey contained a total of 46 items.

The survey software, Qualtrics™ (Provo, UT), enabled a branching mechanism wherein all questions were not delivered to all participants, but were delivered based on responses to key survey items. For example, based on the response to the question – "How have you used the lecture capture or podcasting system?" – the participant was directed to additional questions related to the ease or difficulty of developing podcasts, lecture captures, or plans for future use of the technologies.

The survey included several open-ended items that allowed participants to comment freely on the advantages and disadvantages to faculty and students of using podcast and lecture capture technologies. Faculty who reported not already using the technology were asked to identify their perceived barriers to adoption and what would facilitate their use of webcasting technologies.

Survey administration

Following review and approval of the survey instrument and study protocol by the University Institutional Review Board, we distributed the 46- item survey in the Fall semester of 2010 via email. The initial email message described the purpose of the survey and invited participation by the 1454 full-time health sciences faculty. The email invitation indicated that the study was voluntary, participation implied consent, all responses were confidential, and results data would be reported in aggregate and not linked to any individual respondent. The message also included a link to the survey. While we did collect limited demographic data, we did not gather any personally identifiable information in the survey and faculty were not offered any incentives to participate. The survey was open for 3 weeks, and responses were password protected and stored on the Qualtrics™ server. The Qualtrics™ software is equipped to track non-responders so we composed follow-up messages encouraging completion of the survey which the software delivered to the non-responders in weeks 2 and 3.

After we collected the data, it was cleaned, coded and analyzed. Descriptive statistics were obtained and qualitative and quantitative analyses were performed. Quantitative analysis included frequencies and percentages, Somers'D Phi, and Cramer's V tests of correlation. Qualitative analysis of data from the open-ended survey items generated several response categories based on common themes. We analyzed the data using SPSS statistical software (v. 19.0 SPSS, Inc. Chicago, ILL 2011).

Results

A total of 398 health sciences faculty completed the survey for an aggregate response rate of 27%. Response rate varied by health science school as follows: Dentistry 64% (n=69); Nursing 57% (n=55), and Medicine 27.5% (n=274). Males accounted for 60% of the participants and females represented 40% (n=338). Reported years of teaching experience ranged from less than 1 year to over thirty years, with approximately 50% of respondents having at taught at least 15 years (n=341). Reported years of teaching at this campus had an identical range, but with 70% reporting 15 years or less with this campus (n=334).

Of the total number of respondents, 128 (32%) used lecture capture software to record their live lectures, 9 (2%) pre-recorded podcasts, 27 (7%) used both methods of recording, and 121 (30%) did not use either recording method. The remaining 113 faculty (28%) did not answer this question. Eighty-one respondents (20%) were not aware that their respective schools had podcast/lecture capture systems available.

Of those faculty reporting non-use of the technologies, 83 (68%) indicated they would consider recording a podcast or lecture in the next 2 years, 33 (27%) would not consider doing so, and 5 (4%) did not answer this question. Those considering making recordings indicated that lack of time, 26 (24%) and training, 24 (22%) were the 2 biggest factors that were preventing them from adopting these technologies.

The recording software used varies widely between health science schools. Fifteen separate software packages were identified (see Appendix A.) and many respondents indicated they used more than 1 of these. Recording systems used for lecture capture are available on fixed workstations, 76 (49%), portable devices, 45 (29%), or both, 34 (22%), and are managed to a large degree by school or university information technology departments. Lecture capture software is available in large lecture halls seating over 125 as well as small classrooms that seat fewer than thirty. A relatively large number of faculty, 98 (32%) did not know the name of the system used by their school.

There is little standardization or consistency in the starting and stopping protocols for lecture capture. These procedures are carried out by school support staff, 97 (36%), faculty, 90 (33%), campus information technology staff, 50 (18%), students, 33 (12%), or automated by the system, 30 (11%). In addition, 44 faculty (16%) indicated that the initiation and rendering of lecture capture was conducted by some means other than the aforementioned methods; furthermore, of these 44 respondents, 31 did not know how the recordings were started and stopped.

Podcasting software for pre-recording lectures were used by 36 respondents (13%), 9 of whom used this method exclusively, while 27 used podcasts in addition to lecture capture. The podcast software used was often the same as that used for lecture capture. There was only 1 exclusively podcast system named. Faculty who responded to questions concerning the most difficult aspects of webcasting (n= 135) ranked technical issues, 43 (32%) and learning the software, 34 (25%) as the two greatest challenges. However, many faculty, 47 (35%) indicated that there were no difficulties.

Distribution of the recordings is, for the most part, contained behind firewalls. Course management systems are used as the repositories by 149 respondents (58%). Other password protected sites such as iTunes private channel, and departmental websites and wikis are used by 31 respondents (12%). Only 5 faculty (2%) reported public distribution of their recordings on iTunes and YouTube public channels. Forty-eight respondents (19%) indicated they did not know how the recordings were distributed.

Faculty who reported using webcasting technologies (n=137) were asked if they believed that use of these technologies has improved student learning. Of the 86 responses obtained, 12 (14%) believed learning was not improved, 10 (12%) were unsure, and 64 (74%) believed learning is improved by the use of these technologies. Faculty were then asked if students performed better on exams since the introduction of podcasts/lecture captures than in years prior to use of these technologies. Of the 34 respondents, 10 (29%) indicated scores had improved, 5 (15%) were unsure, and 19 (56%) indicated that using the technologies did not improve their students' exam performance.

We performed correlation analyses to determine relationships between the use of podcasting or lecture capture technologies and the following 4 variables: school affiliation; faculty gender; total number of years teaching; or number of years teaching at this campus. Our results indicate there was no correlation between any of these variables and the use of podcasting technologies.

Table 1

Relationship between Use of Podcast/Lecture Capture and Faculty Characteristics

	School Affiliation (n=280)		Gender (n=260)		Yrs. Teaching (n=252)		Yrs. Teaching at this campus (n=119)	
Use technologies	Dentistry	33	Female	58	< 1	2	< 1	6
	Medicine	108	Male	87	1-5	20	1-5	28
	Nursing	21			6-10	25	6-10	28
					11-15	22	11-15	15
					16-20	19	16-20	12
					21-25	18	21-25	10
					26-30	17	26-30	8
					>30	17	>30	6
Don’t use technologies	Dentistry	27	Female	51	< 1	4	< 1	2
	Medicine	73	Male	64	1-5	19	1-5	38
	Nursing	18			6-10	20	6-10	37
					11-15	13	11-15	21
					16-20	12	16-20	19
					21-25	14	21-25	10
					26-30	17	26-30	8
					>30	11	>30	6
Correlation*	V = .050 (278), p=.704		r_Φ = .044 (258), p=.480		d= -.021 (250), p=.624)		d= .006 (117), p=.566	
*Confidence interval of all correlations is 95%.								

Tables 2 and 3 summarize basic themes that we identified from content analyses of participants’ free-text responses to open-ended survey items regarding the advantages and disadvantages to faculty and students in the use of podcast and lecture capture software. Overwhelmingly (n=80) faculty reported an advantage to students was the ability to use the recordings to review, as often as needed, difficult concepts for improved comprehension and exam preparation.

One limitation of this study is the response rate. Although the School of Dentistry and School of Nursing generated a 64% and 57% response rate, respectively, the School of Medicine response rate was only 24.5%. This may be attributed to the email list provided by the School of Medicine which included all full-time faculty many of whom are exclusively involved in research and/or clinical teaching. We were unable to separate these individuals from faculty who engage in classroom instruction. Other factors may account for the low response rate. Asch et al (Asch 1997) reported a model predicting response rates which revealed that physicians have a 9.6% lower response rate on surveys than non-physicians, and anonymous surveys have a 9% lower response rate.

There are several methods recounted in the literature that attempt to assess and minimize response bias which can occur in even a high response rate survey (Fillion 1976; Lin and Schaeffer 1995; Hikmet 2003; Menachemi 2011; Asch 1997; Ford & Bammer 2009). Two methods, comparing demographic characteristics of respondents to non-respondents, and contacting non-respondents following completion of the survey are not possible with anonymous

Table 2A

Faculty Perceptions of the Benefits of Podcast/Lecture Capture for Students

Themes identified	**Sample Responses**
Advantage to students n=100	
Can review materials as often as needed (80)	"Students can listen as often and when they like." "Allows students to hear and see the content for review or exam preparation purposes." "Students can review the lecture for better understanding." "They can go back and review content they did not understand the first time." "Students have reported they like to go back and listen to them again before exams."
Allows asynchronous learning opportunities (20)	"They manage their own time and repeat sessions when needed." "Allow the students take the lecture at whatever time desired." "View on their own time."

surveys such as this one. A third method, wave analysis (Hikmet & Chen, 2003; Menachemi, Hikmet, et al, 2006; Montori et al, 2005), involves comparing survey answers of respondents who complete the survey in identifiable time units. These groups can be identified as early and late responders or fast, medium, and slow responders (Ford & Bammer) based on whether they completed the survey following the initial call or following subsequent calls. We chose wave analysis to determine if responses to the questions, or demographic characteristics were significantly different among the three groups of respondents.

Following the initial email request, we received 245 responses, following the first reminder 107 responses, and following the second and final reminder 53 responses. We performed a Chi-square analysis comparing the characteristics of gender, school, and number of years teaching. We performed the same analysis on the attribute of use of the technology vs. non-use of the technology which may have affected participation. We found no statistical significance in the responses between the three groups.

Despite the low response rate, we have demonstrated that the characteristics of the respondents are similar to the non-respondents, and the bias that might be present is unlikely to meaningfully impact our conclusions.

Table 2B

Faculty Perceptions of the Benefits of Podcast/Lecture Capture for Faculty

Themes identified	**Sample Responses**
Advantage to faculty n=102	
Once recorded, lecture is widely available (36)	"Can record once and play for multiple classes." "Good for snow days, in case class would be cancelled you still have a way to cover material." "Distribute to larger audiences with less time" "Wider distribution of our materials."
None (31)	
Improved lecture quality (20)	"Rather than spending time lecturing I can view outcomes, edit, enhance & adapt course material." "Able to be consistent in the instruction across numerous sessions." "Helps me refine what is important." "Review and make improvements on delivery."
Helpful to the students (15)	"It gives the students another way of revisiting the lecture." "[students] have RAVED about these Podcasts as adding richness." "They appreciate that we are trying to integrate technology for them into the presentation."

Table 3A

Faculty Perceptions of the Disadvantages of Podcast/Lecture Capture for Students

Themes identified	**Sample Responses**
Disadvantages to students n=97	
None/don't know (29)	
Inability to interact with instructor (23)	"Loss of learner teacher interactions." • "No interaction with lecturer." • "They can't ask a question to clarify as they could during a live lecture." • "I would assume it is less interactive for them."
Less likely to attend class (18)	"They will have incentive to skip live lectures." "It provides an outlet/excuse for students not to attend lecture." "Reliance on the podcasts and thinking they do not need to attend class."
Technology issues (17)	"Some students in rural areas have difficulty accessing them due to tech issues." "Very large file size." "Accessing another system to view the lectures." "Some students do not have a computer at home."
Missing material delivered that is not recorded (5)	"Miss questions asked in class; content before or after the recording is being made." They miss any visual material not on the screen and student questions."
Lack of student engagement (5)	"They can pay less attention in class." "May not pay attention in lecture as they have a fall-back option." "May not be as engaged if watching lecture remotely."

Table 3B

Faculty Perceptions of the Disadvantages of Podcast/Lecture Capture for Faculty

Themes identified	**Sample Responses**
Disadvantages to faculty n=87	
None (28)	
Technology issues (28)	“getting access to the equipment.” “When equipment did not work, this was a nightmare.” “Cumbersome recording” “time consuming to get software up and running.”
Low class attendance (14)	“may reduce class attendance” “students don't come to class” “Students don’t feel obligated to attend and are unable to participate in discussion”
Little faculty-student interaction (9)	“No audience interaction.” “I like to give lectures that are interactive and can't do that with a recording.” “lack of interaction with learners - can't gauge if there are problems with the message.” “Discourages the use of discussion in class.”
Time-consuming to produce (8)	“Finding time to record them if not done live.” “Pre-recorded podcasts can take a lot of time to produce.” “Time to do it and learn the software/ hardware.”

Discussion

The purpose of this study was to assess faculty use of podcasts and lecture capture technologies in this campus's health sciences education programs. Much has been written about these instructional technologies from the student’s point of view. We wanted to hear from faculty about their experiences with this relatively new method of delivering instruction and their perceptions of the advantages and disadvantages of doing so. Specifically, our research questions were intended to determine the following: 1) the extent to which health sciences faculty are using these technologies, 2) differences in use and perceptions of webcasting technologies among faculty based on health science program, faculty gender, or years of teaching experience, 3) faculty perceptions of the advantages / disadvantages for themselves and for their students, and 4) perceived barriers to using the technologies.

Regarding the extent to which faculty use webcasting technologies, although lecture capture and podcasting software systems are in use at each of the health sciences schools represented by the survey, only about one-third of the faculty respondents reported using them. Furthermore, one in five faculty reported that they did not know these systems were available and 30% do not use them as teaching tools. We found that of the 34% who do use these technologies, the majority are using lecture capture methods rather than pre-recording materials for their students. Additionally, although many of these faculty did not know the name of the available software product or system, this did not deter them from producing the recordings.

Our study failed to reveal any correlations between faculty gender and the use of podcast or lecture capture technologies. Much research has been conducted on the issue of gender and technology. Studies have been conducted on gender differences in perception of technology

(Brunner & Bennett, 1998), confidence in using technology (Hon Keung & Alison Lai Fong, 2012), acceptance of (Padilla-Meléndez, del Aguila-Obra, & Garrido-Moreno, 2013), and attitude toward technology (Bain & Rice, 2006). Many of these studies focus on students in K-12, though some recent work has been done on students in teacher education programs (Naaz, 2012; Su Luan & Hanafi, 2007). While these studies show there are some gender difference in approaches to technology, there was nothing conclusive found in the literature about faculty gender differences in relation to their use of technology in the classroom.

Table 4

Comparison of three waves of respondents on attributes that may have influenced participation

	Respondents			
	Fast *N*=245	Medium *N*=107	Slow *N*=53	*p*-value
Gender				
Male	123 (61.5%)	51 (58.6%)	32 (62.7%)	
Female	77 (38.5%)	36 (41.4%)	19 (37.2%)	
Total	200 (100%)	87 (100%)	51 (100%)	.881
School				
Dentistry	38 (15.7%)	21 (20.6%)	9 (17.0%)	
Medicine	170 (70.2%)	65 (63.7%)	39 (73.6%)	
Nursing	34 (14%)	16 (15.7%)	5 (9.4%)	
Total	242 (100%)	102 (100%)	53 (100%)	.622
Year teaching				
Don’t teach/Didn't answer	50 (20.4%)	22 (20.6%)	2 (3.8%)	
<1	1 (0.4%)	4 (3.7%)	1 (1.9%)	
1-5	35 (14.3%)	19 (17.8%)	11 (20.8%)	
6-10	33 (13.5%)	11 (10.3%)	11 (20.8%)	
11-15	27 (11.0%)	18 (16.8%)	5 (9.4%)	
16-20	26 (10.6%)	6 (5.6%)	8 (15.1%)	
21-25	28 (11.4%)	10 (9.3%)	7 (13.2%)	
26-30	29 (11.8%)	8 (7.5%)	4 (7.5%)	
>30	16 (6.5%)	9 (8.4%)	4 (7.5%)	
Total	245 (100%)	(100%)	(100%)	.059
Technology				
Use	96 (57.1%)	48 (64.9%)	18 (46.1%)	
Don't use	72 (42.9%)	26 (35.1%)	21 (53.8%)	
Total	168 (100%)	74 (100%)	39 (100%)	.265

We likewise were unable to find any correlations between use of these technologies and health science school, total years of teaching, or years of teaching at this campus. We found that faculty who have been teaching for only a few years are no more likely to use the technologies than faculty who have teaching for 20 years or more. We hypothesized that faculty with a long history at this campus would be more likely to use these technologies due to the tradition and culture on this urban campus which was an early-adopter of learning technologies and strongly promotes and supports its use in the classroom. However, our findings did not support this hypothesis.

Overall, faculty perceived the webcasting technologies to be advantageous. The number of comments regarding advantages to students and faculty (171) outnumbered the comments on the disadvantages (127). One advantage listed numerous times is that recordings can be viewed by students anytime; this may also be a disadvantage in that if the recordings can be viewed anytime, students may not attend class. Other investigators (Bhatti et al., 2009; Long & Edwards, 2010) have also cited as advantages the convenience and flexibility of podcasts as well as their ability to be widely disseminated. Schreiber (Schreiber et al., 2010) noted that for students with certain learning styles, or slow learners, the ability for students to repeatedly review the material is a huge benefit. Some of the shortcomings of podcasts/lecture capture were also identified by other authors and include a lack of student engagement (Long & Edwards, 2010; Schreiber et al., 2010) and decreased motivation to attend class (Schreiber et al., 2010). In the current study, technical issues were identified as problems for both faculty and students. Similarly, Bhatti noted that students may have difficulty with online accessibility (Bhatti et al., 2009). Previous studies have identified other drawbacks such as technical issues with hardware /software systems and production time (Bhatti et al., 2009; Jham et al., 2008).

The current study found that a perceived lack of time and training were the principal barriers to faculty adoption of the webcasting technologies. Though the wide variety of software available was not presented as a problem by respondents, such an array of choices may contribute to faculty perceptions that there is too much to learn to make this a viable method for instruction delivery. There is currently no initiative at the campus level to standardize the software, hardware or distribution mechanism for the recordings. Such standardization may encourage more use by faculty, especially those reporting lack of time and training as barriers to implementation.

An important aspect to incorporating podcasting technologies is the effect on teaching and learning outcomes. Interestingly, in this study we found that more faculty than not believe use of these technologies enhances learning. However, relatively few faculty had evidence of improved test scores as a result of incorporating these instructional methods. This may indicate that faculty are not routinely measuring the impact of these technologies on student learning. Their perceptions of enhanced learning may also be derived from subjective measures, such as student evaluations and comments. From a pedagogical viewpoint, multimedia learning theory suggests that podcasting technologies might enhance learning by allowing students to process both auditory and visual information together, and by enabling them to pause and replay podcasted material, thereby using repetition to activate memory circuits (Mayer, 2001). However, a randomized controlled trial of learning outcomes in medical education found no significant difference in test performance between students receiving live lectures and podcasted lectures, although students found the live lecture format more engaging (Schreiber et al., 2010). Other studies have shown equal or better performance among students using these technologies compared to lecture alone (Bhatti et al., 2009; Vogt et al., 2010; Zanussi et al., 2011).

It has been argued that because podcasts are usually engaged by students in a passive and solitary manner, podcasts may actually hinder learning. However, faculty can structure podcasts so as to encourage more active learning by incorporating questions, interactive games, assignments, or student group activities associated with the content objectives. In addition, the style, length and delivery of podcasted content may affect student engagement and learning (Long & Edwards, 2010). Alternatively, if pre-recorded podcasts are utilized, class time which was previously used for lecture may be restructured for more interactive learning activities. A recent survey of webcasting technologies in dental education found that as a result of using these technologies, faculty alter the way they teach (Horvath et al., 2013). Therefore, it is critical that faculty development efforts keep pace with these instructional technologies so that faculty can learn techniques to enhance the effectiveness and utility of such teaching tools. Horvath et al.

concluded that webcasting technologies may serve as a useful adjunct to the classroom environment. To maximize the effectiveness of these technologies, the authors offered several "best practices" which included the following: having sufficient preparation time and instructional objectives for faculty, complying with copyright / intellectual property laws, providing IT support, combining recordings with other classroom activities, utilizing shorter content segments rather than full-length lecture recordings, and soliciting student evaluations regarding these technologies (Horvath et al., 2013).

The current study was limited to full-time faculty. Although many part-time faculty teach in health sciences programs, we have found from previous attempts at surveying this group that they tend to be less responsive and more difficult to contact via email than their full-time colleagues. Additionally, this survey did not distinguish between tenured/tenure track and nontenured/non tenure track faculty; this factor may have an impact on teaching load, support level, and availability of instructional technology resources.

Despite these limitations, we believe our study findings fill a void in the literature regarding the use and perceptions of podcasting technologies by health science faculty. Ultimately, the goal of any instructional method should be to enhance learning and future research will explore teaching and learning outcomes as a result of the use of these technologies.

Conclusion

We found a wide array of technologies to record lectures and present additional course materials electronically in use across all 3 health sciences schools. Of the 30% of faculty who reported that they are not currently webcasting, most indicated that they plan to do so in the next 2 years. Faculty identified more advantages than disadvantages for themselves and their students in using these technologies. The software and hardware will undoubtedly continue to change and develop but these methods of delivering instructional content have gained acceptance in health sciences education at this campus.

Further research is needed regarding the role that faculty status (i.e., full/part-time, tenure/tenure-track) plays in faculty use of technology in the classroom as well as faculty motivation and institutional support for using such technology. Future studies should attempt to identify whether the investment in and use of such instructional technologies varies by discipline e.g., medical schools versus engineering or law schools, or by type and size of institution, as well as the impact that these technologies have upon student learning outcomes.

Acknowledgements

The authors wish to thank David Zahl and Steve Graunke for their assistance with statistical calculations and the faculty at the Schools of Dentistry, Medicine, and Nursing for their time in completing the survey.

Ethical approval

The Institutional Review Board at Indiana University, Bloomington, Indiana reviewed and approved the protocol, IRB # EX1008-31B.

References

Bain, C. D., & Rice, M. L. (2006). The Influence of Gender on Attitudes, Perceptions, and Uses of Technology. [Article]. *Journal of Research on Technology in Education, 39*(2), 119-132. doi: 10.1080/15391523.2006.10782476

Bhatti, I., Jones, K., Richardson, L., Foreman, D., Lund, J., & Tierney, G. (2011). E learning versus lecture: Which is the best approach to surgical teaching? *Colorectal Diseases, 13*(4), 459-62. doi: 10.1111/j.1463-1318.2009.02173.x

Bollmeier, S. G., Wenger, P. J., & Forinash, A. B. (2010). Impact of online lecture-capture on student outcomes in a therapeutics course. *American Journal of Pharmaceutical Education, 74*(7), 127. doi: 10.5688/aj7407127

Brunner, C., & Bennett, D. (1998). Technology perceptions by gender. [Article]. *Education Digest, 63*(6), 56.

Cain, J., & Fox, B. I. (2009). Web 2.0 and pharmacy education. *American Journal of Pharmaceutical Education, 73*(7), 120. doi: 10.5688/aj7307120

Copley, J. (2007). Audio and video podcasts of lectures for campus-based students: production and evaluation of student use. [Article]. *Innovations in Education & Teaching International, 44*(4), 387-399. doi: 10.1080/14703290701602805

Corl, F. M., Johnson, P. T., Rowell, M. R., & Fishman, E. K. (2008). Internet-based dissemination of educational video presentations: a primer in video podcasting. *AJR. American Journal of Roentgenology, 191*(1), W23-27. doi: 10.2214/AJR.07.2637

Elkind, M. S. (2009). Teaching the next generation of neurologists. *Neurology, 72*(7), 657-663. doi: 10.1212/01.wnl.0000342516.08077.55

Forbes, M. O., & Hickey, M. T. (2008). Podcasting: implementation and evaluation in an undergraduate nursing program. *Nurse Educator, 33*(5), 224-227. doi: 10.1097/01.NNE.0000334775.98018.e8

Greenfield, S. (2011). Podcasting: a new tool for student retention? *Journal of Nursing Education, 50*(2), 112-114. doi: 10.3928/01484834-20101230-06

Hadley, J., Kulier, R., Zamora, J., Coppus, S. F., Weinbrenner, S., Meyerrose, B., . . . Khan, K. S. (2010). Effectiveness of an e-learning course in evidence-based medicine for foundation (internship) training. *Journal of the Royal Society of Medicine, 103*(7), 288-294. doi: 10.1258/jrsm.2010.100036

Hon Keung, Y., & Alison Lai Fong, C. (2012). Gender Difference of Confidence in Using Technology for Learning. [Article]. *Journal of Technology Studies, 38*(2), 74-79.

Hopp, L. (2010). Designing podcasts for clinical nurse specialist education. *Clinical Nurse Specialist, 24*(2), 106-109. doi: 10.1097/NUR.0b013e3181d33d80

Horvath, Z., O'Donnell, J. A., Johnson, L. A., Karimbux, N. Y., Shuler, C. F., & Spallek, H. (2013). Use of lecture recordings in dental education: assessment of status quo and recommendations. *Journal of Dental Education, 77*(11), 1431-1442.

Jham, B. C., Duraes, G. V., Strassler, H. E., & Sensi, L. G. (2008). Joining the podcast revolution. *Journal of Dental Education, 72*(3), 278-281. doi: 72/3/278 [pii]

Johnson, L., & Grayden, S. (2006). Podcasts--an emerging form of digital publishing. *International Journal of Computerized Dentistry, 9*(3), 205-218.

Kardong-Edgren, S., & Emerson, R. (2010). Student adoption and perception of lecture podcasts in undergraduate bachelor of science in nursing courses. *Journal of Nursing Education, 49*(7), 398-401. doi: 10.3928/01484834-20100224-04

Kennedy, G., Gray, K., & Tse, J. (2008). 'Net Generation' medical students: technological experiences of pre-clinical and clinical students. *Medical Teacher, 30*(1), 10-16. doi: 10.1080/01421590701798737

Long, S. R., & Edwards, P. B. (2010). Podcasting: making waves in millennial education. *Journal for Nurses in Staff Development, 26*(3), 96-101; quiz 102-103. doi: 10.1097/NND.0b013e3181993a6f

Lymn, J., & Bowskill, D. (2010). Learning on the move. *Nursing Standard, 24*(31), 61.

Mayer, R. E. (2001). *Multimedia learning*. New York: Cambridge University Press. doi: 10.1017/CBO9781139164603

McCartney, P. R. (2006). Podcasting in nursing. *MCN; American Journal of Maternal Child Nursing, 31*(4), 270. doi: 10.1097/00005721-200607000-00014

McKinney, A. A., & Page, K. (2009). Podcasts and videostreaming: Useful tools to facilitate learning of pathophysiology in undergraduate nurse education? *Nurse Education in Practice, 9*(6), 372-376. doi: 10.1016/j.nepr.2008.11.003

Meade, O., Bowskill, D., & Lymn, J. S. (2009). Pharmacology as a foreign language: a preliminary evaluation of podcasting as a supplementary learning tool for non-medical prescribing students. *BMC Medical Education, 9*, 74. doi: 10.1186/1472-6920-9-74

Naaz, S. T. (2012). Attitude of Prospective Teachers Towards Computer Technology: A Study. [Article]. *Golden Research Thoughts, 1*(9), 1-3.

Nagler, A., Andolsek, K., Dossary, K., Schlueter, J., & Schulman, K. (2010). Addressing the systems-based practice requirement with health policy content and educational technology. *Medical Teacher, 32*(12), e559-565. doi: 10.3109/0142159X.2010.528809

Nast, A., Schafer-Hesterberg, G., Zielke, H., Sterry, W., & Rzany, B. (2009). Online lectures for students in dermatology: a replacement for traditional teaching or a valuable addition? *Journal of the European Academy of Dermatology and Venereology, 23*(9), 1039-1043. doi: 10.1111/j.1468-3083.2009.03246.x

O'Neill, E., Power, A., Stevens, N., & Humphreys, H. (2010). Effectiveness of podcasts as an adjunct learning strategy in teaching clinical microbiology among medical students. *Journal of Hospital Infection, 75*(1), 83-84. doi: 10.1016/j.jhin.2009.11.006

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

Padilla-Meléndez, A., del Aguila-Obra, A. R., & Garrido-Moreno, A. (2013). Perceived playfulness, gender differences and technology acceptance model in a blended learning scenario. [Article]. *Computers & Education, 63*, 306-317. doi: 10.1016/j.compedu.2012.12.014

Patasi, B., Boozary, A., Hincke, M., & Jalali, A. (2009). The utility of podcasts in Web 2.0 human anatomy. *Medical Education, 43*(11), 1116. doi: 10.1111/j.1365-2923.2009.03471.x

Pilarski, P. P., Alan Johnstone, D., Pettepher, C. C., & Osheroff, N. (2008). From music to macromolecules: using rich media/podcast lecture recordings to enhance the preclinical educational experience. *Medical Teacher, 30*(6), 630-632. doi: 10.1080/01421590802144302

Rainsbury, J. W., & McDonnell, S. M. (2006). Podcasts: an educational revolution in the making? *Journal of the Royal Society of Medicine, 99*(9), 481-482. doi: 10.1258/jrsm.99.9.481

Read, B. (2007). How to Podcast Campus Lectures. *Chronicle of Higher Education, 53*(21), A32.

Reynolds, P. A., Mason, R., & Eaton, K. A. (2008). Webcasting: casting the web more widely. *British Dental Journal, 204*(3), 145-149. doi: 10.1038/bdj.2008.55

Rowell, M. R., Corl, F. M., Johnson, P. T., & Fishman, E. K. (2006). Internet-based dissemination of educational audiocasts: a primer in podcasting--how to do it. *AJR. American Journal of Roentgenology, 186*(6), 1792-1796. doi: 10.2214/AJR.05.1315

Ruiz, J. G., Mintzer, M. J., & Leipzig, R. M. (2006). The impact of e-learning in medical education. *Acad Med, 81*(3), 207-212.

Schlairet, M. C. (2010). Efficacy of Podcasting: Use in Undergraduate and Graduate Programs in a College of Nursing. *Journal of Nursing Education*, 1-5. doi: 10.3928/01484834-20100524-08

Schreiber, B. E., Fukuta, J., & Gordon, F. (2010). Live lecture versus video podcast in undergraduate medical education: A randomised controlled trial. *BMC Medical Education, 10*, 68. doi: 10.1186/1472-6920-10-68

Shantikumar, S. (2009). From lecture theatre to portable media: students' perceptions of an enhanced podcast for revision. *Medical Teacher, 31*(6), 535-538. doi:10.1080/01421590802365584

Stiffler, D., Stoten, S., & Cullen, D. (2010). Podcasting as an Instructional Supplement to Online Learning: A Pilot Study. *Computers, Informatics, Nursing : CIN*. doi:10.1097/NCN.0b013e3181fc3fdf

Straub, E. T. (2009). Understanding Technology Adoption: Theory and Future Directions for Informal Learning. *Review of Educational Research, 79*(2), 625-649. doi: 10.3102/0034654308325896

Su Luan, W., & Hanafi, A. (2007). Gender Differences in Attitudes towards Information Technology among Malaysian Student Teachers: A Case Study at Universiti Putra Malaysia. [Article]. *Journal of Educational Technology & Society, 10*(2), 158-169.

Vogt, M., Schaffner, B., Ribar, A., & Chavez, R. (2010). The impact of podcasting on the learning and satisfaction of undergraduate nursing students. *Nurse Education in Practice, 10*(1), 38-42. doi: 10.1016/j.nepr.2009.03.006

Walmsley, A. D., Lambe, C. S., Perryer, D. G., & Hill, K. B. (2009). Podcasts--an adjunct to the teaching of dentistry. *British Dental Journal, 206*(3), 157-160. doi: 10.1038/sj.bdj.2009.58

Zanussi, L., Paget, M., Tworek, J., & McLaughlin, K. (2011). Podcasting in medical education: can we turn this toy into an effective learning tool? *Advances in Health Sciences Education: Theory and Practice*. doi: 10.1007/s10459-011-9300-9

Appendix A. Software packages identified by faculty respondents

Software Name	# of users
Accordant	3
Adobe Captive	8
Adobe Connect	62
Adobe Presenter	31
Apple Podcast Producer	3
Camtasia	2
Echo 360	1
Elluminate	1
iShowU, Quicktime Pro	1
Lecturnity	1
Mediasite	13
Perfect Meeting	1
ProfCast	14
Snapkast	10
Wirecast	2

Journal of Teaching and Learning with Technology, Vol. 3, No. 1, June 2014, pp. 90 - 93.
doi: 10.14434.jotlt.v3n1.4239

Designing interactive scavenger hunt using QR codes

Julia Gressick[1], Bruce Alan Spitzer[2], and Kyle Sagarsee[3]

Keywords: educational technology, games in education, QR codes, quick response codes

Framework

This article describes the use of the Quick Response codes (QR codes) as a way to engage students in an interactive scavenger hunt to review course content prior to an exam.

QR codes (quick response codes) are two-dimensional, camera-readable bar codes that have become popular for allowing smartphones and other camera-equipped, web-connected devices access to web sites, text messages, and application downloads. QR codes are read by a mobile device through the device's camera using an application specifically designed to read the information embedded in the code. QR codes are easily recognizable by their square shape and series of black square/white space patterns. The size of the QR code is largely irrelevant: as long as the device's camera can bring the code into the field of view, the code can be read by the code reader application.

Gaming as a way of learning and reviewing content has become an increasingly popular way to engage students despite objections by adults who see them as not instructional in nature (Swanson, 2014).

Making It Work

In order to understand the use of QR codes in an interactive game context, it is important know the process for both reading/decoding and creating a QR code.

QR Code Reader Applications

A search of e-commerce sites dedicated to iOS and Android operating systems will result in the discovery of a wide variety of free and cost-based applications to read and decode QR codes. There are no discernable differences between various apps and nothing significant is gained by purchasing an app over installing a free app. To use any of the applications, launch the application on a mobile device. The application automatically activates the camera and presents the user a "target" on the screen wherein the QR code graphic should be centered by the user. Once read, the app will take the action inherently embedded in the QR code such as launching a web browser to access an online web site, sending an SMS text message or email message, or downloading and installing an application to the mobile device.

QR Code Generators

As with QR code reader applications, there are a myriad of web sites that will convert desired actions into readable QR codes. There is nothing significantly different between sites, and most work the same: input information into a form and click a command button to generate

[1] Assistant Professor of Instructional Technology, Indiana University South Bend, jgressic@iusb.edu
[2] Associate Professor of Instructional Technology, Indiana University South Bend, baspitze@iusb.edu
[3] Graduate Student in Education, Indiana University South Bend, ksagarse@iusb.edu

the code. One robust web site for creating free QR codes is QRStuff.com (http://www.qrstuff.com). In addition to a simple QR code creator, QRStuff.com allows for easy creation of QR codes to known web sites (YouTube, Google Maps, Twitter, Facebook, etc.) and other events such as dialing a telephone number, placing a Skype call, and generating an email message. Users have control over the color of the foreground and the output type.

Use of QR Codes in an Interactive Scavenger Hunt

We developed an educational augmented reality learning game (e.g. Wu & Wen-Yu Lee, 2012) that leveraged QR codes as a way to engage undergraduate students by getting them up out of their seats, working in small groups, and exploring a new building on campus, all while using their own technology in ways that helped them review and understand the course content. The purpose of this game was to serve as a formative review opportunity beyond a traditional paper and pencil quiz. Our context was an undergraduate foundational educational psychology course at a regional campus of a state university.

The use of technology-based games in education has become a widely recognized and accepted means by which to engage students in the classroom (e.g. Hwang & Wu, 2012; Burguillo, 2010; & Kafai, 2006). Moreover, there is considerable theoretical and empirical support of the cognitive benefits of games on student learning outcomes and motivation (i.e. Garris, Ahlers, & Driskell, 2002; Gee, 2003).

To design our game, we created 20 distinct QR codes and students were divided into eight small groups ranging in size from three to five students. When scanned with a mobile device, each QR code linked students to a multiple-choice question and possible responses created using Google forms (drive.google.com). The questions centered on concepts covered throughout the first two-thirds of the semester. Each of the 20 questions was followed by 4 potential answers teams could choose from. Along with each response, groups were asked to submit their team number for response tracking purposes. Once a team answered a question and their response was submitted, the data were logged in a Google spreadsheet that tracked the time, response, and team number for each attempt. If the question was not answered correctly on the first attempt, multiple attempts were recorded. For each response a team submitted, a prompt directed the team to another door number in the building where they would determine whether or not their response was correct. If they responded correctly, the door they were directed to would have a new QR code for them to scan, which would link to a new question to answer, and so on. If, however, the response was incorrect, there would not be a new code and students would have to return to the previous door, re-scan that QR code, and re-attempt the previous question until they answered correctly and arrived at the door with the next code.

This game was designed to be completed within an hour. Five of the eight teams that participated completed the game, and all eight teams completed at least 75% of the game. In addition to providing a learning experience that served as an engaging alternative to a traditional quiz, the instructors were provided with a valuable log of how the students responded to the questions, including any incorrect responses and the durations between responses. This afforded the instructional team insight on response trends and highlighted course material that required further focus during instruction. Of the questions that were answered across all teams, 88.3% were answered correctly on the first submitted response, 9.4% required a second attempt, and 2.3% were answered correctly after a third attempt. Since our course enrolled future teachers, the design and implementation of this game not only provided a valuable review opportunity, but also served as an object of reflection for discussing student motivation and as a model of innovative instructional design. Students indicated through in-class and online forum reflections that they recognized the potential cognitive benefits of using a game like this in their future classrooms as a way to actively engage students. Our approach provides one example of how to involve students in assessment activities that are collaborative and engaging. Moreover, this approach embraces the Bring Your Own Device (BYOD) movement in educational technology practices (Lai, Khaddage, & Gerald, 2013) by allowing students to use their personal mobile technology in productive, course-relevant ways.

Future Implications

Because of the resources we used, the game described here demonstrates the potential for flexible adaptation and use across content areas and educational levels. It provides a way to actively engage learners in collaborative problem solving and further serves to improve rapport among students. Here, we modified a traditional quiz to model a game-based classroom innovation with technology. Integrating this activity into our course instruction provided an opportunity for students to reflect on their problem solving strategies and motivation, both central concepts of the course.

While not a definitive list, some possible adaptations for the strategy can be as follows. This strategy could be adapted to humanities contexts in the form of a library/resource scavenger hunt. Possibilities in the natural sciences include using clues to direct students to natural resources, geological, or botanical examples on campus. An adaption to mathematics could involve student exploration of navigational trigonometry concepts like bearing and course.

As QR codes become more popular and students and faculty both begin using them with more frequency, more strategies for implementing QR code technology with ubiquitous mobile access devices will become apparent.

References

Burguillo, J.C. (2010). Using game theory and competition-based learning to stimulate student motivation and performance. *Computers & Education, 55*(2), 566-575. doi: 10.1016/j.compedu.2010.02.018

Garris, R., Ahlers, R. & Driskell, J.E. (2002). Games, Motivation, and Learning: A Research and Practice Model. *Simulation & Gaming, 33*(4), 441-467. doi: 10.1177/1046878102238607

Gee, J. (2003). *What Video Games Have to Teach Us about Learning and Literacy* (2nd Ed.). Houndmills, Basingstoke, Hampshire, England; Palgrave Macmillan.

Hwang, GJ & Wu, PH. (2012). Advancements and trends in digital game-based learning research: a review of publications in selected journals from 2001 to 2010. *British Journal of Educational Technology*, *43*(1). doi: 10.1111/j.1467-8535.2011.01242.x

Kafai, Y. B. (2006). Playing and making games for learning: Instructionist and constructionist perspectives for game studies. *Games and Culture*, *1*(1), 36-40. doi: 10.1177/1555412005281767

Lai, K-W., Khaddage, F., & Gerald, K. (2013). Blending student technology experiences in formal and informal learning. *Journal of Computer Assisted Learning, 29*(5), 414-425. doi: 10.1111/jcal.12030

Swanson, K. (2014). Digital games and learning: A world of opportunities. *Tech & Learning, 34*(6), 22.

Wu, HK, Wen-Yu Lee, S., (2013). Current status, opportunities and challenges of augmented reality in education. *Computers and Education, 62*, 41-49. doi: 10.1016/j.compedu.2012.10.024

Journal of Teaching and Learning with Technology, Vol. 3, No. 1, June 2014, pp. 94 - 98.
doi: 10.14434.jotlt.v3n1.4088

Flipping the classroom in an academic writing course

Marion Engin[1] and Senem Donanci[2]

Keywords: iPad; flipped classroom; academic writing

Framework

Mobile learning is a phenomenon that is sweeping the educational world and cannot be ignored. In September 2012, the three federal universities in the United Arab Emirates were tasked with incorporating the use of iPads into teaching and learning (Cavanaugh, Hargis, Munns & Kamali, 2012; Gitsaki, Robby, Priest, Hamdan & Ben-Chabane, 2013). All students and instructors were given an iPad, materials were available in iBook format, and the nature of the classroom and the learning activities changed considerably (Ally, 2013; Gitsaki et al, 2013).

This paper describes how the authors leveraged the interest and enthusiasm the students had for using their mobile technology such as smart phones, iPads and other tablets to create a flipped classroom in an academic writing course by using an iPad application called *Educreations* (www.educreations.com). Recent research has focused on the extent to which learners perceive their motivation, engagement, and learning through the use of iPads and other mobile technology (Diemer, Fernandez & Streepey, 2012; Rossing, Miller, Cecil & Stamper, 2012). Diemer et al. (2012) found that 85.1% of learners reported extensive or moderate use of iPad in their learning. They also found that learners who were initially uncomfortable with using an iPad in their learning became more engaged as the device became more familiar. Similarly, Rossing et al. (2012) report that there was considerable motivation, excitement, and interest in learning with iPads amongst students, despite certain limitations of the device and technical problems. It has also been recognized that learners require these technological skills to function in a 'technological, knowledge-based economy' (Keengwe, Pearson & Smart, 2009). The aim of this pedagogic approach was to exploit this need, interest and enthusiasm, to cater for all the different learning styles and levels of familiarity with technology, and to 'capitalize on the increasing use of mobile technologies, which is placing the technology in the hands of the learner, to design and deliver learning materials for access by learners' (Ally, 2013).

A flipped classroom may be part of a blended learning model in which students have some control over 'time, place, path and/or pace' (Staker & Horn, 2012). The originators of the flipped classroom define the concept as what was formerly done in class is done at home, and what was formerly done at home is now carried out in class (Bergmann & Sams, 2012). There is also a change in attitude towards teaching in which the attention is on the students rather than the teacher (ibid, 2012). There are many reasons why flipping the classroom makes both pragmatic and pedagogic sense. Firstly, flipping the classroom encourages the students to take responsibility for their learning. Secondly, teachers can work with students in a one-on-one tutorial mode (Hamdan et al, 2013) which may support struggling students. Thirdly, since learners these days live in a multi-modal world and have access to unlimited resources on-line, learning does not have to take place only in 'brick -and –mortar location' establishments (Staker & Horn, 2012). Flipping the classroom builds on the already existing mobile technological tools

[1] Associate Professor, English and Writing Studies Department, Zayed University, marion.engin@zu.ac.ae
[2] senem.donanci_buyuk@zu.ac.ae

which students use outside the classroom. Finally, students can watch and listen to the teacher as many times as they need. This not only helps to reinforce, but also gives struggling students more support.

Making it Work

This study involved two classes of 20 students. They were expected to write a five-paragraph academic essay on the topic of heroes. The class was their Composition II class. The essay should include a thesis statement, concise paragraphs which include topic sentences, quoted/paraphrased researched support with APA citation, and students' response. The writing process lasted about 8 weeks and once the students completed their research and decided on their sources, they had to work on their outline and thesis statement, write an introduction, develop their body paragraphs with topic sentences and supporting points, integrate their evidence from the sources to back up their arguments, and write a conclusion.

For each of the stages of this process, the classroom was flipped using the iPad application *Educreations* which can be accessed from laptops, desktop computers, or any other smart device using a web link that *Educreations* provides once the video lesson is completed. This link can simply be e-mailed to students. *Educreations* is an educational software/tool that 'turns an iPad into a recordable whiteboard'. It allows users to replay voice, handwrite and draw, add photos from iPad camera, photo albums and the Web, animate images by dragging them around, underline or circle text, and pause and resume recording. The teachers created short video lessons where they tapped, wrote on and posted visuals including media, pictures and graphics on the 'whiteboard' and talked over them as they recorded each lesson.

The teachers first had an introduction lesson with the students on how to best use the *Educreations* video lesson, and how to complete the in-video tasks. For the rest of the course, the students followed the video lessons at home and came to class having completed a task or a written outcome that the course objectives required. As a result, the students covered the initial input in their own time and at their own pace, which gained both the students and the teacher more hands-on class time for the actual writing process as well as feedback and interaction. An *Educreations* video lesson was created for each stage of the writing process.

Video 1: Warm-up and brainstorming concepts:
http://www.educreations.com/lesson/view/heroes2/2372191/?s=SwY3Eu&ref=appemail

The video lesson included a variety of tasks interspersed with input. Students had to find a definition of the word 'hero', find some information about Mahatma Gandhi and Mother Theresa, write a list of qualities of a hero, and think of a possible hero they might research. This pre-writing work included tasks such as brainstorming, note taking, questioning, and focusing on topic for research. The final task was to bring a short description of their hero to class.

Video 2: Writing a thesis statement:
http://www.educreations.com/lesson/view/thesisstatements/2548920/?s=LzIFfL&ref=appemail

In this video the teacher gave examples of thesis statements, highlighting the structure and organization of a thesis statement. At the end of the video, students were asked to write a rough thesis statement for their essay based on their chosen hero.

Video 3: Making an outline:
http://www.educreations.com/lesson/view/overview-of-supporting-points-rough-outline/2643701/?s=Gc8Yke&ref=appemail

In this video, the teacher explained the different sections, giving examples in the video. The task at the end of the video was for students to look at their own topic and write a rough outline based on the supporting points identified earlier.

Video 4: Expanding the outline using evidence:
http://www.educreations.com/lesson/view/expanding-your-rough-outline-with-evidence/2813550/?s=EOChLt&ref=appemail

In the video, the teacher explained how to identify the relevant evidence and opposing opinions in their source texts. The task at the end of the video was to incorporate the evidence into their outlines by using appropriate APA citation format.

Video 5: Writing an introduction:
http://www.educreations.com/lesson/view/writing-an-introduction/7125517/?s=89JzkI&ref=appemail

In this video the teacher explained what the introduction should include. The teacher also explained and highlights the structure of an introduction with examples. The video included examples of different 'hooks' as openings and how to include definitions and the thesis statement. The task at the end of the video was to write an outline for their introduction and bring it to class.

Video 6: writing a conclusion:
http://www.educreations.com/lesson/view/145-conclusions/7123315/?s=QMppV6&ref=appemail

In this video, the teacher explained what the conclusion should include, again with examples. The task at the end was to prepare a rough draft of a conclusion for their essay and bring it to class for peer feedback.

At the end of the semester-long course (18 weeks), students were asked to fill in a short questionnaire consisting of 10 open-ended questions on the effectiveness of the videos (see Appendix A). The feedback was very positive, with many students mentioning how the video served as a summary of the main points of the lesson. Many students also said they found the explanations clear. Most students watched the videos at least once; some watched it twice or three times. A few students said they used the videos for review purposes. In terms of catering for different learning styles, many students commented on how the pictures, writing and voice over helped them to understand better. An interesting finding was that although the feedback on the videos was overwhelmingly positive, most preferred to have both the video input ***and*** an overview from the teacher in the following class. The reason for this preference was that students felt they could ask the teacher questions if they did not understand the input. From the feedback it would seem that rather than completely flipping the classroom, in our context the videos served as both a clear summary of the main teaching points before the class, and as a revision guide. Students also wanted the opportunity to ask the teacher questions in the following lesson on the video input. Rather than replacing the lesson input completely, it would seem that the videos provide an opportunity for raising students schemata about the lesson topic before the class so that the students can be more active members in class time by asking questions and clarifying the teaching point.

Implications

Through flipping the classroom, the students were able to develop a basic foundation of factual knowledge, relate these facts to a wider context, and organize them 'in ways that facilitate retrieval and application' (Bransford, Brown and Cocking 2000: 16). They were also able to re-visit input in their own time and at their own pace, and come to class having carried out the initial research and completed the required tasks. This enabled the teachers to work more one-on-one in the class. The input the students needed to exploit at home provided more opportunities for learning to take place in class through interaction and question-answer sessions. However, based on the feedback we are currently incorporating several changes. Firstly, the first part of the lesson following video input at home is now dedicated to a question-answer session. Secondly, we are refining our summary skills using key words, pictures, sound, and voice over to exploit the positive feedback on these aspects of the videos. Finally, we are committed to looking at how more videos can be incorporated into our writing courses to give greater opportunities for interactive sessions in class which focus on the students' own concerns, questions, and needs.

References

Ally, M. (2013). Mobile learning: from research to practice to impact Education. *Learning and teaching in Higher Education: Gulf Perspectives 10*(2), 1-9.

Bergmann, J., & A. Sams. (2012). *Flip your classroom: Reach every student in every class every day*. International Society for Technology in Education.

Bransford, J.D., Brown, A.L., & Cocking, R.R. (2000). *How people learn: Brain, mind, experience, and school*. Washington, D.C: National Academy Press

Cavanaugh, C., Hargis, J., Munns, S. & Kamali, T. (2012). iCelebrate teaching and learning: Sharing the iPad experience. *Journal of Teaching and Learning with Technology 1*(2), 1-12.

Diemer, T.T., Fernandez, E. & Steepey, J.W. (2012). Student perceptions of classroom engagement and learning using iPads. *Journal of Teaching and Learning with Technology 1*(2), 13-25.

Educreations. (2013). Available at http://www.educreations.com Accessed 10 October 2012.

Gitsaki, C., Robby, M.A., Priest, T., Hamdan, K., & Ben-Chabane, T. (2013). A research agenda for the UAE iPad initiative. *Learning and Teaching in Higher Education: Gulf Perspectives 10(*2), 1-15.

Keengwe, J., Pearson, D. & Smart, K. (2009). Technology intergration: mobile devices (iPods), constructivist pedagogy, and student learning. *AACE Journal 17(*4), 333-346.

Rossing, J.P., Miller, W.M., Cecil, A.K. & Stamper, S.E. (2012). iLearning: The future of higher education? Student perceptions on learning with mobile tablets. *Journal of the Scholarship of Teaching and Learning 12*(2), 1-26.

Staker, H., & Horn, M.B. (May, 2012). *Classifying K-12 blended learning*. Available at http://brokersofexpertise.net/cognoti/content/file/resources/documents/13/1319d4c9/1319d4c97e8faaa11702c08691abc208dcdad43f/downloadedfile_6158012205637240566_Classifying-K-12-blended-learning2.pdf. Accessed 2 October 2013.

Appendix A: Questionnaire for students at the end of the course

1. Do you watch the videos the teacher sends you?
2. How often do you watch them?
3. Do you find them useful?
4. What do you find useful in the videos?
5. Do you find the videos help you understand the topic?
6. If yes, why?
7. Would you rather watch the video or have the teacher explain in the class?
8. Why?
9. Do you like having the lesson in a video?
10. Why / Why not?

Journal of Teaching and Learning with Technology, Vol. 3, No. 1, June 2014, pp. 99 - 101.
doi: 10.14434.jotlt.v3n1.5016

Taking advantage of mobile devices: Using Socrative in the classroom

Pamela D. Wash[1]

Keywords: mobile technology, BYOD, instructional technology

Framework

"If we teach today as we taught yesterday, we rob our children of tomorrow", (Dewey, 1916). In higher education, "we have the opportunity to teach students to ask the right questions, use the real-world tools that they have in their hands to find the best answers, and share that in an authentic way with those around them" (Nelson, 2012). In 2012, EDUCAUSE, a leader in IT advancement for higher education, published its findings of a survey disseminated to 195 participating institutions receiving more than 100,000 student responses. According to this report, *ECAR Study of Undergraduate Students and Information Technology Report* (Dahlstrom, 2012), students prefer blended and flipped classrooms, they yearn for seamless integration of mobile technology, they believe technology is critical for both academic success and career accomplishments, and they value multiple options for communicating. Additionally, these results report that 86% own a laptop, 62% own a smartphone, 33% own a desktop computer, 15% own a tablet, and 12% own an e-reader.

The data are clear; the data cannot be ignored. Students are demanding seamless integration of the varied technologies and mobile devices they own and command. In having valid confirmation from a national perspective, institutions of higher education are faced with the challenge of how to respond. These digital natives are demanding that institutions of learning catch up with the 21st century and engage them using the technologies that are a daily staple of their lives. Long gone are the days of standard lecture and PowerPoint presentations from higher education faculty (Wash & Freeman, 2013).

This article describes how one faculty member engages students in the classroom using their own devices, regardless of platform, with the interactive, real-time, web-based student response system tool, Socrative (2013).

Making it Work

Student response systems or clickers are not new to the classroom. There are numerous brands and manufacturers available; however, each requires an additional purchase by either the faculty member or individual student. Now, there are free web 2.0 tools that provide instructors the flexibility and spontaneity of both formal and informal engagement in the classroom using the varied mobile devices students bring to the classroom.

After conducting online research of available free web-based student response system tools and in classroom trial and error of several, Socrative appears to offer the most flexibility and ease of use. Additionally, student survey data (N=40), conducted with two science education methods classes, indicates that using such tools in the classroom *increases classroom*

[1] Associate Professor, College of Education, Winthrop University, pwash@uscupstate.edu

participation, helps provide instant feedback on what students know, and *increases mental engagement in class.*

Classroom Implementation

To get started using Socrative, the instructor creates a "teacher account" and assigns a room number. The room number becomes the login key for students to access course material through any web browser on any Internet-accessible device or by installing the "student login app". From the teacher login portal, instructors can create multiple choice, true/false, and short answer assessments or surveys. Additionally, there are options to run a "quick quiz" that is self-paced, and an "exit ticket" to receive feedback from students prior to leaving a class session, or even a team response competitive game feature. Socrative also allows for spontaneous polling by simply clicking the "single question" feature and selecting the question format from multiple choice, true/false, and short response.

In science methods courses for education majors, Socrative allows practice questions for required certification examinations to be provided, pulse checks on critical thinking questions allowing students to respond with anonymity, formal assessment checkpoints, and review of content material opportunities. Each of these options provides both the instructor and the students with real-time feedback, jumpstarts classroom discourse, and encourages active participation.

When surveys or assessments are engaged, students simply access the Socrative website using a laptop, Smartphone, or tablet, click on the *Student Log In* portal, and type in the room number provided by the instructor. When the survey or assessment begins, the instructor can elect to display live results as they are submitted or hide the results until all responses are received. All data collected for each assessment are stored and archived within Socrative and can easily be retrieved and exported in an Excel spreadsheet for formal documentation.

Table 1

Mean Scores
(Results displayed in Mean order)

Survey Questions: Student response tools such as Socrative…	Candidate Mean (N=40):
increase participation in class.	4.775
help provide instant feedback on what students know.	4.575
increase mental engagement in class.	4.500
should be used more often in university classes.	4.450
stimulate class discussions.	4.400
facilitate positive interactions in the classroom	4.350
increase learning.	4.225

Feedback from students on semesterly administered student opinion poll evaluations indicates positive attitudes toward the use of this technology and form of engagement in the classroom. A few student comments include, “I feel comfortable responding to content questions using the clickers rather than responding out loud” to “I appreciate the instructor including Praxis II practice questions in class. This helps ease my anxiety as I prepare for these exams”.

In addition to the semesterly administered student opinion poll evaluations, a survey developed by the instructor/researcher was administered in two science education methods courses (N=40) to formalize students’ responses to using Socrative daily in the classroom. The survey instrument consisted of seven Likert-scale questions with indicators from strongly agree (value: 5) to strongly disagree (value: 1). The aggregate mean results (see Table 1) indicate that students strongly believe response technology increases participation in class (4.78), that this technology helps to provide instant feedback on what students know (4.58), and increases mental engagement in class (4.50). In contrast, student survey results yielded slightly lower responses for whether or not student response tools such as Socrative facilitated positive interactions in the classroom (4.35) and increased learning (4.23).

Future Implications

As society becomes even more heavily dependent on mobile technology, it is imperative that our classrooms begin to embrace and take advantage of this instructional medium. Rather than viewing this technology as a “disruptive innovation”, a phrase coined by Harvard Business School professor Clayton Christensen, faculty can find innovative ways to engage their students using the varied instructional technology devices they bring to the learning environment.

References

Dahlstrom, E. (2012). *ECAR Study of undergraduate students and information technology, 2012* (Research Report). Louisville, CO: EDUCAUSE Center for Applied Research.

Dewey, J. (1916). *Democracy and education: An introduction to the philosophy of education.* NY: Freepress.

Nelson, D. (2012). BYOD. *Internet@Schools,19(5),*12-15.

Socrative. (2013). Socrative. [Mobile application software]. Retrieved from http://socrative.com/.

Wash, P.D. & Freeman, G. G. (2013). *BYOD - Engaging Students Using Their Own Devices. National Social Science Technology Journal, 3*(1).

Journal of Teaching and Learning with Technology, Vol. 3, No. 1, June 2014, pp. 102 - 104.
doi: 10.14434.jotlt.v3n1.4901

Technology-based adaptation of think-pair-share utilizing Google drive

Norah C. Slone[1] and Nathanel G. Mitchell[2]

Keywords: Think-Pair-Share; learner-centered; Google drive; technology; teaching

Framework

The Think-Pair-Share activity (TPS; Lyman, 1981, 1987) is a learner-centered and highly effective collaborative teaching strategy that is widely used in higher education. The TPS activity promotes student learning through a sequence of three "phases." First, students individually reflect on subject matter, then pair with a partner in class to discuss the information, and finally share ideas from their discussions with the class as a whole. TPS is believed to not only enhance student learning but it also engages all students in discussions, including those who may be more reserved and less likely to share unprompted in class (Karge, Phillips, Jessee, & McCabe, 2011). Instructors may be able to assess how students are understanding the material by walking around to listen in on various group reflections before then facilitating a larger class discussion.

The use of simple online tools, such as Google Drive (i.e., "Google docs"), may provide a platform that facilitates the adaptation of TPS activities. Utilizing Google Docs to facilitate a TPS activity encourages students to take an active role towards investigating a teacher-prompted question in one area, collaborating with peers to add to an electronic document based on the instructor question, and finally projecting their findings on the screen to the larger group. Studies to this point have only evaluated the utility and satisfaction of Google Docs to facilitate small group (i.e., approximately 3 students on average) collaborative weekly reflections and other essay-type writing assignments outside of the classroom (e.g., Denton, 2012; Zhou, Simpson, & Domizi, 2012). However, research has yet to make the pedagogical connection linking Google Docs with TPS nor has the effectiveness for enhancing student learning through *in-class* collaborative activities been evaluated.

Google Drive is a free and easy-to-use technology on which small groups of students can record their findings simultaneously from their laptops or other tablet devices. The compilation of findings recorded on the Google Doc can be viewed on a projector screen while students present their information to the class as a whole. Although the in-class use offers a collaborative activity to promote in-depth learning of new material, one additional benefit of Google Drive is that the information recorded may be continually accessed once the class session is completed.

Making it Work

The Google Docs TPS activity was recently utilized in a graduate-level abnormal psychology class in which students were expected to learn how to competently render diagnoses in clinical practice. Accurately diagnosing clients is a complex skill requiring critical thinking and careful application of knowledge from course materials. A TPS activity was used to facilitate deeper

[1] Instructor, School of Professional Psychology, Spalding University, nslone@spalding.edu
[2] Assistant Professor and Chair of the Health Psychology Emphasis Area, School of Professional Psychology, Spalding University, nmitchell01@spalding.edu

levels of understanding and application of course content. For example, the Google Docs TPS activity allowed students to record information about particular diagnoses (e.g., distinguishing features, etiology, risk and protective factors, cultural considerations, treatment implications) in small groups.

Before class, students were asked to bring computers, tablets, or other electronic devices by which they could access the Internet. Upon arriving to class, students were asked to volunteer to receive an emailed link to a Google document (outline previously prepared by instructor) that was then projected onto a screen. Students were able to quickly access the document from their email. The link can also be sent via email prior to the class beginning, to ensure all students have access to the document.

Students with computers/tablets were asked to serve as the "recorders" for a small group of 1-4 students. In small groups, students were instructed to reflect on and work and together to fill in the prompts displayed on the Google Doc. Students not only saw their findings as they were all typing into the same Google Doc, but could view information other students were recording simultaneously as well.

The instructors assessed the groups' understanding of the content as recorded on the Google Doc by walking to each group to provide individualized feedback based on questions and needs, and monitored student engagement and contribution as they typed their ideas, and to ensure that groups were on-task throughout the class session. Once the groups were finished compiling information into the Google Doc, each group demonstrated understanding by sharing their findings with the class. As findings were discussed and debated, students could continue to make notes and update information in the Google Doc throughout the discussion. After the content of the Google Doc was discussed and evaluated in class, students were then provided access to the information after class for future reference. Given that students had access to the mutually developed Google Doc after class for their studies, it may be important for instructors to review work completed to ensure valid and correct information was recorded. One way the final Google Doc was reviewed and disseminated by the Instructor was through downloading the completed Google Doc to a Word document, saving the reviewed copy, and posting it in a Word document to an online learning platform for the course. Not only could students in the course easily access the document, but they would have the information in an easily printable format. If no online learning platform is used in the course, the document can also be emailed to the class or readily accessed from the Google Doc link itself; however, instructors and students need to be aware that Google Docs automatically saves all updates and previous information recorded is not stored.

As with the traditional TPS activity, the Google Doc TPS adaptation may be helpful for instructors from a wide variety of disciplines wanting to provide an opportunity for students to gain a deeper understanding of course material, offer an opportunity for students to reflect individually and in pairs, and then share information on their findings with the class as a whole through the Google Doc. It may also provide a basis for continuous learning given accessibility after the class session.

Very little preparation is needed by the instructor to implement the Google Docs TPS activity. The primary preparation is to decide upon the content about which instructors would like students to reflect and discuss. Once content is determined, creating a chart, table, or other prompt/guide to which students can respond is often very helpful. Instructors will need to create this document on the Google Drive *before* class. Google Drive automatically saves the information each time the document is updated, ensuring the most updated copy is available and readily accessible for the class session. If students and instructors are interested in old versions or wording, it may be helpful to record this information elsewhere before closing the Google Doc, as only the final draft will be saved.

Future Making it Work and Student Feedback

Qualitative data were recently gathered concerning the Google Doc TPS activity with doctoral students in clinical psychology (N = 25). The data were gathered immediately after the implementation of the exercise at approximately 10 weeks into the course. Students were asked to what extent the Google Doc TPS activity contributed to their learning of course content for which the activity was designed.

Overwhelmingly, students indicated that they benefited from discussing course content, and the Google Drive technology provides a flexible and useful guide to support learning. Further, many commented on learning beyond the content from the required readings through reflections and discussions of responses on the Google Doc.

As the use of web-based technology such as the Google Drive become ubiquitous in our student's lives, it may be necessary to adapt empirically-supported teaching interventions, such as the TPS, to be more culturally relevant and collaborative. The landscape of higher education continues to change rapidly, and instructors must be willing to find creative ways to adapt effective face-to-face activities through integrating technology. Our experiences indicate that the use of Google Drive may be an important tool for supplementing traditional instruction.

References

Denton, D. W. (2012). Enhancing instruction through constructivism cooperative learning, and cloud computing. *TechTrends, 56,* 34-41. doi: 10.1007/s11528-012-0585-1

Karge, B. D., Phillips, K. M., Jessee, T., McCabe, M. (2011). Effective strategies for engaging adult learners. *Journal of College Teaching & Learning, 8,* 53-56. Retrieved from http://journals.cluteonline.com/index.php/TLC/index

Lyman, F. (1981). The responsive classroom discussion. In Anderson, A. S. (Ed.), *Mainstreaming digest*. College Park, MD: University of Maryland College of Education.

Lyman, F. (1987). Think-Pair-Share: An expanding teaching technique: MAA-CIE. *Cooperative News*, 1, 1-2.

Zhou, W., Simpson, E., & Domizi, D. P. (2012). Google docs in an out-of-class collaborative writing activity. *International Journal of Teaching Learning in Higher Education, 24,* 359-375. Retrieved from http://www.isetl.org/ijtlhe/

Journal of Teaching and Learning with Technology, Vol. 3, No. 1, June 2014, pp. 105 - 106.
doi: 10.14434.jotlt.v3n1.4279

Book Review

Lessons from the Virtual Classroom: The Realities of Online Teaching, 2nd Edition

Robert Kimball Neuteboom[1]

Citation: Rena Palloff and Keith Pratt. (2013) *Lessons from the Virtual Classroom: The Realities of Online Teaching,* 2nd Edition. San Francisco, CA: Jossey-Bass.

Publisher's Description: The second edition of the classic resource *Lessons from the Cyberspace Classroom* offers a comprehensive reference for faculty to hone their skills in becoming more effective online instructors. Thoroughly revised and updated to reflect recent changes and challenges that face online teachers, *Lessons from the Virtual Classroom* is filled with illustrative examples from actual online courses as well as helpful insights from teachers and students. This essential guide offers targeted suggestions for dealing with such critical issues as evaluating effective courseware, working with online classroom dynamics, addressing the needs of the online student, making the transition to online teaching, and promoting the development of the learning community.

In a time of expansive and accelerating technological advancement, education has become both easy to access and complicated to deliver. In *Lessons from the Virtual Classroom*, 2nd Edition, Rena Palloff and Keith Pratt revitalize their original version of this text by focusing on the present-day realities, challenges, and advantages of online instruction in terms of student experience. Divided into two parts, the text presents the current status of this modality of instruction and then proposes a set of practices to improve course delivery within a virtual environment. The chapters form a progressive arc, beginning with "Online Learning in the Twentieth Century," moving through chapters that focus on pedagogy, technology, and course delivery within technological spaces, and ending with a section titled "Lessons Learned from the Virtual Classroom," which reflects upon and summarizes the main points of the book. By reconsidering course structure, classroom dynamics, and the role of teachers in the virtual learning environment, the authors analyze the online instructional modality from three essential perspectives: administrators, course developers, and, of course, teachers. From these often conflicting viewpoints, the authors propose that effective online course development and operation depend to a large extent on collaboration between these "stakeholders," who, Palloff and Pratt argue, must make student learning their primary focus (p. 47).

Workman-like in its approach, the textbook acts as a guide for current or soon to be practicing online instructors. While the text offers pragmatic advice—logistically, organizationally, and pedagogically—it also, at times, forwards innovative theory. One suggestion urges faculty teaching online classes to abandon their traditional desire to control the classroom environment, at least in part. Palloff and Pratt claim that students more willingly "take responsibility for their learning" when they "take on part of the teaching function" (pp. 142-143).

[1] Academic Dean, Rasmussen College – Fargo, robert.neuteboom@rasmussen.edu

In this active model, students assume an "equal role in the learning community" with their instructor and peers (p. 148). Consequently, the role of teacher also changes to that of "a guide on the side" rather than "a sage on the stage" in an effective online learning community (p. 137).

This sense of communal learning resonates as both the core argument of the text and a potential solution for improving the learning experience for online students. Palloff and Pratt enumerate several characteristics of an effective learning community: reliable technology, student comfort with both the technology and each other, multiple points of and opportunities for communication, regular, personalized feedback, collaboration, and, when necessary, intervention.

To exemplify the importance of these characteristics, the authors share two case studies, one in which they have succeeded and another in which they have struggled in their own efforts to create a meaningful learning community. For the sake of retaining some measure of objectivity and to illustrate the importance group dynamics play in online community learning, the authors evaluate these experiences through the lens of Bud A. McClure's 2004 "seven-stage model of group development," which consists of "preforming, unity, disunity, conflict-confrontation, disharmony, harmony, and performing" (p. 161). By doing so, Palloff and Pratt identify crucial junctures during the semester in which course participants progressed, stalled, or regressed in their efforts to achieve performance. These extended narratives provide valuable direction for teachers at all stages of community building in the online classroom.

Of course, the success of any online class or program requires the appropriate infrastructure, financial support, and strategic plan. Unlike other texts of its kind, *Lessons from the Virtual Classroom* considers the broader vision of online education in a university setting. The authors negotiate the political tightrope of dichotomous agendas rather fluidity, if not entirely objectively—as teachers first, Palloff and Pratt occasionally lecture administrators on behalf of instructional needs which may, at times, alienate and frustrate a group often encumbered by budgets and competing college needs. Even so, requests for appropriate funding, consistent and accessible technology, training, and a manageable workload constitute reasonable expectations for developing and managing effective online courses. Moreover, the text asks teachers to think beyond the limited scope of their virtual classes to consider the complexities of operationalizing an online course or program at their respective college or university. This broader vision may contextualize slow adoption, inadequate support, or limited resources relative to instruction in this modality. More importantly, it empowers teachers to actively and knowledgably participate in all stages of virtual course development.

This text offers comprehensive insight into virtual education and details the evolving role of teachers in the online modality. It also provides exceptional practical advice and experiential examples of revised or re-envisioned pedagogies applied in this environment. The text not only informs teachers of best practices, but also educates course developers and administrators of the steps required to integrate or improve this modality of instruction at their institutions. Palloff and Pratt make clear that a successful online student learning experience depends upon a strong technological and fiduciary foundation, accessible and simple systems, the creation and perpetuation of learning communities, and open, regular communication. This insight alone makes the book worth the investment for those involved or on the verge of becoming involved in online education.

JoTLT
Journal of Teaching and Learning with Technology

Mission

The Journal of Teaching and Learning with Technology (JoTLT) is an international journal dedicated to exploring efforts to enhance student learning in higher education through the use of technology. The goal of this journal is to provide a platform for academicians all over the world to promote, share, and discuss what does and does not work when using technology in postsecondary instruction. Over the last few decades, faculty have progressively added more and more sophisticated technology into their courses. Today, the variety of technology and the creative ways in which technology is being used is simply astonishing, whether in-class, online, or in a blended format. In the final analysis, however, it isn't whether our students - or faculty members - like the technology that matters but whether the addition of these technological tools results in or expands access to quality student learning. JoTLT will play a prominent role in helping higher education professionals better understand and answer these questions.

We will accept four types of manuscripts:

Quick Hits: A Quick Hit is a brief contribution describing innovative procedures, courses, or materials involving technology (1500 words or less). Each contribution should include sufficient detail to allow another educator to use the Quick Hit in his or her own course.

Empirical Manuscript: Manuscripts in this category should provide qualitative or quantitative evidence demonstrating the effectiveness of the technology in increasing student learning. Each manuscript should include sufficient detail to allow another educator to use the technology in his or her own course.

Book Reviews: Book Reviews can be submitted for recently published works related to teaching and learning with technology. These manuscripts are typically less than 1500 words in addition to the complete citation of the book and the publisher's description of the book.

Case Studies: These studies illustrate the use of technology in regards to teaching and learning of higher education students, usually generalizable to a wide and multidisciplinary audience.

JoTLT
Journal of Teaching and Learning with Technology

Submissions

Authors are encouraged to submit work in one of the following categories:

- Quick Hits: A Quick Hit is a brief contribution describing innovative procedures, courses, or materials involving technology (1500 words or less). Each contribution should include sufficient detail to allow another educator to use the Quick Hit in his or her own course.

- Empirical Manuscript: Manuscripts in this category should provide qualitative or quantitative evidence demonstrating the effectiveness of the technology in increasing student learning. Each manuscript should include sufficient detail to allow another educator to use the technology in his or her own course.

- Book Reviews: Book Reviews can be submitted for recently published works related to teaching and learning with technology. These manuscripts are typically less than 1500 words in addition to the complete citation of the book and the publisher's description of the book.

- Case Studies: These studies illustrate the use of technology in regards to teaching and learning of higher education students, usually generalizable to a wide and multidisciplinary audience.

All submissions for JoTLT should be submitted using the online submission process.

Please follow this link to get more detailed information on the submission process for the Journal of Teaching and Learning with Technology:
http://jotlt.indiana.edu/about/submissions#onlineSubmissions

If you have additional questions or run into problems please contact the journal at jotlt@iu.edu

JoTLT

Journal of Teaching and Learning with Technology

Editorial Board

Journal of Teaching and Learning with Technology, Vol. 3, No. 1, June 2014, pp. 110 – 112.
doi: 10.14434.jotlt.v3n1.####

Style Sheet for the
Journal of Teaching and Learning with Technology

John Dewey[1] and Marie Curie[2]

Abstract: This paper provides the style sheet for the Journal of Teaching and Learning with Technology. Manuscripts submitted for publication should adhere to these guidelines.

Keywords: radiation, metacognition, identity theory, constructivism, educational philosophy.

General Guidelines for the Manuscript

Submissions should be double-spaced. The final manuscript should be prepared in 12-point, Times New Roman, and single-spaced. All margins should be 1 inch. Justify lines; that is, use the word-processing feature that adjusts spacing between words to make all lines the same length (flush with the margins). Do not divide words at the end of a line, and do not use the hyphenation function to break words at the ends of lines. The title (in 16 point bold) and author's name (in 12 pt. bold) should be at the top of the first page. The author's name should be followed by a footnote reference that provides the author's institutional affiliation and address. Please use the footnote function of your word processing program; there are a variety of instructions available online for each program. The abstract should be indented 0.5" left and right from the margins, and should be in italics.

Indent the first line of every paragraph and the first line of every footnote; all first line indentations should be 0.5". Use only one space after the period of a sentence (word processors automatically adjust for the additional character spacing between sentences). The keywords should be formatted identically to the abstract with one line space between the abstract and the keywords. Authors should use keywords that are helpful in the description of their articles. Common words found in the journal name or their title article are not helpful keywords.

Pages should be unnumbered since they will be entered by the JoTLT editorial staff. We will also insert a header on the first page of the article, as above.

References should be incorporated in the text as author's name and date of publication (Coffin, 1993), with a reference section at the end of the manuscript (see below for the desired format for the references). Titles of articles should be included in the references in sentence case. Unless instructed otherwise in this Style Sheet, please use APA style formatting. Footnotes should incorporate material that is relevant, but not in the main text.

Plagiarism

It is essential that authors refrain from plagiarism. Plagiarism is a violation of ethics and, in serious cases, will lead to a manuscript being rejected by this journal. No future manuscripts will be accepted from authors who have submitted a plagiarized manuscript.

[1]Department of Educational Philosophy, Indiana University Northwest, 3400 Broadway, Gary, IN 46408, jdewey@iun.edu.
[2]Institut Pasteur, University of Paris, 75015 Paris, France.

Unique work

This journal does not accept previously published work. We also do not accept work that is being considered for publication by another journal. If your manuscript is accepted, you will be required to sign a form stating that your manuscript has not been previously published.

Section and Sub-Section Headings

Major Sections

Major section headings should be centered and bold-faced (i.e., Section and Sub-Section Headings as seen above). Major section headings should have one-line space before and after. The first paragraph(s) of the article do not require a major heading.

Sub-Sections

Sub-section headings should also be flush-left and bold-faced. Sub-section headings should have a one-line space before and after. Sub-sub-sections should appear at the beginning of a paragraph (i.e., with an 0.5" indent, followed immediately by the text of the sub-sub-section), with the heading also in italics.

Sub-subsections. Sub-Subsections of your manuscript should be formatted like this.

Tables and Figures

Tables and figures should be inserted in the text where the author believes they best fit. They may be moved around a little to better correspond to the space requirements of the Journal. If necessary, tables and figures may occupy an entire page to ensure readability and may be in either portrait or landscape orientation. Insofar as possible, tables should fit onto a single page. All tables and figures should be germane to the paper. Tables should be labeled as follows with the title at the beginning, with data entries single-spaced and numbered. Column labels should be half-line spacing above data. Please use the table functionality in your word-processing program rather than adding an image of a table from MS Excel, SPSS, etc. This allows for more flexibility in laying out the final print version.

Table 1

The title of the table

Unit	**Length, inches**
Point	1/12
Pica	1/6

Figures should have their captions follow the image. Captions should be single-spaced. The Editorial staff may adjust layout to allow optimal use of space.

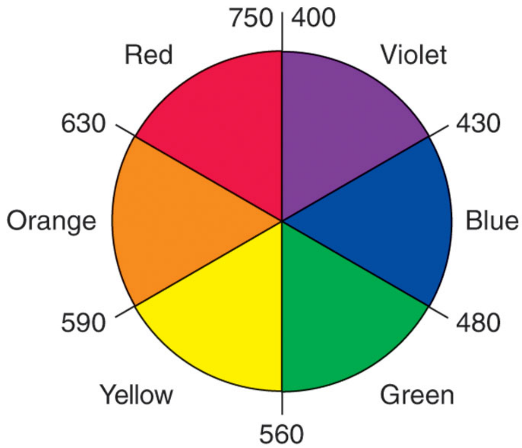


Figure 1. Color wheel with wavelengths indicated in millimicrons. Opposite colors are complementary.

Acknowledgements

Acknowledgements should identify grants or other financial support for this research by agency (source) and number (if appropriate). You may also acknowledge colleagues that have played a significant role in this research.

Appendix

Please insert any appendices after the acknowledgments. If your submission has only one appendix, this section should be labeled '*Appendix.*' More than one appendix will change the section label to '*Appendices.*' Each appendix should have a title; if you are including items from your class or research, please alter them to include a title. Appendices should be alpha-order (Appendix A, Appendix B, etc.) These labels and titles should be at the top of the page, left justified, italicized.

Appendix 1. The Title of the Appendix.

The content of your appendix will appear here.

References

Coffin, D. A. (1993). Using the competitive edge. *Journal of Economic Education*, *24*(1), 62-69.

Garcia, J., & Rodriguez, P. (2002). The determinants of football match attendance revisited: Empirical evidence from the Spanish football league. *Journal of Sports Economics*, *3*(1), 18-38. doi: 10.1177/152700250200300103

Hamilton, S. J. (1995). *My name's not Susie: A life transformed by literacy*. Portsmouth, NH: Boynton/Cook Publishers.

Pappas, D. (2004). Fixing the fan cost index: A more realistic view. Retrieved April 21, 2004, from http://www.baseballprospectus.com/article.php?articleid=2790.

Contact Info for the Journal

JoTLT Editorial Office

Indiana University Purdue University Indianapolis
755 W. Michigan St, UL 1180D
Indianapolis, IN 46202

jotlt@iu.edu

ISSN: 2165-2554