

37th annual Proceedings

Selected Research and Development Papers
Presented at The Annual Convention of the Association for Educational
Communications and Technology - Volume 1

aect

Sponsored by the Research and Theory Division
And
The Division of Instructional Design
Jacksonville, FL

Editor: Michael Simonson

Nova Southeastern University, North Miami Beach, Florida

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Volume 1: Selected Research and Development Papers
And
Volume 2: Selected Papers
On the Practice of Educational Communications and Technology

Presented at
The Annual Convention of the Association for Educational Communications and Technology
Sponsored by the Research and Theory Division
And
The Division of Instructional Design
Jacksonville, FL
2014

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Preface

Since 1979, the Research and Division of the Association for Educational Communications and Technology (AECT) has sponsored or co-sponsored the publication of these Proceedings. Papers published in this year's 37th Annual Proceedings were presented at the 2014 AECT Convention in Jacksonville, FL. A limited quantity of these Proceedings were printed and sold in both hardcopy and electronic versions. Volumes 1 and 2 are available through the Educational Resources Clearinghouse (ERIC) System. Proceedings volumes are available to members at AECT.ORG.

The Proceedings of AECT's Convention are published in two volumes. Volume #1 contains papers dealing primarily with research and development topics. Papers dealing with the practice of instructional technology including instruction and training issues are contained in Volume #2. This year, both volumes are included in one document.

REFEREEING PROCESS: Papers selected for presentation at the AECT Convention and included in these Proceedings were subjected to a reviewing process. All references to authorship were removed from proposals before they were submitted to referees for review. Approximately sixty percent of the manuscripts submitted for consideration were selected for presentation at the convention and for publication in these Proceedings. The papers contained in this document represent some of the most current thinking in educational communications and technology.

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1983	New Orleans	231337
1984	Dallas	243411
1985	Anaheim	256301
1986	Las Vegas	267753
1987	Atlanta	285518
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2001	Atlanta	470066
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2004	Chicago	499961 & 499962
2005	Orlando	499958 & 499963
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2007	Anaheim	499889 & 499896
2008	Orlando	504371
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Information Visualization in Students Eye: An Eye Tracking Study of Rising Sea Levels

Dalia Alyahya Suzan Alyahya

Keywords: eye tracing, information visualization, multimedia, cognitive processes, visual instruction, multimedia learning theory

Abstract

This presentation focuses on how learners' process information visualization by exploring the relationship between fifty undergraduate learners' performance and their viewing behaviors gained from eye tracking. Students' attitudes towards learning by using graphics, along with quantitative and qualitative results have been discussed. The results revealed a deeper understanding of how learners process visual information, and therefore assisted instructional designers in creating more effective visuals.

Background

Endless benefits are yielded through evaluating data that has been transformed into visual representations. Shepard (1967) found that the storage of visual information was far superior to that of verbal information. Visual instructions facilitate and transform learning by communicating larger amounts of information more quickly than text, while showing relationships among meanings and other various factors (Tufte, 1990).

Learners' use of complex visual information still needs to be investigated. Eye tracking techniques could provide a deeper insight into how complex information is processed by an observing eye movement and the distribution of visual attention, such as: where participants are looking (eye fixation), how long they focus on an object (fixation duration), and in what sequence they view information (viewing path) (Holsanova et al., 2011).

Richard E. Mayer has extensively researched hypotheses about the perceptual process used while learning from multimedia materials (Mayer 2010). He stated that, "eye tracking measures, such as total fixation time on relevant areas of an instructional graphic, can be successfully added to researchers' toolboxes as a way of testing hypothesis about perceptual processing during learning under different instructional methods," (Mayer, 2010, p. 169). In addition, eye tracking is a very valuable tool, as it helps to identify the information that is being processed quickly and automatically (Huber and Krist 2004; Scheiter & van Gog, 2009).

Since minimal research has been done on multimedia learning and eye tracking technology, several authors have suggested additional exploration of the topic to gain further understanding (Ainsworth, 2006; de Koning, Tabbers, Rikers, & Paas, 2009; Liu & Chuang, 2011; Schmidt-Weigand & Scheiter, 2011). Only a handful of studies have utilized alternatives to test scores as a means of studying the effect of visuals on learning (Liu & Chuang, 2011), and few have examined the process of information visualization of complex graphics without text. Moreover, Tufte's assumptions regarding the effectiveness of information visualization (Tufte, 1990, 2001) are not researched based, which make it worthy of additional research. This research focused on examining the learners' cognitive processes when viewing information and its relationship to their performance.

Research Questions

The purpose of this study was finding the relationship between learners' performance and eye fixation measures overall and for specific Area Of Interest (AOI). Also, this study seeks to create a more comprehensive understanding of how do learners view visual information and what is there attitudes toward graphics as a source of information.

Method

This study followed a mixed method design to obtain quantitative and qualitative answers to the research questions. The researchers employed multiple regression analysis to examine how eye fixation measures influenced learners' performance, and triangulation of data sources to validate the quantitative results. The dependent variable

here was learners' performance and the independent variables were the eye fixation measures which are fixation duration, number of fixation, and number of visits to a specific AOI. Eye-tracking visualization tools like heat maps and eye paths were used to examine how learners' view the visual information. Finally, personal interviews were conducted to explore the learner's attitude towards obtaining information from graphical content.

Subject:

This study was conducted at a university in the central region of Saudi Arabia, with a convenience sample of approximately fifty learners. Ten students were randomly selected for interviews from the total fifty learners.

Material

The researchers used the, "Rising Sea Levels," graph from McCandless's book (2009) to conduct the study. This graph predicted the flood impact upon cities in the event of an increase in sea level.

Procedure

Learners were approached in public areas on campus with minimal disruption. They were asked to participate for approximately ten minutes. They were given a cover letter and consent form, and after their approval, they began an eye-tacking calibration, and started the task. Upon completion of the task, they took a test. After the test, learners were randomly selected for an interview.

Results

The graph appeared on (Figure 1). Table 1 shows the descriptive statistics for graph fixations.

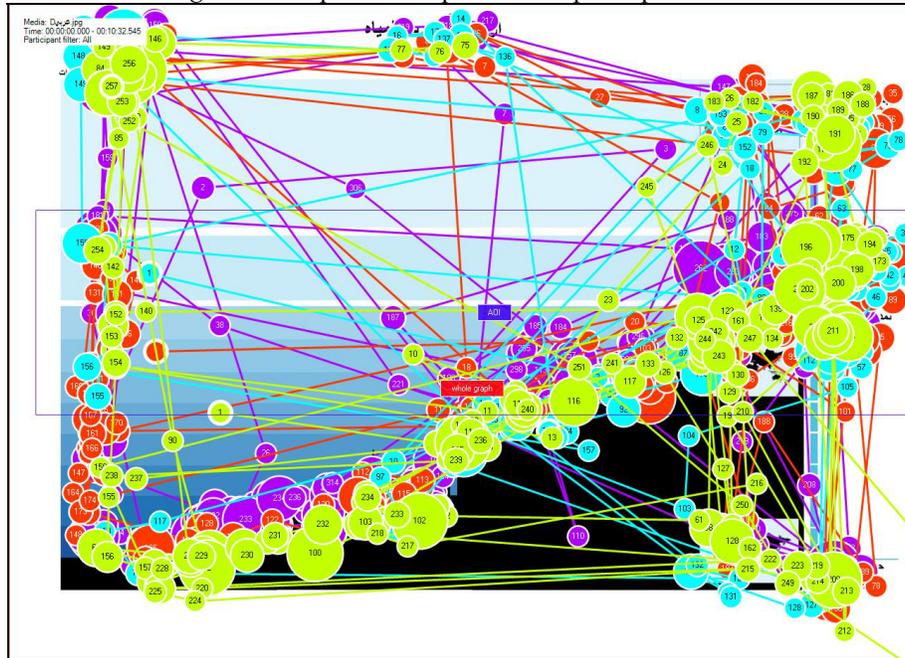
Table 1 Descriptive Statistics for the variables

Items	n	Mean	Std. Deviation
Performance	50	2.180	1.304
Number of Fixation on AOI (count)	50	116.100	89.463
Fixation Duration on AOI (in secs.)	50	0.355	0.079
Number of Fixation of whole graph (counts)	50	295.240	217.198
Fixation Duration of whole graph (in secs.)	50	0.353	0.079
Number of Visits to AOI (counts)	50	22.000	15.802

The results shows that there was no significant correlation between Performance and Fixation Duration of the Whole Graph at significance level , $R=0.015$, t statistics = 0.101 , and P -value = $0.920 > 0.05$. However, there was a correlation between performance and the number of fixation on the whole graph at the significance level , $R=0.291$, t statistics = 2.105, and P -value = $0.041 < 0.05$. Number of fixation and fixation duration for the AOI showed no relationship with the learners' performance. However the correlation between number of visits on the AOI and performance resulted in a significant correlation with $R=0.276$, t statistics = 2.204, and P -value = $0.042 < 0.05$. The two correlations were consistent with those from a number of earlier studies. However, those earlier studies showed stronger relations. (Liu & Chuang, 2011; Rayner, Yang, Schuett, & Slattery, 2013; Schmidt-Weigand, & Scheiter, 2011; Yang et al., 2013). It was assumed that the graph was easy to understand and learners do not need longer time to process information "Longer fixations are generally believed to be an indicator of a participant's difficulty in extracting the information from a display" (Jacob & Karn, 2003, p.585). Significant relationships were found between the performance and number of visits (p -value 0,042 0.050). When learners make more visits to the central area in the graph, there performance increase. Figure 1 shows the eye movement of learners, while comparing how the level of the sea changed through the years while going back and forth between the maps. The finding revealed that the time of fixation duration couldn't be predicted from the learners' performance. An explanation could be that the given graph was not complicated and required less processing time. Also, performance test measures specific number, which was hard to recall due to the high load of information visualization.

Figure 1 shows sample of scan path of the four participants view. The sample path supported comprehensions of individual participant's behavior through the plotted starting points, fixation location, and durational indicator. The learners viewed the picture as a whole and studied the picture's details. The graph shows that the learners spent more time on the right side of the picture due to the amount of information.

Figure 1. Sample of scan path of four participants view



In figure 2 the sample of scan path of one participant's shows that the patters of view was in two main directions, horizontal and vertical. This was due to the figure design of the information being arranged in the graph edges. This figure shows that the learners use compare and contrast to make meaning of the graph. This can be seen in the horizontal and vertical lines. Some variables needs more time to understand than others. This can be seen in the verity of circles size.

Figure 2. Sample of scan path of a participant view

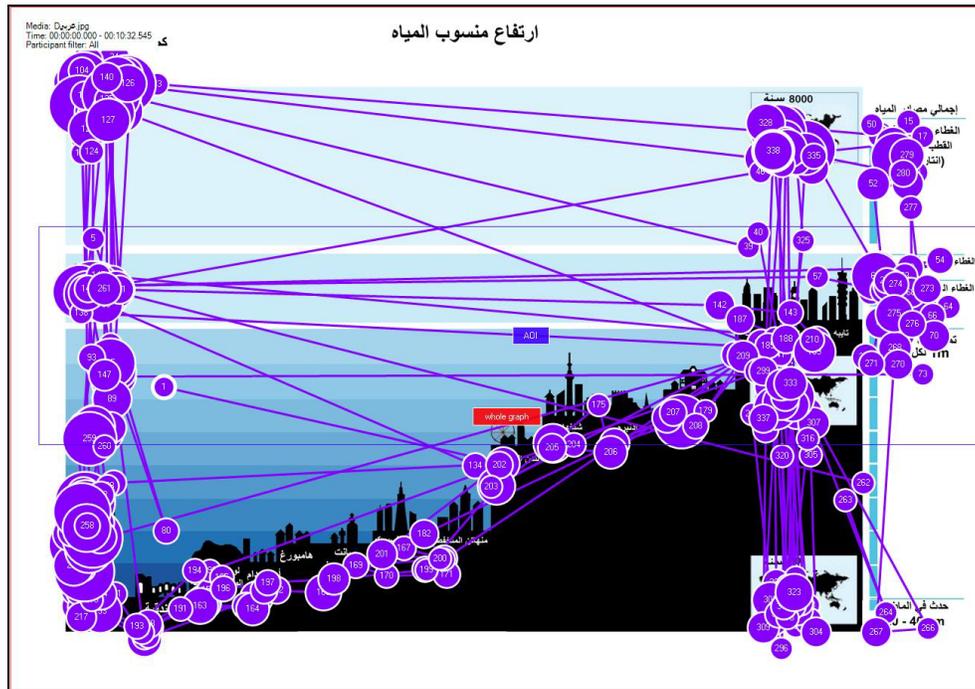


Figure 3 shows the heat map of the participants view. Heat map indicated the highest viewed area by distinguishing it in a distinct color which is on the right side of the sea level graph. As Jacob and Karn (2003) stated, “the number of fixations on a particular display element (of interest to the design team) should reflect the importance of that element” (Jacob & Karn, 2003, p. 585). In Figure 3, the colors Red, Yellow and Green represents the most, normal and least important areas viewed by the participants respectively.

Figure 3. The heat map of the participants view

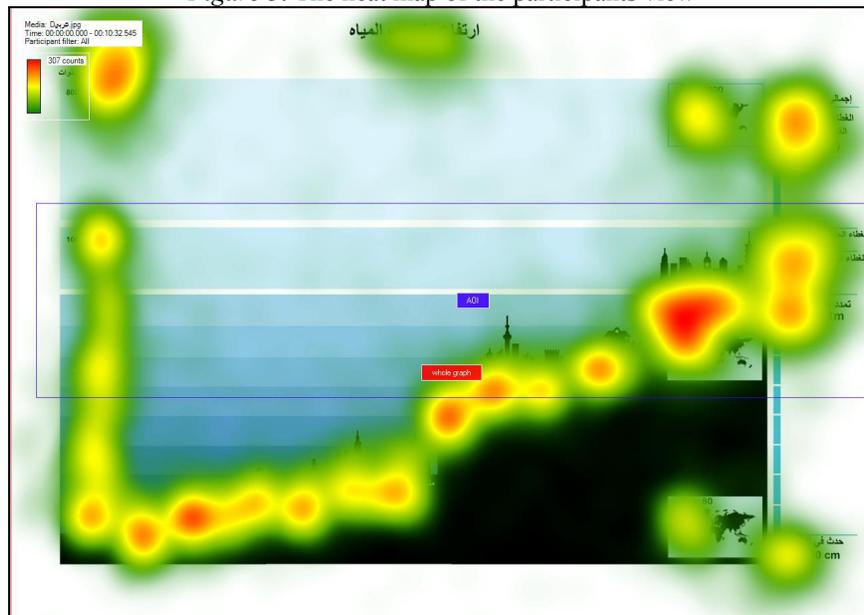
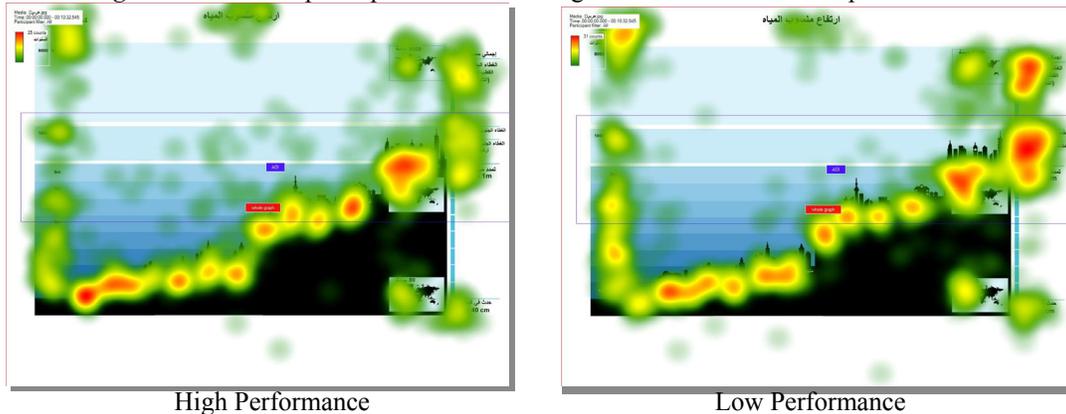


Figure 4 shows a comparison between the highest five grades and the lowest five grade students heat maps. Heat maps shows a higher attention on different information for the higher grade learners than the lower grade learners. Furthermore, higher grade learners has less attention on the middle part of the map that has less information than the lower attention learners. This is consists with what Rayner (1998) points out that longer fixation duration are generally indicative of more extensive processing which does not correspond to the current study.

Figure 4. A heat map comparison between highest and lowest students performance.



Moreover, Learners found the Rising Sea Levels graph interesting and fun for studying. Also, learners' attitude indicated that they found graphics helpful in understanding the information "I understand the graph quickly and easily", "I like to see the information visually, I can remember it for a longer period of time". Also learners thought that the graph helped them to remember the information and recall it easily, "I do not remember every single city, but I got the main idea about how sea level affects the earth", "I can remember some of the main cities like New York", "and the graph is there in my mind, I can recall it". However some learners indicated that the concept is complicated, "it is hard to remember everything, and there is so much information". This concludes that the learners form two levels of understanding, the conceptual idea and the specific information such as the city name. Moreover, the graph has helped the learners to recall information and easily understand the concept.

This study is focused upon information visualization graph with complexity in order to measure learners' performance and explore their attitude. However it is recommended to conduct further qualitative studies based upon multiple images with different levels of complexities. It will provide more detailed understanding of cognitive multimedia learning, learner experiences and learner perceptions. Furthermore, additional studies can be carried out to measure analytical abilities through visual information of groups based upon gender, IQ (Intelligence Quotient) and educational qualifications.

The possibilities of research studies with these instruments are unlimited. Studies that explores cognitive activities on Complex charts, graphs and maps, differences between general images, images with voice overs and images with interactivity will be beneficial for the designers and developers to prepare more appropriate graphical content. Further studies needed related to multimedia learning based on color coding while designing instructional material and diverting learners' attentions to a defined area of interest. It will provide firm background and guidelines for the instructional designers and developers to develop effective multimedia enriched pedagogical agents that communicate efficiently with the learners.

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Interactive Ebooks as a Tool of Mobile Learning for Digital-Natives in Higher Education: Interactivity, Preferences, and Ownership

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Abstract

As usage of mobile technologies for academic learning became popular, it is important to investigate the advanced features of interactive eBooks to develop effective interactive learning content. It will ultimately introduce instructional designers and eBook developers to relate interactive eBook features to its cognitively relevant characteristics. It is also important to identify the student learning preferences as learner characteristics to help instructional designers properly implement eBook and target their audience. This study investigated the eBook learning preferences of the student community at King Saud University by conducting surveys throughout the Preparatory Year Campuses. In this paper the data from 387 valid responses were collected and analyzed using SPSS22 software, and the results of student survey are shared, which provide insight factors such as availability of appropriate framework for implementation of interactive eBooks and learner preferences for interactive eBook features.

Introduction

The time frame characterized by the existence of digital technology is known as Digital Era and Digital Natives are people who were born after the extensive usage and adoption of digital technologies. It doesn't refer to a particular generation but to the children who have grown up using these technologies like Internet, Computers, and Smart-mobiles. Although the advancement in technology has facilitated today's learners to use various types of mobile tools for learning throughout the globe, the student community is the major user of the latest mobile technologies across Saudi Arabia. As digital natives, they follow the modern social media trends and are likely to have different expectations and behaviors towards the use of mobile technologies for learning. Al-Fahad (2009) noted that students at King Saud University, Saudi Arabia, demonstrate positive attitude and perceptions towards mobile learning. He described that "They changed from passive learners to truly engaged learners who are behaviorally, intellectually and emotionally involved in their learning tasks" (p. 118).

Currently, pioneering technologies like interactive eBooks together with Smartphone & tablet devices are the essential tools for m-Learning. The development of eBook content optimized for mobile devices can result in better learning outcomes. One popular technique is to include interactive features that will keep learners motivated and engaged throughout the learning process. Most of the time, this involves adding interactive elements like graphical content, audio-visual content, animations, interactive infographics, online video streaming, interactive 3D elements, live polls, quizzes, and multiple types of questions. According to Zajac (2009), letting learners identify their own learning style, and then giving them an opportunity to match activities to their preferences will help them significantly, as they are individuals and hold their own learning preferences, strengths and skill sets.

Many software tools including HTML5, enhanced interactive features of eBooks to its highest extent. With the advancement of technology in mobile devices such as Smartphones and Tablets, it is now possible to embed these features into eBooks. Currently, it's a trend among individuals to own high-end mobile devices and use most of its prominent features. Most people are aware of these technologies and students are no exception. As (Figure 1) shows, Global Web Index (2013) report states, Saudi Arabia ranked first in the highest twitter using countries. Mobile devices are highly adopted in Saudi Arabia, affecting the increased use of mobile applications such as twitter & Facebook.

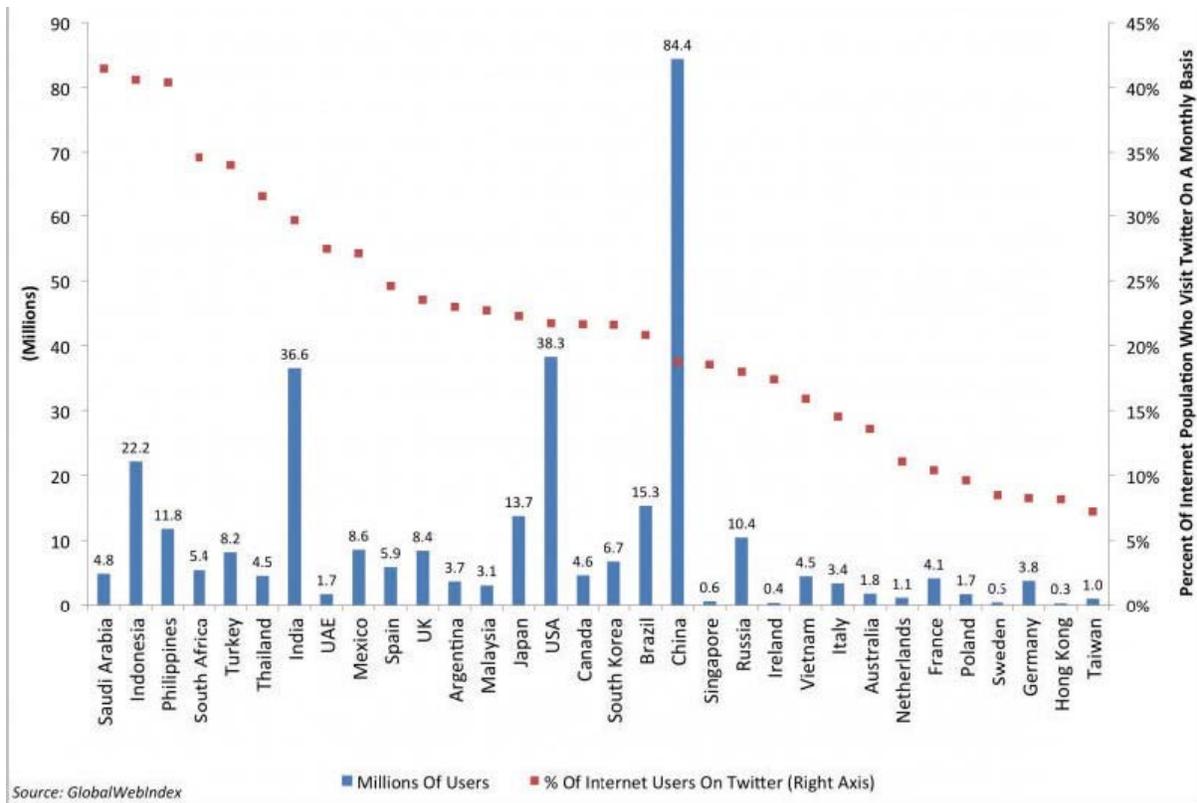


Figure 1: Countries Ranked in Order of the % of Twitter users in their Internet Populations

Higher education in Saudi Arabia aims toward developing and adopting m-Learning in academic delivery (KSU Library & NCEL, 2014). Interactive eBook is one of the on-demand m-Learning solution which has greater flexibility and accessibility than paper-based text. The multimedia-enriched visual appeal has the potential to integrate various supportive materials for personalized learning. Still, it's not been completely adopted by institutions as essential learning tools. It is important to have a full-fledged framework for the development of interactive eBooks, which offers exceptional features like interactive multimedia, assessments, progress reporting etc. Strategies like Gamification and Storytelling can also be integrated into Interactive eBooks to revolutionize the eBook learning environment.

Furthermore, in order to help instructional designers and eBook developers to implement effective interactive learning content, it is essential to investigate the importance of eBook features and how it can enhance learning, along with the availability of appropriate framework, learning preferences as learner characteristics while using interactive features of eBooks. The term "Appropriate Framework" refers to the student device ownership and the knowledge of using technology and its supporting infrastructure like Computers, Internet, and Smartphones etc. To accomplish successful implementation of interactive eBooks, it's important to understand the present learning environment and identify the level of intervention required.

Literature Review:

The present eBook development is aimed primarily to digitize printed works rather than to develop and use the new technology to support learning (Coyle 2008). Hence, many researchers (Berg, Hoffmann & Dawson, 2010; Bierman, Ortega & Rupp-Serrano, 2010; P. Lam, S. L. Lam, J. Lam, & McNaught, 2009; Pattuelli, & Rabina, 2010; Woody, Daniel, & Baker, 2010) have investigated to integrate eBooks into academic learning. Generally users prefer to interact with resources and have functionality to which they have become familiarized in their eBook experiences (Bierman et al. 2010). However, according to the results of these studies both teachers and students believe that current eBooks are not ready to be used as printed books. Unlike printed books, the eBooks should be developed using a more constructive design to build virtuous user experience (Woody et al. 2010). The concerns of usability and functionality therefore became essential for wider adoption of eBooks, especially in academics (Berg et al. 2010).

According to Huang, Liang, Su and Chen (2012), the response from 166 elementary school students shows that the eBook has more preference than printed book in terms of usability and functionality. Korat (2010) conducted many studies on children with eBook reading and emergent literacy which includes vocabulary, word recognition and phonological awareness. The results shows that all the students' vocabulary, word recognition and phonological awareness were improved by reading eBooks. (Korat 2010; Korat & Shamir 2007, 2008; Segal-Drori, Korat, Shamir & Klein, 2010; Shamir, Korat & Barbi, 2008). Grimshaw, Dungworth, McKnight, and Morris (2007) found that multimedia enriched content in eBooks, such as narration along with animated pictures and sound effects shows improvement in children's reading.

Haiguang, Chenzhu, Pan and BaoCong (2012) says "Learners are acquiring more knowledge than before and that requires flexible learning method to limit time and improve efficiency. Mobile learning is which use fragmented time to learn in a self-regulated way. Learners will not passively accept information from others, but to choose learning content according to their own needs and learning goals." (p. 1337). Students are using mobile devices in their personal lives in ever-increasing, creative ways. They will begin demanding learning and productivity applications at colleges, if they haven't already.

Research Questions

This study aims to identify the students learning preferences as learner characteristics to suggest the importance of interactive eBooks in Higher education while demonstrating the existing framework, prior knowledge of its usability and device ownership. In order to achieve the above described objective, the Researcher has conducted this study to answer the following research questions.

- 1 Are students reading and interacting significantly more with Social media enabled mobile devices than before, as interactive features became handy?
- 2 What are the student preferences of interactive eBook features?
- 3 Does the student ownership of the mobile technology form an appropriate framework for implementing m-learning environment?
- 4 Which of the eBook features are capable of resembling a face-to-face learning activity from students' point of view?

Participants:

The survey was distributed electronically to the Preparatory Year students at King Saud University. The number of students at PY, KSU are approximately 12000 students distributed among 5 Campuses. The survey was developed & distributed to participants via University email ID through an online survey system. The initial targeted population was 12000 students, but due to the exam preparation constraints a very less number of responses were experienced. Therefore 387 complete responses have been used. To ensure the privacy of the participants, the survey was conducted anonymously.

Materials:

The eBook features survey was developed and derived from the literature as well as eBook features supported by eBook development software. Even though the participants may or may not have ever used an Interactive eBook, the researcher asked them to study each feature and rank its importance and whether they are resembling the in-class face to face learning activity. Although these two are different in nature, the Researcher's aims to enquire about student perspectives on the similar activities that takes place in both environments.

The survey item includes a 5 point Likert scale questions that ranges from "strongly disagree" to "strongly agree" which holds lowest rank to highest rank respectively, For example, "I prefer to use eBook exercise activities". Also, "yes/no" type questions were used. For example "Do you have a smart device?". The complete survey items were developed in Arabic Language, as it is the primary and official language of Saudi Arabia.

Procedure:

A survey was developed by reviewing the literature and eBooks development software tools and its features. Then it was submitted to a review panel of three professionals in the field of educational technology. A Cronbach's alpha was conducted for reliability testing. During the fall of 2014 semester the survey was distributed to approximately 12000 enrolled students via online survey system. Although the target population was 12000 students, the survey was distributed during Final Exam preparation week, where less number of students access their University Emails which is the only delivery method used. Thus the responses collected were approximately 700.

The survey was developed and distributed using online survey system. After conducting the survey the data was downloaded and analyzed using SPSS statistical software.

Results & Discussion

The survey was conducted using electronic survey system and out of approximately 700 responses from Preparatory Year students, 387 valid responses were used for analyzing the survey data. The analysis was done using SPSS statistical analysis software. To identify existing framework, learner preferences, and device ownership the frequency analysis has been used.

Framework: In order to investigate the prior knowledge and readiness of the infrastructure for implementing e-learning the researcher asked questions related to device ownership and usage. The data indicated that, 100% of the Preparatory Year students use Smart devices along with Social Media apps like Twitter, Facebook and WhatsApp, out of which 88.6% of them uses either Android or iOS based Smart devices which are prominent e-learning platforms. Rest of the 11.4% uses Blackberry, Windows and other Operating Systems as their mobile platforms. This high percentage of Smart device ownership facilitates recurrent usage of mobile Social Media apps which adds support to earlier finding of Global Web Index (2013) report indicating Saudi Arabia being ranked first among Twitter using countries. 94.3% of the sample have been using these devices for more than one year and a total of 90.4% already uses it for academic purposes. Internet availability is wide spread throughout Saudi Arabia with its leading mobile operators. Thus 100% of the students have access to public or private Internet, and 94.8% of the sample reported that they have private Internet service.

Learner Preferences: Although students may or may not have used interactive eBook earlier, the researcher asked them to provide their perceptions about the interactive eBook features which were described by their definitions.

Interactive eBook feature (N=387)	Rank	Percentage
Bookmark: Bookmarks stores page or section information of the eBook for future retrieval.	1	93
Local and web search: Users can search for information within the eBook, or search over internet.	2	92
Table of Content: It is an Index of the eBook that allow the user to open a specific chapter or topic.	3	89
Portable: The user can download it and easily carry it anywhere anytime with-in their Smart devices.	4	89
Interactive Images: It is a graphical image that provides additional information of its parts (areas) upon the user interaction.	5	89
Multimedia: Audio visual content or Multimedia based content, in an eBook allows user to watch videos or animation to learn topics effectively.	6	89
Highlighting and Note taking: The user can highlight the content or take notes which will be available as Study Cards for easy one point access for future reviews.	7	89
Content Sharing: Sharing allows users to exchange knowledge of an eBook through Social Networks.	8	89
Image Gallery: It is a set of related Graphical Images of a certain topic.	9	88
Interactive 3D virtual graphics: It is a Graphic image virtually demonstrated in 3D. It can be viewed in multiple angles upon the user interaction. Example: DNA, Atomic models, Chemical Structures etc.	10	87
Word Wrap: It allows the eBook to rearrange its content according to the device orientation and screen size.	11	87
Assessment: User can assess and evaluate their learning process by using interactive objects such as multiple choice questions, matching, identifying an object in an Image and so forth.	12	85
Dictionary Integration: It displays dictionary reference of a selected word with-in the eBook.	13	84
Flexibility: eBooks are flexible enough of Updating & Appending the learning content.	14	84

Interactive: Provides interactive learning objects such as games, image galleries, 3D Graphic images, videos, assessment tools, and web forms which allows users to interact and exchange information with the eBook.	15	84
Text to Speech: It allows users to listen to the selected text through the device speakers.	16	83
Simulator: Simulators in eBooks recreates real time environment to provide hands-on experience for Software, Anatomy, Surgery and astronomy etc.	17	82
Feedback: User can participate in online feedbacks, surveys in the eBooks, which will submit their views, experiences and suggestions to the development team	18	80

Table 1: Learner preference about eBook features.

Note: The survey has these definitions in Arabic Language.

The analysis of this study revealed that the least preferred feature is Feedback and it holds an 80% of preference, where the most preferred feature is Bookmark which holds 93% of preference. The variation between the most preferred and least preferred features is about 13%. This variations implies that students being digital natives have the knowledge and skills to use these features. However, it has been observed that the generic eBook features (without much interactivity) are most preferred by students, and most recent intuitive features are less preferred. It may be due to the lack of prior knowledge of their usability, feeling attached to it and their lack of understanding in their offerings. Thus features like Bookmarks, Searching and Table of contents became most preferable which are very common in every format of eBooks regardless of interactive or not. And features like Assessments, Text to speech, Simulators and Feedback became less preferable which has potential to revolutionize the concept of eBooks and bring them to an advance level.

Learner Preferences about eBook features

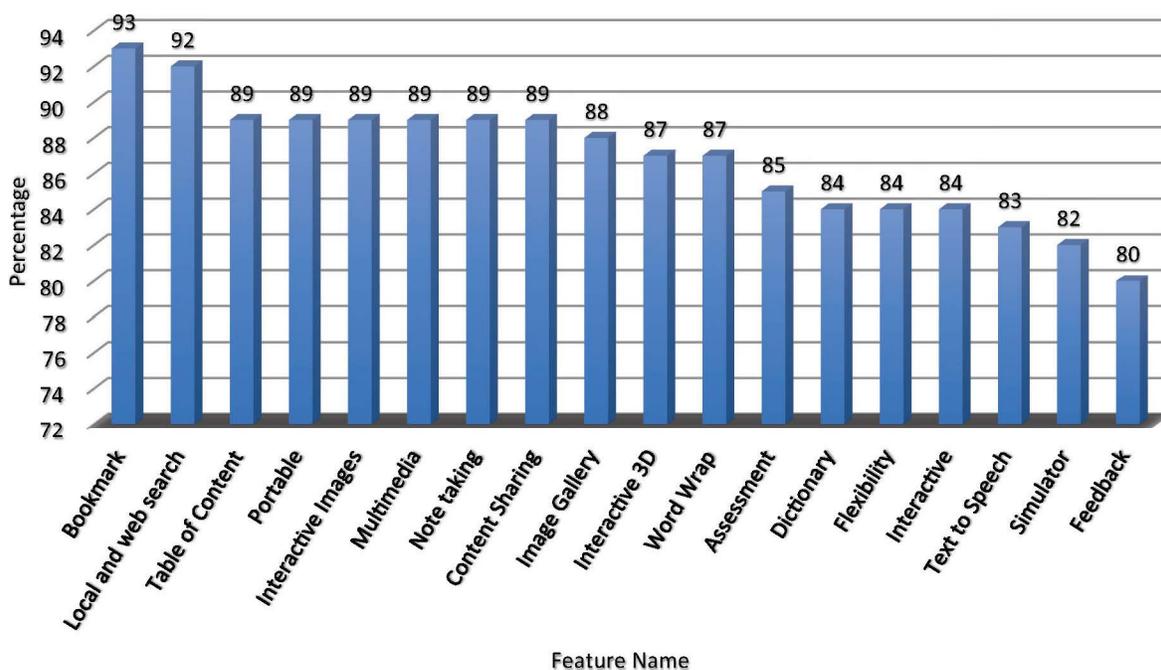


Figure 2: Learner preferences about eBook features

The advancements in technology leads to the development of tools to perform human like activities. This motivated the researcher to investigate, how far these tools are effective, how efficiently they can be used and learners observations about these features, when compared to the face-to-face learning in order to facilitate the development to match the learner characteristics. Following table describes the outcome of the survey items that are targeted to compare the resemblance between interactive eBook feature and face-to-face learning activity. These

items are collected on a 5 point Likert scale in which “Strongly Agree” has the highest degree and “Strongly Disagree” has the lowest degree of preference, and are ranked according to the Agreement percentage.

Rank	Activity Comparisons	Strongly Disagree %	Disagree %	Neutral %	Agree %	Strongly Agree %
1	It is convenient to carry Portable interactive eBooks in one device?	1.3	5.4 9.0	28.4	55.8	
2	I can learn from replaying the Audio Visual content of Interactive eBooks as classroom lectures?	1.6	7.5	9.6	33.3	48.1
3	Interactive 3d, Image Gallery, Images gives me in-depth knowledge of graphical instruction as the Graphics and drawings used in the classroom?	1.6	4.4	9.6	38.5	46.0
4	The Quality of the information of Web search feature is as same as the classroom information?	2.3	8.3	13.4	35.4	40.6
5	Instant results and other tools of Interactive eBook Assessment helps me evaluate myself accurately, as effective as the traditional classroom assessment and feedback?	1.6	12.1	23.0	27.4	35.9
6	Sharing the Interactive eBook content over social media provides me reviews and suggestions as the classroom discussions?	2.8	11.1	14.5	38.0	33.6
7	The Simulators of Interactive eBooks provides me practical knowledge as the classrooms activities?	2.8	11.9	18.1	35.1	32.0
8	Highlighting and Note taking (Study Cards) in Interactive eBooks is as easier as taking class notes?	5.9	26.9	15.5	26.4	25.3

Table 2: Learner perceptions about similarities between eBook features and in class activities.

Note: These compared activities are extracted and translated to English language, as the original language used was Arabic.

Device ownership: The analysis of this study also shows that approximately 90% of the participants are using either Android or iOS based mobile devices. It is very important for the interactive eBook developers to focus upon the platforms they are targeting for. Generally these interactive eBooks are packaged in ePub format which is widely used by most of the platforms backed by their devices. But to utilize the strength of a platform or device, these eBooks can be fine-tuned to perform at its best. It’s also known that some of the platforms doesn’t support some of the very important features, for example, Apple’s proprietary eBook development tool doesn’t fully support Arabic language. In these situations the developer can go for the development of third-party tools to integrate these features into the platform. This study also shows that 100% of the participants has access to public or private internet. This is helpful for the developer to proceed without worry to the development of more internet based features of interactive eBooks. For example, features like Feedback & Progress Reporting, Assessments and Interactive Animations can be developed which make the eBooks more interactive and outstanding.

Conclusion

This study is significant as it examines the interactive eBook features which are rarely explored, and also acknowledges the available landscape and the gaps to form a baseline to move forward. In this study the researcher has investigated the learner preferences, device ownership and available framework. He found that learners gave more preference to the features they already know. Most of the latest and far more advances features are less preferred as they are new and unfamiliar. This supports Zajac’s (2009) statement saying, learners are individuals

who hold their own learning preferences, strengths and skill sets. Letting them identify their own learning style and match their activities to their preferences will help them significantly. Thus it is suggested that, conducting this study with proper training of the usage of interactive eBook features may result in more appropriate and different sets of results. As with any other study, this study also has limitations. And one of the limitation here is, since some students had not used an interactive eBooks before, they had to make guesses on several answers. The researcher argue that it is that general lack of understanding about interactive eBook features that makes this study worthwhile.

The recommendation here is to conduct similar studies which will have focus upon groups divided according to the major field of graduation, prior knowledge, owned device and compare the preferences between trained and untrained learners of interactive eBooks features. Furthermore additional studies can be carried out on features that grab the attention in terms of look and feel, interactivity and responsiveness.

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Recognition of Prior Learning Occurring in Online Informal and Non-Formal Learning Environments: The Case of Higher Education in Turkey

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Introduction

70-90% of individuals' daily formal education learning takes place in informal learning environments like home, job or communities (Latchem, 2013). As Recognition of Prior Learning (RPL) provides new opportunities in different contexts by highlighting the importance of knowledge and learning acquired from online informal and non-formal learning environments, the supremacy of formal education has started to be challenged lately. Policy and research in RPL is often premised on the notion that learning from experience can be made equivalent to academic learning (Shalem and Steinberg, 2002). Although varying in higher education field throughout the world in terms of its online implications, as in the rise of Massive Open Online Courses (MOOCs) and Open Educational Resources (OER) movement, RPL has been an important part of higher education policy for a long time with a rising interest. Besides, regarding the fact that social networks support various learning types as well as innovative educational practices, their potentials in informal and non-formal learning have come into focus (Lucas and Moreira, 2009). When we look at the scope of the PLR practices in the world, it can be seen that there are mainly two types of RPL: Credit Transfer (CT) and Prior Learning Assessment and Recognition (PLAR). Additionally, assessment, accreditation and recognition of prior learning suggests the process of confirming adults' prior learning in a variety of informal or non-formal contexts, with emphasis on learning taking place outside formal educational institutions (Stenlund, 2010). This process of 'making learning visible' (Bjornåvold, 2000) has been given different names in various countries. As an example, in the UK, the accepted term is accreditation of prior (experiential) learning, in the USA and Canada it is prior learning assessment (although Canada rarely uses accreditation of prior learning) and in Australia, New Zealand and South Africa the term recognition of prior learning is used. Even if the concept varies, the general idea behind these concepts can be summarized as recognizing and acknowledging individuals' skill and experience regardless of how and where it is obtained. Recently, many worldwide organizations, commissions and enterprises have made emphasis on the RPL. Although Turkey is a member of one these enterprises, namely European Higher Education Area, and the recognition of prior learning is the main means to promote lifelong learning in Turkey, there has been little or no improvements with this regard mainly due to the legislation's not allowing recognition of informal and non-formal learning officially (Ömer, 2009; Lafont and Pariat, 2012). As an example, in foreign language education discipline prior learning is recognized and assessed while in many other disciplines it is not. With this in mind, the purpose of this study is to discuss the RPL types and degrees to which RPL is accomplished. Moreover, the study reviews the related key implementation issues deriving from the concerns in higher education in Turkey and proposes possible solutions within the scope of recognition of prior learning taking place in informal and non-formal online learning environments.

Literature Review

What is Prior Learning?

UNESCO defines prior learning as "the formal acknowledgement of skills, knowledge, and competencies that are gained through work experience, informal training, and life experience" (Vlăsceanu, Grünberg, & Pârlea, 2004, p. 55). According to Gambescia & Dagavarian (2007), there are five categories of prior learning:

1. Awarding transfer or awarding of credit from a regionally accredited institution – This is the most common type of prior learning credit award. Basically it is a transcript review of learning from another institution. Institutions accept in "good faith" with the understanding that courses may not be absolutely equivalent to their own but they are of equivalent value.
2. Awarding transfer or awarding of credit for advanced standing from an accredited (but not regionally accredited) post-secondary institution for formal documented learning at the college level. This is basically

the same as the first, but often involves a non-regionally accredited institution such as a seminary, or a technical or professional school, etc.

3. Awarding of credits through course challenge exams sponsored by department. This enables students to take an exam to advance more quickly to another level of learning.

4. Awarding of credits by taking nationally recognized standardized exams that assess content knowledge of college-level courses such as College-Level Examination Program (CLEP), DANES Subject Standardized Tests, Advanced Placement Exams (AP), etc. This is a very common approach in adult completion undergraduate programs. Students take these exams at scheduled, proctored sites and the scores are then used by the institution to indicate college-level course knowledge achievement.

5. Awarding of credits for formal and well-documented training programs conducted by non-collegiate sponsors such as tests, certification examinations or certificates that are recognized by, for example, the American Council of Education, for which the institution may choose to award credit or advanced standing. That decision is entirely based on the institution and is not required by any state or federal regulations.

6. Awarding of credits from assessment of prior learning gained from work/life experience. This often takes the form of a portfolio or experiential reflective essay or a set of documentations in which the student assesses his/her learning and demonstrates that it meets substantive college-level course learning.

Recognition of Prior Learning (RPL)

There has been an increasing understanding that learning from experience, gained in a variety of informal or non-formal environments including work and society, should be more largely recognized and valued, especially in educational institutions (Castle & Atwood: 61). Additionally, university-level learning can take place outside the formal educational institutions and this learning can be expressed and evidenced and should be formally recognized (Alexandre, 2014).

Why is it important?

As Stenlund (2010) states a lot of effort has been put into the development of procedures to assess prior learning, regardless of whether the learning has taken place in formal, informal or non-formal settings. However, considerably less consideration has been given to research in this area. Additionally, the formation of systems for the recognition and validation of all forms of learning, regardless of their environment, has become one of the significant topics in all parts of education and training. The importance of learning that takes place outside of the classroom can be mainly categorized for learners and educational institutions. For learners it has the following benefits (Wynne, 2014):

- Facilitates access for 'non-traditional' students - people who may not have the opportunity to do further study can obtain higher qualifications
- Acknowledges value of learning outside a formal setting, e.g. values and recognizes learning in the workplace
- Validates the worth of learning students have achieved by themselves
- Enables progression to other programs of study
- Eliminates unnecessary repetition and duplication of material already familiar to the student. Public (and private) money is better used because people who already have skills and knowledge are not re-trained.
- Shortens the time necessary to earn a qualification - this motivates students who might otherwise be discouraged by the length of time required to complete a college level course or a particular program of study
- Enhances students' pride and self-esteem for what they have accomplished as learners
- Enhances students' perception and understanding of learning as a lifelong process

For higher education institutions it,

- increases institutional efficiency by eliminating the need for unnecessary training
- increases student recruitment and retention
- allows for more appropriate learner placement in programs
- increases accessibility to a broad range of learners
- provides an important service for business, community and industry

Retrieved from <http://www.rrc.ca/index.php?pid=658> on 12.05.2014)

Learning Types

In order to have a better understanding and sight into RPL, it would be beneficial to have a look at different learning types.

Online Learning

Both in definition and practice, open and distance learning (ODL) has become identical with modern models of program delivery that offer more generous open and flexible learning opportunities to wider and more different individuals than traditional classrooms provided (Conrad, 2008). Thanks to the rapidly developing Internet and Communication Technologies (ICT) and initiatives like Open Educational Resources (OER) and Massive Open Online Courses (MOOCs), access to any information has become extremely easier. While this is the case, it is common for learners to fully make use of the flexibility feature of online learning which enables individuals to acquire knowledge. As a result, it becomes inevitable for learners to demand recognition of their online acquired knowledge, which can be under the term prior learning.

Life-Long Learning

According to the European Commission, lifelong learning is defined as "all learning activity undertaken throughout life, with the aim of improving knowledge, skills and competence, within a personal, civic, social and/or employment-related perspective." From this definition, there is an emphasis on the continuation of the learning process through out one's life. With this in mind, it is clear that learning is a never-ending process and thus there is certainly an organic link between lifelong learning and recognition of it.

Formal Learning

According to OECD definition, formal education is defined as "education provided in the system of schools, colleges, universities and other formal educational institutions and that normally constitutes a continuous ladder of full-time education for children and young people, generally beginning at age 5 to 7 and continuing up to 20 or 25 years old or above." This learning type is probably the least problematic type in recognition of prior learning simply because it is fulfilled within a formal context (e.g. schools or universities) and offers an accredited certificate or diploma, which makes the recognition process easier compared to other learning types.

Informal Learning

Informal and incidental learning is at the heart of adult education because of its learner-centered focus and the lessons that can be learned from life experience (Marsick and Watkins, 2001). Informal learning is usually intentional but not highly structured. Self-directed learning, networking, coaching and mentoring, can be given as examples. Informal learning, which should be regarded as the ancestor of formal learning, shouldn't be considered as a lower form of learning. Furthermore, it needs to be seen as fundamental, necessary and valuable type of learning occurring in everyday life contexts. (Coffield 2000)

Incidental Learning

Incidental learning almost always occurs although people are not always conscious of it (Marsick and Watkins, 1990). Although there exists a slight difference between informal and incidental learning, according to a research conducted by Callahan (1999) informal and incidental learning show similarity in practice in many cultures and contexts such as the private and public sectors, hospitals and health care, colleges and universities, schools, professional associations, museums, religions, families, and communities.

Non-Formal Learning

According to the OECD definition, non-formal education is defined as any organized and continued educational activities that do not match exactly with the definition of formal education. Non-formal education may therefore occur both within and outside educational institutions, and serve to learners from all ages. Depending on different countries, it may vary in its coverage. Non-formal education programs do not necessarily follow the hierarchy system, and may have a differing time length.

Since recognition of non-formal and informal learning touches on many different issues within the education system, although the term 'recognition' is a single word, its meaning is not. The main goals followed through the process of recognition of non-formal and informal learning differ according to the individual and country, from exemption of all or a part of the entry requirements for a formal learning program, to the awarding of a full qualification (Werquin, 2008).

Personalized Learning

According to the US Department of Education, personalized learning is defined as adjusting the pace (individualization), adjusting the approach (differentiation), and linking to the learner's interests and experiences. Personalization is more than just individualization or differentiation because it allows the learner a degree of choice about what is learned, when it is learned and how it is learned, which is often expressed as learning 'any time, any where or any place'. This should not be regarded as unlimited freedom, because learners will still have targets to be accomplished. However, it has the advantage of providing learners the opportunity to learn in ways that suit their individual learning styles. Hargreaves and Shirley (2009), however, warn about potential negative aspects of some dimensions of personalized learning. As an example they state that although it is ok for learners to be able to access information instantly online, this process should not be regarded as a deep, critical and meaningful learning. Personalized learning can take place in collaborative activities, for example a group of learners working together to study a particular topic, which can be stated as the one of the targets of connectivist Moocs. ICT can be a powerful tool for personalized learning as it allows learners to do research and enables them access to information, and provides a method for communication, discussion, and recording learning achievements. The general discussion is that there has been much focus on technological tools rather than the spirit of personalized learning. However, all of the different parties of this discussion on personalized learning come to a consensus that formal learning environments should become more flexible and adaptive in responding to the diverse needs and interests of students.

Current situation in some parts of the world

Recognition of Prior Learning can be analyzed mainly under two institutions in the US: Community Colleges and Universities. Two-year community colleges typically function for adult students who are generally excluded from the educational system. These colleges are also places where many community workers find a place for their higher education. For these people, prior learning is valuable for access and credit. Community colleges believe that adults are life-long learners who actively build knowledge from experience; and therefore, assessment of prior learning for credit is an integral part of their educational process. Many community colleges have special courses that help guide students through the process of identifying, documenting and assessing their prior learning. Universities in the US typically have different implications in the process of recognition of prior learning. The main idea is that, they generally get applications from the learners and assess the applicants with some extra supportive courses, trainings or workshops prior to accrediting or accepting (Alexandre, 2014).

According to the OECD Report (2010) recognition of prior learning plays an important role in a number of countries by offering validation of capabilities to simplify entry to further formal learning process. This generally includes exemption from certain coursework or parts of a formal learning environment. It also allows learners complete formal education more quickly, efficiently and cheaply by not having to enroll in previously taken courses (Werquin, 2008). In the same report, it is also stated that, although the 22 countries, which contributed to the study, are very well aware of the importance of RPL, they generally differ in their applications and policies regarding it. Moreover, there has been little or no research on this specific area and thus both countries and educational institutions are seeking for frameworks on RPL. The following figure would provide a graphical view of the present situation of some of the countries.

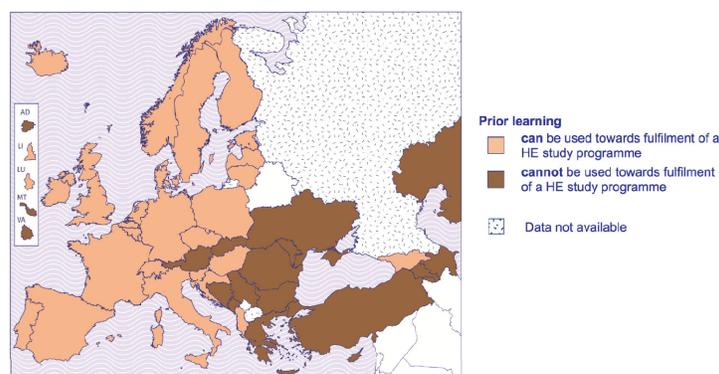


Figure 1. Recognition of prior non-formal and informal learning for progression in higher education studies, 2010/11, European Commission Eurydice Overview

Discussion and Conclusion

When looking into the related literature on RPL, related issues can be categorized under *accreditation*, *research* and *policy*. First of all, educational institutions are generally reluctant in accrediting prior learning. Although today's learners, especially adults, learn in various ways throughout their lives, their social skills develop over years and additionally, as needs arise their technical skills develop in informal and non-formal environments such as work, home and online networks. However, they are generally facing difficulties in accrediting their prior learning. A collaborative approach among different stakeholders and external accreditation can solve this issue.

Secondly, there is little experiential research on the effect of prior learning on learners and/or on higher education institutions (Alexandre, 2014). This might be one of the reasons why present stakeholders of education, namely learners, educational institutions, faculty members, employers and policy makers seem to be unwilling on welcoming RPL. A more detailed review that may result in richer documentation will certainly help to overcome this reluctance. Thorough research and studies will certainly ease the acceptance, application and embracement of RPL in existing implications.

Thirdly, no matter how much importance learners, educational institutions, faculty members or even employers attach on RPL, unless it takes its place in policy in the current systems of countries, it will not go beyond being one of the debates in the field of education. Hopefully there is a tendency that countries are becoming more willing to recognize non-formal and informal learning outcomes within the existing educational system (Werquin, 2008). Defining and improving recognition procedures and processes through collaboration among the stakeholders will result in effective policies with this regard.

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Open Dialogue: A Content Analysis of the #openeducation Twitter Hashtag

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Abstract

This paper describes a qualitative look into the content surrounding the open education Twitter hashtag (#openeducation) using content analysis methodology. A convenience sample of 903 tweets using the #openeducation hashtag was obtained and their content was inductively coded using open coding. The content of these tweets were analyzed for primary topic and emerging themes were organized into categories. These data were tallied along with the number of contributions made by each user of the #openeducation hashtag. The resulting themes and categories were used to guide the development of a questionnaire which was subsequently provided to the most active users of the #openeducation hashtag. A brief literature review was then conducted to ground the emergent themes and categories into the literature surrounding open education.

Abstract

This paper describes a qualitative look into the content surrounding the open education Twitter hashtag (#openeducation) using content analysis methodology. A convenience sample of 903 tweets using the #openeducation hashtag was obtained and their content was inductively coded using open coding. The content of these tweets were analyzed for primary topic and emerging themes were organized into categories. These data were tallied along with the number of contributions made by each user of the #openeducation hashtag. The resulting themes and categories were used to guide the development of a questionnaire which was subsequently provided to the most active users of the #openeducation hashtag. A brief literature review was then conducted to ground the emergent themes and categories into the literature surrounding open education.

Introduction

The rise in digital technologies such as the Internet and hypertext has had an impact on nearly every industry, field, and topic in the world. Its effects can be seen in the norms, communication patterns, and social cultures that surround these industries, fields, and topics. Social Media is a connective technology that enables communication between individuals and groups who may not have otherwise ever connected (Ravenscroft, 2011). Thanks to social technologies, learners in various settings all over the world often interact with people, perspectives, and content that they otherwise may never have encountered. The social fabric that develops as a result of these unique connections and encounters are a major part of the digital culture surrounding social media.

Another culture driven by connection and empowered in many ways by social media is the open education movement (Baker III, 2014). People form this culture through connecting with others on a wide variety of ideas, influences, founding philosophies, beliefs, tools, experiences, drives, and perspectives. The open education movement is a grand experiment able to test innovative ideas and learning designs that are often either not possible or feasible to experiment with inside of the constraints of traditional education structures (Baker III, 2014). Connective digital technologies often support these experiments through enabling more accessible and transparent participatory open classrooms that often exhibit reduced barriers and built-in systems for obtaining feedback from a variety of perspectives (Baker III & Surry, 2013).

Twitter is an example of a connective digital technology that is commonly used in open education courses. A Twitter hashtag is a feature of the Twitter platform where people who do not necessarily know each other but all have Twitter accounts or access to a twitter feed can come together around a topic of interest by searching for the

hashtag term. A hashtag term is placed into a tweet (i.e., a post 140 characters or less to the Twitter platform) and is made up of a pound sign (#) and a word of interest following the pound sign (e.g., #openeducation is used for people interested in open education, #edtech is used for people who are interested in education technology, and #oer is used for people interested in open educational resources). Hashtags achieve common acceptance in groups based on who and how many people use them and are often set up to allow people to connect at conferences, classes, presentations, and other events (Chang, 2010). The common hashtags for a given topic can often be found using an Internet search (i.e., Google, Bing, Yahoo, etc.). Programs like Tweetdeck, Hootesuite, or Janneter are often used for their ability to set up a search column that will automatically search and update tweets sent to a given hashtag or search term. The #openeducation Twitter hashtag is a primary hub of connection for those interested in the open education movement. This study describes an attempt to discover the answers to the following research questions:

- How is the #openeducation hashtag is used?
- What are the most popular topics using the #openeducation hashtag?
- Are the most active hashtag contributors also active in open education?

Methods

This study was designed to discover the content, prevalence of topics, and most active contributors related to the #openeducation hashtag. The research design decisions were guided by the design methodologies in Creswell (2013) and Johnson & Christensen, (2008). The website Topsy.com archives tweets for a variety of hashtags and sells access to the complete records for a given hashtag to interested parties. The quote to obtain the entire data set was well out of the price range for this study, however the site provides access to a subset of tweets surrounding a given hashtag using a search feature. The Topsy database began archiving tweets sometime around late 2009 to early 2010, and they have records for the #openeducation hashtag dating back all the way to 2010.

A convenience sample of 903 tweets using the #openeducation hashtag were obtained from the Topsy.com website’s hashtag search. The sample was obtained using the advanced search feature on the Topsy search software on their website (www.topsy.com). The search term “#openeducation” was used in the “All these words:” section, with the settings “Search a specific type:” set to “Tweets”, the “Search a specific language:” set to “English” and the “Sort results by:” option set to “Date,” as displayed in *Figure 1*. These tweets were all posted to Twitter between 2009 and 2012, were in the English language, and provided the coding pool of common themes and the most active users in our sample.

TOPSY

Advanced Search

All these words:

Any of these words:

None of these words:

Search within a site or domain:

Search within a Twitter user:

Search a specific type: Show only trending results

Search a specific language:

Sort results by:

Oldest date and time: PST

Most recent date and time: PST

[Learn more about search operators available on Topsy. click here](#)

Figure 1. The advanced search settings used at Topsy.com

This is a mixed methods study with a qualitative emphasis derived from descriptive quantitative elements (quan→QUAL). All tweets from the sample were analyzed to obtain the emergent themes, categories, and most active users present in the #openeducation hashtag sample data. Throughout each stage of the study, every attempt

was made to interact with the data from both the emic and etic perspectives. There is no way to know whether these sample data are randomly derived from the #openeducation hashtag tweet population because the Topsy.com search feature is outside of the researchers control; therefore, statistical generalization, which is neither of primary concern or a purpose of this study, is limited.

During data analysis, the tweets from the sample were analyzed by content (e.g., sharing a link to an article or lecture, mentioning a conference experience or competition, stating views on a subject, etc.) and inductively coded into themes (e.g., articles, conferences, opinions, etc.) by a single coder using an open coding format. The coding sessions were performed in large chunks with relatively short periods (hours or days) between the coding sessions in order to minimize intra-coder reliability issues. The themes were enumerated through being tallied as they were coded and were later collected into categories (e.g., information sharing, research, open educational content, etc.) based on their relatedness. These data provided an idea of the prevalence of each theme and category in the sample. The contributing author usernames for each tweet were also listed and their contributions were enumerated and used to determine the most active users of the hashtag. The most active #openeducation hashtag users were identified from the tally data and contacted via Twitter to participate in a survey. The survey inquired about their Twitter usage, blogging participation, employment field, their interest and connection with Massively Open Online Courses (MOOCs) and other various topics in open education and related topics. Three users agreed to participate in the questionnaire.

Emerging Categories and Themes

The data analysis brought about thirty-two themes that fit well into eight major categories based on their relatedness. In this paper, “theme” refers to the overarching concept name or code (e.g., link to article, blog posts, discussion/lecture) given to a common topic (e.g., links to articles, blog post mentions, linking to a lecture, etc.) found in the content analysis of the sample tweets. “Category” refers to the overarching concept name or code (e.g., information sharing, open educational designs, change & awareness, etc.) given to a collection of themes based on their relatedness. These categories are representative of major areas in open education and have a variety of presence in the data.

Category	%	Item	Count	%	Cum %
Information Sharing	21.04%	Links to non-research Articles	148	16.39%	16.39%
		Blog Posts	29	3.21%	19.60%
		Opinion	7	0.78%	20.38%
		Ted	6	0.66%	21.04%
Connection	10.41%	Collaboration Request	17	1.88%	22.92%
		Shared Resource	77	8.53%	31.45%
Research	9.08%	Research	21	2.33%	33.78%
		Open Access	32	3.54%	37.32%
		Research Articles	8	0.89%	38.21%
		Conference	21	2.33%	40.53%
Open Educational Designs	24.47%	Discussion/Lecture	58	6.42%	46.95%
		E-learning	9	1.00%	47.95%
		Open Courses	132	14.62%	62.57%
		Learning Management Systems	13	1.44%	64.01%
		Open Scholarship	5	0.55%	64.56%
		Accreditation	4	0.44%	65.01%
Open Educational Content	19.60%	Open Courseware	25	2.77%	67.77%
		Open Educational Practices	4	0.44%	68.22%
		Open Educational Resources	100	11.07%	79.29%
		Intellectual Property Licensing	9	1.00%	80.29%
		Open Text Books	39	4.32%	84.61%
Change & Awareness	9.19%	Education Reform	19	2.10%	86.71%
		Policy	17	1.88%	88.59%
		Competition	18	1.99%	90.59%
		Open Production	1	0.11%	90.70%
		Open Education Week	15	1.66%	92.36%
		Open Data	7	0.78%	93.13%
		Open Science	6	0.66%	93.80%
Open Technology	4.32%	Virtual Worlds	3	0.33%	94.13%
		Technology	4	0.44%	94.57%
		Open Source Software	32	3.54%	98.12%
Business Promotion	1.88%	Promotion	17	1.88%	100%
100 %		Total	903	100%	

Table 1. Categories and themes that emerged from the data, and their percent contribution to the total.

As seen in Table 1, the categories, with their percent of contribution to the total makeup, are Open Educational Designs (OEDs) (24.47%), information sharing (21.04%), Open Educational Content (19.60%), connections (10.41%), change & awareness (9.19%), research (9.08%), open technology (4.32%), and business promotion (1.88%). The most prominent themes were people sharing non-research articles (16.39%), open courses (14.62%), open educational resources (11.07%), people sharing resources (8.53%), people sharing their discussions & lectures (6.42%), open textbooks (4.32%), open source software (3.54%), open access research (3.54%), open courseware (2.77%), conferences (2.33%), and research (2.33%). Among the least discussed topics were open production (0.11%), virtual worlds (0.33%), pure technology (0.44%), and open educational practices (0.44%), which is noted as the next evolution of open educational resources (OERs) (Open Educational Quality Initiative, 2011). OEDs is an umbrella term for courses designed to be open to some degree through incorporating transparency and freedom (Baker III, 2014; Baker & Surry, 2013), where OER are content items that can be reused, remixed, redistributed, and revised due to open licensing permissions (Wiley, 2010).

While the makeup of the emerging categories is interesting, the makeup of activity in each category is even more interesting. The most active category was OEDs, with nearly 25% of all tweets in the sample discussing something related to open educational course design, where the most active theme (by 1.77%) was people sharing non-research articles (16.39%). Examining the percentage breakdowns of these themes provides an interesting insight into the open education culture. It becomes evident that sharing informational resources is important, and that educational structures are a prominent topic. Considering the dominant categories and topics can provide important perspectives for speculating on the most important values held in the cultural makeup surrounding the #openeducation hashtag. According to these data, concepts related to Open Educational Designs (24.47%), Information Sharing (21.04%), and Open Educational Content (19.60%) seem to be the dominant concerns in the culture.

The emerging themes and categories are consistent with ideas found in the literature on open education. Open content (Butcher, 2011; Carnegie Foundation for the Advancement of Teaching, 2008; Morgan & Carey, 2009; Wiley, 2012), open courses and Open Educational Designs (Baker III & Surry, 2013; Dougiamas & Taylor, 2003; Hannafin, Land, & Oliver, 1999; Kikkas, Laanpere, & Põldoja, 2007; Mentor, 2007; Morgan & Carey, 2009; Rodriguez, 2012; Times et al., 2012), assessment strategies in open designs (Gray, Thompson, & Sheard, 2010; United Nations Educational Scientific and Cultural Organization, 2002), open access research (Carnegie Foundation for the Advancement of Teaching, 2008; Christensen, 2005; Hedlund, 2011; Krikorian, 2010; Lewis, 2012; Mukherjee, 2009), Open Educational Practices (Open Educational Quality Initiative, 2011; Open eLearning Content Observatory Services & Geser, 2007; Piedra & Chicaiza, 2009), and Open Educational Resources (Caswell, Henson, Jensen, & Wiley, 2008; Ehlers, 2011; Porter, 2012) are all prime and relevant topics in the open education literature. Connection, sharing, and social technologies are also prominent in the open education literature relevant to pedagogy, scholarship, and learning through connected/networked teaching and learning (Bell, 2010; Couros, 2009; Drexler, 2010; Mattar, 2010; Veletsianos & Kimmons, 2012). Open education has an interesting history (Baker III, 2014; Mcnamara, 2012; Meiszner, 2011; Shelley & Sherman, 2009) and openness is poised to impact both higher education (Digital Connections Council, 2009; Wiley, 2006, 2010) and the larger society (Baker III, 2012; Lessig, 2004, 2008) in profound ways.

Overall, the themes discovered in the content analysis appear to corroborate well with the literature. The analysis reveals that common themes for the #openeducation hashtag content are non-research articles related to open education (16.39%), content related to open courses (14.62%), and content related to open educational resources (11.07), where the most active categories have to do with Open Education Designs (24.47%) and information sharing (21.04%). These are also common themes and categories in the literature. It appears from these data that the #openeducation hashtag community actively deals with similar content as the literature surrounding the open education movement.

Questionnaire Responses

The theme and category data that emerged from the hashtag analysis were used as a guide for developing the questionnaire used in the second phase of the study. The questionnaire addressed the major categories and concepts found in the data. It asked about the participants' social media presence and habits, participation in MOOCs, use and development of open content, field of employment, level of education attained, and some general demographics questions. The nine most active users of the #openeducation hashtag identified in the data were contacted via Twitter to participate; three of those contacted responded to the questionnaire requests (33.33%).

The questionnaire respondents reported starting their Twitter accounts in 2008, 2009, and 2011. Twitter was founded in 2006 based on open source software, and currently has approximately 200 million active users (@Twitter, 2012), so the respondents do not immediately fall into early or late adopter categories. There were two male respondents, and one female, and the respondents indicated age ranges of 25-29, and 45-49 (one chose not to respond). They also reported being from Europe, the UK, and Australia.

As seen in *Table 2*, the respondents are active in different areas of open education. All respondents were active on Twitter, two were active bloggers, and two had actively used and developed Open Educational Resources. One had previously participated in Massively Open Online Courses (MOOCs), including a Coursera course, a Udacity course, the EdStartup 101 course, and the MOOCMOOC course. These MOOCs vary in style, underpinning philosophy, and design, and represent a variety of different approaches to open education (Baker III & Surry, 2013). This person was also the only respondent who worked in higher education. It is interesting to note that, as seen in *Table 3*, the questionnaire respondents showed limited interest in the largest analysis category (i.e., Open Educational Designs), but all respondents expressed interest in the smaller category of Open Educational Content.

Activity	Respondent 1	Respondent 2	Respondent 3
Year Began Twitter	2008	2009	2011
Twitter Role	Individual: Personal & Professional	Individual: Personal & Professional	For Profit Organization
# Tweets/Day	10+	20+	5+
Tweets related to Open Education (#openeducation)	10%	10%	40% (10% use #openeducation)
Other Hashtags	#edtech	#oer/ "several thousand" others	#opened
% Retweets	10%	10%	10%
Active Blogger?	Yes (Educational Technology)	Yes (Open Education)	No
MOOC Participation?	Yes	No	No
Develop OER?	Yes	No	Yes
Use OER?	Yes	No	Yes
Higher Education?	Yes	No	No
Highest Degree	Master's Degree	Doctorate	Master's Degree

Table 2. Summary table of questionnaire respondent's activity related to open education topics

Category	Item	%
OED	Topic Focused Models	33.30%
	Alternate Education Models	33.30%
	Flipped Classroom	33.30%
Research	Open Access Research	100.00%
Open Content	Open Content	100.00%
	Open Educational Resources	100.00%
	Open Educational Practices	33.30%
	Open Textbooks	100.00%
	Intellectual Property Licensing	100.00%
	Open Courseware MIT	66.60%
Change and Awareness	Open Policy	33.30%
	Open Science	66.60%
	Open Data	100.00%
Technology	Emerging Tech/Social Media	33.30%
	OSS	66.60%

Table 3. Summary table for questionnaire respondent's interest areas in open education topics

Discussion

Together, the content analysis and the responses to the questionnaire provide sufficient data to start constructing speculative responses to the research questions this study sets out to answer. From these data, it is possible to see a few common characteristics emerge that speak to how the #openeducation Twitter hashtag is used by the culture surrounding it. Based on the literature, the larger open education community values sharing, collaboration, connection, and innovation, and these themes follow through to the #openeducation hashtag as evident in the content

analysis and questionnaire responses. The collaborative element is enhanced by the ability to connect through technology and seems to occur both formally and informally. Sharing using the #openeducation hashtag is a common practice as evidenced by the number of shared resources and article shares in the sample data. The questionnaire respondents were also bloggers, tweeters, and contributors to open education, which shows their interest in sharing ideas. From this, it is evident that the #openeducation hashtag is used to enable and support this collaboration, connection, and sharing.

From these data it is also apparent that Open Education Design and Open Educational Content are important topics on the #openeducation hashtag, and the practice of information sharing is also a large part of the community. Linking to non-research articles and content regarding open courses and OER were prime topics. People also used the #openeducation hashtag to share access to discussions and lectures. The #openeducation hashtag is often used to connect with others, share perspectives, and discuss these and other topics of interest between parties who are part of a similar culture of interest but who may not otherwise know each other.

The most active contributors to the #openeducation hashtag contribute to open education in a variety of ways. They are active in blogging, using and developing OER, advocating for and disseminating information about openness, and take part in the culture in a variety of ways. Based on these data, the prevalence of a person's use of the #openeducation hashtag is also indicative of their larger efforts in open education. An interesting opportunity for future research is to follow up on this study and intentionally analyze the types of tweets made by the most active tweeters as they relate to the specific activities related to open education in the larger community. Overall, the #openeducation hashtag culture and the larger open education movement culture appear to have common threads woven between them. These threads manifest themselves in various ways (e.g., sharing knowledge, collaborating publicly, networking, developing resources for public use, etc.) in each culture and surround a very human element centered around connecting with others; even when they are separated by spatial, temporal, cultural, educational, and lingual barriers. These connections are enabled by social media and digital environments where people can connect, and allow for new ways of collaboration and sharing to emerge.

Suggestions for Future Research

This study provides an example of a content analysis and questionnaire model useful for obtaining perspectives on cultural characteristics through analyzing social media hashtag products. The study also provides a model for identifying the most active members of a social media culture and generating the themes and categories relevant to the common behaviors. These themes and categories can then serve as a guide for developing questionnaires that target the interests and cultural elements most relevant to the culture under study. Unfortunately, the option choices utilized in this study's questionnaire did not enable an equal comparison between the questionnaire data and the content analysis data; therefore, an opportunity for future researchers exists to repeat the study with a more robust questionnaire instrument that can make a more direct comparison between the content analysis and the questionnaire. Additionally, the cost for obtaining the full data set from Topsy.com far exceeded the resources available for this study. Future researchers could develop a grant or look into alternative means of obtaining the entire tweet history for the #openeducation hashtag. Perhaps the entire data set will be available in the near future, as the Library of Congress is currently developing methods for storing and making searchable the entire history of tweets and have approximately 170 billion to date (Library of Congress, 2013). Repeating this study with the entire data set more fully sampled may provide more granular results and may confirm the findings in this study. Yet another opportunity for future research could be to validate the model used in this study by using it in another study either on a different hashtag and culture group or on one that is related to the #openeducation culture in some way not utilized in this study. Finally, future researchers may wish to focus on a sub-category or theme from the findings in this study and perform a more focused study on a more specific topic, such as Open Educational Designs or Open Content. It would be interesting to start learning about the overlap in cultures between the different categories that emerged in the data.

Conclusion

Even through distance and non-acquaintance, digital technologies enable ways for people to connect with others around content and ideas in innovative new ways. What is more, social media and open education cultures are converging to enable connections and collaborations around education and instructional design that would not have taken place outside of such a connective social network of technology. This paper describes a study that examined the #openeducation hashtag in an attempt to learn more about how it is used, what topics are most popular on the

hashtag, and whether the most active hashtag contributors are active in open education. The researcher considered the literature on open education and obtained a convenience sample from the #openeducation Twitter hashtag. Three of the most active tweeters to the #openeducation hashtag responded to a questionnaire, designed from the results of a content analysis, which considered how these participants contributed to open education. The study shows that the hashtag is an active platform for connecting with others and sharing ideas, that Open Education Designs and Open Educational Content are the primary topic areas discussed on the #openeducation hashtag, and that the most active hashtag contributors are active voices in open education in a variety of ways.

The #openeducation Twitter hashtag provides a hub for connecting strangers with similar interests around common ideas, a platform for sharing related contributions in other areas, and a resource for tapping into a flow of information related to open education. It seems that, even in an increasingly digital world, people are still finding ways to assimilate technology into what it means to be human, and are finding ways to use that technology for connecting and building new interactions with others.

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Enhancing Online Courses with Digital Storytelling

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Introduction

Online learning continues to grow, however, many online courses utilize technology in a manner that fails to actively support learning. Existing lessons are merely integrated into technology, without verifying the impact on learning and student achievement (U.S. Department of Education, 2007). Neuroscientists report little benefit to students of simply adding technology to conventional educational lessons (Robin, 2008), particularly as learners are now accustomed to enriched media as a result of the widespread popularity of interactive games, simulations, and entertainment. In addition, online courses have been cited as having a loss of spontaneity that helps to make education more effective and enjoyable for the learner (Tiene, 2000). Students are twice as likely to drop out of an online course than a traditional course (Willging & Johnson, 2004). Reasons cited include too many low level assignments and lack of interest in the material (Willging & Johnson, 2004). Previous studies have found that more technology alone does not increase learning outcomes; better course design is needed to help online courses gain legitimacy, engage students, and increase learning (Rovai, 2003).

Technology within online education must tangibly enhance courses. It is important to understand the educational benefits of an instructional method and incorporate the method in a meaningful manner. With digital storytelling, learners become absorbed within the lesson, and this cognitive arousal leads to a greater focus of attention and incorporation of knowledge (Green, Strange, & Brock, 2002). Digital storytelling is viewed as a popular method for including students' voices into curriculum. Students enjoy being able to contribute and collaborate, aspects that are reflected in popular culture, through the popularity of blogs, wikis, and YouTube. Digital storytelling has the capability of engaging learners and improving learning and performance. Digital storytelling involves utilizing imagery, audio, video, and interactive digital features, in combination with narration, to involve and inspire learners (Chung, 2007; Robin, 2008). Digital storytelling can enrich online learning in a variety of ways, either through the addition of different audio-visual components or by making the lesson more immersive and participative. As a result, the information resonates more with the learner. This helps stimulate learning and knowledge retention (Bou-Franch, 2012). In addition, digital storytelling reinforces digital literacy as well as other 21st century skills, like the ability to use technology, information and images to be able to communicate more effectively in today's world (Bran, 2010; Robin, 2008).

Theoretical foundations support the effectiveness of digital storytelling in education. Scientists have determined incorporating narratives into learning is effective because our brains search neural networks for similar items (Westwater & Wolfe, 2000). When our brains recognize information, the information is more likely to be retained. New information must be connected to existing information and knowledge in order for the new information to establish itself within the learner's brain. This process is termed homeomorphogenesis (Liston, 1994). In addition, because content is grouped together to form a story, in a thematic organizational format, information becomes more memorable (McGregor & Holmes, 1999). Learners are able to reconstruct and remember information that corroborates with past experiences, enabling learners to add to existing knowledge (Psomos & Kordaki, 2012). Constructivism theory is based on this concept. Knowledge is constructed when new information comes in contact with existing knowledge that has been developed through experiences.

Many studies have examined the effects of digital storytelling in developing diverse skills across various learning disciplines. Students have created stories to gain skills and participate in the learning process (Kearney, 2011; Kieler, 2010; Maier & Fisher, 2007). This format has been used to connect students with lessons in history, language arts, teacher education, journalism, mathematics, law and science (Bou-Franch, 2012; Iseke, 2011; Kearney, 2011; Sadik, 2008; Steslow & Gardener, 2011; van Gils, 2005). In addition, studies demonstrate that

digital stories helped struggling readers understand text and meaning better (Dreon, Kerper & Landis, 2011), as well as offering the ability to connect “marginalized communities” (Maier & Fisher, 2007, p. 176) with learning materials, by overcoming literacy barriers. Furthermore, Maor and Fraser (2005) pointed out the ability of interactive stories to help students develop investigative skills, and explore a variety of experiences from multiple perspectives. While these studies revealed critical educational effects of digital storytelling, the educational effects of digital storytelling are believed to be far-reaching.

In this research, we critically reviewed empirical studies and conceptual papers on digital storytelling and examined the impact of this instructional method on student’s cognition and learning outcomes. We also identified challenges and issues regarding effective incorporation of digital storytelling into the curriculum. Instructional design suggestions from the literature were synthesized to provide best practices for future integration of this instructional method into online courses. We hope to provide educators and course designers with suggestions to encourage incorporation of effective digital storytelling activities, as a way to enrich education, further higher learning, and increase the value of online courses.

Research method

Initially, a search was conducted for articles involving “storytelling,” “digital storytelling” and “interactive storytelling” in the EBSCO and Google Scholar databases. The search was later focused on “digital storytelling” and expanded to include the EdITLib: Education and Information Technology Digital Library, ERIC, and Web of Science, and articles cited within the articles found. A total of 58 articles were selected, and then later culled down to 36, when research became more concentrated on digital storytelling’s educational effects and challenges, and suggestions for instructional design. Articles that supplied information for the following result section were published between 2005 and 2014, and involved education. Included in this analysis were empirical studies, such as case studies, and conceptual papers focusing on digital storytelling environments, models, and theoretical framework. These articles addressed the issues of educational effects, challenges, and instructional design suggestions.

Results

Educational effects

After the collected research studies were analyzed, we identified the nine most important educational effects of digital storytelling. We found that the multimodal aspect of digital storytelling offers increased opportunities for learning and can lead to improved knowledge retention. Digital storytelling can help reveal and build students’ identity. Students’ communication and collaboration skills are improved through working in a community of practice. Producing digital stories also helps students develop reflective and critical thinking skills as well as build their digital literacy. Creating their own stories, students become more engaged in learning, and produce higher quality work. Each of these educational effects is discussed in this section and supported with evidence from literature.

Multimodal learning and improved knowledge retention. The combination of sound, text, and pictures offers students an opportunity to connect images with narration, which allows them to better understand the lesson’s meaning and increase knowledge retention. Because digital stories are typically housed on the Internet, students are able to replay stories, which aids in knowledge retention. It also affords students a way to create more powerful narratives compared to a traditional format. Digital storytelling, according to Robin (2008) is an especially good method for combining visual images and written text. Alonso, Molina, and Poro (2013) reviewed 30 multimodal digital narratives and discovered the combination of pictures, music, and narration found in digital storytelling helped convey “highly complex mental images” (p. 382). Sixteen Spanish students made stories for an English studies course in Bou-Franch’s (2012) research, with the premise that meaning is made not only through language but the combination of sound, text, and pictures. Choi and Johnson (2005) gave support that combining visual and audio gave students “additional and complementary information” (p. 217), which aided comprehension and retention. By being involved in actively creating a story, ESL students were able to comprehend and integrate knowledge better (Tsou, Wang, & Tzeng, 2006). After a digital storytelling workshop and two weeks of storytelling activities, student learners’ post-test scores indicated increased knowledge and improved technical skills (Figg & McCartney, 2010).

Identity. Students come to terms with how to present themselves to others through digital storytelling, since there is an emphasis on personal voice. Stories can be created in which students play historical roles or work through past experiences. Bou-Franch (2012) observed students trying new identities as they created stories about various

time periods and displayed different personas for the task. Bran (2010) noted students' ability to develop their own individual, unique stories when faced with a general prompt ("Message in a bottle"). In Ranieri and Bruni's (2013) study of fifteen teenagers, students initially drew disembodied figures and their stories were very simple. By creating digital stories with mobile phones the students were able to explore and strengthen their identity. The use of technology helped 80 students explore and develop their identity within a rural community, as they created digital stories to show the relation between location and self (Wake, 2012).

Communication. Digital storytelling involves communication skills in the form of writing and speaking. As a result of the richer experience of digital storytelling, English learning students displayed significant improvement in English proficiency, critical thinking and motivation (Yang & Wu, 2012). Although Figg and McCartney (2010) found it was initially difficult for at-risk students to begin to write scripts, as these struggling students became involved in the task they reported writing the story to be one of the easiest parts of the process, and the students' writing skills increased with the creation of digital stories. Creating digital stories allowed 11 ELL students to practice their reading and writing, oftentimes reading a script several times to ensure they spoke clearly while recording (Hur & Suh, 2012). Using digital storytelling in a public speaking classroom enabled students to improve their powers of persuasion and public speaking skills (Leopold, 2010). Employing technology inspired students to "write for an authentic audience and recognize their product as something worth sharing with others interested in their message" (Wake, 2012, p. 35). Students using Second Life and Windows Movie Maker to write digital stories improved their writing self-efficacy (Xu, Park, & Baek, 2011).

Collaboration and community of practice. Digital stories allow students to share ideas and knowledge. In Rambe and Mlambo's (2014) study, students created a repository of digital stories in an attempt to address the articulation gap in South African higher education. The stories proved important to address skill deficiencies and help archive knowledge for other students. English foreign language students were able to use their classmates' and teacher's stories to build their own stories, and add them to a storytelling website (Tsou et al., 2006). English language students collaborated to create digital stories, which resulted in improved listening comprehension, as compared to the control group who, "lacked similar opportunities for collaborative construction of meaning in authentic productive environments" (Yang & Wu, 2012, p. 346). Ranieri and Bruni (2013) found students were more involved in participating and sharing work when given the opportunity to create stories using mobile devices.

Reflective thinking. Digital storytelling offers students an opportunity to reflect upon past experiences and delve into the reasons for actions (Kearney, 2011). Sawyer and Willis (2011) used digital storytelling as a counseling method for high school students working with younger children. Pairs of students were able to identify potential issues and work through various endings, considering options. In addition, the permanency of digital storytelling enables students to review and reflect upon their creation (Kearney, 2011). Disadvantaged youth, with below average reading and writing abilities, collaborated to make digital stories to share with classmates. In the process of viewing peers' digital stories, students were able to "compare their positions to those of their peers," (Maier & Fisher, 2007, p. 181) as they engaged in personal reflection.

Creative thinking. Students are inspired to think creatively, as a result of the need to research, document and produce digital stories. Digital stories are innately personal, a focal point that makes each story unique. In creating stories, students strive to make their work entertaining and original, even when dealing with historical or factual matters (Bou-Franch, 2012). Bran (2010) reported an increase in creativity after analyzing 78 digital stories created by journalism students.

Building of digital literacy. The use of multimedia allows students to become familiar with creating digital content and navigating the Internet in a new way (Hartley, McWilliam, Burgess, & Banks, 2008). Di Blas and Paolini (2013) suggested the benefits of 20,000 students using a digital storytelling initiative included "the ability to decode, write through, and with, all forms of media, in specific with text, audio and images in multimedia form"(p. 24). Pre-service teachers participated in a digital storytelling workshop and reported increased self-efficacy in regards to technology, which was then found to impact the comfort they felt with implementing technology in a classroom setting (Heo, 2009). The seventh grade students involved in Maier and Fisher's (2007) work enjoyed learning how to create media pieces that were relevant to the media they consumed in their non-academic lives. Sadik's (2008) study found digital storytelling offered Egyptian teenagers an opportunity to "acquire new media literacy and IT skills, including capturing and editing digital photos, recognizing different image formats, recording and using audio clips, searching the Web for text and images" (p. 502) for playback.

Student engagement. As technology advances, students are able to share their stories with a greater audience. This inspires students to work harder on their projects. In addition, students tend to have an emotional connection with the stories they create, thus fostering greater engagement (Bran, 2010). Digital stories involve more than absorbing or reciting back information. There is a need for students to become actively involved in order to create the content. As a result, students must take an active role, rather than simply listen (Di Blas & Paolini, 2013).

Fails, Druin, and Guha (2010) noted that students were “engaged and energized by the prospect of creating something” (p. 2). Campbell (2012) measured the engagement of students writing digital stories compared to stories written traditionally, and found a 26% increase with student’s engagement based on time spent on task. Campbell also noted students perceived themselves as better writers as a result of being able to create a tangible digital story. Reluctant readers were encouraged to engage more in classroom discussions after being exposed to content via digital storytelling (Malin, 2010). A study of 32 ELL learners in Korea found digital storytelling helped students have a deeper understanding of the lesson, thus generating greater confidence and engagement (Yoon, 2013).

Quality of work. Digital storytelling leads to higher quality work for several reasons. First, students are able to work through drafts until they are satisfied with results (Campbell, 2012). Second, students are motivated to produce higher quality work in consideration of the potentially larger audience when stories are posted online (Wake, 2012). Third, students are often provided with scaffolding within storytelling software to help guide them in story creation. For example, 114 third-graders were able to elaborate on their work and create more complex stories by using a concept map to create digital stories (Liu, Chen, Shih, Huang & Liu, 2011).

Challenges and issues regarding incorporation of digital storytelling

Researchers identified several challenges when digital storytelling was used in the classroom. Several researchers cited access to technology as an issue, which created a problem integrating this method into instruction (Dogan & Robin, 2008; Dreon et al., 2008; Hartley et al., 2008; Sadik, 2008). In Wake’s (2012) study, 80 rural teens shared two computers while creating digital stories. While many of the students were connected to technology outside of the classroom, resources were scarce at school. In some studies, once connected, students and teachers became frustrated by technical problems (Choi & Johnson, 2005; Sadik, 2008). Heo (2009) noted that pre-service candidates showed a higher level of confidence with technology if they had used computers and the Internet for non-academic purposes. Ranieri and Bruni (2013) experienced difficulties introducing a group of teens, aged 11-15, to digital storytelling because the teens were resistant to recording their voices, until given mobile phones to use. Also, some participants refused to be photographed, as a result of self-image issues. In this same study, publishing stories on Facebook was met with mixed results: to some participants, Facebook was viewed as a space for peer interaction and the digital stories were seen as a “threat to the [teens] reputation” (p. 226).

Teachers and teacher candidates expressed concern in implementing digital storytelling due to the time involvement of planning and preparing lessons, advising students, and classroom management (Figg & McCartney, 2010; Maier & Fisher 2007; Sadik, 2008). Teachers who were surveyed on barriers that kept them from using storytelling in the classroom ranked “time issues” high (Dogan & Robin, 2008). Teachers also expressed concern about the quality of student work and the direct relationship between student produced stories and objectives of the subject matter (Sadik, 2008). Researchers warned that students’ creativity in producing digital stories could supersede learning objectives. Students may become more immersed in the development of the artifact than the educational content of the lesson (Chung, 2007; Hartley et al., 2008; Kearney, 2011; van Gils, 2005). While Photo Story was frequently used in the studies (Heo, 2009; Hung, Hwang, & Huang, 2012; Leopold, 2010; Sadik, 2008; Wake, 2012; Yang & Wu, 2012), van Gils warned that formatted software could lead to dull stories. Effective teaching, in which teachers’ emphasized story development, was found key in terms of “going beyond the novelty or entertainment effect” (Campbell, 2012, p. 393) and increasing students’ writing skills.

Instructional design suggestions

Researchers suggested a structured plan for introduction, intervention, and reflection of digital storytelling (Chung, 2007; Di Blas, Garzotto, Paolini, & Sabiescu, 2009; Liu et al., 2011; Sadik, 2008). Sandars, Murray, and Pellow (2008) found offering a step-by-step approach was important in creating successful stories in undergraduate medical education. To promote high quality writing, Figg and McCartney (2010) had student learners create a variety of digital stories that were sequenced in order of difficulty, so that the writing skills for the first digital story provided practice in basic skills for writing, and each subsequent story required the learner to build upon the skills learned in the previous task. Di Blas and Paolini (2013) offered six steps to structure digital stories: topic selection and gathering of material, content organization, content preparation, first version, evaluation, and final version. Kieler (2010) used the Center for Digital Storytelling’s seven elements of digital storytelling as a guide for her class and found each element to be important. When she unintentionally omitted three elements, she found her students’ stories to be disconnected. Researchers from the College of Education at the University of Houston offered instructional design guidelines after many years of focusing on digital storytelling (Robin & McNeil, 2012). This comprehensive list follows the ADDIE model of instructional design and includes analyzing the audience to develop an appropriate script, adding a personal connection, using a detailed script and storyboard, and understanding intellectual property issues.

It is important to offer support and examples. To guarantee the same lesson was delivered to all participants, Heo (2009) used a video tutorial that included instructions for how to create digital stories with Photo Story software. Instructors at Italian schools utilizing PoliCultura “made available online a sizable library of the works done by classes: this provided a strong drive for imitation” (Di Blas et al., 2009, p. 16). Anchoring digital stories to real life makes the experience more motivating (Di Blas et al., 2009; Maier & Fisher, 2007). Roby (2010) offered the content-related digital storytelling (CoRDS) model as a way to link subject matter with students in a personal way. This model helps instructors connect students to the subject matter, themselves and others.

The method for creating digital storytelling should be considered, based on the equipment, technology and time available. Fails et al. (2010) suggested mobile devices appealed to children’s inclination to move and these devices inspired collaboration. Low cost, simplicity and the wide availability of authoring tools encouraged digital storytelling in a three-year experiment involving 381 classes (Di Blas et al., 2009). Kearney (2011) suggested instructors should consider outlets for publishing students’ digital story productions, from the general Internet to more specific school or district opportunities, as a way to showcase work. Psomos and Kordaki (2012) used the Dimension Star, a reference model to evaluate the effectiveness of digital storytelling environments. Kearney (2011) stressed the importance of carefully outlining the expectations for digital storytelling assignments. Sandars et al. (2008) emphasized the need to express the intention of the exercise to focus on reflection and deeper learning for students, over technical excellence.

Discussion and Conclusion

The educational value of digital storytelling is clear. Rather than simply adding technology to assignments, digital storytelling allows learners an opportunity to incorporate technology into classwork in a meaningful way, through the creation of artifacts that connect content in a personal manner. This is an effective method to increase engagement and develop a community of learners, as well as increase retention and inspire creativity. Unfortunately, studies are lacking regarding incorporating digital storytelling into online courses. In many ways online courses address the challenges involved with digital storytelling, overcoming issues associated with digital storytelling and technology. Students are already connected via technology to online courses and are largely proficient utilizing the media. Also, since time management in online learning is frequently tied to students’ interest, creating a digital story could be based on the time necessary for the student to complete the task, rather than a bell ringing in the classroom. Much of the success of digital storytelling involves effectively implementing it within courses, marrying content with students’ personal contributions. There must be a structured plan, and while many have been suggested, more research is necessary to determine if one structure is more effective for learning in a specific context. Providing students with examples can help guide production of stories and demonstrate the appropriate balance between content and creativity, as well as help inspire students. By having the stories published on the Internet, students are more likely to generate higher quality work. In online classes, digital stories can serve as particularly poignant artifacts that draw classmates together and build a community, based on the personal interjections that naturally evolve from the work. Digital stories also serve as powerful ways to give students a voice and build communication skills, aspects that bolster online course effectiveness. Digital storytelling offers a way to creatively involve students in online courses, generating greater engagement with course content and with other students, and producing quality results, aspects much needed to improve online education.

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Visualizing Learning for the Next Generation: Visual and Media Literacy Research, 2000-2014

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Introduction

Technology allows information to be gathered by a push of a button or stroke on a keyboard. A world of information can be easily accessed from a phone that fits in the palm of one's hand. Today, every aspect of life is flooded with images and diverse forms of media. The ability to "discriminate and interpret the visible actions, objects, symbols, natural or man-made ... to communicate with others" (Debes, 1969, p. 27), has become an increasingly important skill set for learners in and out of the classroom. The goal of this paper is to explore and identify the current trends of research pertaining to visual and media literacy. The researchers hope to show how research on visual and media literacy has evolved in the last fifteen years.

Literature review

Initially, the researchers explored past studies on visual and media literacy. Research-based articles focusing on visual and media literacy (VML) published between 2000 and 2014 were collected. The researchers identified a total of 129 articles to be included and reviewed for this study. Each article was reviewed for its content from 1) research question, 2) population studies, 3) methodologies, and 4) findings.

Comparison of research questions

The researchers identified similarities among research questions found in the 129 articles selected for the study. A common trend on the use of concept maps in education was identified. Twelve articles examined the classroom use of concept map and its effectiveness (Blunt & Karpickle, 2014; Chang & Chang, 2008; Harris & Zha, 2013; Marculcu, Karakuyu & Dogan, 2013; Wahidin & Meerah, 2013). A majority of these articles found that visual component of concept maps helped facilitate learning. Another trend of inquiry focused on how learners use technology effectively in the classroom. Most articles looked into how students use technology in the classroom (Bremen & Hassell, 2014; Dias & Trumpy, 2014; Lawanto, Santoso, Lawanto & Goodridge, 2014; Lee & So, 2014; Luckhardt, 2014).

Several articles focused on how digital and media literacy could help improve students' learning. This includes the influence of technology in the perception of popular media (Barden, 2014; Babad, Peer & Hobbs, 2012), and enhanced understanding of content with the integration of technologies (Ashley, Lyden & Fasbinder, 2012; Garcia-Ruiz, Ramierz-Garcia & Rodriguez-Rosell, 2014; Nakagaw & Arzubiaga, 2014; Schmidt, 2013; Sur, Unal & Iseri, 2014). A number of research articles focused on the connection between visual literacy and:

- 1) Level of understanding of visual literacy among students (Asrlan & Nalinci, 2014; Brante, Olander & Nystrom, 2013; Brumberger, 2011; Jefferies, 2007; Mayall & Robinson, 2009);
- 2) Improving learning abilities through visual literacy (Leigh, 2012; McTigue & Croix, 2010; Wang & Lee, 2014; Willis & Lockee, 2009; Yeh & Lohr, 2010); and
- 3) Using various tools to improve visual literacy skills (Baker, 2010; Coleman, 2010; Hattwig, Bussert, Medaille & Burgess, 2013; Prior, Willson & Martinez, 2012; Sosa, 2009).

Other articles examined the use of visuals and demonstration of visual interpretation. Examples of visuals examined included graphic novels (Gavigan, 2011; Valerie & Abed, 2013), picture books (Maderazo, Martens, Croce, Martens, Doyle, Aghalarov & Noble, 2010; Yu, 2009), and other images (Farha, 2009; Jin & Boling, 2010; Kovalik & Williams, 2011; Mahmood & Fernely, 2006). These research articles examined how students' interpret visual content to facilitate better communication.

Comparison of population studied

The articles reviewed covered different populations. At least four different populations or sources of data have been identified, including

- 1) Educators (Craig, 2013; Ismail, Bokhare, Azizan & Azman, 2013; Lane, 2013; Nakagawa & Arzubiaga, 2014; Parkhill & Davey, 2014),
- 2) General population (Boyle & Cook, 2001; Brown, Hardaker & Higgett, 2000; Brumberger, 2011; Newfield, 2011),
- 3) Students including undergraduates (Barden, 2014; Dias & Trumpy, 2014; Garcia-Ruiz, Ramirez-Garcia & Rodriguez-Rosell, 2014; Kupczynski, Brown, Holland & Uriegas, 2014; Lawanto, Santos, Lawanto & Goodridge, 2014); graduate (Arslan & Nalinci, 2014; Brante, Olander & Nystrom, 2013; Getzlaf, Perry, Toffner, Lamarch & Edwards, 2009; Stewart-McKoy, 2014; Sutton, 2014); elementary (Arend, 2009; Hattwig, Bussert, Medaille & Burgess, 2013; Heilmann, 2012; Jin & Boling, 2010; Pinto, 2014); middle school (Baker, 2010; Luckhardt, 2014; Percival & Percival, 2009; Power, 2008; Valerie & Abed, 2013); and high school (Ashley, Lyden & Fasbinder, 2012; Gold, 2004; Harris & Zha, 2013; Hilbert & Renkl, 2008; Jones & Cooke, 2006), and
- 4) Articles from past studies (Bremen & Hassell, 2014; Coleman, 2010; Efaw, Hampton, Martinez & Smith, 2004; Kurtz, Beaudoin & Sagee, 2004; Mayall & Robinson, 2009).

Comparison of methodologies

Two types of methodologies were used for gathering the data: qualitative and quantitative. Qualitative data collection involved: comparison (Ke, Lin, Ching & Dwyer, 2006; Newfield, 2011; Parkhill & Davey, 2014; Schwarz & Crenshaw, 2011; Sutton, 2014), discussion (Baker, 2013; Luckhardt, 2014; Nakagawa & Arzubiaga, 2014; Rye, Landenberger & Warner, 2013; Wichadee, 2014), interviews (Heilmann, 2012; Schulte, 2010; Sur, Unal & Iseri, 2014; Redmond, 2012; Valerie & Abed, 2013), and observations (Barden, 2014; Gavigan, 2011; Kenny, 2011; Lee & So, 2014; Young, 2012). The data collected were coded and organized for content analysis by cluster or comparison.

The research articles used generated data using the following collection strategies: 1) online surveys (Heilmann, 2012; Sur, Unal & Iseri, 2014), 2) Likert scale surveys (Dinet, Marquet & Nissen, 2003; Gavigan, 2011; Grzeda & Miller, 2009; Wichadee, 2014), 3) pre- and post- test (Kenny, 2011; Valerie & Abed, 2013), and 4) open-ended questionnaire (Arend, 2009; Hilbert & Renkl, 2008; Freeman & Jessup, 2004; Scull & Kupersmidt, 2010; Shaikh & Macaulay, 2001). Surveys were often collected online and had both open and closed questions.

Comparison of findings

Four common themes were identified in the findings, including (a) the need for teaching VML (Garcia-Ruiz, Ramirez-Garcia & Rodriguez-Rosell, 2014; Marulcu, Karakuyu & Dogan, 2013; Redmond, 2012; Schmidt, 2013; Sur, Unal & Iseri, 2014); (b) the use of visuals and media helps to facilitate critical thinking (Blunt & Karpickle, 2014; Harris & Zha, 2013; Parkhill & Davey, 2014; Rye, Landenberger & Warner, 2013; Schwarz & Crenshaw, 2011); (c) Visuals can improve a student's performance (Chang & Chang, 2008; Ke, Lin, Ching & Dwyer, 2006; Nesbit & Adesope, 2006; Percival & Percival, 2009; Wahidin & Meerah, 2013); and (d) Visuals can motivate students (Barden, 2014; Gavigan, 2011; Kenny, 2011; Leigh, 2012; Valerie & Abed, 2013).

All articles found for this exploratory study support the use of visuals and media in the classroom. Most studies supported the idea that VML is important in furthering the development of technology-supported classrooms. Similarly, Sosa (2009) argued in her work that "the results of this study indicate that visual literacy truly is the missing piece of many technology integration courses" (p. X). These articles as sources of data for our study will help in exploring how VML research changed since 2000 and will better informed the directions of current and future research practices and needs.

Methods

This paper is an exploratory study of research-based articles pertaining to VML published between the years 2000 and 2014. The purpose of this paper is to show how VML is currently being researched and how that research has changed in the past fifteen years. The sources of data used included a population of 129 peer-reviewed articles collected from forty-one journals. These articles were published between the years 2000 and 2014. The primary method in collecting these peer-reviewed articles involved searching the online databases and journal archives. Printed copies of peer-reviewed journal articles provided by peers and colleagues were also used. Articles found meeting the stated requirements were printed or pulled, and later organized for analysis.

In this exploratory study, the researchers reviewed each article included in the study. An article's content was coded using four categories: (a) research question, (b) population studied, (c) methodologies, and (d) findings. For analysis, similarities within categories were identified as well as relationships between categories. Qualitative data was quantified to better facilitate a comparative approach among the articles. Using an Excel spreadsheet, the articles' content was compared using the following indicators: a) date of publication, b) journal title, c) key words, d) location of the study, and e) primary author(s).

Findings

The data analysis generated the following findings: 1) peer-reviewed journals publishing visual and media literacy research, 2) research article productivity by publication year, 3) top keywords in peer-reviewed articles related to VML research, 4) relationship journals and keywords, and

Journal publications

Four peer-reviewed journals published more research articles directly or indirectly related to VML --- *Journal of Educators Online* (JEO), *Research in Learning Technology* (RLT), *Journal of Visual Literacy* (JVL), and *Journal of Media Literacy Education* (JMLE). Table 1 illustrates the relationship of the number of VML research articles published in a journal and publication year. Out of the four top journals, RLT, started publishing VML research articles in 2000 but has barely published one in the last five years. However, the journal contributed about 17% of articles used in this study. The JEO has increased its frequency of publishing VML research since 2004. This journal supplied forty research-based articles related to VML research, totaling about 30% of all the articles used in this study.

JVL was the third highest publisher of research-based articles relating to VML research. However, this journal only published 11 research-based articles. The researchers expected more research-based articles but discovered that, though it had published extensively on visual and media literacy, the majority of the articles focused on defining the VML as a field of study, and less on research.

Table 1. Frequency of VML Article Publication from 2000-2014 by Peer-Reviewed Journals

Journal	Year of Publication															Total
	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	
Journal of Educators Online (JEO)	10	6	2	2	2	4	2	2	3	4	3	--	--	--	--	40
Research in Learning Technology (RLT)	1	--	--	--	--	1	--	1	2	--	2	3	3	6	4	23
Journal of Visual Literacy (JVL)	--	1	--	2	4	1	--	2	1	--	--	--	--	--	--	11
Journal of Media Literacy Education (JMLE)	--	1	3	2	2	--	--	--	--	--	--	--	--	--	--	8
Communicar	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3
Merlot Journal of Online Learning & Teaching (JOLT)	--	--	--	--	1	--	1	1	--	--	--	--	--	--	--	3
EDUCAUSE Quarterly	--	--	--	1	--	--	--	--	--	--	1	--	--	--	--	2
Instructional Science (IS)	--	--	--	--	--	--	1	--	--	--	--	--	--	--	1	2
Journal of Computer-Assisted Learning (JCAL)	--	--	--	--	--	--	--	--	--	--	--	1	--	1	--	2
Language Arts	--	--	1	--	1	--	--	--	--	--	--	--	--	--	--	2
TechTrends	--	--	--	--	--	2	--	--	--	--	--	--	--	--	--	2
Turkish Online Journal of Educational Technology (TOJET)	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2

Further, the overall review of the data collected revealed that the publication of VML research continued to increase after 2008. Table 2 illustrates the number of VML research articles published annually. Most articles were published in 2010, 2013, and 2014. This fact helps support the earlier statement that research on VML has been slowly increasing, especially within the last seven years.

Table 2. Frequency of Article Published on VML Research by Publication Year

	Year of Publication															Total
	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	
Number of VML Research Articles Published	21	15	9	9	12	9	5	7	7	4	9	7	3	7	5	129

Journal productivity

The researchers identified 2-3 keywords based on the content of the article. Table 3 illustrates the range of keywords identified by the researchers from the articles in the span of fifteen years. In completing this task, the researchers used the keywords identified by the author(s) in the articles. For those articles with no keywords identified, the researchers generated some by determining the article's main focus. For example, if an article was researching on the effectiveness of concept maps, then researchers would choose "concept maps" as one of the keywords.

Table 3. Top keywords in journals that publish VML research articles by year of publication

Keyword	Year of Publication															Total
	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	
Online Education	10	5	1	2	1	3	1	2	4	5	3	2	2	3	3	47
Visual Literacy	2	3	3	2	9	3	--	3	1	--	--	1	--	--	--	27
Technology Integration	2	1	--	1	2	5	--	--	--	--	2	2	1	3	2	21
Media Literacy	3	1	3	2	3	4	--	--	--	--	--	2	--	--	--	18
Concept Maps	1	4	--	--	--	--	2	1	1	--	2	--	--	--	--	12

Keywords

The top five keywords identified in selected VML research articles were Concept Maps, Media Literacy, Online Education, Technology Integration, and Visual Literacy. In the span of 15 years, “Online Education” was the top keyword identified from 47 VML research articles. “Visual Literacy” was the next frequently mentioned keyword. Most of the research on visual literacy focused on how well students and teachers understand and interpret visuals. The majority of research on this topic tried to determine if visual literacy is being taught and understood well within classrooms. Table 3 illustrates the trends of keywords as well as demonstrates how research activities on related topics seem to have increased since 2000.

“Technology Integration” is another keyword that researchers found heavily mentioned in VML research articles. However, a gap spanning from 2005 until 2008 seems evident and could be attributed to shifting ideas or research activities over time. However, even with this gap in research activities, the researchers identified twenty-one articles that studied how technology is being used in education. The majority of research articles examined the types of technologies being used in the classroom and their effectiveness.

Other top keywords included “Media Literacy” and “Concept Maps”. Most of the research activities focusing on media literacy occurred after 2008 while for concept maps, many activities occurred between 2006 and 2008. Table 3 also showed that trends of VML research activities have changed since 2000. Online Education is the only keyword that was able to demonstrate some staying power --- slow but increasing popularity since the early 2000s.

The researchers were interested in examining if there is a relationship between the top ten journals and the top five keywords. In using the top keywords from Table 3, researchers connected the types of research projects undertaken for the last 15 years, and published in top journals. The top ten journals are JEO, RLT, JVL, JMLE, Communicar, Merlot JOLT, EDUCAUSE Quarterly, JCAL, Language Arts, and Instructional Science. Cumulative totals from the study were posted in Table 4.

Table 4. Relationship between journals publishing VML research articles and keywords

Keywords	Top Journals Publishing VML Research Articles by Keywords									
	JEO	RLT	JVL	JMLE	Communicar	Merlot JOLT	EDUCAUSE Quarterly	JCAL	LA	IS
Online Education	32	10	--	--	--	--	--	1	--	1
Visual Literacy	1	--	9	--	--	--	--	--	1	--
Technology Integration	2	9	--	--	--	--	2	--	--	--
Media Literacy	--	--	--	8	2	--	--	--	--	--
Concept Maps	--	--	--	--	--	--	--	1	--	1
TOTAL	35	19	9	8	2	0	2	2	1	2

Journal productivity and keywords

“Online Education” was the top keyword found among 44 articles (34.1%) and reflected a trend in visual and media literacy research. JEO and RLT were the two journals that published more VML research articles with this keyword in the last 15 years. JEO published 32 (24.8%) articles while RLT had 10 (7.75%).

“Visual literacy” was the second most common keyword identified from the study. JVL published nine (6.9%) articles with this keyword given the same timeline. RLT published nine (6.9%) articles for “technology integration” keyword while JMLE had eight (6.2%) for “media literacy”.

Further, with the number of articles identified for this study, the researchers wanted to know where research activities are undertaken and who are authoring them. Table 5 provided information on the location of the VML research studies. Researchers examined articles published in the United States and Canada separately. Europe was also scrutinized and identified which countries produce VML studies.

Table 5. Region or country where the research on visual and media literacy was completed

Region or Country	United States	Caribbean Region	Canada	Europe	Asia	Africa	Australia	TOTAL
TOTAL	81	1	6	28	10	1	2	129

Authorship

In identifying the authors of the articles, the researchers expected to find multiple articles published by the same author. However, the results informed the researchers that most authors published only once as a primary or lead author. There were a small number of cases where a primary author served as secondary author for another article, but for the most part they only published once. Only one author was found to have published twice as the primary author. It seems that the lack of repeat publications of similar if not related research articles by an author indicate a potential lack of interest in researching and publishing in VML.

Region or country

Two regions or countries have been identified as places where VML research was conducted: United States and Europe. A majority of research studies took place in the United States. Eighty-one studies (60%) were completed in America. The second region or country that produced a great number of studies is Europe with 28 (20%) studies on visual and media literacy. Most studies done in Europe were from the United Kingdom. Asia was the third highest publishing region with ten studies. Six published studies originated from Canada and two from Australia. One article each came from Africa and the Caribbean.

Most research studies took place in the United States and the United Kingdom. This fact was not surprising since both countries are technologically advanced compared to other. So it is expected that both would be leading research activities focusing on VML.

Implications

This exploratory study shows that research on VML is lacking if not minimal in the last 15 years. However, there is an indication that research interest in this area has been slowly growing. In reviewing the content of articles published in early 2000s, it seems there is a shift among authors to research more on the value, benefit or impact of VML rather than simply trying to define the field. This study also shows that research on VML is interdisciplinary or multidisciplinary. An example would be the integration of VML with online education or technology integration. While these questions do not always pertain to visual and media literacy, it was observed that a large amount of data gathered sought to answer questions that pertained to those subjects.

This study also shows that research on VML is taking place over a wide range of disciplines, not simply education or mass communication. Several of the journals have articles pertaining to other disciplines, such as, science, language arts, and history. What this means is that research on VML encompasses multiple fields of study. Finally, VML research studies are taking place all over the world. However, the majority of VML studies are completed in the United States and Europe.

Limitations and Recommendations

Given the exploratory nature of this study, the researchers are aware of several limitations. One hundred twenty-nine articles on VML were collected for this study using online databases, journal archives, and printed materials. Some articles may not have been available or accessible to the researchers given the limited time and resources. This could have impacted the analysis and interpretation of the results for making any generalization. Given the number of research articles from the United States and Europe and the limited amount from Asia or other regions of the world, the researchers believe there is a potential of bias towards Western thinking for this field of study. Also, researchers recommend the identification of more articles to be included in a follow up study especially from research activities completed beyond North America and Europe.

Conclusions

This exploratory study identified current trends of VML research. The findings provided information on journals publishing VML research including increased productivity from 2000 to 2014. Also, the findings demonstrated the interdisciplinary or multidisciplinary nature of VML research, and the increased use and integration of technology, especially in online education, that continues to support VML research. Visuals and media will continuous influence or impact everyday life. This makes VML research important to those who teach how to interpret and use visuals and media in order to communicate with others. VML knowledge and skills are necessity to those engage in all levels of education.

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Examining the Role of Emotion in Public Health Education Using Multimedia

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Abstract

This completed study investigates how learners' emotions, induced by video clips in different modality conditions (i.e., written and spoken), influence learning performance and mental effort during test in a multimedia learning environment. A total of 90 students watched video clips with various emotional tones (i.e., positive, negative, and coactive) and took recall, retention tests, and rated their mental effort for each test. The results of this study revealed that only in the written-text condition, positive groups outperformed negative groups on retention test scores; however, they did not differ from coactive groups. Recall test scores and mental effort for the test did not differ among the three emotional groups. Implication, limitation and directions for future research are discussed.

Introduction

Learners' emotion can be induced by various audio and/or visual multimedia elements with emotional tone which include on-screen texts, narrations, photographs, animations, and videos (Um, Plass, Hayward, & Homer, 2011). Emotion is associated with motivation and cognition (learning) (Goetz, Frenzel, Pekrun, Hall, & Ludtke, 2007; Pekrun & Stephens, 2010; Um et al., 2011). Previous studies have argued that positive emotion improves learning by enhancing attention, motivation for learning, and cognitive performance (e.g., test scores), while negative emotion could impede the learning processes.

However, they have not considered the intensity (i.e., arousal levels) of emotional experience. According to emotion theories (e.g., Lang, 2006; Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011; Russell, 2003), emotion is composed of two dimensions, valence (positive/negative) and arousal (calm/arousing). Therefore, the effects of positive emotion may be different between calm (e.g., relaxed) and arousing (e.g., enjoyment) levels. Some types of negative emotions (e.g., stress and anxiety) may be effective for learning if they facilitate learners' motivation to avoid academic failures (e.g., Pekrun, Elliot, & Maier, 2009). However, there is little research investigating the effects of valence in multiple levels of arousal in educational settings.

This study is grounded by *the Limited Capacity Model of Motivated Mediated Message Processing* (LC4MP: Lang, 2006) guiding to examine how valence and arousal interactively influence motivated cognitive processing of mediated content. According to the LC4MP, in a moderately arousing level, memory performance is suggested to be greater with negative emotion than positive emotion (see Figure 1). Thus, the current study focuses on the effects of valence in a moderately arousing level. In addition, the LC4MP suggests that people can feel mixed

emotional feelings (i.e., coactive) while processing both pleasant and unpleasant information simultaneously (i.e., when media users learn both information about benefits and side effects of a medicine). Therefore, the current study has the following research questions:

- (a) Does the different type of emotions (positive, negative, and coactive) differently influence students' learning performance (retention and recall test scores) in multimedia learning?
- (b) Does the different type of emotions (positive, negative, and coactive) differently influence mental effort for each test?
- (c) Do the effects of emotions differ in different modality conditions (i.e., written and spoken)?

Literature Review

LC4MP

Human emotion, motivation, and cognitive systems are intertwined and influence each other (Cacioppo & Gardner, 1999; Lang, 2006). According to the LC4MP (Lang, 2006), human has two underlying motivational systems, called appetitive and aversive systems. The appetitive system activates in response to pleasant stimuli, eliciting positive emotion. The aversive system activates in response to unpleasant stimuli, eliciting negative emotion. The intensity of pleasantness or unpleasantness determines arousal levels of positive or negative emotion. While eliciting emotional responses, as shown in Figure 1, the appetitive and aversive systems differently regulate the amount of resources allocated to cognitively processing information (Lang, 2006).

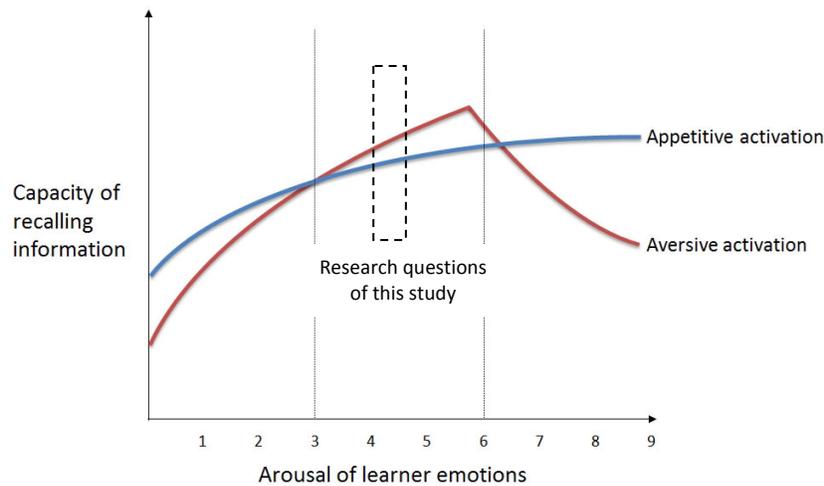


Figure 1. The Relationship Among Emotion, Motivation, and Cognition

A human has the instinct for approaching pleasant but avoiding unpleasant stimuli (Cacioppo & Gardner, 1999; Lang, 2006). In a safe environment (with little threat), the human instinctively wants to seek and remember as much pleasantness as possible. Thus, in calm levels of arousal, memory capacity is greater for appetitive than aversive activation. On the other hand, the aversive system functions to identify and remember as much unpleasantness as possible. In a greater threatening environment, the aversive system more agilely activates to protect individuals from any danger. In arousing levels, thus, memory capacity is greater for aversive than appetitive activation. Overall, greater motivational activation leads to better memory capacity. If a life-threatening stimulus (e.g., death) is presented, the aversive activation turns down to remember the repulsive unpleasantness and rather switches for internally retrieving escaping information.

In addition, the LC4MP suggests that the appetitive and aversive systems independently work. Thus, human can experience simultaneous feelings of positive and negative emotions (e.g., thinking about side effects and benefits of a medicine). The simultaneous activation of the appetitive and aversive systems is referred as coactivation. According to the LC4MP (e.g., Lang 2006; Norris, Bailey, Bolls, & Wise, 2012), memory capacity with coactivation is greater in calm levels than aversive activation only, and greater in arousing levels than appetitive activation only. However, because of the inherent complexity of coactive information, cognitive overload is more likely to occur during coactivation.

Emotion and Multimedia Learning

Emotion studies in education have suggested the utilization of positive emotion in instructional designs using multimedia. For example, positive emotion can be induced by such as aesthetic design elements, bright warm colors, human-like shapes (Um et al., 2011), pictorial illustrations (Park & Lim, 2007), video-based instructions (Chen & Sun, 2012), and background music (Fassbender, Richards, Bilgin, Thompson, & Heiden, 2012). They have demonstrated the benefits of positive emotion in enhancing motivation, satisfaction, behavioral intentions, cognitive interest, cognitive perceptions, and knowledge acquisition and retention. However, the findings were addressed with positive emotion without the consideration of its arousal level (e.g., Um et al., 2011). Moreover, there has been no research examining the effects of coactive emotion, although learners could process learning materials which may cause the mixed feelings.

Further, multimedia learning materials can be presented in a different modality format (i.e., written or spoken text). For example, the presentation of information can be displayed as on-screen text or delivered as narration only. Since human has a separate channel of visual and auditory processing, each modal's cognitive capacity is also different and the time of holding the information may also differ (Mayer & Moreno, 2003). Thus, we aims to examine how learners' emotions (i.e., positive, negative, and coactive) affect their learning in different modality conditions.

Method

Data Collection

Participants in this study were 90 undergraduate students ($n = 45$ for a written text condition; $n = 45$ for a spoken text condition) from a large southwestern university in the United States. This study used an experimental design with 3 levels of valence (positive, negative, and coactive) and 2 types of modality (written and spoken).

For the experiment, two video clips with positive tone (i.e., reversing diabetes) and two video clips with negative tone (i.e., suffering diabetes) were created. All video clips have the same running time (2' 35"). In regards with valence conditions, positive, negative, and coactive groups watched two positive, two negative, or one positive + one negative video clips, respectively. In regards with modality conditions, the written-text condition contained captions within the video clips. The spoken-text condition contained narrations, instead of the captions, in the video clips.

Dependent variables included (a) retention test, (b) recall test, (c) mental effort for retention test, and (d) mental effort for recall test.

Learning content for this study is presented after the video clips. Total 12 major risk factors causing Type 2 diabetes were instructed. Thus, recall test scores could be up to 12 points; retention test scores could be also up to 12 points; and mental efforts were measured using a one-item 9-point scale (1 = extremely low; 9 = extremely high).

This study followed three phases in the following order:

- emotional video clip (treatment) with learning content
- self-ratings of valence and arousal (for manipulation check)
- assessment (recall and retention tests) and mental effort for each test

Manipulation Check

Participants were asked to indicate how positive, negative, and arousing they felt about the video clips they just watched on a three 9-point Likert scale (e.g., 1= not at all positive; 9 = extremely positive) (Norris et al., 2012). ANOVA analysis indicated significant differences in positive valence among positive, negative, and coactive video clips, $F(2, 87) = 54.427, p < .001$. A post-hoc test revealed that positive valence was greatest for positive video clips ($M = 6.67; SD = 1.73$), followed in order by coactive ($M = 5.33; SD = 1.95$) and negative video clips ($M = 2.20; SD = 1.38$). ANOVA analysis also found significant differences in negative valence among the three types of video clips, $F(2, 87) = 38.618, p < .001$. A post-hoc test revealed that negative valence was greatest for negative video clips ($M = 6.40; SD = 2.14$), followed in order by coactive ($M = 4.60; SD = 1.81$) and positive video clips ($M = 2.27; SD = 1.46$).

Results

ANOVA analysis showed no interaction effect between valence and modality on retention test scores ($F(2, 84) = 2.779, p = .068$), on recall test scores ($F(2, 84) = .942, p = .394$), on mental effort for retention test ($F(2, 84) = .332, p = .718$), and on mental effort for recall test ($F(2, 84) = .487, p = .616$). Additional analyses were performed to examine the effects of positive, negative, and coactive emotions in each modality condition (see Table 1).

Regarding the written-text condition, ANOVA analysis revealed significant differences on retention test scores, $F(2, 42) = 3.507, p < .05$. A post-hoc test indicated that positive emotion ($M = 8.20, SD = 2.34$) outperformed negative emotion ($M = 6.13; SD = 2.03, p < .05$); however, coactive emotion ($M = 7.13, SD = 2.03$) did not differ from positive ($p = .367$) and negative emotion ($p = .413$).

However, ANOVA analyses found no significant difference on recall test scores ($F(2, 42) = 2.145, p = .130$), on mental effort for retention test ($F(2, 42) = .195, p = .823$), and on mental effort for recall test ($F(2, 42) = .170, p = .844$).

Regarding the spoken-text condition, ANOVA analyses found no significant difference on retention test scores ($F(2, 42) = .381, p = .686$), on recall test scores ($F(2, 42) = .161, p = .851$), on mental effort for retention test ($F(2, 42) = .457, p = .636$), and on mental effort for recall test scores ($F(2, 42) = 1.136, p = .331$).

Table 1. Mean and standard deviation

	Written-text condition (N = 45)			Spoken-text condition (N = 45)		
	Positive	Negative	Coactive	Positive	Negative	Coactive
Retention test scores	$M = 8.20$ $SD = 2.34$	$M = 6.13$ $SD = 2.03$	$M = 7.13$ $SD = 2.03$	$M = 7.07$ $SD = 2.58$	$M = 7.67$ $SD = 1.99$	$M = 7.73$ $SD = 2.31$
Recall test scores	$M = 5.93$ $SD = 2.49$	$M = 4.33$ $SD = 2.32$	$M = 5.73$ $SD = 2.09$	$M = 5.40$ $SD = 2.47$	$M = 5.07$ $SD = 2.05$	$M = 4.93$ $SD = 2.40$
Mental effort for Retention test	$M = 6.87$ $SD = 1.41$	$M = 6.60$ $SD = 1.50$	$M = 6.93$ $SD = 1.71$	$M = 5.47$ $SD = 1.64$	$M = 5.87$ $SD = 2.13$	$M = 6.13$ $SD = 1.96$
Mental effort for recall test	$M = 6.00$ $SD = .926$	$M = 5.93$ $SD = 1.53$	$M = 6.20$ $SD = 1.37$	$M = 5.80$ $SD = 1.47$	$M = 5.00$ $SD = 2.00$	$M = 5.93$ $SD = 1.98$

Discussion

This study was a first trial to examine how positive, negative, and coactive emotions influence learning in a multimedia learning environment. The results revealed no interaction effect between valence and modality on learning performance (retention and recall test scores) and mental effort for each test. However, in each modality condition, the effects of learners' emotions were different. Specifically, retention test scores were different only in the written-text condition; however, they did not differ in the spoken-text condition. We conjecture that the emotion effect may keep longer sustained in the written-text condition because visual processing (i.e., reading) could require more cognitive effort than auditory processing. Moreover, the information of the spoken text tends to be transient and processed relatively more quickly. Specifically, the results showed that positive emotion outperformed than negative emotion in the written-text condition. Positive emotion may be sustained longer than negative emotion; whereas negative emotion seems to be quickly diluted by additionally provided learning content on the risk factors of Type 2 diabetes.

Moreover, although retention test scores were different among the three types of emotions, recall test scores did not differ. The results are possible because recall requires more cognitive effort and deeper learning process. In other words, although recognition of useful information could be successful, it does not ensure successful recall of the information. We assume that emotions could help learners, without effort, motivated with the given content but deeper learning should involve learners' active cognitive effort and processing.

Furthermore, mental effort was not different among the three types of learners' emotional states. Mental effort indexes learners' conscious effort to think about what they learned. Thus, the findings are consistent with the notion that emotions have a motivational power which automatically allocates cognitive resources to the processing of the learning content.

This study has many limitations due to the nature of experimental research, and thus addresses several directions for future research. First of all, this study did not examine the effects of emotional tones in different arousal levels. As shown in Figure 1, depending on the arousal levels, the effects of three types of emotions may be counteracted. Further, future research needs to explore how different the sustaining time of the different types of emotions is and how they differently influence learning. The effects of coactive emotion were not found in this study,

although coactive emotion exists and successfully manipulated in this study. This study was conducted in a specific learning context and media context. So, future research may explore the effects of coactive emotion in different mediated learning contexts.

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Students' Online Learning Experiences in Collectivist Cultures

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Abstract: This survey research investigates online facilitation strategies in collectivist cultures within the “Community of Inquiry” framework. Four hundred and ninety-five students registered in a Southern European online university participated in this study. Preliminary findings show that online students in collectivist cultures value reflection within the online learning community, long for affective expression and group cohesion, value collaborative activities and are able to self-organize to increase presence in online programs.

Background

Online education is on the rise in higher education. The Online Learning Consortium reports (Allen & Seaman, 2013) on online education in the United States that: (1) the number of students taking at least one online course is 7.1 million, which represents 33% of all higher education students; and (2) sixty-six percent of academic higher education institutions identify online learning as a critical part of their long-term strategy. While this scenario offers challenges to higher education, it also offers opportunities to widen access to education, enhance the quality of teaching, and reduce the cost of higher education.

In the study of online education within higher education, much has been discussed about the value in creating communities of inquiry in general, and in online environments in particular. Communities of inquiry are “where interaction and reflection are sustained; where ideas can be explored and critiqued; and where the process of critical inquiry can be scaffolded and modeled... [a] community of inquiry must include various combinations of interaction among content, teachers, and students” (Garrison & Cleveland-Innes, 2005, p. 134). It is also argued that online students should attain high levels of critical thinking and knowledge construction as result of well-designed online learning experiences (Aviv et al., 2003; Wu & Hiltz, 2004). Online learning experiences reach their potential when they aim to support knowledge construction as a process of creation and innovation developed collaboratively.

With the growth of Web 2.0 technologies (e.g., social networking sites, blogs, wikis, and video sharing sites), consumers of information transform into producers of information. This trend is invading the educational arena (Downes, 2006), expanding the role of the learner, and shifting the role of instructor. Members of an online learning community rely increasingly on trust and reciprocity to support their own and one other’s learning. Such evolution in online education leads to alternative ways to facilitate online learning.

According to Goodyear, Salmon & Steeples (2001), facilitators need to perform a plethora of roles ranging from process facilitator (facilitating the range of online activities that are supportive of student learning) and content facilitator (concerned directly with facilitating the learners’ growing understanding of course content) to adviser/counselor (working on an individual/private basis, offering advice or counseling learners to help them get the most out of their engagement in a course) and researcher (concerned with engagement in production of new knowledge of relevance to the field).

From a social constructivist perspective, it is expected that the facilitator be an active promoter of the learning community as well as a content expert. The sustainability of an online learning environment is a direct result of an increase in reflection within the community, which in turn increases the levels of participation and trust among its members (Salmon, 2000). Online discussions create opportunities for students to construct meanings together and integrate new knowledge into their prior experiences (Rourke & Anderson, 2002). Online discussions can serve as a platform for students and instructors to interact in a social environment without boundaries of time and distance, promoting students’ critical thinking and helping students reflect on their ideas (Brooks & Jeong, 2006; Hew & Cheung, 2008; Wang, 2008).

Research has identified several problems related to online discussions, such as limited student participation (Hewitt, 2005), inadequate critical analysis of peers’ ideas (Rourke & Anderson, 2002), lack of motivation, commitment, and time, and failure to communicate effectively (Brooks & Jeong, 2006). To address some of these

pitfalls, a number of facilitation strategies, mostly focusing on the instructor as facilitator or moderator, have been described in the literature (Anderson et al., 2001). Although tutors and instructors play a critical role in online discussion environments, their domination may result in an instructor-centered discussion, suppressing students' active participation (Rovai, 2007). For example, instructors may not be able to fulfill all the facilitation responsibilities because of the high time commitment required (Rourke & Anderson, 2002). Managing a large discussion group online may be overwhelming.

Although instructor-led discussions do not necessarily result in instructor-dominated discussion, having the instructor at the center of the discussion may create an "authoritarian presence" (Rourke & Anderson, 2002, p. 4) not conducive to genuine conversations. While in Garrison, Anderson, and Archer's (2000) Community of Inquiry framework, the authors give most of the moderation activities to teachers, they acknowledge that teaching presence can also be achieved through meaningful interaction among students. In this line of reasoning, facilitation is a shared responsibility among instructors and students, changing the traditional role of the instructor from having much of the control in the instructional relationship to becoming more of a participant and fellow learner. Baran and Correia (2009) examined student-led facilitation strategies as a way to overcome the challenges of instructor-dominated facilitation, enhance the sense of learning community, and encourage student participation in online discussions. In this naturalistic study, three facilitation strategies – inspirational, practice-oriented, and highly-structured – were identified

Research Purpose

Even though much research in online facilitation has been conducted, most of it has occurred in North American contexts of practice, which are defined by Hofstede (2001) as individualist cultures. Hofstede's extensive work on comparing values, institutions, and organizations across nations has established a four-dimensional model of differences among national cultures. The four dimensions are:

- 1) Power Distance – describes the extent to which the less powerful members of institutions and organizations within a nation expect and accept that power is distributed unequally;
- 2) Individualism / Collectivism – describes the ties between individual members of a society. In individualist societies, the ties between individuals are loose, and everyone is expected to look after himself or herself and his or her immediate family; in collectivist societies, people from birth onwards are integrated into strong, cohesive ingroups, which throughout people's lifetimes continue to protect them in exchange for unquestioning loyalty;
- 3) Masculinity / Femininity – describes the degree to which dominant values of a society are distinctively "masculine" or "feminine," and the degree to which social gender roles are distinct or overlapping;
- 4) Uncertainty Avoidance – describes the extent to which the members of a culture feel threatened by uncertain or unknown situations and try to avoid such situations.

The Individualism / Collectivism dimension, which is particularly evident between collectivist cultures (e.g., Portugal, Brazil, Chile, and Costa Rica) and individualist cultures (e.g., USA, Canada, and other English-speaking countries) is addressed in this study. Such differences within the Individualism / Collectivism dimension impact teaching and learning (Hofstede, 1986). According to this author, Individualism / Collectivism describes the ties between individual members of a society. In individualist societies, the ties between individuals are loose, and everyone is expected to look after himself or herself and his or her immediate family; in collectivist societies, people from birth onwards are integrated into strong, cohesive ingroups, which throughout people's lifetimes continue to protect them in exchange for unquestioning loyalty.

This research study aimed at investigating online facilitation strategies in collectivist cultures within the Community of Inquiry framework (Garrison, Anderson & Archer, 2000). The following questions guided the research:

1. To what extent are online students engaged in online learning (levels of teaching, social and cognitive presence)?
2. How often do students engage in online collaborative activities (e.g., online discussions or online teamwork – two or more peers)? What types of collaborative activities are used in class? Which role(s) do students perform in these activities?

Online facilitation is identified here as one of the most important roles of the online instructor. By facilitating the online experience, the instructor helps to bring about learning outcomes through unobtrusive assistance, guidance, and monitoring.

The Community of Inquiry offered a framework to analyze online learning experiences through the development of three interdependent components, as follows:

- Social presence– “the ability of participants to identify with the community (e.g., course of study), communicate purposefully in a trusting environment, and develop inter-personal relationships by way of projecting their individual personalities” (Garrison, 2009, p. 353);
- Teaching presence– “the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes” (Anderson, Rourke, Garrison & Archer, 2001, p. 6);
- Cognitive presence– “the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse” (Garrison, Anderson & Archer, 2001, p. 9).

Methods

A survey research approach was used, which is “aimed primarily at tapping the subjective feelings of the public” (Fowler, 2013, p. 2). The study took place in a Southern Europe online university, refereed here as Aurora University (AU). AU offers education to more than 12,000 students in 33 countries over five continents, including migrant communities and Portuguese-speaking countries that are home to over 240 million people across the globe (e.g., Brazil, Mozambique, Angola, Cape Verde, and Guinea-Bissau).

The Community of Inquiry survey has been extensively tested (Arbaugh et al., 2008) and validated (Swan et al., 2008). Swan et al. report that Cronbach’s Alpha equals to 0.94 for Teaching Presence, 0.91 for Social Presence, and 0.95 for Cognitive Presence. The Community of Inquiry survey consists of 34 Likert scale-type items (1-Strongly Disagree to 5-Strongly Agree). The items are organized under three categories: teaching, social and cognitive presence. A translated version into Portuguese of the Community of Inquiry survey was used as data collection instrument. A section on demographics and one open-ended question about online collaborative activities were added to the survey. The survey was administered online to AU students over 21 years old who were asked to complete the survey in reference to the online course(s) in which they were enrolled. Previously to this full-blown study, a translated version of the Community of Inquiry survey was filled out by a group of 30 students and yielded a Cronbach’s Alpha of 0.885.

Analyses and Results

Out of 495 respondents, 53% were female and 47% male with ages ranging from 22 to over 65 years old. Forty-one percent of the participants were between 35 and 44 years old. The majority of the respondents (90%) lived in Portugal. Sixteen percent were unemployed at the time of the survey and pursuing a degree at AU as an opportunity to advance their knowledge and skills, shift careers and/or finding a job. Sixty-six percent of the respondents were pursuing a Bachelor's degree while 23% were graduate students. A small group of 55 students were attending courses in the Lifelong Learning program. Ninety percent of the students were experienced online learners who have taken more than three courses at AU.

Since levels of social, teaching and cognitive presence determine to what extent online students are engaged in an educational experience the data analysis focused initially on determining these levels. For example, high levels of these three interdependent dimensions indicate cognitive and social development as well as the facilitation of meaningful learning. In regards, to the extent online students were engaged in online learning the following results were obtained (Table 1). The survey items followed the categorization proposed by Swan et al. (2008). Examples are, Design & Organization, Facilitation, Direct Instruction, Affective Expression, Open Communication, Group Cohesion, Triggering Event, Exploration, Integration and Resolution.

Table 1 – Highest/lowest percentages on the three types of online presence (social, teaching and cognitive). For each type of presence the two highest (in *italics*) and the two lowest combined percentage of agreement (Strongly Agree + Agree) are reported.

Social presence	Strongly Agree + Agree = 79.59%	<i>I felt comfortable interacting with other course participants (Open Communication)</i>
	Strongly Agree + Agree = 76.22%	<i>I felt comfortable conversing through the online medium (Open Communication)</i>
	Strongly Agree + Agree = 69.87%	I was able to form distinct impressions of some course participants (Affective Expression)
	Strongly Agree + Agree = 67.15%	I felt that my point of view was acknowledged by other course participants (Group Cohesion)
Teaching presence	Strongly Agree + Agree = 92.53%	<i>The instructor provided clear instructions on how to participate in course learning activities.</i>
	Strongly Agree + Agree = 91.38%	<i>The instructor clearly communicated important due dates/time frames for learning activities. (Design & Organization)</i>
	Strongly Agree + Agree = 70.47%	The instructor provided feedback that helped me understand my strengths and weaknesses.
	Strongly Agree + Agree = 69.86%	The instructor provided feedback in a timely fashion. (Direct Instruction)
Cognitive presence	Strongly Agree + Agree = 91.96%	<i>I utilized a variety of information sources to explore problems posed in this course (Exploration)</i>
	Strongly Agree + Agree = 90.33%	<i>Reflection on course content and discussions helped me understand fundamental concepts in this class (Integration)</i>
	Strongly Agree + Agree = 78.79%	I have developed solutions to course problems that can be applied in practice (Resolution)
	Strongly Agree + Agree = 74.95%	Online discussions were valuable in helping me appreciate different perspectives (Exploration)

Social presence exhibits lower levels of agreement compared to teaching or cognitive presence. In terms of social presence, open communication (e.g., feeling comfortable when interacting and conversing with other online students) shows the highest percentage of agreement, but affective expression (e.g., forming distinct impressions about the course participants) and group cohesion (e.g., feeling their point of view acknowledged) obtained the lowest percentages. Teaching presence displays high agreement percentages in design & organization (e.g., clear instructions on how to participate in course activities; and, communication of important due dates/time frames for learning activities) and lowest in regards to direct instruction (e.g., feedback provided and timeliness of the feedback).

Finally, cognitive presence shows the highest percentage of agreement in relation to exploration (e.g., use of a variety of information sources to explore problems), but also the lowest one (e.g., online discussion and its value on helping students to appreciate different perspectives). This seems to evidence some contradiction within the Exploration category. Cognitive presence also shows the highest percentage of agreement in integration (e.g., value of reflection on course content and discussions), but the lowest percentage in resolution (e.g., course problem and its application in practice). Overall the percentage of agreement are high for these three types of online presence and it may be argued that this translate into a significant level of student engagement in online learning.

Sixty-three percent of the students reported being engaged in online collaborative activities ranging from program orientation to team projects and field work. Most of the students were part of self-organized groups to address questions and issues raised in their online classes and to serve as support group. Table 2 shows the types of online collaborative activities students engaged in and respective frequencies.

Table 2 -Types of online collaborative activities and frequencies

Online collaborative activities	%
Self-organized online groups led by the students to address questions / issues raised in their online classes and to serve as support group (synchronous and asynchronous communication)	40.2%
Online discussions moderated by the instructor to address course content (synchronous and asynchronous communication)	23.0%
Team projects and accompanying reports	13.5%
Class presentations (real-time and pre-recorded)	7.6%
Open-forums create and moderated by the course instructor to discuss course-related questions and issues	6.1%
Team projects (including presentations to the class)	4.5%
Field trips and accompanying reports	3.0%
Program orientation (for new students)	2.3%

Conclusions

Preliminary findings of this study bring some understanding about online learning within the Community of Inquiry framework in collectivist cultures. For example, a high percentage of students are engaged in online collaborative activities, occurring most of them in self-organized online groups led by the students. These groups do not only address questions and issues raised in their online programs, but as importantly they act as support groups. They might have been spurred out of the students' need for a higher level of social presence in the online courses.

The purpose of this study is not to look at online learning in collectivist cultures and compare it to individualist cultures. By the contrary, the contribution of this study is to offer a look into a phenomenon that has not been extensively researched since much of the research in online facilitation has occurred in North American contexts of practice, where individually constructed knowledge is more valued. Initial findings provide evidence that online students in collectivist cultures value reflection within the online learning community, long for affective expression and group cohesion, value collaborative activities and are able to self-organize to increase presence in online programs.

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Emphasis on Standards: What do the Interns Report?

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Abstract

The purpose of this study was to examine the internship activities of practicing graduate student library science interns. To be prepared to teach critical twenty-first century skills to students, future school librarians need in-depth understanding of the standards guiding education in public schools. Standards help define common ground in terms of sets of skills and dispositions, for use in preparing students to function as learners in an increasingly digital environment (Mardis & Dickinson, 2009).

This paper will provide an analysis of survey responses and interviews from 114 library science interns regarding their professional internship experiences with specific sets of standards. The standards under review for this study are American Association of School Librarians (AASL) Standards for Initial Preparation of School Librarians and International Society for Technology in Education (ISTE) Standards for Coaches.

Introduction

The role of the school librarian has changed in recent years due in large part to emerging technologies. Studies have proven the value of school librarians in contributing to student success. Because education today involves dealing with rapidly shifting technologies the librarian role must be fully integrated into the instructional practice if librarians are to effectively serve. To be fully integrated, school librarians must have an understanding of professional standards in order to meet the needs of those they will serve. Therefore, to improve collaborative efforts and meet instructional needs graduate school educators for future librarians realize it is necessary to make the teaching of professional standards a top priority.

Librarians must look beyond the individual role and plan, to the broader, more expansive national and international view, which demands attention to state, national and international standards. Sets of standards have been tested and vetted by informed educators to determine if and how they may provide support and direction for both classroom teachers and librarians (Church, Dickinson, Everhart, & Howard, 2012). These standards help define common ground in terms of sets of skills and dispositions, for use in preparing students to function as learners in an increasingly digital environment (Mardis & Dickinson, 2009).

This study examines the standards practiced during library and information science internship courses and investigates the kinds of experiences interns in library and information science graduate programs report they have experienced.

Need for Study

As the positions of school librarians come under increasing scrutiny, it becomes ever more important to be able to provide support for the classroom teacher. In doing so librarians are able to further show their contributions to schools. Educators are increasingly bombarded with new technology and school librarians who are prepared to provide teachers with the support they need will make it a priority to keep up with advances and changes in technology and will also be keenly aware of the national standards as they relate to and support teaching with technology (Choi & Rasmussen, 2006; Ekhaml & Hubbard, 2003). Efforts focused on technology skills and the integration of technology in the classroom are critical. Having a solid foundation in the use and integration of standards in the instructional process is crucial to the well-prepared librarian. With this background beginning librarians will feel empowered (Hughes-Hassell & Hanson-Baldauf, 2008), be able to guide classroom teachers and help determine the best uses of technology for the best outcome. (Ballew, 2014). School librarians who are particularly well versed in both American Association of School Librarians (AASL) Standards and International

Society for Technology in Education (ISTE) Standards for Coaches, as well as being skilled in technology use and integration, will be better able to better foster an atmosphere of shared support, respect and rapport with teachers.

Therefore researchers for this study were interested in the standards practiced during library and information science internship courses and the kinds of experiences interns in library and information science graduate programs have. The research questions that guided this study included questions and areas of interest to the researchers regarding the kinds of clinical experiences in technology integration pre-service librarians perceived they participated in within the internship; which critical standards were emphasized within the internship; and any feedback on preparing students for leadership roles in school librarianship that could emerge from an examination of the data. To answer these concerns and determine practices, processes and results of professional development, researchers designed and conducted a web administered survey.

Methods

Based upon a review of the empirical research on professional standards, a survey was designed to gather self-reported information from library science graduate students. Researchers employed a survey method. This study used a 52-item web-based survey, “Final Perceptions of Standards Practiced within the Internship” which was developed by the author/researcher and approved by the university’s Institutional Review Board. The survey was distributed to library science interns who were drawn from eighteen sections of the professional internship course at a southeastern university over a period of time from 2010-2014. The study defined “intern” as a student in an extended field experience under the direct supervision of a certified school librarian who is in collaboration with a graduate program. Information collected in the survey included year of the internship, gender, and school status, and 40 questions asking about program standards and perceptions of technology integration within the internship experience. A total of 114 interns responded to the study.

The survey was formatted and disseminated using a web-based survey instrument, Qualtrics. To emphasize reasons for the study, introductory information was sent electronically to the selected population along with the survey links. A Likert scale was utilized to obtain quantitative data, allowing for self-reporting with individuals addressing each question. Open-ended questions allowed respondents to provide more detailed and individualized information. Upon culmination of the survey, research software the Statistical Package for Social Science (SPSS), was employed, in conjunction with Qualtrics, to facilitate a detailed analysis of the reported data.

Participants

Participants interned in different settings as library interns, with 46% at rural settings, 35% at suburban settings, and 20% urban settings.

Table 1

	Response	%
Rural	51	46%
Suburban	39	35%
Urban	22	20%

School level participation included 60 % at primary level, 21% middle level, and 19% at secondary level.

Table 2

Answer	Response	%
Primary	65	60%
Middle	23	21%
Secondary	21	19%

Gender was reported as predominantly female with 9% male and 91% female. The average age of respondents was 40.5, with the youngest being 24 and the oldest 59.

The years in which the respondents reported serving internships were reported as follows:

Table 3

Answer	Response	%
2009	5	5%
2010	15	14%
2011	17	16%
2012	12	11%
2013	40	38%
2014	16	15%

Foundation of the Survey

AASL Standards for Initial Preparation of School Librarians and International Society for Technology in Education Standards for Coaches emphasize problem-solving, critical thinking, and analytical skills while giving teachers some flexibility and judgment in delivering the curriculum. Specifically AASL Standards for Initial Preparation of School Librarians are written for LIS educators to prepare graduates to develop and manage library services in school programs (AASL, 2010), while ISTE Standards for Coaches concentrates upon the standards for evaluating the skills and knowledge that education coaches need to guide and support teachers in an increasingly connected and global society (ISTE, 2012). Both sets focus on acquiring the skills to pursue knowledge. Together these standards provide guidance on key skills for instruction, along with logical steps and direction on how to deliver instruction in an effective manner to encourage student learning. Both sets of standards also recognize that skills and disposition that connect curriculum with real-world application is necessary (Mardis & Perrault, 2008). Themes from each set of standards were used for development of survey questions.

Analysis of Findings

It is clear from the standards that school librarians must model the vision of a technology aware school and be collaborative partners. If students are to make use of and benefit from technology, leaders have to provide access, organize, and display and use whatever types of technology are available. It is important to identify innovative products for teaching and learning use. We must model technology enhanced experiences in our teacher in-service opportunities through first planning technology integrated lessons with teachers and then collaborating with teachers to develop inquiry experiences for students.

The overlap between ITSE Standards for Coaches, in terms of vision and leadership and AASL Standard 4: Advocacy and Leadership was evident in our survey results. Respondents reported experiences in connecting, sharing, collaborating, and interacting with other educators. The close alignment in these standards, specifically AASL 4 and ISTE 1 focused on demonstrating leadership through networking and building relationships with teachers. Working together teachers and librarians can benefit everyone involved. Results indicated experiences with these two standards as reported

ALA/ AASL Standard	ISTE Standards for Technology Coaches	Activities Practiced and Reported
AASL Standard 4: Advocacy and Leadership	ISTE Standard 1. Visionary Leadership	<ul style="list-style-type: none"> • Advocated for learning programs and positive learning environments • Led collaboration with a variety of instructors • Participated in professional growth and leadership opportunities • Advocated for information programs, resources, and services

Another area where strong evidence was reported with two overlapping standards included the AASL Standard 1 and ISTE Standard 2. Both of these standards appeared to be addressed well in the internship:

ALA/ AASL Standard	ISTE Standards for Technology Coaches	Activities Practiced and Reported
AASL Standard1: Teaching for Learning	ISTE Standard 2: Teaching, Learning, & Assessments	<ul style="list-style-type: none"> • Instructed based on knowledge of diverse learning needs and interest of students • Collaborated with other educators in the integration of 21st Century skills • Documented, analyzed, and shared data on student achievement • Advocated and modeled best practices for incorporating technology into instruction • Contributed to instruction based on knowledge of curriculum standards

Conclusions

The information gained through this study may be helpful for programs in deciding which sets of standards are most appropriate for a particular program. The results indicate that pre-service librarians are increasingly requiring technology competence for effective instructional collaboration. In their dual roles as both school librarian and instructional collaborator, mastery of technology and skills as technology coaches are crucial. ISTE Standards for Coaches provide a solid foundation from which to prepare future school librarians towards this end. Graduate program coursework aligned with AASL Standards for Initial Preparation of School Librarians provide future librarians with skills and dispositions to support mastery of technology and associated troubleshooting skills as an essential part of their preparation program. While these standards are different, they are not opposing, and together they can help to more optimally support instruction.

Successful graduate programs should identify and concentrate upon standards that enhance their abilities to facilitate development of well-prepared, qualified learners who are ready to step into interdisciplinary atmospheres that will support a broad range of diversity in faculty, students, and student interests. Without doubt, knowledge of the standards and their impact in this digital information era must be our focus as we strive to help learners navigate life through deeper, more meaningful, lifelong learning.

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A COMPARISON OF LEARNER SELF-REGULATION IN ONLINE AND FACE-TO-FACE PROBLEM-BASED LEARNING COURSES

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Abstract

A posttest-only, quasi-experimental study was conducted to investigate the effect of two problem-based learning environments on students' self-regulation of learning and students' level of cognitive load. The study involved 40 graduate nursing students from two intact nursing courses where problem-based learning was the principal method of instruction. Twenty students from an online course and 20 students from a face-to-face course received one ill-structured problem per week in their respective courses over the 4-week duration of this study. All participants completed the Motivated Strategies for Learning Questionnaire after their 4-week participation in the study to describe their learning motivation and their use of learning strategies. Students' 4-week participation in the study also involved a weekly measure of students' cognitive load after the completion of an ill-structured problem distributed weekly. A total of four cognitive load measures (i.e., one measure per week) were generated to assess students' cognitive load across the duration of the study.

The results of the study revealed that students did not differ in motivation, cognitive load, and eight of nine self-regulated learning strategies. A MANOVA statistical test indicated that students who received problem-based learning in the online course used fewer metacognitive strategies than students who received problem-based learning in the face-to-face course. Students in the online course were comparable to students in the face-to-face course with respect to the learning strategies rehearsal, elaboration, organization, critical thinking, peer learning, help seeking, effort regulation, and time and study environment. A second MANOVA statistical test indicated that students who received problem-based learning in an online course did not differ from students who received problem-based learning in the face-to-face course with respect to learning motivation. Students in both problem-based learning environments reported comparable intrinsic goal orientation, extrinsic goal orientation, control of learning beliefs, task value, test anxiety, and self-efficacy for learning and performance. Both groups of students experienced a high level of cognitive load but did not experience different levels of cognitive load, as determined by a mixed ANOVA statistical test.

Introduction

Nearly 33% of postsecondary students are enrolled in at least one online course where students receive 80% or greater of their course instruction by Internet (Allen & Seaman, 2013). This percentage is projected to rise as high as 50% by the end of 2014, increasing the number of students with a minimum of one online course enrollment (Christensen, Horn, Caldera, & Soares, 2011). The projected rise in student enrollment in online courses will likely give rise to an expansion of the common practice of replicating traditional, face-to-face course design in online courses (Bonk & Dennen, 2003). Vaughn (2010) suggested that such replication occurs when postsecondary instructors fail to make the transformational shift from the practice of disseminating information to the practice of creating learning environments that enable students to co-construct knowledge. The inability of postsecondary instructors to make this transformation has forced many students to contend with poorly designed online courses (Bannert, 2004; Zumbach & Mohraz, 2008).

Several scholars (Amadiou, Gog, Paas, Tricot, & Mariné, 2009; Evans & Douglas, 2008; Schnotz & Heiss, 2009) indicate that poor instructional design contributes to excessive cognitive load in students who receive instruction in online courses. Paas and Van Merriënboer (1994) defined cognitive load as the load that performing a particular task imposes on the limited resources of students' working memory. Thus, poor online course design, resulting from the practice of transferring traditional face-to-face courses to online courses, may place an excessive burden on the limited resources of students' working memory.

The transfer of traditional face-to-face course design to online courses not only raises the potential for excessive cognitive load but also shows the wide regard for online courses as delivery systems (Allen & Seaman,

2013). As such, a number of problem-based learning instructors at the postsecondary level have recently begun to transfer their face-to-face problem-based learning courses to online course environments (Chia-Wen & Yi-Chun, 2013; Duncan, Smith, & Cook, 2013). This transfer of face-to-face problem-based learning courses to online courses assumes that students in face-to-face and online problem-based learning courses exhibit comparable self-regulation of learning in the two learning environments (Savin-Baden, 2007).

Amadiou et al. (2009) suggests that comparable self-regulation of learning among students in online courses is not easily achieved as students who receive instruction in online courses must overcome the cognitive load presented by the nonlinear nature of online courses. A similar suggestion was posited by Zumbach and Mohraz (2008), who indicated that students' self-regulation of learning in online courses required students to surmount the cognitive load emanating from the nonlinear presentation of text. Bannert (2004) indicated that students' self-regulation of learning placed a demand on students, requiring them to overcome the cognitive load generated by the simultaneous task of processing hypertext nodes and planning further navigation in online courses. Thus, the cognitive load associated with the physical structure of online courses may diminish self-regulated learning among students who receive problem-based learning in online courses.

The cognitive load generated by the structure of online courses is not the only obstacle that students must overcome for comparable self-regulation of learning in online and face-to-face problem-based learning courses; students must also surmount the cognitive load inherent in problem-based learning to regulate their learning (Yuan et al., 2011). Ribeiro (2008) suggested that students' self-regulation of learning requires students to overcome the cognitive demands of arduous workloads that are not commonly associated with learning in traditional face-to-face courses. International nursing students complain that these workloads are time-consuming and stressful, indicating that students' self-regulation of learning is not easily achieved when problem-based learning is implemented (Yuan et al., 2011). Therefore, comparable self-regulation of learning among students in face-to-face and online problem-based learning courses may demand that students overcome the combined cognitive load associated with problem-based learning and the physical environment of an online course.

Purpose of Study

The purpose of the present study was to determine whether students' self-regulation of learning is comparable in online and face-to-face problem-based learning courses. Comparable self-regulation of learning among students implies there should be little difference in students' learning motivation and use of learning strategies. It was expected that students who received problem-based learning in an online course would differ from their face-to-face counterparts in learning motivation and their use of cognitive, metacognitive, and resource management strategies. This expected difference was based on empirical findings that suggest that the extraneous cognitive load associated with students' navigation of nonlinear learning environments negatively affect students' learning motivation (Christensen & Miller, 2008) and use of learning strategies (Amadiou et al., 2009). Furthermore, it was expected that students who received problem-based learning in an online course would differ from students who received problem-based learning in a face-to-face course with respect to cognitive load. This expectation was predicated on research that suggests that the cognitive load that students experience in problem-based learning is likely to be expanded by the cognitive load that students experience in online courses (Schnotz & Heiss, 2009).

Research Questions

1. Do students who receive problem-based learning in an online course use different learning strategies (i.e., cognitive, metacognitive, resource management strategies) than students who receive problem-based learning in a face-to-face course?
2. Does the learning motivation of students who receive problem-based learning in an online course differ from students who receive problem-based learning in a face-to-face course?
3. Do students who receive problem-based learning in an online course experience different levels of cognitive load than students who receive problem-based learning in a face-to-face course?

Methodology

The present study involved a posttest-only, quasi-experimental design. All participants were selected from two intact nursing courses, which consisted of a face-to-face problem-based learning course and an online problem-based learning course. The participants in the face-to-face course served as the control group; those in the online

course served as the experimental group. Both groups were compared based on posttest data collected using the Motivated Strategies for Learning Questionnaire (Pintrich, Smith, Garcia, & McKeachie, 1991), which assessed participants' self-reported motivation and use of learning strategies and the Mental Effort Rating Scale (Paas, 1992), which assessed participants' cognitive load for each of four weeks following students' completion of a weekly problem-solving task. Two types of statistical tests were performed on the data collection, including a multivariate analysis of variance and mixed analysis of variance.

Participants

The participants in the present study included 40 graduate nursing students at a small, Midwest Catholic university. Participants possessed a wide range of experience with online pedagogy, with more than half of the participants receiving greater than 50% of their academic program online. Although less prevalent in the participants' academic program, many participants also had experience with problem-based learning, as evidenced by their participation in the undergraduate nursing program. All participants possessed a diverse range of technology skills, including competencies in the use of productivity tools, social networking sites, web-conferencing software, and course management systems.

Experimental Components

A description of the components of this quasi-experimental study is presented below.

Treatment. The experimental group for the present study received problem-based learning in an online course. This course was implemented as a *single module online at a distance* to determine the effect of problem-based learning in an online course on students' self-regulation of learning. The single module online at a distance approach to problem-based learning has been used extensively to assess the effectiveness of problem-based learning as a viable instructional framework for educating students (Lee, 2006).

This framework was used to provide participants a weekly case study over the 4-week duration of this study. Participants were provided instruction on the Maastricht Seven-Step Model prior to the study to enable the participants, working in groups of five, to devise solutions to the issues presented in the cases. This problem-solving model has been used successfully to guide students' problem-solving activities in past problem-based learning research (Schmidt, 1983).

Control group. The control group consisted of the face-to-face graduate nursing course. This course was facilitated by the same instructor who facilitated the online version of the course and served as tutor. Participants received a weekly case study over the 4-week duration of the study and worked in groups of five to solve the problems presented in the cases. All participants received instruction on the Maastricht Seven-Step Model prior to initiating work on the cases.

Problem-based learning tutor. An experienced problem-based learning instructor with prior experience in online instruction served as the problem-based learning tutor for both the online and face-to-face problem-based learning course. This individual stimulated interaction among students, provided stimuli to promote student elaboration, and encouraged students to integrate new knowledge with their existing knowledge. The tutor fulfilled these tasks by asking questions, clarifying information provided by students, and providing perspectives intended to enhance students' application of knowledge. Online discussion forums and webinars supported these interactions by the tutor in the online course. Participants used the online discussion forums throughout the study; webinars were conducted on each Wednesday of the study. Students in the face-to-face course interacted with the tutor in person.

Procedures

Participants in the online course received a case study in an online discussion forum designated for their collaborative groups on *Monday* of each week of the study. The tutor or group members were contacted via the discussion forum if participants needed to clarify their understandings of the case study. Participants posted a definition of the problem and possible solutions to the problem in their group discussion forum prior to midnight on *Tuesday*.

Group participants met via Adobe Connect web meeting software for approximately one hour on *Wednesday*. All groups met in virtual breakout rooms where they began one-hour meeting times in intervals (e.g., Group 1 begins at 6:00 pm, Group 2 begins at 6:20 pm, and Group 3 begins at 6:40 pm) to accommodate the tutor's availability. A 20-minute tutorial followed a 40-minute group meeting where an assigned scribe for each group led his/her group in building consensus on the nature of the problem presented, possible solutions to the problem

presented, priorities for solving the problem, and the knowledge base needed to solve the problem. The tutor joined the group after a group consensus was reached to provide coaching, clarify information, and make recommendations. Participants began their self-study to expand the group's knowledge base after this meeting with each individual investigating a key part of the needed knowledge base.

Participants began posting their self-study findings to the problems identified in group discussion forum on *Thursday*. All self-study postings were due at midnight on *Friday*. The scribe summarized the self-study postings in the context of the problem solution, posted the summary in the group discussion forum, and made the summary available to participants by *Sunday* at noon. Participants used the scribe's summary to debate how the problem was best managed and decided whether the solution existed in the posted findings. Groups submitted a written solution by *Monday*.

Control group. Participants met in a campus classroom on *Tuesday* evenings for a 3-hour class. The tutor asked the students to organize themselves into groups of five and distributed a case study to all participants. All participants read the case study and posed questions to their group members to clarify any misunderstandings about the case study. The tutor was also available to clarify participant misunderstandings. Participants were prompted by the scribe to articulate the problem and were led by the scribe in building a consensus of the definition of the problem. The scribe also asked group members to propose possible solutions to the problem, establish priorities for solving the problem, and determine the knowledge base needed to solve the problem. All discussions were recorded in writing by the scribe. The tutor provided coaching, clarified information, and made recommendations.

Self-study occurred outside of class meetings. All participant findings were emailed to the scribe by Friday of each week. The scribe summarized the findings in a document and provided all group members the document of summarized findings by Sunday. The group debated how the findings best addressed the problem during the first hour of class on the following Tuesday, prior to beginning work on the next problem scenario.

Measures

Two sets of data were collected during this study. The first set of data consisted of repeated measures of students' cognitive load over the duration of the study. This data was collected for the experimental and control groups using the Mental Effort Rating Scale (Paas, 1992). The second set of data consisted of posttest data collected using the Motivated Strategies for Learning Questionnaire (Pintrich et al., 1991). This data was also collected for the experimental and control groups.

Repeated measures. The Mental Effort Rating Scale (Paas, 1992) was used to generate weekly measures of participants' cognitive load after performing a weekly problem-solving task. This instrument refers to a 9-point, single-item Mental Effort Scale (Paas, 1992), which was used to measure how participants rate the mental effort they devoted to solving the issues presented in the case study. Participants respond to the question immediately following the completion of the task. The scale for the Mental Effort Rating Scale (Paas, 1992) ranges from 1 to 9, with 1 representing *very, very low effort* and 9 representing *very, very high effort*. This subjective rating scale is used frequently to measure the construct cognitive load, which represents the construct mental effort (Reynolds, Woods, & Baker, 2007). The Mental Effort Rating Scale was administered after the completion of each weekly case study.

Posttest. Participants in the control and experimental groups responded to the Motivated Strategies for Learning Questionnaire (Pintrich et al., 1991) to determine whether students who receive problem-based learning in an online course differed from students who received problem-based learning in a face-to-face course with regard to self-regulated learning. The Motivated Strategies for Learning Questionnaire (Pintrich et al., 1991) is an 81-item, self-report questionnaire that uses a 7-point Likert scale to measure college students' motivation and use of learning strategies. Responses for the Likert scale ranges from 1 (Not at all true of me) to 7 (Very true of me). Two sections comprise the Motivated Strategies for Learning Questionnaire (Pintrich et al., 1991): a motivation section and a learning strategies section. The motivation section consists of 31 items that consist of the expectancy, value, and affective components of motivation. Expectancy is divided into the learner's *control of learning beliefs* and *self-efficacy for learning and performance*. The learner's control of learning beliefs refer to the learner's belief that his/her efforts to learn will result in positive outcomes. Self-efficacy for learning and performance pertains to the learner's personal judgments of his/her ability to accomplish a given learning task.

The value component of motivation is divided into *intrinsic goal orientation*, *extrinsic goal orientation*, and *task value*. Intrinsic goal orientation refers to the degree to which learners perceive themselves to be participating in an activity for reasons such as mastery, challenge, or curiosity. Extrinsic goal orientation pertains to the degree to which learners perceive themselves to be participating in an activity for competition, rewards, grades, performance, and evaluation by others. Task value refers to how interesting, important, and useful learners perceive a particular learning task to be.

The affective component of motivation consists of one construct: *test anxiety*. This construct is thought to be divided into two components: cognitive and emotional. The cognitive component of test anxiety refers to the negative thoughts that disrupt learner performance. Affective and physiological arousal aspects of anxiety comprise the emotional component of test anxiety.

The learning strategies section of the Motivated Strategies for Learning Questionnaire (Pintrich et al., 1991) consists of 31 items that comprise the cognitive and metacognitive strategies *rehearsal*, *elaboration*, *organization*, *critical thinking*, and *metacognitive self-regulation*. Rehearsal relates to the recitation or naming of items from a list and is best used for simple tasks or the activation of information in the working memory. This strategy is not recommended for learners who must acquire new information. Elaboration helps learners store information into long-term memory by helping learners build connections to information that must be learned. Some elaboration strategies include paraphrasing, summarizing, generative note-taking, and the creation of analogies. Organization strategies help learners select appropriate information and construct connections between the information that must be learned. Strategies related to organization include clustering, outlining, and selecting the main idea from a passage. Critical thinking involves the extent to which learners report applying previously-learned material to a new situation to solve problems, reach decisions, or make standardized evaluations of excellence.

Metacognitive self-regulation consists of three processes: planning, monitoring, and regulating. Planning relates to activities that activate relevant aspects of learner prior knowledge that simplify the tasks of organizing and comprehending the material. Such activities include the tasks of goal setting and task analysis. Monitoring activities involve learner tracking of attention, self-testing, and questioning. These activities help the learner understand new material and integrate the new material with prior knowledge. Regulating activities supports the fine-tuning and continuous adjustment of one's cognitive activities. Such activities are intended to improve performance by helping learners to check and correct their behavior as the learners work toward a given learning goal.

The learning strategies section of the Motivated Strategies for Learning Questionnaire (Pintrich et al., 1991) further includes 19 items that involve resource management strategies. Resource management strategies include such strategies as time and study environment management, effort regulation, peer learning, and help-seeking. Time and study environment strategies pertain to the learner's capacity to manage study time and the learning environment. These strategies require learners to manage their study time by scheduling and planning activities. Learners must also regulate the study environment by ensuring that the study environment is quiet, organized, and free of visual and auditory distractions. Effort regulation strategies refer to the learner's capacity to control his/her effort and attention when presented with distractions or uninteresting material. These strategies are not only an important aspect of goal commitment but also foster the continued use of self-regulated learning strategies. Peer learning involves learner collaboration with peers. Such collaboration has been shown to have positive effects on achievement, helping learners to clarify course material and attain insights not easily achieved in isolation. Help-seeking refers to strategies that learners use to seek academic help. Such strategies require the learner to be able to determine that help is needed and seek help from the instructor or peers.

Results

The data collected for the present study allowed the researcher to address the three research questions. Results for *Research Question 1* are described in the first section to present statistical analyses of data pertaining to student use of self-regulated learning strategies in online and face-to-face courses where problem-based learning is the exclusive method of instruction. This section is followed by a description of the data analyses for *Research Question 2*, which describes students' learning motivation in online and face-to-face courses where problem-based learning is the exclusive method of instruction. The third section describes the data analyses for *Research Question 3*. Data analyses for this section present a comparison of cognitive load data for students in online and face-to-face problem-based learning courses.

Do students who receive problem-based learning in an online course use different learning strategies than students who receive problem-based learning in a face-to-face course?

A multivariate analysis of variance was performed to test the hypothesis that students who received problem-based learning in an online course used different self-regulated learning strategies than students who received problem-based learning in a face-to-face classroom. Student use of self-regulated learning strategies was assessed by nine measures: rehearsal, elaboration, organization, critical thinking, help seeking, peer learning, time

and study environment, effort regulation, and metacognitive self-regulation. These measures were assessed for students at both levels of the independent variable, as shown in Table 1.

Table 1

Mean Scores and Standard Deviations for Measures of Student Use of Learning

Strategies

Strategy	M	Group			
		F2F	Online		
		SD	M	SD	
REH		4.75	.444	4.61	.349
ELA		2.18	.099	2.16	.072
ORG		4.65	.454	4.69	.302
CTK		4.85	.440	4.62	.289
MSR		5.12	.424	4.68	.364
TSE		4.83	.340	4.81	.345
ERE		4.92	.354	4.79	.374
PLN		4.98	.439	4.97	.458
HSK		4.95	.350	4.75	.303

Note. REH = rehearsal; ELA = elaboration; ORG = organization; CTK = critical thinking; MSR = metacognitive self-regulation; TSE = time and study environment; ERE = effort regulation; PLN = peer learning; HSK = help seeking.

A statistically significant multivariate effect was obtained, $F(9, 30) = 11.243, p < .0005$; Wilks' $\Lambda = .229$; partial $\eta^2 = .771$. The multivariate effect size indicated that student use of learning strategies accounted for 77.1% of the variance in the canonically derived dependent variable.

Follow-up univariate analysis of variance (ANOVA) tests were conducted to test the assumption of homogeneity of variance for each of the nine learning strategies' subscales. A series of Levene's F tests indicated that the homogeneity of variance assumption was satisfied ($p > .05$). A series of post-hoc analyses (Tukey) were performed to examine individual mean difference comparisons across both levels of problem-based learning environment and all nine learning strategies' subscales. The results revealed that the post-hoc mean comparison for the learning strategy metacognitive self-regulation was statistically significant ($p < .05$), suggesting that students who received problem-based learning in a face-to-face course had a statistically significantly higher mean score on the dependent variable metacognitive self-regulation ($F(1, 38) = 12.004, p < .005$; partial $\eta^2 = .240$) than students who received problem-based learning in an online course. The effect size of .240 indicated that metacognitive self-regulation accounted for 24% of the variance. Therefore, the hypothesis for *Research Question 1* was confirmed.

Does the learning motivation of students who receive problem-based learning in an online course differ from students who receive problem-based learning in a face-to-face course?

A multivariate analysis of variance was performed to test the hypothesis that the learning motivation of students who received problem-based learning in an online course differed from students who received problem-based learning in a face-to-face course. Students' learning motivation was assessed by six measures: intrinsic goal orientation, extrinsic goal orientation, control of learning beliefs, task value, test anxiety, and self-efficacy for learning and performance. These measures were assessed for students at both levels of the independent variable, as shown in Table 2.

Table 2

Mean Scores and Standard Deviations for Measures of Learning Motivation

Strategy	Group				
	M	F2F		Online	
		SD	M	SD	M
IGO	4.69	.420	4.62	.349	
EGO	4.60	.462	4.52	.371	
COL	4.80	.402	4.74	.401	
SEF	4.82	.359	4.70	.307	
TVA	4.86	.486	4.62	.349	
TAX	4.72	.412	4.67	.339	

Note. IGO = intrinsic goal orientation; EGO = extrinsic goal orientation; COL = control of learning; SEF = self-efficacy for learning and performance; TVA = task value; TAX = test anxiety.

No statistically significant multivariate effect was obtained, $F(6, 33) = 2.122, p = .07$; Wilks' $\Lambda = .722$; partial $\eta^2 = .278$. This finding suggests that students who received problem-based learning in an online course did not differ from students who received problem-based learning in a face-to-face course with respect to learning motivation. Thus, the hypothesis for *Research Question 2* was not confirmed.

Do students who receive problem-based learning in an online course experience different levels of cognitive load than students who receive problem-based learning in a face-to-face course?

A mixed-model analysis of variance test was performed to determine whether the self-reported cognitive load of students who received problem-based learning in an online course differed from students who received problem-based learning in a face-to-face. Cognitive load scores for weeks 1 through 4 were the within-subjects variables with time as the within-subjects factor name. The between-subjects factor was problem-based learning environment. A 4 (Time) x 2 (Problem-based learning environment) mixed-model ANOVA with overall scores revealed no statistically significant interaction between the intervention and time on cognitive load, $F(3,114) = .063, p = .979$, partial $\eta^2 = .002$. The main effect of time showed no statistically significant difference in cognitive load, $F(3,114) = .063, p = .979$, partial $\eta^2 = .002$. This finding indicated that there was no difference in cognitive load regardless of the intervention group. The main effect of group showed no statistically significant difference in cognitive load between intervention groups, $F(1, 38) = .073, p = .789$, partial $\eta^2 = .002$. This finding indicated that there was no statistically significant difference in cognitive load between the different intervention groups. Therefore, the hypothesis for *Research Question 3* was not confirmed. The findings on the dependent variable are consistent with a significant disordinal interaction, as shown in Figure 1.

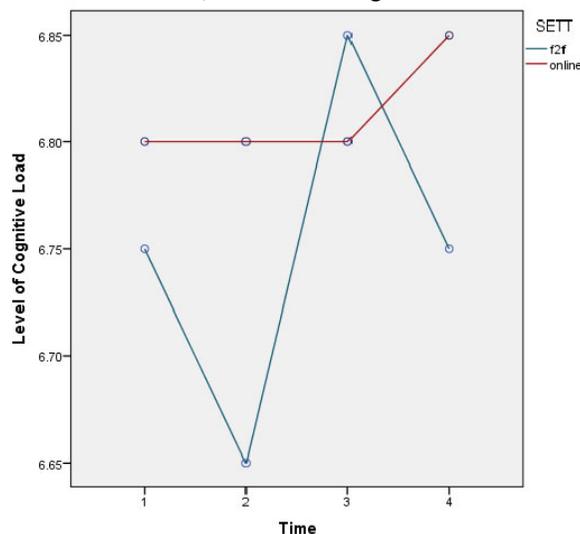


Figure 1. Level of cognitive load for online and face-to-face groups after each of four weeks. The figure shows a significant disordinal interaction.

Group means and standard deviations for four measures of cognitive load are shown in Table 3.

Table 3

Group Mean Scores and Standard Deviations for Measures of Cognitive Load

Week	Group			
	F2F		Online	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
1	6.75	1.21	6.80	1.15
2	6.65	1.14	6.80	1.24
3	6.85	1.14	6.80	1.20
4	6.75	1.25	6.85	1.14

Discussion

The environment in which students receive problem-based learning appears to impact their learning process. An examination of *Research Question 1* revealed that students who received problem-based learning in an online course did not use self-regulated learning strategies in a manner comparable to students who received problem-based learning in a face-to-face course. The primary contributor to this difference was the variable metacognitive strategy use. This finding seems reasonable in light of findings in computer-supported collaborative learning literature, which indicates a lack of student participation in the co-regulation of learning (Ochoa & Robinson, 2005; Rose, 2004). One implication of this literature is that students who receive problem-based learning in an online course would not be expected to use metacognitive strategies as effectively as their face-to-face counterparts as students who receive problem-based learning in an online course are typically inclined to concede to minority opinions with little cognitive dissonance or contribution (Ochoa & Robinson, 2005). Hung and Crooks (2009) offered an explanation for this behavior, reporting that college students regarded online connections to collaborative group members as superfluous, inconvenient, and unsupportive of their learning process. This attitude would be expected to impact students' motivation to co-regulate learning.

Furthermore, students who received problem-based learning in an online course did not exhibit different learning motivation than students who received problem-based learning in a face-to-face course. Both groups of graduate students exhibited high learning motivation, as determined by the Motivated Strategies for Learning Questionnaire (Pintrich et al., 1991). This finding is consistent with Hung et al. (2010), who reported students' level of education positively influenced students' learning motivation. On the other hand, the finding that the learning environment had no differential effect on students' learning motivation departs from existing literature that suggests that students' learning motivation is influenced by the learning environment (Bolliger, Supanakorn, & Boggs, 2010).

Moreover, students who received problem-based learning in an online course not only exhibited learning motivation comparable to their face-to-face counterparts but also experienced a comparable level of cognitive load in comparison to their face-to-face counterparts. Students in both groups experienced an excessive level of cognitive load. This observation is consistent with past research, which has shown that cognitive load is typically high for students who receive any form of problem-based learning (Ruiz-Gallardo et al., 2011; Yuan et al., 2011). Conversely, the observation of comparable cognitive load among these students is not consistent with past research that suggests that students who receive instruction in online courses experience a different level of cognitive load than students who receive traditional classroom instruction (Amadiou et al., 2009; Bannert, 2004; Schnotz & Heiss, 2009). In conclusion, it cannot be determined from the present study whether excessive cognitive load is the result of instruction or the learning environment but high cognitive load among students who receive problem-based learning is in line with the established literature.

Implications for Practice

Results of the present study indicated that there is a disparity in metacognitive strategy use between students who receive problem-based learning in online and face-to-face courses. Students who received problem-based learning in an online course were less likely to use metacognitive strategies to regulate learning than their face-to-face counterparts. This finding seems to indicate that there was a lack of support for metacognitive strategy use in the online course. Past research has shown that students' metacognitive strategy use is improved by the tools (discussion forums and email) used to support learning in an online course (Dabbagh & Kitsantas, 2005). This

finding is consistent with Kramarski and Mizrachi (2006), who reported that discussion forums with metacognitive guidance helped students in online courses surmount difficulties associated with the metacognitive tasks of goal setting, planning, self-monitoring, and evaluation. Thus, students need support for metacognitive self-regulation when problem-based learning is implemented in an online course.

A second implication of the results of the present study is that efforts should be made to reduce cognitive load when problem-based learning is implemented in online and face-to-face courses. While the influence of cognitive load on students' self-regulation of learning was not assessed in the present study, the level of cognitive load was determined to be excessive, as defined by Paas (1992). Morozov (2007) showed that the high cognitive load that students experienced could be reduced through the use of a comprehensive hierarchical map to help students navigate the learning material. Research by Schnotz and Heiss (2009) suggested that cognitive load could be reduced through the use of semantic scaffolds. A study by Cheon and Grant (2012) demonstrated that cognitive load could be reduced through the use of a metaphorical interface, which contributes to schema automation and construction. Therefore, the high level of cognitive load experienced by students in the present study should be addressed through instructional design of the learning environment.

Future Research

The present study showed that students who received problem-based learning in an online course exhibited statistically significant differences from students who received problem-based learning in a face-to-face course with respect to student use of self-regulated learning strategies. It was found that group differences in metacognitive self-regulation contributed to a multivariate main effect. The limited use of metacognitive strategies by students who received problem-based learning in an online course indicated that students who received problem-based learning in an online course needed support for metacognitive strategy use.

A study by Azevedo et al. (2005) revealed that adolescents who received adaptive human scaffolding used more metacognitive strategies in the regulation of their learning process. This form of scaffolding has been consistently shown to support metacognitive monitoring through the capacity of human tutors to continuously monitor learning progress, diagnose students' emerging understanding, and provide students' timely scaffolding (Aleven & Koedinger, 2002). Thus, research on human adaptive scaffolding in online and face-to-face problem-based learning courses might determine whether human adaptive scaffolding eliminates the disparity in metacognitive strategy use between students who receive problem-based learning in an online course and students who receive problem-based learning in a face-to-face course.

Other forms of scaffolding might also eliminate the disparity in metacognitive strategy use between students who receive problem-based learning in an online course and their face-to-face counterparts. Van den Boom, Paas, and Merrienboer (2004) reported that students who received reflection prompts in tandem with tutor feedback demonstrated improved metacognitive strategy use. Similar improvements in students' metacognitive strategy use were reported by Moos and Azevedo (2008) when students were afforded conceptual scaffolding. Therefore, research on different types of scaffolding is needed to determine how students who receive problem-based learning in an online course are best supported in the regulation of learning.

In addition, research on the use of learning diaries is recommended for future studies that compare students' self-regulation of learning in online and face-to-face problem-based learning courses. Kuusela and Paul (2000) indicated that diaries enable an examination of the nature of students' thinking and reasoning through retrospective verbal protocol analysis. Such analysis of diaries allows researchers to capture students' self-regulation of learning across a given learning task through students' generation of narrative content (Ericsson & Simon, 1993). Capturing students' self-regulation of learning across a particular learning task through the use of learning diaries would likely detect changes in self-regulated learning not apparent when self-regulated learning is reported via self-report questionnaire.

Moreover, conducting the present study using learning diaries would capture students' self-regulation of learning and cognitive load around the different phases of problem-based learning as opposed to the reporting phase of problem-based learning. Schmitz and Wiese (2006) indicated that diaries structured using a series of event questions captured students' self-regulation of learning before and after events. Such event questions would likely make it possible to assess cognitive load and self-regulated learning at the different stages of problem-based learning. The present study did not examine self-regulated learning and cognitive load with respect to the events of problem-based learning. As such, the present study may not have fully accomplished its intent. Thus, subsequent studies of this nature may be best conducted with a focus on the events of problem-based learning.

Limitations of Study

The quasi-experimental design of the present study limits its generalizability. One issue with the design of this study was the lack of participant randomization, which introduced several confounding variables, including participants' personal characteristics, technology efficacy, and technology attitudes. Such confounding variables pose a serious threat to the external validity of this study, limiting the researcher's ability to make sound inferences from the data.

A second limitation of the study involved the population from which the participants were selected. All participants were graduate nursing students with one or more years of clinical experience. Results for this group may not be easily generalized to undergraduate nursing students and students in academic disciplines where less academic rigor is evident.

A lack of standardization in course design represented a third limitation of this study. The designer of the learning environments used in the present study was accustomed to making arbitrary course-design decisions. Most of the course designer's decisions reflect personal preferences as opposed to sound instructional design practices. Therefore, the results of this study cannot be generalized to situations where best instructional design practices have been applied.

The use of the Mental Effort Rating Scale presented a fourth limitation of this study. This instrument only allowed the researcher to determine whether students experienced high cognitive load after performing a learning task. It is impossible to know whether cognitive load is a result of the learning environment or the instruction. Therefore, the results of this study are not easily generalized to other situations.

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Exploring the Influence of Academic Technology Professionals in Higher Education

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Abstract

Key Words: Academic Technology, Instructional Technology, Technology Leadership, Higher Education

Academic Technology (AT) is a fast growing field that deserves attention given its dynamic nature and impact on educational practices. The field has evolved from information technology to concentrate on advancing technology to enhance teaching and learning. Yet, the field appears to be insufficiently mature or defined making it difficult for AT professionals to be categorized and characterized or to fully understand their changing roles. There is uncertainty as to the roles, responsibilities and positions of AT professionals both within and outside of the field.

An online survey was conducted of 81 AT professionals to better understand the responsibilities and perceptions of their roles, concerns and influence. The study findings concludes that the majority of AT professionals have influence on the AT decision making process at their institution of higher learning, AT decisions appear to be made based on technological rather than pedagogical considerations and AT professionals have an expanded responsibilities and obligations at their institution of higher learning.

Introduction

For more than 200 years, colleges and universities have embraced digital technology and employed it in support of virtually all aspects of academic and administrative college life (Oblinger, 2010). Nevertheless, Susan Metros, Associate Vice Provost and Deputy Chief Information Officer (CIO) at the University of Southern California, describes a troublesome situation that plays out on college campuses all over the world:

IT [Information Technology] departments are often guilty of offering services that are technically complex, user unfriendly, poorly communicated, and perceived as changing too rapidly. Many IT systems are based on technical requirements decided by the IT group alone and not on what is best suited for the faculty member undertaking research, advancing scholarship, teaching classes, and/or serving the community. (Metros, 2010, p. 54)

Typically, colleges have one IT department to service a wide range of goals and needs, even though there can be no single technological approach that adequately addresses all of them. If the goal is to support teaching and learning at the college, the focal issue of this paper, IT personnel who understand technological applications to teaching should make a dedicated effort to communicate and work with faculty and students to achieve the college's mission (Nworie & Albright, 2008). This bridge between the IT and teaching worlds is Academic Technology (AT), usually led by the Senior AT Officer (Nworie & Albright, 2008). AT professionals are found on campus assisting IT departments and supporting faculty in integrating technology into their teaching repertoire in a pedagogically sound way, yet they are seldom found in influential positions on campus (Kowch, 2005).

Paul Michael Privateer, Professor of Humanities at Arizona State University, states that if colleges are going to be contemporary and effective they must have a strategic AT agenda that focuses on changing the model of traditional higher education, where the emphasis has been on storage and recall of information rather than producing intelligence, enabling students to synthesize information, and linking it to real world situations (Privateer, 1999). He further states that higher education needs to develop a strategically guided approach to technology-mediated instruction. In order for this to happen, learning outcomes need to be consistent and integrated throughout the curriculum, and there should be dedicated resources on campus that are managed by an AT officer (Privateer, 1999).

Common examples of AT are Learning Management Systems (LMS), used for hybrid and distance learning courses; Student Response Systems (Clickers), used for in-class assessment; and video podcasting, commonly used

in flipped classroom scenarios. These technologies are just a few examples of those used in teaching and learning in higher education. The list of technologies that are currently used and will be used in the future is constantly changing and growing.

In different forms, technology has been a part of education for a long time. Michael J. Albright (1989) wrote “Instructional Technology has never had a brighter future than in 1989,” yet Susan Metros’ comment reflects the ambiguousness of AT in 2010. In the 11 years between Albright and Metros’ comments, individuals filled AT roles on campus, but many were without clear charters and official, defined positions within their organizations (Nworie, 2005).

Ana Donaldson, past president of the Association for Educational Communications and Technology, wrote that describing the profession of AT to others can be a daunting task. Part of the challenge that AT professionals face is even what to call themselves, and Donaldson suggests that if position titles were more descriptive and uniform it would be easier to clarify what the professional does (Donaldson, 2012). John Nworie (2005) also states that as the roles and responsibilities of the AT professional changes, so does the job title.

The terminology used to describe the field needs to be clear. Johnson et.al. (2003) broadly define AT professionals as those who encompass the broad functions of creating collections of digital resources for faculty and student use; designing and supporting classroom technologies; and assisting faculty to integrate technology into their teaching. The lack of a clear understanding of the AT field leads to much confusion when discussing the roles and responsibilities of the professionals who identify with the community. According to Bates and Sangra (2011), academic technologists should be responsible for helping the college support innovation in teaching and establish goals and strategies for learning technologies. These AT professionals should facilitate a collective approach to setting and implementing learning technology goals and be champions for change in the way that instructors teach (Bates & Sangra, 2011).

Information Technology (IT) focusses on technology implementation and support across campus, while AT concentrates on those technologies that support teaching and learning and the pedagogy of their implementation into the curriculum. As Table 1 illustrates, IT professionals tend to focus on technology as a tool, ensure its delivery, and maintain the infrastructure. They work with an end user to ensure that person can make the technology tool function. The AT professional emphasizes technology as an application to achieve pedagogic goals and objectives, focuses on integration of technology and instructional design and the creation of content and methods that are appropriate for technology use in education.

Table 1
A comparison of Information Technology and Academic Technology

Information Technology	Academic Technology
Technology as a Tool	Technology as an Application
Focus on Delivery	Focus on Integration
Technology Infrastructure	Instructional Design (Content Production)
End User Support	Faculty Development
Systems and Network Administration	Technical and Pedagogic Training
Accessibility	Skills Development
Stability	Quality Assurance and Assessment

The 2011 CDW-G Report (Caraher & Braselman, 2011) states that there is a disconnect between the priorities of college administrators and the way in which technology is leveraged in teaching and learning at their institutions. In theory, a college’s different operating divisions are united in fulfilling the mission to educate students, yet the technology employed in support of one unit is often at odds with that used in another. Leadership is key to the success of a learning community (Wenger, White, & Smith, 2009), and the communal aspects of technology imply that it will help find learning partners and engage them meaningfully (Wenger et al., 2009). Wenger et al. (2009), state that while integration of technology into education is an important technical goal, there are limits to what we can expect directly from technology. Ideally, technology must be applied in a meaningful way to create a relationship between the tool and the educational goal (Wenger et al., 2009). AT professionals on campus are in a position to achieve this relationship, but they are rarely in leadership or influential positions, so despite the importance of well-adapted technology, a comprehensive, integrated view of AT’s role in teaching and learning is often missing.

Study Overview

The value of technology rests in the quality and effectiveness of the activities that it supports. Technology in education is not a new phenomenon, but the speed at which technology changes and different technologies are introduced into education is constantly increasing. The AT field directly supports technologies that are used purposefully to enhance teaching and learning in higher education. Colleges and universities are making substantial investments in technology platforms to achieve their mission of educating students to have meaningful and productive lives in the workforce and in the community at large (Arroway & Sharma, 2009; Green, 2009).

IT departments, under the leadership of the CIO, often make decisions regarding technology investments and usage based on non-academic criteria that are not always attuned to the needs of faculty and students. AT professionals are the bridges between the administrative departments (including IT) and the academic realm on campus. These individuals are versed in both technology and academic fields and are able to move comfortably in both sectors. However, many higher education institutions do not have an organized AT strategy that extends across campus, nor do they have AT professionals with sufficient influence to implement campus-wide improvements. Contributing to the problem are the dynamic nature of technology use in teaching and learning and a broadly defined AT field, making it difficult for some AT professionals to easily explain what they do (Donaldson, 2012).

This study sought data to clarify the position of AT professionals, their roles, and their ability to establish priorities and policies for integrating technology into teaching and learning. Specifically of interest was whether or not AT professionals can influence decisions that set strategic goals and strategies for learning technologies, allocate resources, approve projects and evaluate the effectiveness of technology strategies at their institutions (Bates & Sangra, 2011).

This study ascertained the responsibilities of AT professionals based on what they self-report their duties *are* and what they believe their responsibilities *should* be to identify perceived gaps in responsibilities and how they affect the influence that AT professionals currently have on college campuses.

This research is a descriptive study based on factor analysis methodology. Descriptive research questions, such as those in this study, are asked in order to describe a situation at a specific point in time. This descriptive study summarizes the current status of AT professionals in higher education, a valuable and needed first step to investigate this area (McMillan & Schumacher, 2010).

The goals of this research were twofold:

1. To create a snapshot of AT professionals' current roles and responsibilities in higher education and the perceived influence that they have at their institution.
2. To gain an understanding of what AT professionals believe their roles, responsibilities, and influence *should* be at their institution.

The goals of the study were to create a snapshot of the current roles and responsibilities of AT professionals in higher education and to understand what they believe their responsibilities and influence should be.

To achieve these goals the following six research questions were asked:

1. What are the major areas of responsibilities of AT professionals?
2. To what extent do AT professionals believe they fulfill their perceived level of obligations across the areas of responsibilities determined in Research Question 1?
3. Is there a gap in performance across the areas of responsibilities?
4. Is there a relationship between the magnitude of the gap in performance in obligations and the professional background and characteristics of the AT professionals?
5. To what extent do AT professionals believe that they participate in institutional AT decision making?
6. Is there a relationship between the magnitude of the gap in performance and the degree of perceived participation in decision making?

In addition to other anticipated outcomes of this study, the conclusions may assist in addressing ambiguities in the field as it is currently constituted, namely, the lack of precision and clarity in delineating the roles and responsibilities of AT professionals. The results of this study can also help clarify roles and expectations and thereby improve the field. Further, this study will assist those who want to work, and institutions that want to hire people to work, in the field of AT.

Subjects and Sample

The subjects of this study are the perceptions of current AT professionals in higher education whose primary function is to serve their academic community—faculty and students—by creating technology-enhanced pedagogical experiences. These individuals hold various titles that include, but are not limited to, AT directors, instructional designers, and directors of eLearning. They are found in technology centers on campus and within various departments, including IT and the provost’s office. Regardless of the differences in titles and departmental affiliation, since these individuals identify themselves as belonging to the AT profession, we were interested in gathering information about how they perceive their own roles and responsibilities.

Individuals were contacted through organizations that cater to the AT profession: Educause Learning Technology Leadership Alumni distribution list (LTLAlum); and the Association for Educational Communications and Technology (AECT). LTLAlum has 375 people on their email distribution list and AECT has 2,200 members in good standing. Both organizations publish journals, provide professional development, and hold conferences. The principle researcher used email to contact the manager of the LTLAlum distribution list and the person responsible for AECT research initiatives. Both responded by email agreeing to disseminate the survey.

Instrumentation and Data Collection

Descriptive research design uses a data-gathering instrument to obtain numerical indices that correspond to characteristics of the subjects, a process that provides objectivity in measuring and describing phenomenon by use of numbers and statistics to explain, predict, or describe a situation (Johnson & Christensen, 2008; Mcmillan & Schumacher, 2010). These numerical values are then summarized and reported as results.

For this study, data were collected with a survey of the type used frequently in education because it obtained accurate information for large numbers of people with a small sample. The instrument included the same questions for all participants from the sample target population of AT professionals selected by the investigator (McMillan & Schumacher, 2010).

Validity

Validity is the extent to which inferences made on the basis of numerical scores are appropriate, meaningful, and useful (McMillan & Schumacher, 2010). Content validity was established using a panel of three experts. Each of the experts holds an Ed.D. and is knowledgeable about a different area of the AT field. A modified copy of the survey was created on the web-based survey tool “Novi Survey.” The panel members were asked to evaluate whether the survey questions adequately address the research questions. Majority rule methodology was applied to the recommendations of the panel.

Reliability

Instrument reliability refers to the consistency of measurement (McMillan & Schumacher, 2010). The Cronbachs Alpha test was used to establish reliability and internal consistency of the survey questions. The test was run on the *does* perform and *should* perform selections of questions 8 through 33. Cronbachs Alpha established that 93% of the variance in the composite score is internally consistent and reliable (Table 2).

Table 2

Cronbach's Alpha Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.932	.936	60

Data Collection

After the survey was vetted by the experts, the questions were entered into the web-based survey tool “Novi Survey.” According to Mcmillan & Schumacher (2010), online surveys offer advantages, compared to other

techniques, such as quick response, easy follow-up, and the ability to survey a large population. The survey was designed to be as short as possible to achieve the maximum response rate from the subjects.

The survey was available online for 2 weeks. The survey instrument had seven multiple-choice and short-answer questions to ascertain current employment and background characteristics. These were followed by 30 statements describing different professional responsibilities. Participants were asked to respond to these questions in two different ways. The first response reflected whether or not they do perform the task. The second response reported the respondent’s opinion whether or not they should perform the task. Both sets of responses were based on a Likert scale ranging from 1 to 5, with 1 representing “never” and 5 representing “always.”

The last four statements of the survey were designed to ascertain the level of influence the respondents *do* have and believe they *should* have at their institutions. The recipients of the instrument were asked to respond to these questions in two different ways. The first response reflected whether or not they *agree* that they have influence. The second response is the respondent’s opinion as to whether or not they *should* have influence. Both sets of answers were again based on a Likert scale ranging from 1 to 5, with 1 representing “agree” and 5 representing “disagree.” Table 3 shows examples of the survey questions.

Table 3
Sample Survey Questions

Please rate these questions to the following scale:													
1 = Strongly disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, 5 = Strongly agree													
Please circle your choice in both columns for each item.													
DOES PERFORM						SHOULD PERFORM							
agree			disagree			agree				disagree			
(34)	1	2	3	4	5	I have the opportunity to express my perspective or make recommendations for a particular cause of action.	1	2	3	4	5	(64)	
(35)	1	2	3	4	5	I believe my recommendations effect the decision making process at my institution.	1	2	3	4	5	(65)	

Results

A factor analysis study was conducted of individuals who describe themselves as AT professionals. Seventy-one AT professionals completed the online survey. The majority of the respondents work at a 4-year baccalaureate college and hold a master’s degree. About ¾ of the respondents have an employment background in education, about half in teaching. Many of the professionals do not have a position title that fit within the survey choices. Approximately half of the respondents are considered staff connected to the IT unit of their institution. Less than a quarter of these individuals are affiliated with the academic executive branch or Provost Office.

Summary of RQ 1: Major responsibilities of AT professionals

The first research question of this study: “What are the major areas of responsibilities of AT professionals?” was asked in order to categorize the roles, responsibilities and obligations of AT professionals. A factor analysis of the data, accounting for 97% of the variation in data, revealed that AT professionals primarily have responsibilities and obligations in the following five categories:

1. Strategic Planning
2. Instructional Design
3. Ongoing Personal Professional Development
4. Academic Technology Management
5. Research and Assessment

Summary of RQ 2: Fulfillment of responsibilities

The second research question: “To what extent do AT professionals believe they fulfill their perceived level of obligations across the areas of responsibilities determined in Research Question 1?” sought to

examine the extent that the respondent AT professional fulfills the responsibilities and obligations defined in research question one. The survey asked the respondents to indicate the level to which they “do” perform a specific responsibility and the level which they feel they “should” perform the responsibility. The average score of the “do” and “should” responses were calculated. Where the mean score of the “should” response was greater than the “do” response, the respondent believed that they responsibility should be fulfilled to a greater extent than it is currently. This was the case with all of the responsibilities, with the greatest differences in *Ongoing Personal Professional Development* and *Academic Technology Management*. In other words, though AT professionals believe they should fulfill all of the responsibilities more than they do, this is especially so in the areas of *Ongoing Personal Professional Development* and the *Academic Technology Management*.

Summary of RQ 3: Gap in Performance of Responsibilities

As research question 2 showed, there is a difference in fulfillment of responsibilities by AT professionals. Research question 3: “Is there a gap in performance across the areas of responsibilities?” sought to identify perceived gaps in those responsibilities and obligations. A statistical paired t-test was conducted to determine if there were any significant gaps between the levels that responsibilities were performed. It was determined that there was a significant gap in performance across all the stated responsibilities and obligations that AT professionals perform.

Summary of RQ 4: Relationship of performance gap and respondent characteristics

After it was determined that there were significant gaps in the fulfillment and performance of AT responsibilities, research question 4: “Is there a relationship between the magnitude of the gap in performance in obligations and the professional background and characteristics of the AT professionals?” identified the magnitude of the gaps and compared it to the characteristics of the respondent. It was discovered that only two respondent characteristics, *institutional unit connected to* and *official title*, influenced the performance gap of responsibilities. The performance of “Strategic Planning” responsibilities was influenced by the *institutional unit connected to* with ATP’s connected to the *Media Center* reporting the greatest underperformance and those connected to *IT* the least underperformance. The *official title* of an AT professional effected the performance level of “Instructional Design,” “Ongoing Personal Professional Development,” “Academic Technology Management” and “Research and Assessment” responsibilities.

AT professional’s with the official title of *Academic Technology Director* and *eLearning Director* report that they underperform in the areas of “Instructional Design” and “Research and Assessment” and over participate in “Ongoing Personal Professional Development.” Those with the title of *Instructional Designer* report that they over perform in the areas of “Instructional Design” and “Research and Assessment” and over participate in “Ongoing Personal Professional Development.”

Summary of RQ 5: Extent of participation in AT decision making

Research question 5: “To what extent do AT professionals believe that they participate in institutional AT decision making?” It was found that the majority of respondents agree that they have an opportunity to express their recommendation for a particular course of action and that these recommendations effect the decision making process at their institution.

Summary of RQ 6: Relationship between gap in performance and AT decision making

Finally the study sought to answer research question 6: “Is there a relationship between the magnitude of the gap in performance and the degree of perceived participation in decision making.” It was found that the stronger perception the respondents had that they have the opportunity to express their perspective and make a recommendation for AT decision making, the less likely there were to over perform in the areas of “Strategic Planning” and “Instructional Design” and they are moderately likely to over participate in “Ongoing Personal Professional Development” and over perform “Research and Assessment” responsibilities.

Conclusions

Relationships and trends were identified in the resulting data, and three conclusions became evident: a) AT professionals underperform Academic Technology Responsibilities b) AT decisions appear to be made based on technological rather than pedagogical considerations; and c) AT Professionals have the opportunity to express their opinions and influence AT decision making at their institution. These conclusions have an effect on the field of AT as a whole, the individuals who are working in the field, and those who are affected by the AT decisions that are made.

AT Professionals Underperform Academic Technology Roles

In this study the research results show that AT professionals (ATP's) perform their responsibilities and obligations less than they believe that they should be performing them. Research questions 2 and 3 concentrated on the extent to which AT professionals fulfill their obligations and responsibilities and whether or not there is a gap in their performance and if the gap in performance is relational to the professional background characteristics of the ATP. The average score of the responses to the "do" and "should" statements were calculated and the mean, mode, median and standard deviation was determined. The results show that across all of the responsibilities and obligations of ATP's there is a feeling that they should be performing them more than they currently are performing.

AT is an integral and essential component of almost all core higher education activities and needs to be managed as such (Bates & Sangra, 2011). ATP's tend to be considered supervisors in both the administrative and the academic domains of a college or university. On one hand they support institutional efficiency and continually monitor the cost-effectiveness of the applied technology, while on the other, they maintain the quality of the academic program and the proper application and implementation of technology in the curriculum and teaching on campus (Sellers, 2005).

As AT has expanded in higher education, so too has the responsibilities of the ATP. Those responsibilities now include *Strategic Planning, Instructional Design, Ongoing Personal Professional Development, Academic Technology Management* and *Research and Assessment*. ATP's believe that they underperforming their professional responsibilities. It seems that the expectations of the institution have expanded the scope of the ATP and there is not enough time and resources to perform the functions that the ATP feels is necessary.

AT Decisions Appear To Be Made Based On Technological Rather Than Pedagogical Considerations

In this study the research data show that the Academic Technology organization structure favors the technological side of the institution rather than the pedagogic side. ATP's are attached to the Information Technology departments, under the leadership of the Chief Information Officer (or Chief Financial Officer), rather than connected to Provost Office (academic executive branch of the institution). Despite the ATP's background in education only 22%, less than ¼, of the study respondents were connected to the provost office. Over ¾ of the AT professionals who participated in the study are part of a non-academic department of the college or university. ATP's who are affiliated with the office of the Academic Executive (Provost Office) underperform strategic planning responsibilities.

The strategic importance of technology to the university has increased and entrusting AT to individuals who are experts in technology but not in pedagogy is dangerous (Jackson, 2011). AT is mission critical to the university and decisions regarding AT need to be made by individuals who have a strong understanding of the academic goals of the university (Bates & Sangra, 2011). According to Sellers (2005), IT is central to the educational administration of higher education institutions, yet as Brown states, IT departments have, in the past, been considered indifferent at best, and openly resistant at worst, to the needs of their customers: students and faculty (Brown, 2004). Furthermore, with IT at the center of the administrative structure, technology is driving many academic decisions (Sellers, 2005) and there seems to be a lack of consensus on how technology should be used and integrated into universities (MA & Runyun, 2004). The CIO, typically the head of IT, is charged by the university to ensure that his institution uses technology to its maximum long-term benefit (Jackson, 2011) and to many, technology for teaching and learning is a *desirable nice-to-have* rather than a core component of the institutions technology repertoire. Technology is best integrated into teaching and learning when the related decisions are made in conjunction with other academic decisions such as content, pedagogy and teaching methods (Bates & Sangra, 2011).

The literature emphasizes the importance of having an AT professional, who understands technology and its pedagogical uses, in a position of importance and leadership in the institution (Nworie & Albright, 2008;

Privateer, 1999). The data clearly proves that a minority of AT professionals are affiliated with an academic executive branch of the institution, such as the Provost office, rather, the majority of ATP's are found within the IT units of their institution. It is an interesting phenomenon that AT professionals seem to be relegated to technology positions and not academic positions. The majority of the AT professionals have a background in education, but when the term "technology" was added to their position, they became technology professionals.

AT Professionals Have Opportunity To Share, Do Influence, But Not Consulted

AT professionals report being given the opportunity to express an opinion or recommendation and when they do so they believe that their recommendation has an effect on the decision making process. Seventy-four percent of the respondents strongly-agree or agree that they are given an opportunity and an additional 14% were ambivalent about whether or not they had an opportunity to express a recommendation on an AT decision. More than 2 / 3 of the respondents believe they have the opportunity to effect the AT decision making process at their institution.

When AT professionals are given the opportunity to express a recommendation 61% believe that their recommendation effects the AT decision making process at their institution. A majority of those who do have the opportunity to make a recommendation believe that their views are considered as part of the decision making process.

The literature suggests that decisions for integrating technology into teaching and learning should be made in conjunction with other academic decisions under the leadership of an AT professional (Bates & Sangra, 2011; Nworie & Albright, 2008; Privateer, 1999). Privateer continues to express the need for an institution wide AT agenda under strong AT leadership (Privateer, 1999). The data shows that current ATP's believe that they have influence in AT decision making, but as they are overwhelmingly affiliated with IT and not academia their influence is limited to the technological side of the institution.

AT professionals who are skilled in both technology and pedagogy have the ability to influence curriculum reform and changes in teaching methods that facilitate the development of skills in a particular subject domain, and by influencing changes in assessment ensure those skills are evaluated (Bates & Sangra, 2011). These additional responsibilities and successful change requires the opportunity to influence the AT decision making process. The data supports this opinion that AT professionals have an opportunity to express their opinion or recommendation and influence AT decision making at their institution.

Summary

A descriptive study was conducted to describe the current AT professionals perception of their influence on the decision-making process at their institution. Seventy-one AT professionals completed an online survey and statistical factor analysis of the responses identified the five most cited responsibilities and compared differences between what the professionals "do" and what they believed they "should" do. ANOVA was used to calculate the resulting gaps in performance based on the "do" and "should" responses.

The data supported three conclusions: a) AT professionals underperform in their AT roles; b) AT decisions appear to be made based on technological rather than pedagogical considerations; and c) when given an opportunity to make a recommendation, they influence AT decision making, but they are rarely given the opportunity. AT is a fast-growing field that deserves attention, given its dynamic nature and its impact on educational practices. The AT field is different from IT, as it concentrates on advancing technology to enhance teaching and learning. Yet the field appears to be insufficiently mature or defined, making it difficult to for AT professionals to be categorized and characterized or to fully understand their changing roles.

AT is at the convergence of pedagogy and technology. AT professionals are in the unique position of being able to influence technology decisions based on educational goals and assist faculty to use technology appropriately to achieve the desired outcome. To ensure student success, higher education institutions need to implement an AT plan to support the needs of the faculty and students. The AT plan needs to be implemented by professionals in the field who are uniquely qualified to bridge the gap between academia and technology.

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Educational Technologies Working in Today's Classrooms: Tech Tools and Apps for Teaching in the Real World

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Abstract

This presentation will look at technology tools and apps for K-12 education. It will showcase resources and also share the results of a teacher survey to differentiate between tools that sound good versus those that work well for teachers. Video vignettes and interviews will feature teachers describing these tools in their own words. Participants in the presentation are encouraged to follow along with mobile devices so they can download apps and access the tools in real time.

Technology Integration in K-12

Successful technology integration by K-12 teachers is the subject of ongoing, ever-evolving inquiry. One hallmark of teachers who successfully integrate technology is that they possess a “strong sense of personal ownership of the (mobile) device and associated activities” (Kearney & Maher, 2013). This research also indicates various aspects of the use of mobile technologies and apps in the classroom including: personalization, authenticity, and collaboration (Kearney & Maher, 2013). By introducing teachers to technologies that will work in their respective classroom settings, these tools will be more likely to improve students’ learning. Specifically, research shows that when teachers recognize the impact that technology tools can have on their students’ learning, they are more motivated to continue experimenting with these kinds of tools in the future (Ottenbreit-Leftwich, 2007). Additionally, research indicates that teachers’ acquisition of technology knowledge and expertise can lead to positive changes in self-efficacy, pedagogical belief, and culture (Ertmer & Ottenbreit-Leftwich, 2010).

Introduction

Recent years have brought about an unprecedented proliferation of technology tools designed for K-12 education. Many of these tools are app-based and either free or relatively inexpensive. These tools have opened up a world of possibilities, while at the same time relegating once pricey, stand alone tools like sets of classroom clickers to the junk pile. Over 3000 education apps are currently offered through the Apple App Store as are many others through Google Play. For teachers who are new to these tools or who wish to expand their repertoire, choosing quality tools can be difficult due to the sheer volume of available options. So where is a motivated, forward-thinking teacher to start?

When considering new tools for their classrooms, teachers should first look to their colleagues. These colleagues may include not only pre-service and experienced in-service teachers, but also teacher educators, school librarians, technology specialists, and other K-12 related service professionals interested in technology integration. By consulting colleagues such as these, technology-seeking teachers can better differentiate between tools that sound good versus those that are actually working well in real classrooms.

The technology tools highlighted in this presentation and paper are appropriate for a variety of student populations and instructional situations including preschool, elementary, middle/high, special education, and students receiving support via the Response to Intervention (RTI) process. The technology tools will be introduced and demonstrated by two presenters whose roots are in K-12. One presenter is a professor of educational technology and former high school Biology teacher. The other presenter is both a K-12 school psychologist and educational technology doctoral student.

To further explore this topic, a brief survey was specifically developed to ask K-12 educators what tools they currently use in their classrooms and would recommend to others. Additionally, several other teachers were interviewed and videotaped speaking about their favorite technology tool. Tools covered in this presentation include: Nearpod, Gaggie, iPadio, Edmodo, Zondle, ClassDojo, FutureMe, ToonCamera, and more.

The Survey: What's Working in K12

At the time of this report, 32 teachers and other K-12 educational professionals had responded to a brief survey conducted specifically for this paper and presentation. The survey was administered via Google Forms and distributed through the social networking site Facebook. Specifically, a convenience sampling method was used, and individuals who chose to take the survey were encouraged to pass the link on to their other K-12 educator friends. The survey consisted of the following items:

- How would you describe your role?
- In what state are you currently employed?
- How many years of experience do you have working in education?
- How often do you use technology tools (e.g., mobile apps, tablet computers) in your classroom?
- If you indicated never or occasionally, why?
- If you indicated "yes" (e.g., occasionally, weekly, or daily), how do you use these tools?
- Please name your most used tech tools (list up to 3).
- Name any tools that you're interested in using but haven't yet tried.
- If you answered the previous question, what, if anything, is preventing you from using a particular tech tool with your students?
- Have you attended any professional development related to tech integration?
- Does your school district offer technology-related professional development?
- Which answer best describes the origins of the tech tools you use with students? Options: a) tools that I learned about in school, b) my own tools/devices; or c) tools provided by my district.

Interesting Findings & Themes

As previously noted, 32 teachers and other K-12 educational professionals responded to a survey about the technologies they use in their classrooms and/or daily practice. Specifically, a breakdown of the responses provided by the classroom teachers and their characteristics including position, years of experience, frequency of technology use, and perceived barriers to access are reviewed below:

- **High School teachers (2 total)** – all came from Kentucky, all had from 5 to 20 years teaching (avg. 10.67 years), used technology weekly to occasionally (avg. 1.67), all had barriers relating to lack of access, all use their own devices when using tech tools with students.
- **Elementary teachers (7 total)** – mixed locations, mixed experience (all but one has over 5 years of experience – avg. 9.07 years), most used tech daily, but one was never and one was weekly (avg. 2.43), 5 of the 7 reported they use technology for planning/organization and instruction.

- **Middle school (4)** – 3 of the 4 were from Kentucky, all had over 5 years experience (avg. 15.25 years), 3 of the middle school respondents use tech daily & 1 weekly (avg. 2.75), all used technology for planning/organization and instruction, all have attended tech-related PD, all are offered tech-related PD by districts.
- **Special Ed. (9)** – 2 of the 9 were from Ohio and the other 6 were from KY, all had over 5 years experience (avg. 11.67 years), 7 use tech daily and 2 use it weekly (avg. 2.78), 8/9 use for planning/organization and 8/9 use it for instruction, 8/9 use for games/student rewards.

The results of this brief survey provide only a snapshot of the current issues impacting teachers' use of technology in the classroom. The presentation, brief survey, and video vignettes shed light on directions for future inquiries and ways in which the research can be tightened up and focused.

Going Forward

Although research on technology integration in the classroom is prevalent, researchers and practitioners should continue to gather data on the topic in order to clarify factors including potential barriers to effective use, teacher attitudes toward technology, and avenues for technology-focused professional development. Whether it be to deliver instruction, facilitate planning/organization, or to use as incentives/rewards for students, technology integration and the potential it holds for the classroom is at the forefront of many teachers' minds. As educational technology professionals, our ability to link research to practice and professional development may be the greatest gift our field can give to K-12 education.

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Modeling the Processes of Diagramming Arguments that Support and Inhibit Students' Understanding of Complex Arguments

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Abstract: Research on the efficacy of diagramming complex arguments has been mixed. One reason for the mixed findings is that the precise processes students use to construct argument diagrams have yet to be fully examined. This study identified sequential patterns in argument diagramming actions performed by graduate-level students that created high versus low quality diagrams. Transitional state diagrams revealed patterns in the action sequences used by high vs. low performing students - processes believed to either help or inhibit students' ability to construct accurate argument diagrams and achieve a better understanding of complex arguments. The findings reveal processes that can be embedded into future diagramming software to test how particular processes affect students' analysis and understanding of complex arguments.

Purpose

Research on the efficacy of using visual diagramming tools to facilitate argument analysis has been mixed (Braak et al., 2006; Ruiz-Primo & Shavelson, 1996). One reason for the mixed findings is that empirical studies have yet to be conducted to formally identify the sequential steps and reasoning processes students use when constructing argument diagrams. This study developed a set of visual analytic software tools to record, sequentially analyze, visualize, identify and compare sequential patterns in argument diagramming actions performed by graduate-level students that created high and low quality argument diagrams. Transitional state diagrams were then created and used to visualize sequential patterns found in the actions of students that created high and low quality argument diagrams. The transitional state diagrams were then compared to reveal action sequences that were used by high performing students, but not used by low performing students and vice versa. The unique action sequences performed only by the high performing students can reveal the types of diagramming processes that can be promoted and scaffolded to help students construct more accurate argument diagrams and improve understanding of complex arguments.

Introduction

Critical thinking is an important skill that enables one to accurately reason and judge information and become lifelong learners for the 21st century. It has been defined as 'the art of analyzing and evaluating thinking with a view to improving it' (Paul & Elder, 2001) and an intellectual standard that includes clarity, accuracy, precision, relevance, depth, logic, and breadth (McLean, 2005). However, recent research suggests that many college students fail to develop critical thinking skills to the extent that they can effectively use them (Kuhn, 1991). To address this problem, various methods have been used to teach students the skills of argumentation and argument analysis across many disciplines. Argument analysis is the study of logical relationships between propositions presented in an argument (which can be mutually supporting or opposing opinions/claims) in order to reason through premises to reach a conclusion. In argument analysis, students identify the functional roles of each proposition (i.e., conclusion, premise, co-premise, counterargument), analyze the hierarchical relationship among propositions (i.e., levels of

premise), and evaluate the quality and line of reasoning. This process helps students to correctly judge the quality and identify flaws within an argument and help students to make well-reasoned decisions.

Given that arguments are often complex and ill-structured, argument-mapping software like Belvedere (De Neys, 2006) and Rationale (van Gelder, 2007) have been developed to help students visualize/identify hierarchical relationships between minor/major premises and claims (Braak, 2006). Some diagramming software, like REASON (ThinkReliability, 2007), prescribe the use of specific logic rules and processes such as the backward reasoning or goal-driven approach (Sharma, 2012). Yet, a critical review of the research on argument diagramming/visualizing tools revealed that the majority of the studies found no significant differences (Braak et al., 2006) and/or were flawed in design. Furthermore, students' maps often varied widely in accuracy regardless of the instructional intervention (Scavarda et al., 2006). Ruiz-Primo and Shavelson's (1996) review of the research led to the conclusion that students' diagrams should not be used to assess learning until students' facility, prior knowledge, and processes used to create the diagrams are thoroughly examined.

Given that no studies at this time have modeled, identified, and/or validated prescribed mapping processes that enable/inhibit students' to accurately analyze complex arguments, Author (2010) created jMAP to chronologically log each action a student performs while constructing an argument diagram in jMAP. This data can be sequentially analyzed to identify the processes used by students to produce high and low quality argument diagrams. In particular, processes associated with informal reasoning fallacies performed while constructing argument diagrams can in theory be detected by observing diagramming processes. For example, a hasty generalization or leap to conclusion can be observed when a student creates a link ($D \rightarrow A$) when the effects of D on A is mediated by B ($D \rightarrow B \rightarrow A$). Circular reasoning can be observed when a student links $A \rightarrow B$ and $B \rightarrow A$. To date, no studies have examined the diagramming/actions sequences associated with reasoning fallacies (including actions that immediately precede/follow such action sequences) in the course of constructing argument diagrams. Using this approach, this study addressed the following questions:

1. What sequential patterns in students' diagramming actions produce the most versus least accurate argument diagrams?
2. What are the differences in processes used to produce the most versus least accurate argument diagrams?

Method

Seventeen graduate students in an online graduate-level course on computer-supported collaborative learning at a large Southeastern university reviewed arguments produced by students in an online debate (but from another course) to support/oppose the claim: "One's choice of media significantly affects learning". After viewing a video on how to use jMAP, students downloaded a jMAP file to diagram the supporting arguments and another jMAP file to diagram opposing arguments. In both cases, students were presented an initial screen (Figure 1) containing nodes that represented the main claim and supporting/opposing premises.

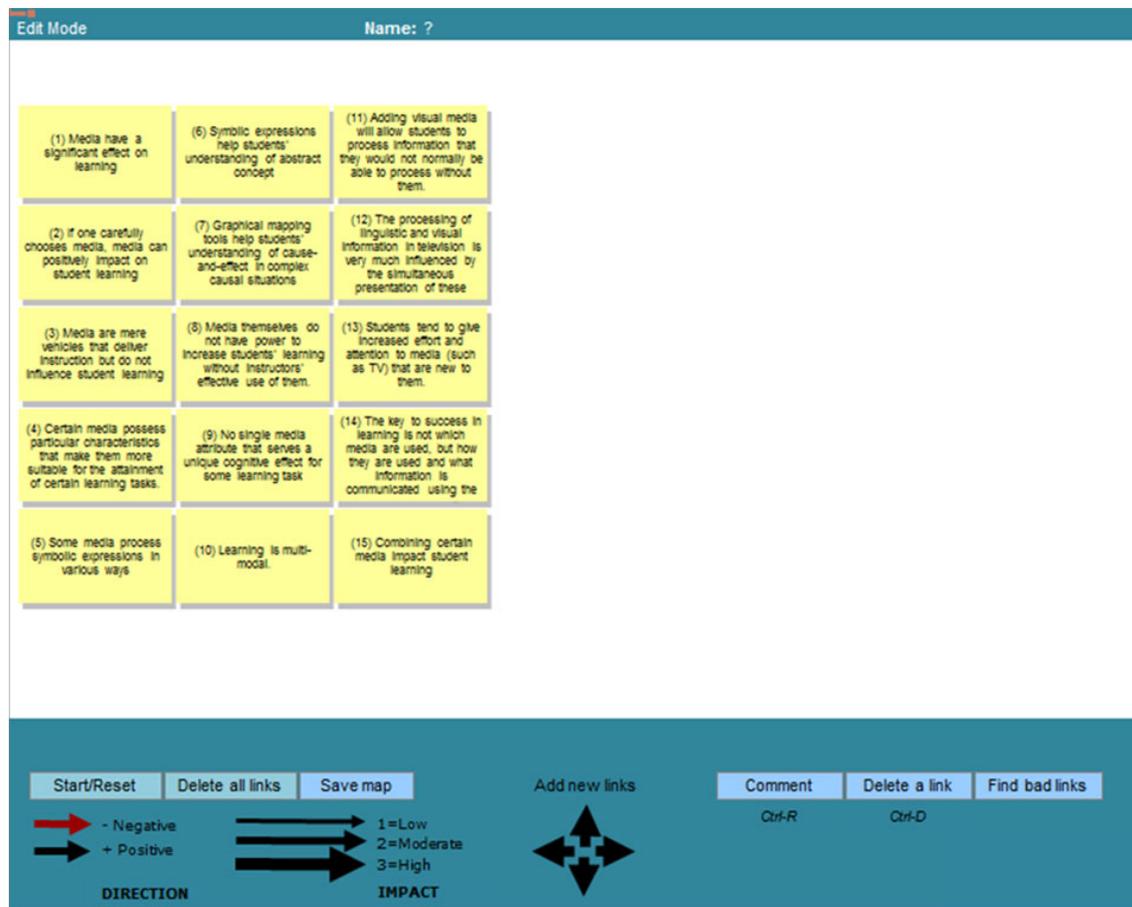
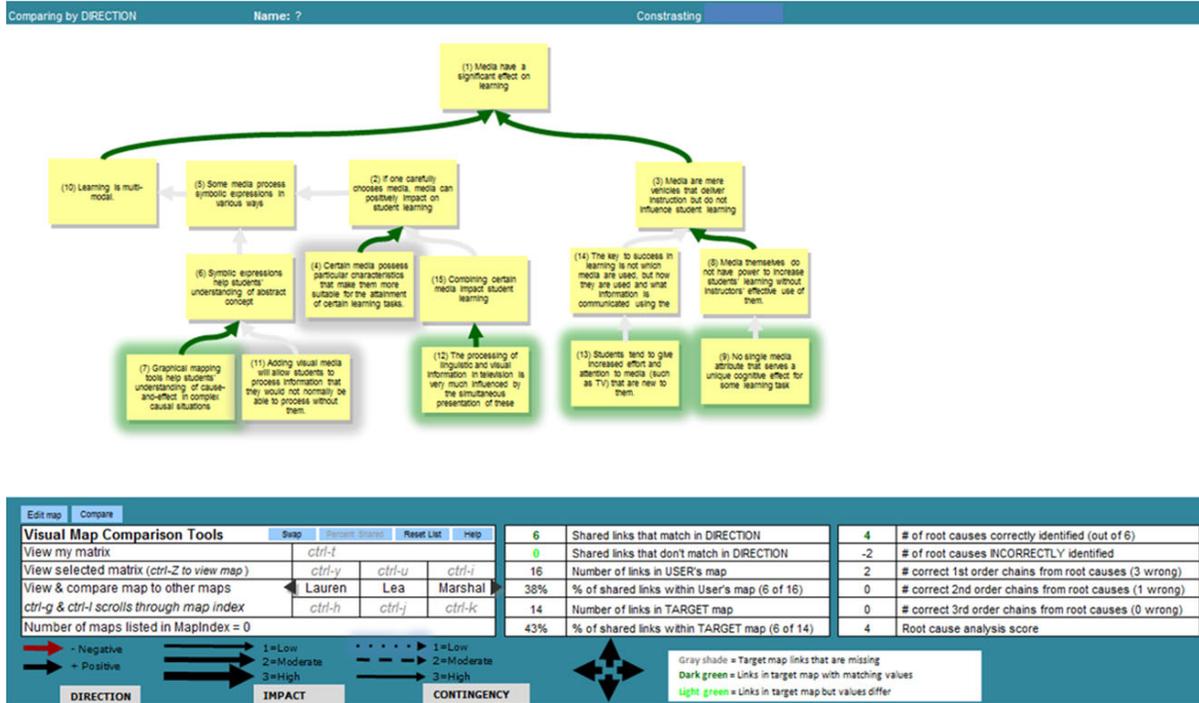


Figure 1. Students' initial screen with premises randomly arranged on the screen.

The students' diagrams were imported into a jMAP file containing the instructors' argument diagram (Figure 2) to score the students' diagrams on three criteria presented in Figure 3: a) percentage of links that match those in the instructor's map; b) number of nodes correctly identified as a root premise (node with no arrows pointing inward); and c) number of correct links stemming directly from each correctly identified root premise up to the main claim. Using a cumulative score to identify diagrams with high versus low accuracy, data from the top 6 and bottom 6 diagrams of the *supporting* arguments and from the top 6 and bottom 6 diagrams of the *opposing* arguments were selected to produce 12 best and 12 worst diagrams. The logged actions (Figure 4) recorded in jMAP from the bottom diagrams were aggregated and then reduced down into six categories to capture more general patterns in students' actions. The same process was repeated with the top diagrams.

The logged actions from the bottom diagrams were imported into the Discussion Analysis Tool (DAT) to produce the frequency, transitional probability, and *z*-score matrices (Figure 5). The frequency matrix shows for example that when these students added a link, 40 of the 129 actions that immediately followed were to add yet another link. To determine if this transitional probability of .31 was significantly higher/lower than expected probabilities (and whether AddLink→AddLink can be deemed to be a sequential "pattern"), the *z*-score matrix shows for this particular action-action sequence a *z*-score of 6.55 (which is greater than the critical *z*-score of ± 1.96 at $p < .05$). As a result, the AddLink→AddLink sequence was found to be a sequential pattern in the actions used to produce the bottom diagrams. DAT converted the probabilities into the right transitional state diagram (Figure 6). This process was repeated with data from the top diagrams to produce the left transitional state diagram.



Note: Dark/gray colored arrows identify links present/missing in student x's diagram; Nodes with green halos identify lowest level premises correctly identified by student x.

Figure 2. Instructor's diagram visually and quantitatively compared with student x's diagram.

Close	Shared links that match in DIRECTION	% of shared links within User's map	# of minor premises correctly identified	# of correct 1st order links from minor premises	# of correct 2nd order links from minor premises	# of correct 3rd order links from minor premises	Score
Lauren	6	37.5%	4	2	0	0	97.8
Lea	4	22.2%	4	1	0	0	66.2
Marshal	5	20.8%	0	0	0	0	62.1
Lauren	5	10.9%	0	0	0	0	61.1
Lea	3	18.8%	5	1	0	0	56.9
Marshal	2	20.0%	4	1	1	0	56.0
Lauren	2	14.3%	4	1	0	0	45.4
Lea	3	16.7%	0	0	0	0	41.7
Marshal	2	15.4%	3	0	0	0	34.5
Lauren	2	14.3%	3	0	0	0	34.4
Lea	2	14.3%	1	0	0	0	32.4
Marshal	1	12.5%	3	0	0	0	24.3
Lauren	1	7.1%	3	0	0	0	23.7
Lea	1	7.1%	2	0	0	0	22.7
Marshal	1	12.5%	1	0	0	0	22.3
Lauren	1	6.7%	0	0	0	0	20.7
Lea	0	0.0%	0	0	0	0	10.0

Figure 3. Screen shot from jMAP showing scores assigned to students' diagrams of supporting arguments.

Category	Code	Definition
LINK	ADDR	added new link pointing to the right
	ADDL	added new link pointing to the left
	ADDU	added new link pointing up
	ADDd	added new link pointing down
	LK2	attached link to the affected node
RELINK	RLK1	redirected the existing link to a new causal node
	RLK2	redirected the existing link to a new affected node
-	ULK1	detached the beginning tail of the link
-	ULK2	detached the end of the link
ATTR	ATT-	changed link to color red to convey a negative or inverse relationship
	ATT+	changed link to the color black to convey a positive relationship
	ATT2L	changed link to low level of impact
	ATT2M	changed link to moderate level of impact
	ATT2H	changed link to high level of impact
DEL	DEL	deleted the link
MOVE	MS	moved a node (which was the same node as the last moved node)
	MDn	moved node to the north of the previously moved node
	MDne	moved node to the NE of the previously moved node
	MDe	moved node to the East of the previously moved node
	MDse	moved node to the SE of the previously moved node
	MDs	moved node to the South of the previously moved node
	MDsw	moved node to the SW of the previously moved node
	MDw	moved node to the West of the previously moved node
MDnw	moved node to the NW of the previously moved node	
COMM	COM	added comment to link to explain how node influences affected node
	CREV	revised the existing comment on the given link

Codes	
1	ADD LINK
2	RELINK CAUSE
3	RELINK EFFECT
4	ATTRIBUTE
5	DELETE LINK
6	MOVE

Figure 4. Codes assigned to each action students perform in jMAP while constructing an argument diagram.

Frequency matrix

	ADD LINK	RELINK CAU	RELINK EFFI	ATTRIBUTE	DELETE LIN	MOVE	Replies	No Replies	Givens	% replies	% givens
ADD LINK	40	8	4	23	1	53	129	2	131	.13	.13
RELINK CAU	1	1	0	3	0	6	11	0	11	.01	.01
RELINK EFFI	0	0	0	0	0	6	6	0	6	.01	.01
ATTRIBUTE	8	0	0	3	0	19	30	1	31	.03	.03
DELETE LIN	3	0	0	0	2	5	10	0	10	.01	.01
MOVE	79	2	2	2	7	735	827	9	836	.82	.82
	131	11	6	31	10	824	1013	12	1025		

Transitional probability matrix

	ADD LINK	RELINK CAUSE	RELINK EFFEC	ATTRIBUTE	DELETE LINK	MOVE	Replies	No Replies	Givens	Reply Rate
ADD LINK	.31	.06	.03	.18	.01	.41	129	2	131	.98
RELINK CAU	.09	.09	.00	.27	.00	.55	11	0	11	1.00
RELINK EFFI	.00	.00	.00	.00	.00	1.00	6	0	6	1.00
ATTRIBUTE	.27	.00	.00	.10	.00	.63	30	1	31	.97
DELETE LIN	.30	.00	.00	.00	.20	.50	10	0	10	1.00
MOVE	.10	.00	.00	.00	.01	.89	827	9	836	.99
	131	11	6	31	10	824	1013	12	1025	.37

Z-Scores identify probabilities that are higher/lower than expected

	ADD LINK	RELINK CAU	RELINK EFF	ATTRIBUTE	DELETE LIN	MOVE	
ADD LINK	6.55	6.00	3.97	10.43	-0.26	-12.56	129
RELINK CAU	-0.38	2.58	-0.26	4.69	-0.33	-2.29	11
RELINK EFFI	-0.95	-0.26	-0.19	-0.44	-0.25	1.18	6
ATTRIBUTE	2.28	-0.58	-0.43	2.24	-0.56	-2.57	30
DELETE LIN	1.62	-0.33	-0.25	-0.56	6.11	-2.56	10
MOVE	-6.76	-5.47	-3.07	-10.98	-0.96	12.98	827
	131	11	6	31	10	824	1013

Note: The values identified in bold/underline identify action sequences occurring at higher/lower than expected frequency based on the critical z-score of ± 1.96 at $p < .05$.

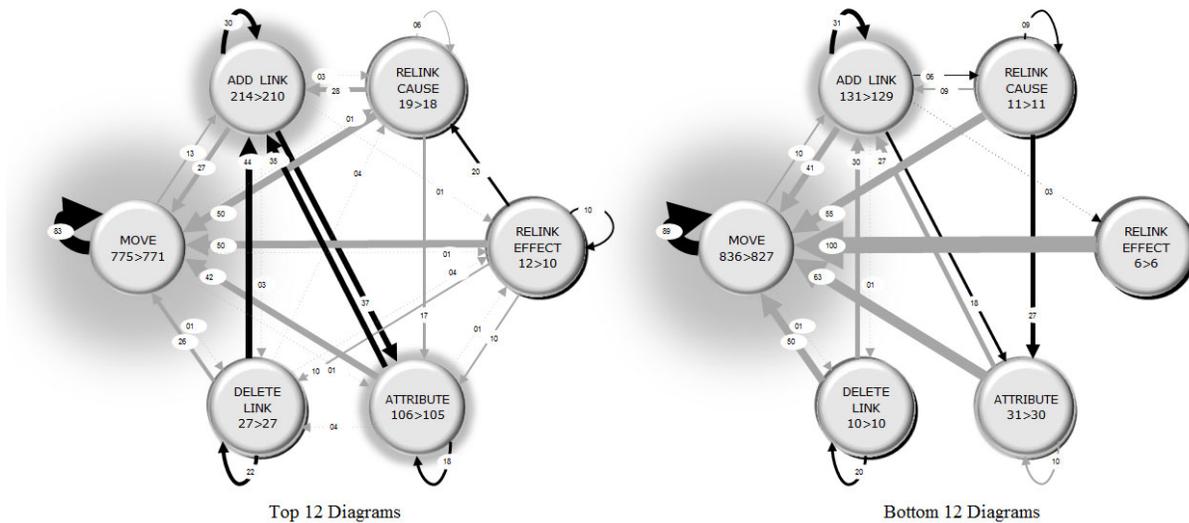
Figure 5. Screen shot from DAT showing the frequency, transitional probability, and z-score matrices used to reveal sequential patterns in the actions used to create the 12 bottom diagrams.

Main Findings

The two state diagrams (Figure 6) reveal four action-action sequences that were common in both groups (AddLink→AddLink, MoveNode→MoveNode, and DeleteLink→DeleteLink, AddLink→ ChangeLinkAttribute). The first three action sequences suggest for example that students constructed their diagrams using a stage-like sequence by moving multiple premises into position first, then inserting links to connect the premises with links, and then deleting (or correcting) the links between premises. Given that these four processes were observed in both groups, the findings suggest that the use of these four processes neither increases nor decreases the accuracy of students' argument diagrams.

The diagrams also show that top scorers exhibited five unique action sequence patterns. For example, the left diagram shows that when top scorers deleted a link, they were most likely (44%) to follow that action by adding a new link between nodes than bottom scorers. When they specified the attribute of the link, they were most likely

(35%) to follow that action by adding a new link. Overall, the differences between the two state diagrams suggest that the following five action sequences (when performed on a consistent basis) can help students construct more accurate diagrams: DeleteLink→AddLink, Attribute→AddLink, Attribute→Attribute, Relink Effect (move the head of the arrow to point to another affected node)→Relink Effect, and Relink Effect→Relink Cause (move tail of arrow to point to another causal node). In particular, the sequence of DeleteLink→AddLink may be an indication of times when students are restructuring their diagrams to undo an error produced when making hasty generalizations (when $A \rightarrow \text{Conclusion}$ and $B \rightarrow \text{Conclusion}$ should in fact be restructured to $A \rightarrow B \rightarrow \text{Conclusion}$).



Note: Thickness of arrow conveys strength of transitional probability; dark black arrows identify probabilities that are significantly greater than expected based on z -score tests ($p < .01$) performed in the DAT software; first and second numerical value displayed in nodes identify the number of times the given action was performed and the number of events that followed the given action; the size of the glow emanating from each node conveys the number of times the action was performed.

Figure 6. State diagrams of processes used to produce the top vs. bottom diagrams.

In contrast, the low-performing students exhibited four unique action sequence patterns (AddLink→RelinkCause (change tail of link to point to a supporting or subordinate premise), AddLink→RelinkEffect (change head of link to point to a superordinate premise), Relink Cause→Relink Cause, and Relink Cause→ChangeLinkAttribute). Given that low scorers exhibited the tendency to perform the RelinkCause→RelinkCause sequence whereas high scorers exhibited the tendency to perform the RelinkEffect→RelinkEffect sequence, these differences suggest that the processes used to: a) create more accurate argument diagrams involved the use of a forward or bottom up approach - systematically examining which major premise (or effect) is supported by a given minor premise (or cause); and b) create the less accurate diagrams involved the use of a backward or top-down approach by progressively examining which minor premise supports a given major or superordinate premise.

To determine if the differences in the observed patterns are statistically significant, a phi-coefficient (ϕ) will be used to measure the strength of association between group membership and particular pattern (Bakeman & Gottman, 1997). Retroactively recoding and further analysis of the action logs will examine actions (and the actions preceding them) that produced correct versus incorrect links across the argument diagrams of all 17 students.

Conclusions and Implications

Although the findings are not conclusive, the observed differences in action sequences used by students to construct argument diagrams with high versus low accuracy provide initial insights into the types of processes that can help students create more accurate and achieve deeper understanding of complex arguments. At minimum, the findings

and the possible interpretations of the meaning behind the findings provides some insights into the possible methods and approaches that can be used in future research to model and better understand the processes that can be used effectively to analyze and better understand complex arguments.

Future work is needed to: a) replicate this study with larger sample sizes; b) apply multiple approaches to establish validity in the criterion used to assess diagram accuracy, c) refine the precision of the data mining codes in jMAP to fully determine if students are in fact linking premises using a forward or backward approach and are sequentially relinking premises into logical chains to correct for errors produced by making hasty generalizations; d) identify which diagramming actions reflect general reasoning processes that improve argument analysis (areas B and E in Figure 7, respectively); e) integrate the target action sequences directly into the software interface of the diagramming software so that controlled experiments can be conducted to determine cause-effect relationships between target processes and map accuracy; f) determine to what extent particular processes are dependent on students' prior knowledge in order to identify the target processes that can be promoted regardless of students' prior knowledge; and g) examine to what extent the target processes are effective across arguments varying in hierarchical structure/complexity.

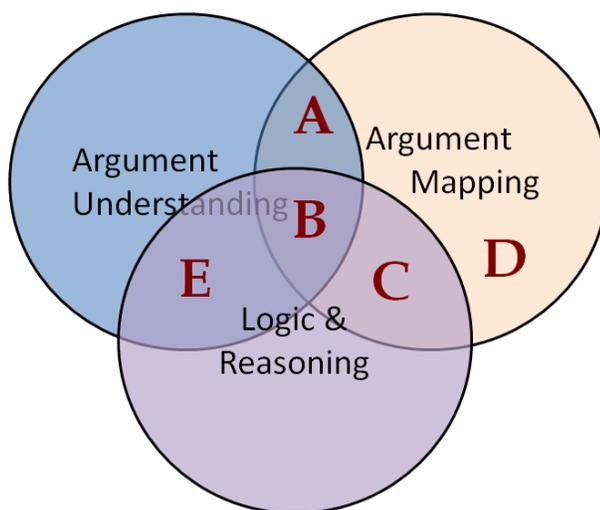


Figure 7. Areas for further research on the relationships between diagramming processes, general reasoning processes, and understanding of complex arguments.

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A Review of Research on Collaboration via Blogs in Online Learning

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Index Descriptors: Collaboration, Blogs, Motivation, Team work, group work, knowledge development

This is a review of published research on using blogs for collaborative online learning. One aim of the review is to explore the impact of collaborative learning activities on students using group blogs for collaboration processes. A second purpose is to review learning outcomes from collaborative blogging reported in research. Blogs have some attributes that can potentially facilitate collaboration. Because collaboration is important, we should seek to understand how online tools such as blogs can be used to foster collaborative activities and how they can be used to facilitate learning. The factors for collaboration are grouped into four segments: 1) importance of collaboration; 2) blogs as a collaborative tool; 3) role of motivation when collaborating via blogs; and 4) evaluating learning when collaborating via blogs.

Introduction

The use of online tools has become an everyday affair for everything from social correspondence, to learning, to conducting business. Blogs (online time-stamped journals) are widely used by organizations, groups, and individuals to voice opinions and to share information and receive feedback from their readership. Research shows blogs have been commonly used in online learning environments for collaboration for over a decade (Avci & Askar, 2012; Boulos & Maramba, 2006; Bouwma-Gearhart & Bess, 2012; Byington 2011; Chen, Cannon, Gabrio, Leifer, Toye & Bailey 2005; Ahrens & Zascersinska, 2010). Considering that more than 6.7 million students took at least one online course in 2012 (Allean & Seaman, 2013), a review of the use of blogs for collaboration in online learning is timely.

One aim of the review is to explore the impact of collaborative learning activities on students using group blogs for collaboration processes. A second purpose is to review learning outcomes from collaborative blogging reported in research. Blogs have some attributes that can potentially facilitate collaboration. Because collaboration is important, we should seek to understand how online tools such as blogs can be used to foster collaborative activities and how they can be used to facilitate learning (Avci & Askar, 2012; Boulos & Maramba, 2006; Bouwma-Gearhart & Bess, 2012; Byington, 2011). This review aims to address the following questions:

- How collaborative is the blog based learning technologies for students and to what extent do students believe that blogs can enhance collaboration? How consistent is blogging to the learning design method? Can blogs efficiently facilitate the communicational and information management requirements?
- To what extent do the blog based collaborative interactions affect self-regulation of the group blog members? Are there any significant differences for impact among the different kinds of blogs? What about their collaborative learning outcomes? Is it similar or different to class collaborative work?

Importance of Collaboration

Collaboration is a well-known instructional strategy associated with knowledge development. Collaboration encourages reasoning and critical thinking. Laughlin, Hatch, Silver and Boh (2006) found that groups of three or more persons perform better than equally intelligent individuals in a group of one or two when solving complex problems. Furthermore, researchers found that collaboration helps develop reasoning skills and abilities to solve complex problems and acts as a source of knowledge development (Slavin, 1995; Sorensen & Tackle, 2002; Wheeler et al, 2008). Other researchers found that with successful collaboration participants further develop skills, such as: critical thinking, reflective thinking, providing constructive feedback, and teamwork (Chandra & Chalmers, 2010).

Several factors have been shown to impact the effectiveness of collaboration (e.g., time management, synchronization, and active communication) (Coleman, Austin, Brach & Wagner, 2009). Division of labor (distributing work to members) has also been found to be a key influence on the successful implementation of collaborative learning (Bouwma-Gearhart, & Bess, 2012). In most situations, collaboration requires individuals to work together as a team to solve problems. If one of these aforementioned conditions is missing or implemented poorly, conflicts may arise that negatively affect knowledge development (Ishtaiwa & Abulibdeh, 2012; Kerawalla, Minoch, Kirkup & Concole, 2009). However, when implementation of collaboration is based on strategies shown as successful, the growth of knowledge is encouraged through constructive feedback from participants (Chandra & Chalmers, 2010; Yang, 2009). Therefore, to properly understand what happens during collaboration, we need to understand the collaboration process.

Collaboration Process

Collaboration can be defined as a process where two or more students join learning resources and individual knowledge to achieve common learning goal. Curtis and Lawson (2001) identified the following behaviors as a supportive form of collaboration: (a) giving and receiving help and assistance, (b) exchanging resources and information, (c) explaining or elaborating information, (d) sharing knowledge with others, (e) giving and receiving feedback, (f) challenging others contributions, (g) advocating increased effort and perseverance among peers, and (h) monitoring each other's efforts and contributions. According to Arsenyan and Buyukozkan (2009), a collaboration process has four dimensions: trust, coordination, colearning, and co-innovation.

Building open trust-based relationships is the key to successful collaboration. Accordingly, collaboration can be achieved by working through three stages: exchange of vision, negotiate agreement, and negotiate trust (Greenfield, 2003). The collaborative team needs to look for trusting members to rely and to coordinate successfully. Coordination is another key factor in collaboration particularly if teams from different organizations and locations are engaged for the same purpose. Improved learning is partly the result of effective communication and information distribution systems both within and between organizations (Carayol & Roux, 2005). Colearning emerges as another key issue in collaboration. Identifying relevant knowledge inputs from the various partner organizations needs to be viewed as a constant (Arsenyan & Buyukozkan, 2003).

Information sharing emerges as an important aspect of collaboration. A key goal for blogbased collaborative learning is to shift from an essentially static approach of learning that is based on information acquisition towards a greater emphasis on information interpretation and distribution. Use of learning technologies are changing rapidly which drives the need for increasing information sharing and cooperation. Knowledge is accumulated both through internal capacities of the agent and through the direct and indirect connections that allow access to others' knowledge (Carayol & Roux, 2005).

Blogs as Collaborative Tools

The word 'blog' is a short form of weblog. When effectively utilized, blogs can offer a way to enhance students' learning experiences and deepen levels of learners' engagement and collaboration within digital learning environments. Therefore, research should be conducted to determine the best ways to integrate blogs into existing collaborative e-learning programs for student learning. Advantages of using blogs in online learning include ease of use, low cost (free – e.g., Google blogs), and broadcasting. The disadvantage is the quality of the blog content and the lack of control over the content. Monitoring and moderating blog posts, deleting as necessary, rendering red-only option, controlling who can post, and blocking specific user (IP) are some possible remedies in blogs quality management.

Early on, Taylor-Powell et al. (1998) suggested that for online collaboration to be effective, participating members must practice communication, contribution, coordination, and cooperation. Subsequent studies reveal that managing and producing content via a blog can improve a student's skill in writing, responding, communicative skills, and synthesis of information (Ishtaiwa & Abulibdeh, 2012; Robert & Dennis, 2005; Tekinarslan, 2008). Curtis and Lawson (2001) found that blogs were a more effective collaborative environment for peer learning than other tools such as wikis. Thus, it can be said that blogs favor exchange of ideas through posting new comments and replying to other comments much easier instead overwriting a previous comment/post.

As blogs engage people in knowledge sharing, reflection, and debate, they often attract a large and dedicated readership (Lederer, Greenberg, Muehlen & Ralph, 2003). Hence, blogs can easily draw like-minded people together in a small form of virtual groupings where individuals interested in co-constructing knowledge around a common topic within a community of practice can easily collaborate together.

Wu, (2006) in Taiwan reported on blog implementation for peer review and teacher feedback in an Intermediate EFL (English as a foreign Language) composition class that was composed of adult university students (n = 39). The course lasted for 18 weeks and combined course meetings with two peer reviewed blog writing sessions. The analysis of the data showed that most of the students were easily encouraged and motivated by their peer feedback and constructive criticism due to the fact that all students were to carry out a peer review during the course.

In another study, the teacher's feedback and Ferris' subjective rating scale with values ranging from 0 to 6 points (1997), were applied to two different drafts submitted before and after a blog peer review. The results showed little progress in students' writing skills. Murray and Hourigan's (2008) Irish study took a step toward articulating the special nature of a blog. Blogging was required in an academic writing class composed of students majoring in various modern languages (n = 42). In their assumption, the blog environment serves two different kinds of activities, one expressive (creative and reflective) and the other socio-cognitive (critical and collective). The students reflected on their language learning process through blogs in their target language in which the students were majoring. However, students were required to write a 3000word essay in English to integrate the blog entries. Although they concluded that the use of a blog had a positive role in self-reflection, the roles of the two investigated activities were difficult to discern.

Wang (2009) tested blog-based electronic feedback (e-feedback) with EFL (English as a foreign Language) Taiwanese university students in Taiwan (n = 30). The course consisted of a ten-week writing class and a four-week blogging project. For the four week blogging, the blog system was used for pre-/post essay writing and peer feedback. In their comments, the students were allowed either to identify themselves or to remain anonymous. The submissions were corated in terms of their linguistic function and accuracy and were evaluated statistically. Thus, the students' attention tends to be uneven. In other words, the students were focused more on the micro-level (lexical and grammatical) or on lower – order concerns (LOCs) and less on the macro-level (organization and content) or on higher-order concerns (HOCs).

A blog is an interactive collaborative tool, where editor/writer publishes and collects personal information according to the purposes and plans of the blog editor (Makri & kynigos, 2007). Blogs generally include the following five features: (1) content which is separated from presentation, (2) presentation templates which are usually provided for bloggers to easily produce blog articles, (3) blogging application programming interfaces (APIs) also help bloggers to use software, such as Microsoft Word, to publish content to blogs, (4) many information management tools which are offered in blogging systems for content management, and (5) "Really Simple Syndication" (RSS) a mechanism which offers a subscription to the blogging clients who are interested in specific topics (Lindahll & Blount, 2003).

Blogs have the ability to support informal communication, shared learning, group reflection, and community building (Nardi et al., 2004; Divitini et al., 2005). Due to these characteristics of blogs, it has begun to be used in educational settings in recent years. An implemented blogging system has been proven to be feasible in an international distance course (Lin et al., 2006). Students were able to use the system to document their learning and to share experiences and knowledge. For the moment, blogs are able to provide valuable materials for supporting students' learning (Huang et al., 2008). In addition, blog articles were functional to construct a learning map called blog-based dynamic learning map (Wang et al., 2008). It is designed to provide informative blog articles to assist students' learning. Furthermore, difficulties around the issues of direct student-student and student-tutor interactions were addressed. However, some delivery features of a blog increased anxiety among some students resulting in the inefficient use of learning time (Dron, 2003). Through the application of different structural and methodological techniques, these problems can be overcome. Using the learning research methods and learners' experience presented in a blog (Giarr'e & Jaccheri, 2006), researchers or learners have been able to study the relationship between the research process and results (Giarr'e & Jaccheri, 2005).

In blogs, participants can discuss research problems, exchange information by drawing upon the knowledge of each other, collaboratively find solutions to their research problems, and find/discuss new applications for concepts without any constraints in terms of time (Mai, 2005; Nicola & Giuseppe, 2006). Nevertheless, most of the blogging actions take place on PCs or laptops which causes the temporal and spatial limitation of publishing blog entries. Under these constraints, blogging could make students unaware of the features and the problems encountered in authentic context. Huang, Jeng and Huang (2012) studied an educational mobile blogging system which enables mobile bloggers to publish their comments in authentic context anytime and anywhere. They showed that with the help of the mobile blogging system that students can establish a collaborative learning with positive outcome in virtual classrooms seating. Thus, the mobile blogging system can provide more authentic context learning examples and help in solving the coordination issue in a collaborative learning environment.

In addition, the developed mobile blogging system allows students a similar manipulation of web-based blogging system in daily life with no position and time limitations. The result of the study implies that the mobile blogging system can be used for providing authentic context of learning example. For instance, students can share a picture of a train which can be an example of *Linked Lists* concept and upload it to mobile blog. After students read the blog article, they can discuss and comment on it. One student can illustrate the concept of the figure, and the others can look for different example more appropriate. By that manner, students learn to coordinate their efforts toward consistent and correct outcome and elaborate the learning material in a collaborative learning setting.

Role of Motivation When Collaborating via Blogs

Motivation is a major component of learning (Anderman & Bawson, 2011). Motivation involves both social and cognitive factors for learning. There are two primary types of motivation -intrinsic and extrinsic (Ryan & Deci, 2000). Intrinsic motivation is the natural inclination to learn and assimilate or do something without the need of external push. Blogging can generate intrinsic motivation in that students can view and compare each other's work (Chandra & Chalmers, 2010). Intrinsic motivation can potentially lead to high-quality learning and creativity, so it is important to identify factors that can foster intrinsic motivation (Ryan & Deci, 2000). For example, positive feedback increases intrinsic motivation (Deci, 1971; Elliot & Harackiewicz, 1994), and negative feedback reduces intrinsic motivation (Deci & Cascio, 1972). Because some activities may not be intrinsically motivating to learners, educators may employ extrinsic motivators. Extrinsic motivation occurs when an activity is done or needs to be done as a result of external interest and not form within (internally). Social tools, such as blogs can be a significant motivational tool in learning, teaching, and assessment (Ajjan & Hartshorne 2008; Avci & Askar, 2012). An instructor can assess a student's blog to determine the quality and level of interaction and participation by the student. The assessment will act as an extrinsic motivator for the student.

Moreover, in the field of collaborative learning with blogs, the collaboration process, motivation of learning and positive learning outcomes are of great importance. Collaborative learning activates aims to foster productive interactions among the users (students, teachers, researchers) by increasing their awareness and facilitating their self-regulation. Besides that, blogs are social software for asynchronous communication, content management systems, and recently quite popular collaborative learning environments. It is therefore useful to study collaborative interactions for group blogs through which students implement learning activities according to collaboration scripts.

Standard blog features include easy posting, archives of previous posts, and a standalone Web page for each post to the blog with a unique URL. The latter feature facilitates linking to and organizing content within the same blog and from external sites (Byington, 2011). Posting a clinical photo from a digital camera directly to a blog after optimization and adding of a blogger's comments can also be made at the touch of a button using free Google product (e.g. Picasa). Moreover, the currently available 3G generation of mobile phones equipped with 2+ megapixel cameras can instantly post high resolution clinical photos to photoblogs/moblogs (mobile blogs) to a potentially worldwide audience on the Web. Agosto and Copeland (2013) investigated that the use of blogging was effective to encourage student collaboration and knowledge sharing in the face-to-face course environment. Medical blog examples include Clinical Cases and Images. Parkes, Dredger and Hicks (2013) evaluate the many reflective tasks required to help students increase their level of critical thinking (e.g., in the blogs that they contribute to for the field class).

Instructional design research can find ways in which to innovate and at the same time place innovation within the context of sustainable development through collaborative online platforms (e.g., blogs and wikis). Therefore, co-innovation appears to be another key factor in collaboration. The search for agreement on the innovation applies to both internal and external students as knowledge is accumulated both internally and externally. Carayol and Roux (2005) state that expected number of innovation is a function of accumulated knowledge. This constitutes a link between co-learning and co-innovation which cannot be stated separately from trust and coordination in collaboration.

Evaluating Learning When Collaborating via Blogs

The use of standardized measures to assess collaborative knowledge growth via journaling tools such as blogs is not commonly practiced. However, a pedagogical approach known as "folio-thinking" is beginning to emerge as a possible approach to evaluation components of collaborative learning with blogs. This practice is adopted from e-portfolios using a benchmark tool similar to the one developed by Semar (2005) to evaluate

collaborative learning. The “folio-thinking” concept works on the reflective practice of creating portfolios that enable students to document and track their learning growth and develop an integrated, coherent picture of their learning experiences (Stanford Center for Innovations in Learning, 2002). Using this tool enhances a student’s self-understanding of what he or she is learning (Brown, Peterson, Wilson, & Ptaszynski, 2008). Students who blog within a course can use “folio thinking” to document their reflective thinking and demonstrate how they developed their knowledge.

As mentioned, the Semar’s benchmark tool is used to evaluate the effectiveness of collaborative learning (Semar, 2005). Four important factors of collaboration will be measured using this tool, and they are level of synthesis, level of freedom, level of interaction and level of participation. These scores for an individual are then compared with the rest of the group members. This benchmark is a good tool to measure the level of group collaboration and how successful the participants were in solving a given problem. This tool can be adapted to assess the level of collaboration (via blogs) of a given group.

Researchers have also found that successful online collaborative discussion is directly linked to its assessment. Simply put, this means that to encourage collaborative discussion one must grade it. Participation for discussion must count for a significant portion of the course grade and individual discussion postings must be individually assessed. A requirement of a particular number of discussion postings per week or per course module will help ensure students participate in discussion. Recent research by Ho (2004) links the ratings on four rubrics (quality, quantity, relevance and manner) derived from Grice’s cooperative principles for effective face-to-face discourse (Hawisher & Pemberton, 1997) to both the numbers of responses generated by an individual posting and the average number of responses generated by particular students suggest that this rubric may elicit collaboration. It is certainly worth further investigation. In addition, Ho found that students’ overall Gricean ratings were also linked to their final course grades, suggesting the value of collaboration.

Most importantly Dwyer’s (2011) study builds on a new metric for measuring collaborative value from the information content of participant contributions to propose a measure of collaborative efficiency and demonstrates its utility by assessing collaboration around a sample of weblogs. Dwyer’s research on a methodological identification of collaborative performance measure is more broadly applicable approach by being algorithmic and therefore automatable and lowers the barriers to taking advantage of the large volume of online collaborations.

Conclusion

The goal of this review was to investigate how blogs may be used as a collaborative tool and how to evaluate learning via blog-based collaboration. As online instruction has become a mainstream, students use of tools such as blogs has also become routine. Furthermore, this review examined the latest international studies on collaborative learning blogs. We selected some recent quality papers published in peer-reviewed journals that reported experimental research on collaborative blogs in various settings. Based on our review, we found the following interesting key points:

1. Blog based collaborative learning are rapidly growing in instructional technology that needs proper guidelines to support quality education, social interaction, knowledge sharing, and motivation of learning (Hsu, Ching & Grabowski, in press). Future research should investigate how to promote collaboration and interaction through mobile versions of Web 2.0 applications (eg, WordPress, Twitter, Google+).
2. Expanding the context to blog contents: we mostly focused on the issues related to collaboration in blog based online learning. Incorporating the verities of learning content (text, images and videos), there is a need to study the impact of learners’ cognitive load in blog based learning technologies. Also, we need to analyze the confluence of individual cognitive load over collaborative and individual performance. The use of mobile technologies might play significant roles and new dimension of future research.
3. The analysis of qualitative and quantitative assessments of collaboration might fit in blog based instructions. There is a need to update the research base by examining the affordances of current mobile technologies as the advancement in technologies can afford social interaction and dynamics not possible with earlier technologies.

Such tools could be of great value and advantageous for students to use for academic collaboration and future experiential research. With better understanding of how to integrate social tools and evaluate learning in a collaborative environment, we will be able to prescribe effective practices and uses for online social and collaborative tools. We hope that our review of studies provides informative analyses and discussions for the research community. We also look forward to seeing more quality experimental research in these relatively uncharted and promising areas.

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Competency of Teachers in Using Technology Based on ISTE NETS.T in Tatweer Schools- Saudi Arabia

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Introduction

As technology advances, schools should also react and change to incorporate technology appropriately. In fact, in the last 20 years, technology, especially Web 2.0 tools, has dramatically affected how people communicate and learn (Solomon & Schrum, 2007). Technology has given teachers more opportunities to design more engaging learning environments that help students succeed. Studies have supported the positive effects of technology on student engagement and learning, such as searching for information easily, promoting self-expression and creativity, and constructing deep knowledge through collaboration and sharing with others (Erickson, 2010; Johnson, 2011; Thill, 2011; Yoon & Wang, 2014).

Erickson (2010) examined the use of blogs as a tool for improving open-response writing in the secondary science classes compared to handwritten dialogue journals. Four classes were equally divided into an experimental group using the blog and a traditional group using the traditional journal (Erickson, 2010). Results indicated that the blog group had a significantly more positive attitude about the experience than the dialogue journal group. Students indicated that that blogging was fun and helpful and made them look forward to science class (Erickson, 2010).

Initiatives of Using Technology in K-12 Education in Saudi Arabia

Technology uses in education has been expanded in the last three decades in Saudi Arabia. Starting in the early 1990s, educational technology uses, especially computers, were limited to administrative purposes, lesson planning, writing assignments and reports, and other classroom management activities (Alshumaim & Alhassan, n.d.). To support the spread of computer literacy among the new generation, the Ministry of Education established many computer clubs in several cities (Al-Mezher, 2006). In 1999-2000 school year, the Ministry of Education decided to change school libraries into educational learning centers that were connected to the internet and equipped with computers, projectors, and other multimedia (Al-Mezher, 2006). Later, computer literacy programs as a compulsory subject in the secondary school curriculum were introduced where schools were gradually equipped with a computer lab and teachers were trained (Al-Mezher, 2006; Alshumaim & Alhassan, n.d.).

In 2010, the Ministry of Education and King Abdullah bin Abdulaziz Public Education Development Project (Tatweer) signed a contract with the Microsoft worldwide program - "Partner in Learning", which aimed to support the ministry and Tatweer efforts to develop education through ICT integration. This partnership focused on training policy makers, school leaders, and teachers to gain knowledge and skills in integrating Information and Communication Technology in the learning process. The training focused on several tools including Microsoft software, like Microsoft office, Microsoft publisher, Microsoft Auto Collage, Live Sky Drive, Bing Search, Microsoft Mathematics 4.0, Microsoft Movie Maker, Microsoft Photosynth, and Microsoft OneNote.

King Abdullah bin Abdulaziz Education Development Project (Tatweer)

In reaction to the increasing criticism to the Saudi curricula and continues calls from stakeholders to improve the whole educational system in the country, the Saudi Council of Ministers launched King Abdullah bin Abdulaziz Public Education Development Project (Tatweer) at the beginning of 2007. Tatweer is an Arabic term, simply means reform. Unlike the previous reform initiatives, Tatweer adopts a comprehensive systemic change in the Saudi education system. In addition to curriculum development, others educational aspects are addressed, including developing educational standards and assessment to fit the 21st century needs, improving professional

development, and enhancing school environment to promote learning (Hakami, 2010). In general, Schools are considered as the building block for reforming the Saudi education in Tatweer project.

Tatweer schools new curriculum emphasizes using new educational technologies to support students' collaboration work with community involvement to help them possess 21st century skills (Tatweer, n.d.). As technology is one of the building blocks in this new school system and to help the schools move forward standing on a concrete base, it is important to investigate the competency of Tatweer school teachers in using technology based on the International Society for Technology in Education (ISTE) National Educational Technology Standards for Teachers (NETS.T) widely accepted technology standards, especially neither formal nor informal study has been conducted to examine the use of educational technology in Saudi Arabia in relation to these standard.



Figure 1: Tatweer School

International Society for Technology in Education National Educational Technology Standards

The International Society for Technology in Education (ISTE) is the premier membership organization for educators and educational leaders (*About ISTE*, 2011). ISTE promotes professional development, innovation, and advancing the effective use of technology PK-12. More than 100,000 members come from across the globe. ISTE is the home of the National Educational Technology Standards (NETS), the Center for Applied Research in Educational Technology (CARET), and the National Educational Computing Conference (NECC).

National Educational Technology Standards (NETS) have served as a guide lines since 1998 for improved learning and teaching through the proper technology integration (*Standards for global learning in the digital age*, 2011). NETS have been widely adopted by U.S. educators and increasingly advocated in countries worldwide. Aiming to integrate technology across all curricula, NETS are used to help technology planning and curriculum development across primary and secondary school settings. ISTE recently led an international project involving thousands of educators and education leaders to update the NETS. The project resulted in updated standards:

- National Educational Technology Standards for Students (NETS.S): The skills and knowledge students need to learn effectively and live productively in a digital world (*NETS for students*, 2007).
- National Educational Technology Standards for Teachers (NETS.T): The skills and knowledge educators need to change the way they teach, the way they work, and the way they learn in an increasingly connected global and digital society (*NETS for students*, 2007).
- National Educational Technology Standards for Administrators (NETS.A): The skills and knowledge school administrators and leaders need to lead and sustain a culture that supports digital-age learning, builds a vision for technology infusion, and transforms the instructional landscape (*Standards for global learning in the digital age*, 2011, para. 2).

The National Educational Technology Standards for Teachers (NETS.T) has been around for more than a decade. However, little research is found in the literature about teacher use of technology in light of NETS.T. Sam (2011) examined how urban middle school teachers described their competence in the 2008 NETS.T and how they describe their use of technology to support teaching and learning. Participants included 45 teachers responded to the quantitative survey instruments and 18 teachers participated in the three focus interview groups representing three (private, charter, and public) middle schools. Urban middle school teachers in this study were found not aware of the important role technology can play in preparing students for the 21st century. In addition, teachers were “not fully competent in the NETS.T, nor have they used them as a basis to design 21st century lessons. The data show that

among the three classifications of schools, urban public school teachers were less aware of the NETS.T” (Sam, 2011, p. 114). The researchers suggested further studies are needed to investigate high and elementary school teacher competence NETS.T and their use of technology to support teaching and learning.

Using multi-stage cluster sampling of all K-12 public school teachers in New Jersey, Bergacs (2008) studied teacher perceptions of the alignment of their practices in using technology with NETS.T. Results found that 144 participating teachers’ technology use was adhering to NETS.T (Bergacs, 2008). While no differences were found between different teaching experience groups, differences were found significant between different subject area groups in the adherence of teacher use of technology to NETS.T. Results indicated that there were significant differences between grade level groups in their technology use in light of NETS.T, with lower grades had lower mean scores than higher grades. The research found a significant difference between respondent groups who knew about, read, and understand the standards before the survey and those who did not (Bergacs, 2008).

Statement of the Problem

While the National Education Technology Standards for Teachers developed by International Society for Technology in Education (ISTE) has worked as a guide for teachers in technology implementation, lack of research that relates technology use to the National Education Technology Standards for Teachers is apparent in the literature. More precisely, no study could be found in the literature that examined teacher use of technology in light of the National Education Technology Standards for Teachers in Saudi Arabia.

Significance of the Study

Through examining teachers’ uses of technology in light of ISTE NETS.T, this study provides information to stakeholders in the Saudi education system, particularly since Tatweer schools are an indicator of the readiness of Saudi schools to implement technology assisted- progressive education that supports learner-centered approach. Also, with the increase in the use of emerging technologies in Saudi schools, this study provides a better understanding of how technology can support the learning process , as well as to assist in making modifications in the school environment and to develop better professional development for teachers based on a formal needs assessment. Such information could serve in determining how teachers use a standards-based approach to utilize technology in their teaching.

Methodology

Population and Sampling Issues

As the leading model of the Saudi schools reform most recent initiative, Tatweer schools were found the best fit for the study goals, especially since the framework of the schools adopts a learner-centered approach with technology integration. Tatweer schools started in 2007 with 50 pilot schools nationwide and were expanded gradually. In 2012-2013 there were 30 Tatweer schools in Jeddah directorate. These schools were equally divided according to levels (elementary, intermediate, high) and genders (15 boys’ schools and 15 girls’ schools). The whole population (1073 teachers: 578 male and 495 female) was surveyed.

Data Collection

To administer the data collection process, a paper-and-pencil cross-sectional survey was used as it was distributed at the participating schools by the researcher. The survey contains 10 closed-ended items representing using educational technology based on the ISTE NETS.T and its performance indicators (*NETS for teachers*, 2008). The survey in this study uses a 4-point Likert-type rating scale, ranging from “strongly agree” to “strongly disagree”.

Validity and Reliability

To insure instrument’s content validity and appropriateness to study goals, an expert panel group was conducted. The 640 valid responses were found highly reliable as the Cornobach’s alpha value for this instrument was $\alpha = .95$.

Results

Table 1 *ISTE NETS for Teachers: Mean, Media, Mode, and Standard Deviation*

		Collaborative knowledge construction	Personalizing learning activities	Exploring real-world issues	Designing Relevant learning	Practicing safe and legal use of technology
N	Valid	640	640	640	640	640
	Missing	0	0	0	0	0
Mean		3.2172	3.0828	2.9938	2.8625	2.8438
Median		3.0000	3.0000	3.0000	3.0000	3.0000
Mode		3.00	3.00	3.00	3.00	3.00
Std. Deviation		.77602	.83789	.80294	.83159	.82258

Table 2 *ISTE NETS for Teachers: Mean, Media, Mode, and Standard Deviation (Cont.)*

		selecting technology effectively and productively	Sharing best uses of technology with PBL	Communicating relative info with students, parents, peers	Locating, organizing, analyzing, evaluating information	Interaction, collaboration, and publishing
N	Valid	640	640	640	640	640
	Missing	0	0	0	0	0
Mean		2.9359	2.8813	2.9000	2.9609	2.8234
Median		3.0000	3.0000	3.0000	3.0000	3.0000
Mode		3.00	3.00	3.00	3.00	3.00
Std. Deviation		.79353	.83261	.86272	.82605	.87304

Data Analysis and Discussion

Descriptive analysis, through reporting the mean, median, mode, standard deviation, and frequencies, was utilized to summarize the use of the ISTE NETS.T in Tatweer classrooms. Overall results showed good use of technology by Tatweer teachers based on ISTE NETS.T. The most frequent response found in all items was “Somewhat Agree”. The highest use of technology by Tatweer teachers found was “using technology in teaching to model collaborative knowledge construction by engaging in learning with students, colleagues, and others” (M= 3.22, SD= .78). This use of technology included the growth of social networking tools, such as Facebook and Twitter, among Saudis in recent years. Utilizing these technologies in educational activities is very significant progress in Saudi education. The least use of technology by Tatweer teachers was in “using technology in teaching to help students to interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media” (M= 2.82, SD= .87). Although this use was the lowest, it had a very good mean, which still reflected the alignment of Tatweer school teacher technology use with ISTE NETS.T, but with more variations, which might indicate school differences in technology use. Overall findings reflected the alignment of Tatweer school teacher technology use with ISTE NETS.T, which provides an indication of the positive impacts of the recent initiatives of the Ministry of Education to integrate educational technology into Saudi education.

Conclusion

As recommendations were developed from study findings in Tatweer schools in Jeddah, only, findings generalizability is limited. Teachers can use technology for improving the learning process through creating differentiated instructions to fulfill students need and meet individual learning styles. In addition, meaningful learning requires students to work collaboratively in knowledge construction through solving authentic problems that involves finding, organizing, and analyzing data, synthesizing information, and making decisions, which can be done in more productive and effective ways with the proper use of technology. Therefore, a standards-based approach to technology use in learning, based on ISTE NETS in professional development should focus on preparing teachers to use technology purposefully in the classrooms to develop student cognitive skills. In addition, stakeholders and change agents need to understand that for successful technology-assisted learning implementation teachers should be supported through offering ongoing and appropriate professional development programs. Recommendations for future studies included conducting similar study on other schools like private schools, which

are known to have better learning environment and technology facilities. Moreover, a qualitative study through a series of focus groups of selected Jeddah Tatweer school teachers is recommended to gain a deeper understanding of using technology uses to support a meaningful learning.

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Middle School Teachers' Perspective: The Benefits, Challenges, and Suggestion When Using the iPad

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This study interviewed 7 teachers in a Massachusetts public middle school who already had been using the iPad with their students for at least 1 year. Teachers are the ones who best understand their students, classroom environment, and the overall schooling system. Thus, learning from teacher experience and suggestions is important for educational stakeholders develop an efficient MT integration plan. This study aimed to report teacher self-reported benefits, challenges, and suggestions of using the iPad in teaching and learning. The participating teachers reported three educational benefits and a challenge when using iPads in teaching and learning. The teachers also made a suggestion to overcome the challenge.

1. Introduction

Mobile technology (MT), such as Smartphones and tablets, combines both communication and computing features. People carry these portable devices anywhere to make calls and send text messages or emails to interact with families, colleagues, and friends. They can also use diverse mobile applications (apps), like calendars and schedulers in order to keep track of their daily events and work tasks. Using cloud-based file-sharing apps like Dropbox, people can share, save and work on files at their convenience. Mobile communication, collaboration, and information accessibility may give them greater flexibility in their use of time and enable people to work from different locations.

With the advanced functionality of computational MT, educational leaders and technologists see the potential of using MT to support teaching and learning and argue that MT is one of emerging teaching tools that will educate the next generation (Erickson, 2012a; Erickson, 2012b). In the Horizon Report 2009, researchers reported that MT is a flexible teaching solution which supports learning in a variety of ways, by offering diverse new technological features like multimedia communication channels and a touch screen with educational applications (Horizon Report, 2009, p. 6).

Previous research has shown that while MT offers many potential benefits to education, there are many challenges as well. In addition, recently there were reports on the negative experiences of using MT, raising educators' skepticism over the educational value of MT and discouraging them from integrating it into their curricula. For example, the nation's second largest school district in Los Angeles spent \$1 billion to distribute the iPad to improve their education. However, the district recently recalled the iPad due to the series of challenges (Mathis, 2013). Thus, more research is needed to respond to educators' concerns and to develop strong pedagogical integration strategies (Sheppard, 2011).

This study aimed to collect, analyze, and report teacher *self-perceived* benefits and challenges when using MT, particularly iPads. This study also reports these teachers' suggestions to overcome the challenges. The reason to focus on reporting the experienced teachers who already have used iPads for education is because their expertise is constructed based on their practice in the classroom over time. Thus, they are the ones who understand the classroom environment and who know how to utilize learning materials to teach students with iPads. Observing and understanding teacher statements can inform the field on the practical experiences of using MT from the inside rather than from the outside as researchers, administrators, producers or educational technologists; this folklore approach, insider opinions, has been proven to provide an authentic perspective that should not be ignored. These expert teachers' wisdom will help educational stakeholders enhance policies, strategies, and support for teachers and students using iPads in education.

2. Literature Review

Early adopters have examined the use of MT in the classroom and reported its educational potential (Herrington, et al., 2009; Kukulska, 2010; Naismith, et al., 2004; Pattern, Sanchez, & Tangney, 2006; Shuler, 2009). The existing research suggests that using mobile technology has been focused on: (1) improving *access* to learning materials, (2) stimulating *collaborative learning* activities, (3) providing *personalized learning* experiences to each student, and (4) providing a *constructivist* learning environment, allowing students to develop their own learning resources through multimedia features.

Mobile technology provides “*anytime, anywhere*” access to educational resources to support learning activities. Portable MT facilitates teaching and learning independent of time or location. This educational process is also referred to as ‘mobile learning’ (Traxler, 2007) or ‘always-on learning’ (Cobcroft, et al., 2006, p. 25). Using ubiquitous MT, students can conveniently access the Internet and find information to acquire new knowledge as they need it (Kinshuk & Chen, 2005). This accessibility enables students to choose when and where to study, or to study a subject immediately in context, increasing the productivity of learning activities (Cobcroft, et al., 2006; Pietrzyk, et al., 2011).

Second, MT facilitates *collaborative learning* activities. Unlike wired technology, which is constrained to a physical location, mobile devices facilitate the collaborative learning environment by allowing learners to share ideas and information beyond the classroom (Naismith, et al., 2004). Using email and text messages, students can exchange their inquiry and opinions with classmates and teachers to further understand content while outside of the classroom. Also, when students find information that is useful for their group projects, they can record and share the information with their group and reflect on new knowledge together anywhere, at anytime (Naismith, et al., 2004; Shuler, 2009).

Third, MT supports individual learning experiences by providing tailored lessons to each student. The efficacy of individualized learning was previously discussed by educational scholars (O’ Keeffe, Brady, Conlan, & Wade, 2006; Sampson, Karagiannidis, & Kinshuk, 2010). According to this research, individualized learning promotes positive learning outcomes because it customizes instruction and materials “based on an analysis of the learners’ objectives, current status of skills and knowledge, [and] learning style preferences”, and so helps them achieve meaningful learning (Sampson, Karagiannidis, & Kinshuk, 2010, p. 25). Using mobile web browsers, students can instantly search for information that helps their understanding. This self-remediated learning process help students catch up lessons and keep them engaged. By using educational game apps and monitoring the scores, teachers can track each learner’s progress easily, and tailor their instruction for each student’s abilities, interests, and needs. Also, schools can deliver on each student mobile devices the same learning content using various media, such as text, audio, and video. This enables students to select educational resources based on their own learning styles (Motiwalla, 2007; Virvou & Alepis, 2005).

Lastly, MT encourages creation and exploration in learners and stimulates constructive learning. According to Jerome Bruner, who is an advocate of constructivism, learning is more effective when teachers provide learning activities in which students can explore and discover (Bruner, 1996) because in this way, students can actively construct new ideas or concepts based on their previous knowledge to scaffold new knowledge. Also, students can capture both “know what” and “know how” to gain a deeper understanding of both the subject and the process (Brown, Collins, & Duguid, 1989). This constructivist teaching approach enables learners to interact with authentic situations. Using portable wireless mobile technology, a teacher can promote constructive learning by creating active learning lessons. Using multimedia features, such as microphones and cameras, students can apply what they have learned in the classroom, create their own learning content, and present their understanding of the subject.

However, along with these potential benefits, research has also reported a number of challenges in relation to the use of MT: accessing inappropriate information (Goad, 2012; UNESCO, 2011), classroom distraction (Campbell, 2006; End, Worthman, et al., 2009; Gingerich, 2011), cost of equipping quality MT (Attewell, 2005; Herrington, et al, 2009; Kukulska, 2010; Thomas & Bolton, 2012; UNESCO, 2011), lack of professional development (Naismith, et al., 2004; Shuler, 2009; Ferry, 2009), dangerous behaviors, such as sexting (Willard, 2011). These drawbacks are crucial factors that discourage teachers from using MT in their instruction.

First, MT can interrupt student learning. MT enables students to access recent web resources anywhere and anytime; however, this advantage worries teachers because students may find incorrect information and develop inappropriate knowledge (Goad, 2012). Also, classroom distraction is another challenge that teachers found. Teachers argue that student use of mobile phones not related to classroom activities, such as texting their friends, causes difficulty focusing on classroom lessons and consequently risks poor learning outcomes (Campbell, 2006; End, Worthman, Mathews, & Wetterau, 2009). A recent research finding supports the teachers’ opinions. Gingerich

(2011) examined the impact of texting on students' comprehension of lectures. The research found that students who received text messages during the lecture performed worse on their quizzes than students who did not receive any text messages.

Even more worrisome, MT can also create interruptions that can seriously harm learners, such as sexting. According to Pew Research Center (2009), 4% of student ages 12-17 reported that they had sent sexual images or videos of themselves to someone via text message (p.5). Fifteen percent said that they had received sexual images of someone they know via text message (p.5). Willard (2011), an expert in cyber-bullying, reports that cyber-bullying and sexting can occur in the classroom where MT is not forbidden. For these reasons, teachers hesitate to adapt MT in the classroom.

Second, educators worry about the cost to implement MT in the classroom. The cost of mobile devices has declined while the number of mobile users has grown. However, wireless network infrastructure has not kept up with the advancement of mobile technology (Herrington, 2009, p. 61). Specifically, at the institutional level, installing the Internet infrastructure and expanding bandwidth to provide wireless network services are still expensive. As technology develops, MT has gained more computational capability while types of MT are becoming more diverse. Also, teachers reported that mobile technologies were more useful when they were paired with other software and hardware devices, such as video editing software, headsets, and microphones (Herrington, 2009; UNESCO, 2011); however, hardware and software developments do not yet allow the diverse types of MT to communicate cheaply and efficiently. These mobile accessories are extra costs that stakeholders need to consider.

Third, the variety of mobile phones is another difficulty when integrating the devices into the classroom. Each phone has different capabilities. Some phones are simple, while others are far more advanced (Goad, 2012; Herrington, 2009). Thus, teachers may be unsure how to run the same educational activities for all learners because of the variation students may experience due to device differences.

Lastly, a lack of teacher professional development programs is another drawback that educators discuss. Technologies can support teachers and students, only if teachers know “when, why and how to use these tools.” As with previous technologies, most mobile learning technology implementation did not include quality professional development, so “teachers did not know how to use [MT] and as a result [MT] did not promote learning; instead it became a source of distraction.” To improve teachers' capabilities to use mobile technologies, stakeholders should provide professional development that improves both technological and pedagogical skills and knowledge.

3. Method

3.1. Data

This is a qualitative case study. This study collected and analyzed three types of data: interviews, classroom observations, and classroom document analysis.

First, I interviewed seven middle school teachers experienced in employing iPads for at least 1 year to investigate the benefits, challenges, and suggestions of using iPads. Second, I observed classrooms to gain a better understanding of the classroom environment and to validate teachers' opinions. Lastly, to understand teaching process, I collected and reviewed documents, such as lesson plans, syllabi, and other relevant resources. Using these three approaches in an investigation of using iPads triangulated data and improved the validity of the resources.

3.2. Participants

There was a total of seven participants: two English teachers, one Latin teacher, two science teachers, two social studies teachers. All teachers had already used iPads for over one year. The participants' background information is described in the Table 1.

Subject	Teaching Experience	iPads Experience in Teaching
English	9 years	Over 1 year
English	17 years	Over 1 year
Latin	4 years	Over 1 year
Science	12 years	Over 1 year
Science	9 years	Over 1 year
Social Study	14 years	Over 1 year
Social Study	13 years	Over 1 year

Table 1: Teaching Experience of Participants

4. Findings

All seven participating teachers reported three educational benefits of using iPads: (1) *creating a constructive and active learning environment*, (2) *individualizing instructions*, and (3) *increasing student engagement*. Along with these benefits, they also reported a challenge using iPads: classroom management. The participating teachers suggested clear communication with students regarding teacher expectation, classroom rules, and consequences of breaking rules as a solution to manage the inappropriate use of iPads in the classroom, called “iBad” behavior, and to manage classroom. Through this communication, the participating teachers aimed to develop their students’ responsible use of using MT in and outside of the classroom.

4.1. Benefits

First, all participating teachers reported that the use of iPads benefited them in *creating constructive and active learning environment*. These teachers were able to ask students to use handy apps not only to manipulate lesson materials, but also to create projects in the classroom conveniently. For example, students could use note-taking apps to manipulate and annotate their own ideas on the digital textbooks or PDF lesson handouts to create their own learning materials. The review of their own notes helped students to recall lesson content better. Also, by requiring students to develop projects using visual media with text, these participating teachers were able not only to develop student creativity, but also help them make connections between text and concrete examples and gain a better understanding of the subject matter. The following teacher report illustrates this benefit of using iPads.

What I was having the kids do, I was having them make flash cards on their iPads in variety of different ways. The main method was using the Keynotes and ‘Doodle Body’. What they will do is, they will draw an image using ‘Doodle Body’, and then put the main image and write the Latin word underneath. Students can make direct connection between words and images. It allows them to learn without using English. So they are not going ‘caseus’ that means cheese, ‘malum’ means apple and understanding that way [pause]...they are directly, ‘okay I am drawing ‘caseus’. This is what ‘caseus’ looks like. ‘Malum’ looks like that.’ So they associate directly.

Other teachers also provided specific examples how the iPads integration benefited participants in *creating constructive and active learning environment*. One teacher reported that by actively involving students in researching and encouraging them to create projects to form their understanding, students were able to construct their knowledge efficiently.

We did this activity, called Genetic Disorders. So the kids have to pick a genetic disorder, and create a research poster on Pages based on the genetic disorder that they find out about it. They need to add different images, and at the bottom, they insert a video file of a personal story. And so, it is really cool because they’re using Page, they have images, they have personal stories, they’re really seeing someone’s face with genetic disorder. Kids are really, really reflective, very serious about it. They realized, you know, just how big some of these genetic disorders are. So that’s a huge one that I love. Some of them we put it on the board, and kids like to share, because it’s personal experience.

Second, all participants reported that *individualizing instruction* is another benefit of using iPads in teaching. Students have different learning styles with different levels of background knowledge. By utilizing supplementary online resources, these participating teachers were able to support not only each student different learning needs, but also different student learning preferences. Furthermore, using educational game apps, teachers were able to provide chances for individual students to practice, reinforce, and develop skills in a certain subject area at their own pace. One teacher gave a specific example of accommodating different levels of student subject knowledge by distributing and allowing students access to different instructional materials on their own iPads.

This [Web Quest] is great when I have to differentiate instructions to different students. So some students are really hungry like for the information they want to know more. So by accessing these websites using iPads, there are so many links within this website that they can go to, so the kids that work fast then they can go ahead, and get so much more information. They can find them on their own. If students need a little more assistance with that I also give them directions exactly. So sometimes I will give this other students, tell you exactly where to click, click on Transmission, so that students a little more help, I will give them a slightly different

document, other students would not be able to tell, they are slightly different, but I can give them few more directions, that's how I can differentiate my instructions too. Some students need more assistance, but maybe they don't want to look like they need more assistance.

The last benefit that the participating teachers reported was the positive influence on student engagement. They believed that when students were more engaged in learning, students were more motivated to pay attention, work harder, and push themselves to excel. As these teachers understood it, this positive learning attitude helps students integrate, transfer, and retain new knowledge better. Another commented that these students' extra effort led them to achieve unexpected learning outcomes, exciting teachers to use iPads in teaching. The following teachers' explanation elucidated participants' instructional belief and their feelings about student engagement when using iPads and its positive educational influence.

The boy who looked up the ringworm on his iPad will probably tell his folks about it tonight. He's going to share that experience, because he went out of his way to find that picture and to find if that was virus or bacteria. Those are their mini-experiences that are different from the norm. They will pick up on those more. The more fun a child has with an assignment, the more likely they will remember it...In senior year they'll be like 'Remember the day when we went to outside, we were jumping around leaves and had a lot of fun.' That's what they remember. So, you have to give them those experiences.

If the kids are enjoying it, and they're having good time with it, then, it makes your job as a teacher a little bit easier. They're excited to use it. They're excited to work with it... That's what I really love about this. Sometimes you'll envision what you want the kids to do and, they'll take it to the next level. I gave them some guidance, but they created these things that I just wasn't even expecting. They'll make something with it that you didn't even think of. Or, they'll really put all this extra energy or effort into it.

The above summarize three educational benefits that all my participating teachers self-reported when using iPads in teaching: (1) creating constructive and active learning environment, (2) individualizing instruction, and (3) engaging students in learning. Along with these benefits teachers also reported one specific challenge when using iPads in the classroom.

4.2. Challenge

The participating teachers reported that classroom management is a significant issue when using MT in the classroom. They said that iPads have created different types of behavioral problems among students, challenging teachers to manage classroom than those ordinarily demanded when iPads were not in use in the classroom.

These participants elucidated three new types of behavior problems: (1) classroom distraction, (2) student technical competence, and (3) no ideal punishment. First, there are many non-educational apps, such as games and message services that students can download and use for entertainment and social purposes. The participant teachers reported that students were easily distracted by these apps, which made it difficult for these teachers to maintain students' focus on learning activities. In addition, because iPads are not designed for educational purposes, but for personal use, it was difficult to manipulate the platform and force students to use iPads only for educational purposes. The following example explicates participant opinions on different types of behavior problems and the need of different types of classroom management strategies.

Students are not perfect. They will be off-task some days. They have good days, they have bad days, they have assignments they don't like, assignments they like, subjects they like, subjects they don't like. Before [we had iPads], if they were off-task, they didn't have an iPad to entertain them, so they might poke the kid in front of them or throw paper across the room or draw something on the desk. You don't have as much of that happening now because there's something to entertain them. So, it's a different type of management.

Second, student *technological strength* also challenged classroom management. Some participants mentioned that student technological competence helped them develop their own technological skills. However, when it came down to classroom management issues, student technological competence made it more difficult for teachers to monitor student "iBad" behavior. The following teacher report explained why student technological

competence was a problem.

When they are on their iPads, these kids are so savvy. They know how to sweep, you know what I mean. When you are walking by they are typing, you don't really know if there are closing and opening up another app when you walk by, you know when you come back up here. So, it's very hard to manage a large class to know that they are using iPads appropriately. It's not easy to manage.

Lastly, participants said that there is no ideal punishment that they could apply to discipline their students' "iBad" behavior. Their school suggested that these teachers could take iPads away to punish students' misuse of iPads. However, these teachers explained these solutions were not effective. When they took away iPads, students could not complete their learning tasks because most of instructional materials and activities were on iPads. This dilemma is well described by the following teacher.

There has to be more effective management because the kids get where the lines are, and they get the boundaries are kind of weak. One thing they understand is that they know a teacher can't really take away their iPads. Because it will be another teacher will have their homework on their iPads, project is due on the iPad, they need for the next class...They know you really can't take it because they need it for other stuff. So things like that become challenging.

In sum, the participating teachers said that iPads have created different types of behavioral problems among students, challenging teacher classroom management. Thus, developing different types of classroom management skills are needed to benefit students' learning by using iPads.

4.3. Suggestions

To overcome the classroom management challenge and to guide student "iBad" behavior, these participants applied the communication method. They applied straight-forward communication method to explain classroom rules, expectation, and consequences of "iBad" behavior. The following teachers' reports exemplified these participating teachers suggestion for applying straight-forward communication to manage "iBad" behavior. These teachers said they intended to establish their responsibility and authority through communication, to set clear guidelines about when, how, and what to do with iPads.

So this year I started what's called the responsibility rubric. So, what's that entail? So each week students get 10 points for being a responsible student. So I taught them the first week what a responsible student is. You come in on time. You come prepared, iPad is charged. You have homework done, you're respectful, and then anytime you do something where you're not being responsible, I take a point away from 10 points you have. If you're using the iPad when you're not supposed to, I let them know that you are using the iPads when you are not supposed to and they'll see me make a check on a clipboard, knowing that I am taking a point away from their grade. That tends to motivate them to not really want to do it.

I think it's just those really clear limits, setting those limits from the beginning, being really clear about what you can and cannot do and really enforcing those becomes very important when you're giving a kid a device like this. Be very clear on the expectations and what you expect, and that you reinforce those consistently.

You have to really make it clear when it's okay to use the iPads, and you also have to make it clear what the consequences are if they go against that rule. You have to warn them first and tell them that you should only use your iPad when I tell you to. If you use it when you're not supposed to, the consequence is that I will take it away, and you really have to follow through by doing that. One mistake by one student is all it takes, because they need to know that you really mean business, that it's not just an empty threat. And you will really give it to the assistant principle for the day. And you have to go and pick it up from her at the end of day. So they have to have a conversation of why it was taken away from the first place.

Reflecting upon these participants experiences in identifying an effective “iBad” management method, teacher classroom experience was to be found crucial to the process of identifying practical solutions in managing “iBad” behavior. Thus, to prepare teachers with adequate “iBad” discipline skills, the participating teachers suggested that educational stakeholders should utilize the teachers’ expertise and wisdom gained in using iPads with students reported in this study to contribute to developing “iBad” management guidelines. These common guidelines will help novice teachers who are just beginning to use MT understand the potential challenges, apply the appropriate solutions that match to their instructional styles, and create safe educational environments.

5. Conclusion

This study reported teacher self-reported benefits, a challenge, and a suggestion when integrating iPads into curricula. All my participating teachers reported three educational benefits: (1) creating constructive and active learning environment, (2) individualizing instruction, and (3) engaging students in learning. This study confirms two benefits that previous research reported: creating constructive learning environment and individualizing instruction. A new benefit that this study reports on and expands the understanding of is mobile technology’s (MT)—specifically, iPads—positive influence on student engagement in the classroom.

Previous studies reported that classroom management is a significant issue when using MT in the classroom (Campbell, 2006; End, Worthman, Mathews, & Wetterau, 2009; Gingerich, 2011; see **Error! Reference source not found.**). The participating teachers also reported the same challenge. They said that iPads have created different types of behavioral problems among students, requiring teachers to develop different types of classroom management skills than those ordinarily demanded when iPads were not in use in the classroom. To overcome this challenge, the participant suggest that schools and teachers need to set clear rules and have clear communication with students about classroom expectations and the consequences of their students’ “iBad” behavior.

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Concept centrality: A useful and usable analysis method to reveal mental representation of bilingual readers

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Abstract

This investigation examined how cognitive operations in a second language (L2) interact with a first language (L1). Forty low proficient Korean learners of English performed two writing tasks after reading an L2 text: writing directly into English (control condition) as well as writing in Korean and then translating into English (experimental condition). All L1 and L2 essays were converted into Pathfinder Networks. For the Pathfinder networks analysis, we propose “concept centrality” as an innovative measurement method of knowledge structure to mathematically and visually describe cognitive state changes during L1 use in L2 writing. The centrality values (i.e., graph centrality & node centrality) described and analyzed the maps in order to fully describe and distinguish between the Translation and Direct groups, suggesting a fundamental way that L1 and L2 cognitive processing differs.

Introduction

Theoretically based on schema theory, conceptual networks, and cognitive structure, knowledge structure refers to how information elements are organized in memory (Jonassen, Beissner, & Yacci, 1993). Clariana, Wallace, and Godshalk (2009) proposed that knowledge structure is pre-propositional, but it is the precursor of meaningful expression and thus the underpinning of thought. Said differently, knowledge structure is the mental lexicon that consists of weighted associations between knowledge elements. Due to our dimensionally limited senses, knowledge elements usually enter memory as sequential (linear) strings of propositions (i.e., when reading and listening), but these linear strings, after consolidation with existing traces, have relational patterns. Thus in our view, knowledge structure is both linear and relational at the same time.

Knowledge structure has been recognized as an important part of cognitive processing – affecting learners’ ability to transfer what they know to new problems and settings. In this regard, explicit knowledge structure externally elicited is a snapshot of the degree to which learners have organized and comprehended the content of a specific context. For example, an author’s knowledge structure is reflected in her text, and the reader’s knowledge structure becomes more like the author’s knowledge structure as he reads that text. Indeed, several studies have demonstrated that measures of knowledge structure can differentiate between experts and novices (e.g., Schvaneveldt, 1985), predict classroom learning and achievement (e.g., Goldsmith, Johnson, & Acton, 1991), reflect training manipulations designed to influence learning (Kraiger, Sales, & Cannon-Bowers, 1995), and mediate transfer performance on novel tasks (Kraiger et al., 1995). Thus, apposite knowledge structure seems most important for higher-order outcomes such as forming inferences, comprehension, and problem solving. In sum, knowledge structure as a demonstration of cognitive structure, the pattern of relationships among concepts in memory, is worth measuring.

We utilized the knowledge structure theory to measure the lexical structure of bilingual learners, with Korean as an L1 and English as an L2. This investigation measured the flow of knowledge structure elicited as maps before (Premap), during (During map), and after (Post map) writing. Specially, we elicited, represented, and compared the knowledge structure derived from Korean English language learners’ direct (control condition) and translated (experimental condition) academic writing. In this investigation, we propose “centrality” as an innovative

measurement method of knowledge structure (KS) to mathematically and visually describe cognitive state changes during an L1 use in an L2 writing.

Background and Related Work

L1 use in L2 writing

In the English as a Second Language (ESL) and Second Language Acquisition (SLA) fields, the value of the L1 use in L2 writing has been a continuous source of interest and debate. The bulk of research has been done to explore the use of the L1 while composing text in L2 (Uzawa & Cumming, 1989; Kobayashi & Rinnert, 1992; Cohen, Brooks-Carson, & Jacobs-Cassuto, 2000). Despite their different research goals, many of the studies have revealed that L2 proficiency may constrain the amount of L1 use, thereby exerting varied effects on writers' composing process and the quality of writing production (Wang & Wen, 2002).

Qi's study (1998) revealed that a high proficient bilingual writer used their L1 for initiating an idea, for developing a thought, for verifying the meaning of a word, and for avoiding working memory overloading. In comparison, the lower proficiency writers used their L1 far more than the higher proficiency writers in order to search out and assess appropriate wording, compare cross-linguistic equivalents, and less frequently consider about linguistic choices in the L2 (Cumming, 1990). A study compared direct writing with translating writing reported that participants with low proficiency levels in an L2 benefited from translating processes from an L1 into an L2, in terms of language use, text content, style, and organization (Uzawa, 1996). Another study in the category of translating writing also showed that the L2 composition of low proficient bilinguals written in the translation mode demonstrated higher levels of syntactic complexity and the benefits in areas of content, style, and organization (Kobayashi et al., 1992). These writing mode studies revealed that low proficient bilinguals seem to benefit from translation whereas those at high levels did not. Woodall (2002) complicated the relation of L2 proficiency with an L1 use even further, by including the linguistic properties of two languages as an additional independent variable in his study. He found that overall, low proficiency bilinguals switched more often from L1 to their L2 than high proficiency writers, but this effect was influenced by task difficulty and language group like non-cognate (e.g., Korean/English) or cognate languages (e.g., Spanish/English); switching between a cognate language was related to higher quality L2 text while switching between a non-cognate language was related to lower quality texts.

In sum, bilinguals with different proficiency levels may use their L1 in different patterns (Woodall, 2002) or for different cognitive processing while composing in L2. And there are indications that both translation from the L1 to the L2 and L1 use during L2 writing tend to improve L2 text quality, but not in all situations and not for all writers (Kobayashi et al., 1992; Uzawa et al., 1989). Together with the findings from the studies reviewed above, we propose that the use of the L1 for L2 writing may bring some benefits in terms of KS like organization and complexity to the L2 writing, especially for lower proficiency bilinguals. Of course, this proposition must be tempered by considering a number of variables such as the linguistic properties of two languages, the linguistic experience of bilinguals, the task difficulty (Woodall, 2002), the participants' motivation to write in the languages, and the genre of the writing (Cohen et al., 2000).

Although those studies provided new insights into the possible role L1 plays for writing in an L2, overall, the value of L1 use in the L2 writing has still remained a controversial issue. Furthermore, the reasons for L1 use and which cognitive activities are carried out in an L1 also remain somewhat unclear. As mentioned above, the L1 can be used to solve linguistic or lower-order problems (cognitive level), but is also used for higher-order activities such as planning or to prevent cognitive overload (metacognitive level).

To summarize, the unclear findings in L1 use for L2 writing make it hard to generalize results over task or across languages, or to establish a direct link between L1 use and text quality, which is a relevant issue for educational purposes. Therefore, with a purpose to contribute to this on-going debate, the present investigation attempts to provide further insight into the role L1 use plays during L2 writing by applying a recent KS analysis method to try to determine how the structure of L1 lexicon affects L2 cognitive performance. One unique way to unfold the influence of an L1 in L2 cognitive processing will be to examine L2 cognitive processing with low proficiency bilinguals. So, this investigation proposes to capture and visually represent low proficiency bilinguals' L1 and L2 KS derived from their direct and translated academic writing (essays) and maps.

As noted above, previous studies in ESL or SLA fields have not conceptualized KS in an L1 and L2 as our approach does. This investigation, thus, presents a novel approach to measure bilinguals' KS in L1 and L2 in order to "see" the interaction between an L1 and L2, which can open doors to various follow up studies. If this KS approach is supported, therefore, it could have wide scale influence as a complementary and mediating variable to account for various language performances and competences.

Concept maps for eliciting knowledge structure

Concept maps are one common approach for eliciting KS. Concept maps and other similar graphical representations are one way, and maybe the most explicit way, to elicit and visualize KS of content (Jonassen et al., 1993). Concept maps in education have been the subject of intensive investigation so far. Many studies have validated the appropriateness of the concept mapping technique to fulfill different educational purposes: to support learning, to assess learning, and to organize and present information for teaching and learning (Arruarte, Elorriaga, Calvo, & Larranaga, 2012). However, as far as we can determine, no studies have investigated the validity of concept maps to elicit bilinguals' KS and its influence in L1 and L2 settings. Given that production tasks of words and sentences are notoriously difficult for bilinguals, it is important to have a cognitively easy measure that is comparable for bilinguals at different levels of L2 (Van Hell & Kroll, 2012). The concept mapping can be a very good example of such a measure that is not difficult even for poor L2 bilinguals. Therefore, this investigation utilized concept mapping as a tool for eliciting, representing, and comparing bilinguals' cognitive residue in both languages.

Then, which aspects or components of knowledge are captured by concept maps? Concept mapping consists of several distinct cognitive activities including recalling important terms (the extent of knowledge), sorting terms closer together or farther part (relational-associational knowledge), and linking highly related terms with a line and adding a linking phrase to show the meaning of the proposition in that context (propositional-declarative knowledge) (Clariana, 2010). According to the findings from Clariana, Koul, and Salehi (2006), concept map scores derived from proposition data (links drawn between terms) were more related to verbatim knowledge from the lesson text covering facts, terminology, and definitions; whereas concept map scores derived from relational data (distance between terms) were more related to comprehension, inferential, higher order knowledge. These findings suggest that concept map links and distances between terms represent different aspects of KS, specifically propositional-declarative knowledge and relational-associational knowledge. The mapping prompt used can differentially elicit one at the expense of the other, for example requiring hierarchical maps increases the importance of propositional relations and decreases the importance of the spatial relations in the map artifact (Clariana, 2010). In this investigation, we provided mapping directions that intentionally deemphasized propositions (links between terms) and that emphasized association (distance between terms) to more clearly measure and compare participants' comprehension level. Thus, in this investigation, KS data consists of the distances (i.e., proximities) between the key terms in the maps.

Centrality as a measure of knowledge structure

A general graph theory concept called centrality (Freeman 1978) has been recently used by several researchers as a way to analyze concept maps (Ifenthaler, 2010; Clariana, Draper, & Land, 2011; Clariana, Engelmann, & Wu, 2013). Clariana et al. (2011) demonstrated the potential of graph centrality measures by applying it to an online course. They quantified four categories of network graph layout forms using graph centrality as an omnibus numerical measure of concept maps structure, with 0.1 representing linear form, 0.4 a hierarchical form, 0.6 representing a network form, and 1.0 representing a star form. Their investigation showed that the group average KS of the participants in a collaborative online community of practice converged toward a more *hierarchical* structure that is indicative of expertise relative to a self-paced group that did not collaborative online ($C_{graph} = 0.45$ vs. 0.25). Their finding supported using graph centrality for measuring convergence of KS representations in a computer supportive collaborative problem-solving task.

In a follow-up investigation, Clariana et al. (2013) applied both graph centrality and node centrality (e.g., the number of links to a concept). They viewed node centrality as a measure of concept importance and graph centrality as a measure of form. Their study sought to mathematically and visually describe state changes from problem space to problem solution during problem solving. Participants (N=120) were randomly assigned to interdependent or non-interdependent conditions to work online in triads to create a concept map to solve a problem scenario. Node centrality of the interdependent group-created concept maps resembled the fully explicated problem space, while the non-interdependent group-created concept maps mainly resembled the problem solution. The node centrality values agreed with the result using common relations count analysis and the centrality measures allowed for additional comparisons including analysis by multidimensional scaling. The results demonstrated that node centrality provides supplementary measure of KS. In this present investigation, we compared the graph centrality (a single number) and node centrality (a vector) of the various maps from the translated writing group to those of the direct writing group to further determine the usefulness of concept map centrality as a measure of KS.

Purpose

This investigation and the others cited above presumes that persistent KS exists and influences cognition in a way that can be expressed as a nomological network (Cronbach & Meehl, 1955, a set of constructs/concepts and their linkages), or at least KS influence can be measured and is worth measuring. But the existence, differentiation, and validation of a construct and of a model of constructs (a theory) cannot be established in one investigation, it requires a body of evidence. The purpose of the investigation is to add to the growing evidence of the likely validity of graph centrality and node centrality of maps as measures of KS by demonstrating the logical relations observed between these measures.

Method

This experimental investigation involved directed and translated writing was conducted in two face-to-face classes (20 & 20 respectively) with 40 Korean - English language learners at a South Korean based University in the spring semester of 2013. The participants all received a TOEFL (Test of English as Foreign Language) score of lower than 550, which is the minimum score for admission to most undergraduate schools in the USA. According to a self-report survey, their fluency in English is rated an average as 3 on a 7-point scale (with 7 being native-like fluency and 1 being elementary fluency). According to the TOEFL score and self-report, the students can be considered as low proficient learners of English.

Participants were randomly assigned to either the experimental condition (translated writing) or the control condition (directed writing). Next, they completed mapping training lesson on how to draw maps in both Korean and English (a distance-related relational specific training). Then, they were asked to read a 450-word English text taken with permission from TOEFL reading materials and then create a map (Premap) of this content on the handout. Before creating a Premap, all participants were given the same list of approximately 20 key terms (but in L1, Korean, or in L2, English depending on treatment) from the text that they could use for their Premap. They can use any terms and any number of terms in their maps (i.e., open-ended concept mapping). Figure 1 summarizes and compares activities between the two groups.

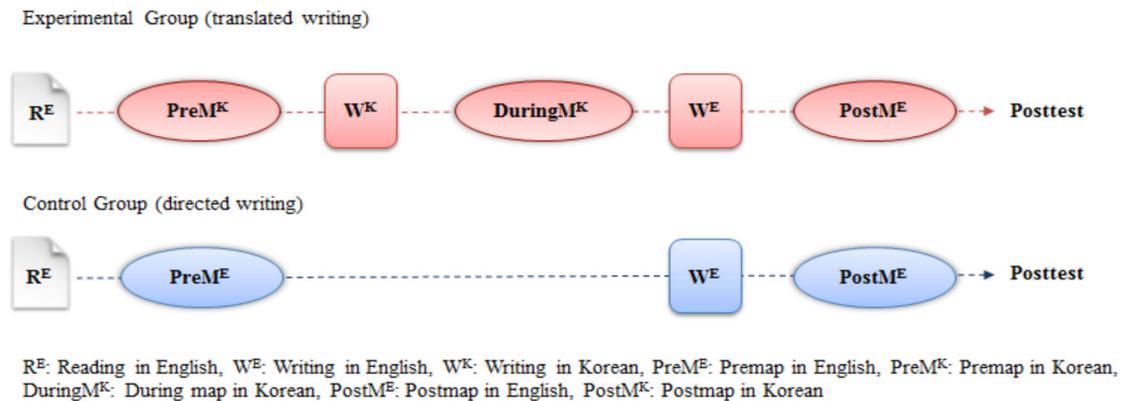


Figure 1. Research design

All terms used by all participants were combined and arranged in order of frequency, and then this ordered list was given to a content expert. While considering this list and the instructional text, the expert determined the 10 essential terms (*cave painting, puzzling, location, seasonal migration, hunting ceremony, tribal ceremony, motivation, overpainting, ancient human, intelligent*) and then created an expert map with these terms, and this map is used as the referent map for comparing to all of the participants' maps.

For map analysis, *Jrate* (see for more detail Corsaro, 2003) software was used to calculate the raw distance data that contained all pair-wise distance between the 10 terms in expert' and in participants' maps. Each paper-based map was recreated in *Jrate*, a manual process that can introduce error, though care was taken to maintain the original spatial relationships between terms in the map. In this way, each map was converted to a proximity file with 45 elements (i.e., $(10^2 - 10)/2 = 45$) that are the distances in pixels between every term. Using *Knowledge Network and Orientation Tool* software (*KNOT*, for more details see Clariana et al., 2006, Clariana, 2010), all of the participants' and also the expert's map proximity data (distances) were converted into network representations of

structural knowledge called a Pathfinder Network (PFNet). PFNets describe the interrelatedness of concepts within a content domain – the knowledge structure – at that moment in time (Goldsmith et al., 1991). Each concept is represented as a node in the network, and the links between the nodes are based on the pattern of distance estimates. Thus, PFNets are believed to show how one individual understand the interrelatedness - an organization of the concepts - in the certain content domain.

All participants' maps (*represented as PFNets*) and the expert referent map (*represented as PFNet*) were entered into a node degree table using the same 10 concepts. The data were analyzed in two different equations, using graph centrality that establishes one value ranged from 0 to 1; and then using node centrality that uses 10-element vector for each map that were then analyzed by correlation and multidimensional scaling (for more detail see Clariana et al. 2013). Since correlation values (r) are not interval-level data, the values were squared to form coefficient of determination values (r^2) that can then be analyzed with traditional statistics.

For essays analysis, *ALA-Reader* software (for more details, see Clariana et al., 2004; Koul et al., 2005) was used to transform the Korean and the English essays into raw distance data for the same 10 terms. This data was also converted to a proximity file and analyzed by *KNOT* software. Using the same approach described for map analysis above, all of the participants' essay proximity data were converted into PFNets that were then entered into a node degree table for calculating graph centrality and node centrality. Since all maps and essays are converted to PFNets, then the KS elicited as maps can be compared to maps, as essays can be compared to essays, and remarkably, maps can be compared to essays.

Results

Graph centrality

Control group's Premap^E, writing^E, and Postmap^E on average were linear in form (centrality range .23 to .28 to .34 respectively) while the experimental group's Premap^K, writing^K, duringmap^K, writing^E, and Postmap^E were all relational forms (.51 to .57 to .54 to .46 to .48 respectively, see Table 1). This result for graph centrality could indicate that the average KS of the participants in the translated writing condition converged towards a more *relational* structure like an expert (0.47) relative to the direct writing condition that had a more *linear* structure, suggesting a fundamental way that L1 and L2 cognitive processing differs, the latent knowledge structure of the Lx term set is imparted to the Lx artifacts.

Table 1. Graph centrality and comprehension posttest

Comprehension Posttest		Graph Centrality				
		Pre	W ^K	During	W ^E	Post
Trans.	82/100 (0.17)	0.51 (0.12)	0.57 (0.22)	0.54 (0.30)	0.46 (0.15)	0.48 (0.11)
				<i>relational graph</i>		
Direct.	64/100 (0.15)	0.23 (0.05)	--	--	0.28 (0.11)	0.34 (0.18)
				<i>linear graph</i>		

(note: values shown in parentheses are standard deviation)

As shown in Figure 2, the Direct group's non-linear relationships between graph centrality and comprehension posttest for the Premap and Postmap were not significant. But the Translated group's Premap, During map, and Postmap all show a significant non-linear relationship between graph centrality and posttest comprehension score. In other words, perhaps too little structure (which might indicate a deficient map) or too much structure (which might indicate non-appropriate dominance of the structure by one or a few irrelevant terms) both negatively influence performance on the posttest, but optimal structure (graph centrality of about .56 for Premap, .52 for During map, .48 for Postmap) relates to optimal posttest scores. This result could explain in part why the average graph centrality values of translated group' maps ranged from 0.46 to 0.57, and their performance on comprehension posttest was much higher compared to direct group (82 vs. 64).

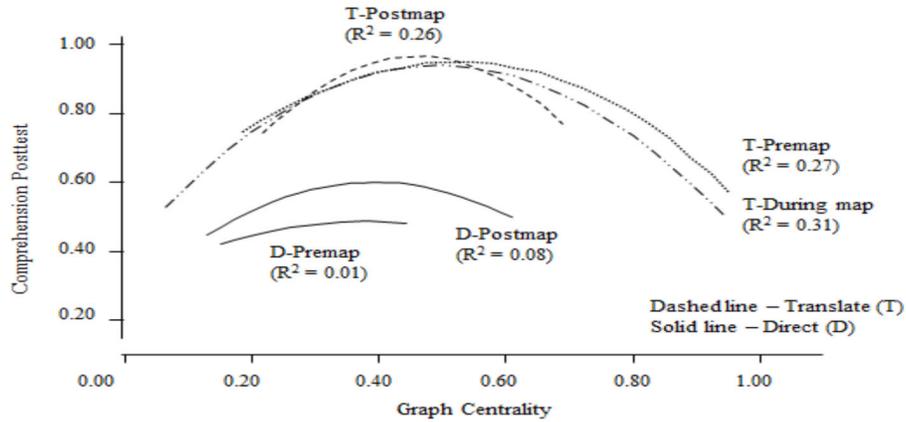


Figure 2. The relationship between graph centrality and performance on the posttest (comprehension score).

Node centrality

Proxscal multidimensional scaling (SPSS 20.0) was used to analyze the node centrality vectors including all of the participants’ maps and expert referent map.

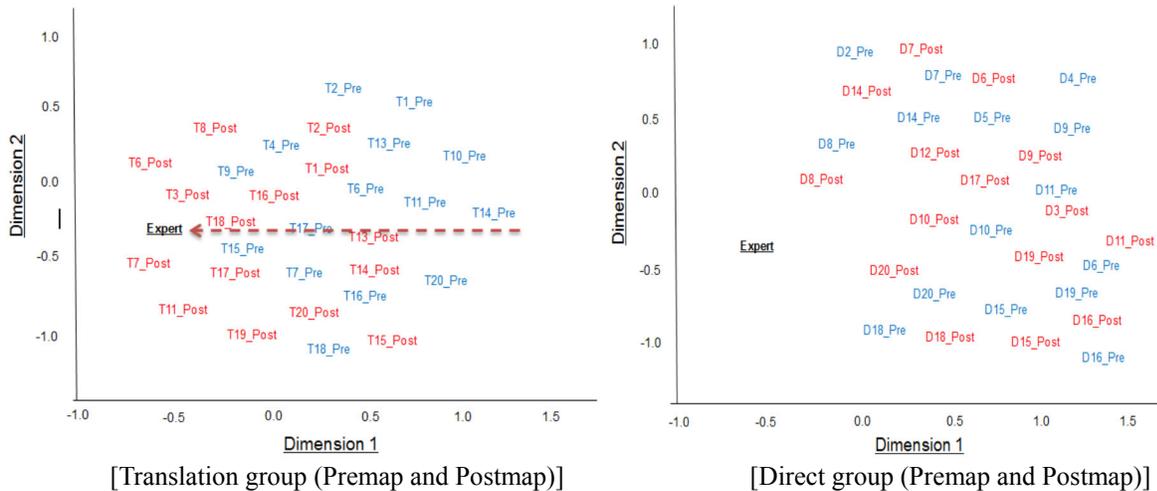


Figure 3. The proxscal 2-dimensional representation of the map node centrality data. T indicates the translation group’s maps while D indicates the direct group’s maps, Pre in blue indicates their Premap and Post in red their Postmap, and the number indicate the individual participant ID.

In this representation, the Expert map fell toward the left of the figure in both. The dimensional representations suggest the flow of map node centrality from Premap to Postmap, since more Premaps are towards the right and more Postmaps towards the left, we infer from the diagrams that the Translation group’s maps moved from the right (Premap) to the left (Postmap) of the multidimensional scaling (MDS) representation converging on the Expert map. The Direct group Premaps and Postmaps were fairly evenly distributed across the MDS figure with no clear pre-to-post shift, and if any shift is present, it is a bit more toward the right, away from the Expert map.

Here, convergence means that maps are more alike, and is measured as average percent overlap (Clariana et al., 2013) of all maps in two conditions. To represent the percent overlap as a measure of convergence, the map data in the node degree table were correlated to each other within condition and then *r* values were squared into coefficients of determination (*r*²). The Translation group average overlap percent was *M* = .66, *SD* = .08 and the average percent overlap of the Direct group was *M* = .32, *SD* = .05, effect size of *d* = 1.25 (*t*-test *p* = .01). The Translation group members’ maps converged more (66%) relative to the Direct group (32%). This finding shows that the Translation group Postmaps were much more homogenous while the Direct group Postmaps were more idiosyncratic. This convergence is also clearly represented in the MDS results (convergence represented as nearness in the MDS space).

Discussion

This investigation analyzed the distances between concepts in a concept map as a measure of KS. We proposed centrality as a new measure of KS to clearly describe cognitive state changes during L1 use in L2 writing. First, the graph centrality values showed that the use of L1 during L2 writing appears to help these low proficient bilingual learners who appear to have *linear* KS for this term set in L2 but have a *relational* structure for the same concepts in L2, and the relational structure had a positive influence on their academic performance in L2 (in this case comprehension multiple choice posttest). This result aligns with the finding of previous research in *Second Language Writing*, which suggested that translating may bring some benefits in terms of KS like organization and complexity to L2 writing, especially for students at a lower proficiency level.

Second, node centrality values as MDS were interesting and significant in order to account for and distinguish between the Translation group and Direct group' KS. This node degree MDS analysis demonstrated that the Postmaps of the Translation group from pre-to-post 'moved' towards the Expert map, while those of the Direct group were scattered and away from the Expert map (see Figure 3). We infer that having a KS more like the Expert leads to better comprehension.

To sum up, our view is that the L1 structure is almost always richer, more complex, and much better compared to L2. As shown by this investigation, the L1's lexical complexity strongly influences the KS established in L2 and L2 text comprehension. Of course, this finding does not mean that we can conclude that L1 use during writing in L2 is directly related to the good L2 writing performance because L2 text quality may be positively or negatively affected by a number of variables as reported at the literature in this paper.

Significance of the study

This present paper describes a new measure of bilinguals' KS residue in both L1 and L2 established during mapping and writing in L1 and L2, namely centrality. In this investigation, its appropriateness and validity were clearly demonstrated as a useful measure of KS contained in the bilinguals map artifacts that allow researchers to better describe and distinguish the mental representation of L1-L2 lexical relationships. Centrality is an easy to automate and easy to understand measure with software or even manually. Therefore, measures and applications of KS using centrality can be applied in online and other learning settings as an assessment tool that could be applied to concept maps and other graphical approach for eliciting, representing, and comparing KS.

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Adolescents' Internet Use and Usage in a Family Context: Implications for Family Learning

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This study investigated the potential impact of the internet on the quality of family relationships using a family boundaries approach. A total of 825 Grade 8 students from 36 secondary schools in Hong Kong were selected through stratified random sampling, with levels of academic ability as the strata. Results from the structural equation model showed that family cohesion was significantly negatively related to internet use but significantly positively related to learning and information search usage. These findings provide evidence of how adolescents' internet use and usage affect family relationships and advance our understanding of how technology can be used to support family learning.

Introduction

The emergence of the internet and related technologies in the home environment has fundamentally transformed family communication and interactions over the past two decades. Blinn-Pike (2009) examined the changing impact of computer technology on the family since the 1980s and concluded: "technology has proved to have positive and negative influences of the family" (p. 573). Little, Sillence, Sellen, and Taylor (2009) considered it timely "to gain a better understanding of how and why people are using and adapting communication technologies to suit their family lives and what effect technology can have on the interleaving of home, work and leisure" (p. 125). In a more recent online article, Taylor (2013) raised a thought-provoking question: Is technology creating a family divide? The author argued that various factors such as divergence in digital competence between children and parents and the independence afforded by technology have put family relationships in jeopardy.

Family scientists and therapists have acknowledged the importance of maintaining family functioning through balancing certain aspects of behaviours. For instance, Olson (2000) developed the Circumplex Model of Marital and Family Systems to evaluate families along three major dimensions: cohesion, flexibility and communication. According to the model, balanced and well-functioned families should fall within the mid-range of cohesion and flexibility. Some studies have attempted to use the model to examine the influence of media on family well-being. Bryant, Bryant, Aust, and Venguopalan (2001) found some evidence that America's prime-time television families of the 1990s were quite psychologically healthy as indicated by the scores reported by the families in the three dimensions.

Families with adolescents are the common focus of most research since the majority of adolescents are heavy users of technology (Subrahmanyam & Greenfield, 2008). Increasingly, various forms of technology are being integrated into the daily practices of adolescents and have become an indispensable part of their lives. It is therefore important to consider their digital worlds "as another social context for adolescent development along the lines of other familiar contexts such as families, peers, and schools" (Subrahmanyam & Šmahel, 2011, p. 32). The research question of the present study is: Does the internet help to isolate or integrate individuals in families?

A Family Boundaries Approach

The effects of media on individuals have been studied from the perspective of theories such as social cognitive theory and cultivation theory. This study adopted family systems theory to understand early adolescents' internet use and usage in a family context (Mesch, 2006). The theory views the family as a basic unit of analysis with a number of interrelated individual components that influence each other. This conceptualisation of family enables researchers to examine family interactions and family processes that include "family boundaries, rules, decision making, independence, control, roles and communication among the components" (Goodman, 1983, p. 409).

Family boundaries are an important feature in the theory. Rosenblatt (1994) defined family boundaries as "interfaces between what they bound and what surrounds what they bound. Rather than being simple barriers, they are gates, sieves, and windows that open and close" (p. 86). In connected families, the boundaries between individual members and others are relatively open, whereas in separated families, family members maintain strong, rigid and close boundaries among themselves. One of the indicators of family boundaries is family cohesion, which refers to the pattern of separateness and togetherness of family members (Olson, 2000). The arrival of the internet in the home presents a challenge to family boundaries, and it is thus the intent of this study to explore the potential effects of the

internet on the quality of family relationships using a family boundaries approach. The study extends previous work in this area (e.g. Mesch, 2006) by considering how parents influence adolescents' internet use and usage through their parenting styles.

The Influence of Parenting Style on Internet Use and Usage

Despite the fact that parenting style has been conceptualised in various ways in the literature, more recent research has tended to use parental warmth and control to represent parenting style in the context of ICT use. Lwin, Stanaland, and Miyazaki (2008) showed that there was a negative association between parental control and home internet usage. Lee and Chae (2007) maintained that parental warmth was positively related to the use of the internet for educational purposes. Our previous study (Lau & Yuen, Under review) found that learning-related and leisure-related internet usages were positively associated with parental warmth and control respectively.

The Influence of Internet Use and Usage on Family Relationships

The relationship of teenagers' internet use and usage to family cohesion remains elusive in view of some mixed findings reported in earlier studies. Some research shows support for the view that the internet promotes social interactions between members inside and outside the household. Wellman, Haase, Witte, and Hampton (2001) asserted that online interactions afforded by the internet heighten offline relationships as it fills the communication gaps between face-to-face meetings. Yoon (2006) contended that the internet allows individuals to extend family connections beyond their own nuclear family through regular contact between family members. Based on the Pew Internet and American Life Project entitled "Networked Families", Kennedy, Smith, Wells, and Wellman (2008) reported that most adults found technology made their family life closer today than in the past.

Other studies have indicated a more complex relationship between the two concepts. Mesch (2003) found that the presence of the internet within the home did not affect closeness between adolescents and parents in families, although family cohesion was significantly lowered when adolescents spent a long time on the internet (Mesch, 2006). Padilla-Walker, Coyne, and Fraser (2012) showed that family media use involving adolescents and their parents using cell phones and emails, watching TV and movies together, and playing video games together was positively associated with family connection. However, increased use of the internet for social networking purposes was negatively related to family connection. These findings suggest that the influence of media on family relationships is contingent upon the context and type of media used and also on whether the media are used jointly or individually.

Method

Sample and Procedure

The target population comprised Secondary 2 (Grade 8) students in the 2011/2012 academic year from schools that implement the local curriculum in Hong Kong. The sampling frame consisted of the school identity number, school size for the target grade, and the students' overall academic ability level (high, middle and low). Thirty-six secondary schools were sampled using stratified random sampling with levels of academic ability as the strata. This method ensured that students of different academic abilities were well-represented. For each sample school, two replacement schools were prepared so that if any sample school chose not to participate in the study, a matching school was available for substitution. One intact Secondary 2 class was invited to participate in the study from each sample school. A briefing session was organised for each class of students to explain the whole procedure of data collection. Students responded to a self-report online survey in about 60 minutes. This study focused on family related items in the survey. The final sample size was 825 after data verification. The mean age of the students was 13.16 (SD = .77), 48% of the students were males and 52% were females.

Measures

Family cohesion. Students were asked to respond to four items on a 5-point Likert-type scale (1: strongly disagree to 5: strongly agree) adapted from the cohesion subscale of the Family Environment Scale (FES) developed by Moos and Moos (1986). The four items were: "Family members always do their best to help and support each other", "There is an atmosphere of harmony and unity in our family", "My family members always devoutly support each other" and "Family members hitherto get along well with each other". Alpha reliability of this measure was .94.

Internet use and usage. A single item was used to measure internet use: "In the last 2 weeks, how much time on average have you spent daily on using computers / the internet at home?" Six options were provided for this item (1: less than 1 hour, 2: 1 to 2 hours, 3: 3 to 4 hours, 4: 5 to 6 hours, 5: 7 to 8 hours, 6: more than 8 hours). Internet usage

at home was assessed along two dimensions: learning-related and leisure-related. Uses and gratifications theory was utilised to understand the motives for internet usage (Katz, Blumer, & Gurevitch, 1974). According to this theory, individuals choose particular media to fulfil their different needs. Using a 5-point Likert scale (1: never to 5: always), eleven items were adopted and modified from the previous studies of Slate, Manuel, and Brinson (2002) and Kalmus, Realo, and Siibak (2011). Exploratory factor analysis (EFA) with principal component method was performed on the items followed by varimax rotation. Results revealed two factors with eigenvalues greater than one. The first factor called learning and information search had 6 items, while the second factor called social media and entertainment had 5 items. Further details of the EFA are given in Table 1.

Table 1. Results of EFA on internet usage at home.

Internet usage at home	Factor loading	Eigen value	Cumulative variance explained	Cronbach's alpha
Learning and information search		3.00	49.62%	.78
Discuss with classmates about matters concerning learning	.71			
Do assignment / report on designated topic	.78			
Watch news	.67			
Read e-books	.49			
Search for learning materials	.82			
Search for daily life information (transportation route, weather forecast etc)	.62			
Social media and entertainment		2.47		.71
Download songs / movies / photos / pictures	.69			
Play online games	.60			
Chat with net friends (via chatroom / MSN / Skype / QQ)	.80			
Browse entertainment news	.56			
Browse social networking sites (e.g. Facebook / Weibo)	.71			

Parenting style. A number of parenting style scales have been researched and used in the literature. However, many of these scales were not designed for specific contexts and cultures. Since the purpose of this study was to examine the influence of parenting style on internet use and usage, the study employed an internet parenting style scale that was developed and validated with parents in Hong Kong. A previous study with the scale demonstrated its desirable psychometric properties among early Chinese adolescents (Lau & Yuen, 2013). The scale contains four subscales (encouragement, worry, monitoring, and permission) with 14 items rated on a 5-point Likert scale (1: strongly disagree to 5: strongly agree). EFA with principal component method followed by varimax rotation on the items indicated the four proposed factors (see Table 2 for more results of the analysis).

Table 2. Results of EFA on parenting style scale.

Parenting style	Factor loading	Eigen value	Cumulative variance explained	Cronbach's alpha
Encouragement		2.68	67.74%	.78
My parents encourage me to use computers frequently	.68			
My parents think that being good at computers is useful for my future	.67			
My parents always talk to me about the benefits of computers / the internet	.76			
My parents share their experience of using computers / the internet with me	.78			
My parents always help me in using computers / the internet	.67			
Worry		2.68		.81
My parents worry (if) using computers too often will cause health issues	.79			
My parents worry (if) using computers too often will decrease the time of communication with them	.77			
My parents worry about my thinking ability if I depend too much on the internet	.82			
My parents worry about online risks that have a negative impact on me (e.g. online violence, pornography information)	.70			
Monitoring		1.70		.80
My parents always ask me what I do with computers	.85			
My parents always ask me who I chat with on the internet	.86			
Permission		2.43		.81
My parents allow me to chat with net friends	.81			
My parents allow me to download songs / movies	.86			
My parents allow me to play online games	.84			

Data Analysis

Structural equation modelling (SEM) was used to examine the relationships between the variables as shown in Figure 1. Item parcels were created by averaging the items in corresponding factors (Little, Cunningham, Shahar, & Widaman, 2002). This practice was recommended as EFA of the items was performed to identify their factor structure (Yuan, Bentler, & Kano, 1997). Nasser and Wisenbaker (2003) provided several reasons for using item parcels instead of single items to represent latent constructs. First, the distribution of item parcels is more likely to be normal compared with single items, and there is thus a higher chance that they meet the normality assumption of the commonly used maximum likelihood estimation methods. Second, the use of item parcels reduces the complexity of measurement models, resulting in a more precise estimation of parameters. Finally, since item parcels allow fewer numbers of indicators to be used in modelling, it is possible for researchers to focus on more realistic models that better describe increasingly complex human behaviour.

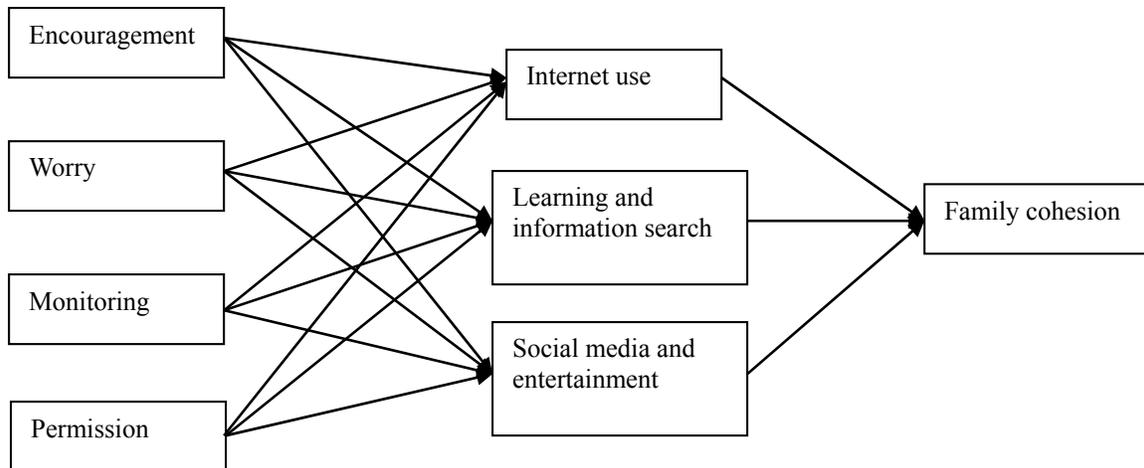


Figure 1. SEM of the variables

Results

Means and standard deviations of the variables of interest are presented in Table 3. On average, students reported quite a high level of family cohesion. At the time of the survey, they had spent, on average, 3 to 4 hours daily on computers / the internet at home in the previous two weeks. They used the internet more for the purposes of social media and entertainment than for learning and information search. In terms of parenting style, permission was the dominant style, which was followed by monitoring, worry, and encouragement.

Table 3 also shows the correlation matrix of all the variables concerned in this study. Family cohesion was significantly negatively related to internet use but significantly positively related to the two types of internet usage and all the parenting styles with the exception of monitoring. Internet use was significantly positively related to social media and entertainment usage, worry style and permission style. Learning and information search usage was significantly positively related to social media and entertainment usage, and all the parenting styles. On the other hand, social media and entertainment usage was only significantly positively related to monitoring style and permission style. Most of the four parenting styles were significantly positively correlated.

Table 3. Correlations between variables.

	Mean	SD	1	2	3	4	5	6	7	8
1. Family cohesion	3.59	.88	-							
2. Internet use	3.14	1.42	-.13**	-						
3. Learning and information search	2.86	.78	.30**	-.01	-					
4. Social media and entertainment	3.44	.86	.07*	.28**	.28**	-				
5. Encouragement	2.72	.78	.26**	.04	.25**	.05	-			
6. Worry	3.01	.87	.12**	.07*	.16**	.06	.30**	-		
7. Monitoring	3.02	1.10	.02	.05	.20**	.15**	.24**	.47**	-	
8. Permission	3.77	.90	.17**	.13**	.11**	.43**	.19**	.04	.05	-

* $p < .05$. ** $p < .01$.

The assumptions of normality and absence of outliers were examined. Univariate and multivariate normality of the data were confirmed (Kline, 2005; Raykov & Marcoulides, 2008). Based on the criterion of the Mahalanobis distances of all cases, 68 cases were identified as multivariate outliers and were removed from the dataset. The final sample size was 757. The method of maximum likelihood estimation with the option to estimate means and intercepts was used to handle missing data. The fit indexes ($\chi^2/df = 2.14$, CFI = .99, TLI = .96, and RMSEA = .04) showed that the model fitted the data very well (Hu & Bentler, 1999). As shown in Table 4, permission style was significantly positively related to internet use; encouragement style was significantly positively related to learning and information search usage; parental control was significantly positively related to both types of internet usage; and family cohesion was significantly negatively related to internet use but significantly positively related to learning and information search usage.

Table 4. Results of the SEM.

Dependent variable	Independent variable	Estimate	SE	Standardized estimate
Internet use	Encouragement	.04	.07	.02
	Worry	.11	.07	.06
	Monitoring	-.01	.05	-.01
	Permission	.25	.06	.16***
<i>R</i> ²				.03
Learning and information search	Encouragement	.21	.04	.21***
	Worry	.03	.04	.04
	Monitoring	.11	.03	.15***
	Permission	.07	.03	.08*
<i>R</i> ²				.10
Social media and entertainment	Encouragement	-.07	.04	-.06
	Worry	-.01	.04	-.01
	Monitoring	.13	.03	.17***
	Permission	.45	.03	.46***
<i>R</i> ²				.23
Family cohesion	Internet use	-.09	.02	-.16***
	Learning and information search	.26	.04	.24***
	Social media and entertainment	.01	.04	.01
<i>R</i> ²				.09

* $p < .05$. *** $p < .001$.

Discussion and Conclusion

This study contributes to the literature on the process of family adaptation to internet technologies, which is a relatively under-researched area in family studies. An important finding of this study is that although internet use can have a negative effect on family cohesion, use of the internet for learning and information search purposes can positively affect family cohesion. This suggests that parents may need to employ strategies to encourage their teenage children to engage in such online activities. Another important finding is that there exist different pathways through which parenting style can influence adolescents' internet use and usage. For example, parental encouragement of adolescents' use of the internet results in more learning and information search usage and subsequently leads to higher family cohesion. This is an extension of previous work in this area (e.g. Mesch, 2006).

This study provides evidence of how adolescents' internet use and usage affect family relationships and advances our understanding of how technology can be used to support family learning (Hart, Bober, & Pine, 2008). In particular, given that the internet has become a commonplace feature in the lives of many families today, it is increasingly necessary to explore further how parents should participate in learning with their children using technology in the context of their families.

As technology becomes less exotic and a more mundane feature of the home environment, there have been growing concerns over its potential influence on family interactions and relationships. For example, Lee (2009) found empirical support for the displacement hypothesis in that time adolescents spent on online communication displaced time interacting with parents but did not displace time interacting with friends. The technologisation of childhood

(Plowman, McPake, & Stephen, 2010) is a process that demands sustained effort from parents to mitigate its negative impact and promote optimal child development. Further empirical investigation in this area is definitely needed to inform policymakers, researchers, and parents alike.

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Leveraging Technology: Facilitating Preservice Teachers TPACK through Video Self Analysis

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Abstract

This paper reports on the initial findings from an ongoing study exploring the impact of video self-analysis on preservice teachers Technological Pedagogical Content Knowledge (TPACK). Preservice teachers were instructed to individually analyze their videotaped microteaching simulations. Through this analysis, preservice teachers were able to identify their knowledge gaps, and self-prescribe specific instructional strategies to enhance their Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK). The initial findings suggest video self-analysis may be a viable option in developing preservice teachers TPACK.

Context

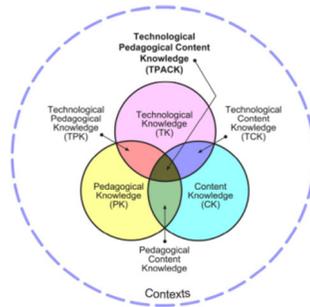
A nationwide survey conducted by the Bill and Melinda Gates Foundation found that 81% of K-12 educators in the U.S. believe technology integration in their classroom is vital to student achievement and academic engagement (Bill & Melinda Gates Foundation, 2010). An overwhelming majority of K-12 educators believe teaching with technology is vital because numerous studies have shown that effectively integrating technology into classroom instruction can help teachers enhance their students learning (Beetham & Sharpe, 2013; Gulek & Demirtas, 2005; Wenglinsky, 1998), students' academic achievement (Cheung, 2013; Lei, 2010; Schacter, 1999), and students engagement (Abrami, 2001; Wankel & Blessinger, 2013).

As technology becomes more ubiquitous in our society, a teacher's ability to meaningfully integrate educational technologies into instruction will be an increasingly vital component in becoming an exemplar teacher (Pierson, 2001). In order to best prepare the next generation of teachers to effectively integrate technology into their instruction, teacher preparation programs must do a better job preparing preservice teachers to leverage all available classroom technologies, in order to meet the needs of 21st century learners (Ertmer & Ottenbreit-Leftwich, 2010; U.S. Department of Education, 2010).

Effectively teaching with technology is a complex process, and there is a prodigious need to research and design new instructional strategies that will help teachers steepen their learning curve (Koehler & Mishra, 2009; West & Graham, 2007). This study will use the Technological Pedagogical Content Knowledge (TPACK) model as a theoretical framework to examine how video self-analysis impacts preservice teachers TPACK development.

What is Technological Pedagogical Content Knowledge (TPACK)?

Building upon Shulman's (1986) seminal Pedagogical Content Knowledge (PCK) model, Pierson (2001) and Mishra and Koehler (2006) developed a new technology integration model called: Technological Pedagogical Content Knowledge, also known as TPACK. They believed Shulman's (1986) PCK model was incomplete and hypothesized a third knowledge domain (i.e., Technology Knowledge-TK) was needed in order for teachers to successfully teach in the 21st century (Mishra & Koehler, 2006; Pierson, 2001). This amalgamation of TK and PCK became what we know today as TPACK [See Figure. 1] (Koehler & Mishra, 2009).



[Figure. 1] Koehler & Mishra (2009) TPACK model

Recognizing the complexity of developing teachers TPACK, Mishra and Koehler (2006) stated that researchers must be flexible and open to test and develop various instructional approaches and to be mindful that “there is no single technological solution that applies for every teacher, every course, or for every view of teaching” (p. 1029).

A Potential Instructional Strategy

A promising strategy that may help preservice teachers effectively integrate technology into their instruction is the use of video self-analysis. Video self-analysis has been seen as an effective tool in developing preservice teachers’ instructional practices, because it forces preservice teachers to see their teaching in an “objective light” (Sewall, 2007, p. 14), “provides actual records rather than uncertain recollections” (Kong, Shroff, & Hung, 2009, p. 546), enables teachers to examine their instruction and develop strategies to improve future instruction (Sherin & van Es, 2005; Snoeyink, 2010), and helps teachers become reflective practitioners (Pellegrino & Gerber, 2012).

Why Video Self Analysis?

Video analysis is seen as a powerful tool for educational research, because videos are able to capture “rich recordings of social processes” and provide researchers with a “new source of data” (Knoblauch, Schnettler, Raab, & Soeffner, 2006, p. 9). Since the 1960’s, video analysis has been used as a teaching tool in teacher preparation programs to help preservice teachers reflect and improve their pedagogy (Moore, 1988; Fuller & Manning, 1973). In addition to being used to help enhance teachers pedagogy (e.g., Chase Martin & Sadera, 2011), video analysis is also pervasively used in business (e.g., Hershey, Jung, Mummareddy, & Sharma, 2011), athletics (e.g., Knudson, 2013), and medicine (e.g., Guerlain, Turrentine, Adams, & Calland, 2004). The use of video analysis has gained popularity in diverse sectors because analyzing videos has been shown to help teachers, doctors, athletes, and businesses improve their practices by prompting key stakeholders to critically “observe, assess, and confront their own actions” through self-analysis (Rich & Hannafin, 2008, p.66), and develop strategies to improve practices (Sherin & van Es, 2005; Snoeyink, 2010).

Potential of Video Self Analysis in Developing Teachers TPACK

In order to prepare teachers to effectively use and integrate technology into their instruction, Bell (2001) suggests that “teachers must first internalize the value of learning with a new strategy before they will begin to use the strategy” (p. 525-526). To help teachers internalize the value of integrating technology into their classroom instruction, researchers believe teacher preparation programs should provide opportunities for preservice teachers to practice teaching with technology so that they can *see* and *experience* the value of using technology in their classroom (Bauer & Kenton, 2005; Kent & McNergney, 1999; Willis, 2006). To help facilitate preservice teachers to *see* and *experience* the value of integrating technology into their instruction; the use of video self-analysis may be a viable solution in helping preservice teachers develop their TPACK.

Recent studies investigating the efficacy of the use of video analysis as a teaching development tool has revealed that both preservice and in-service teachers improved their teaching practices when video analysis was used in their teacher training (Beck, King, & Marshall, 2002; Goldman, Barron, & Derry, 2014; Sherin & Van Es, 2005; Wang & Hartley, 2003). Studies have found that videotaping preservice teachers and having them analyze and reflect on their individual teaching samples, encourages meaningful reflections on their teaching practices (e.g., Wang and Hartley, 2003). By providing preservice teachers with opportunities to analyze their videotaped

microteaching simulation, preservice teachers are able to “build a stronger depth of knowledge and understanding about their own teaching” (Chase Martin & Sadera, 2011, p. 4300); and develop strategies to integrate technology into their future instruction (Chase Martin & Sadera, 2011, Pierson, 2008).

Rationale for Study

Over the past decade, scholars, researchers, and practitioners have shown considerable interest in designing and developing instructional strategies that can help teachers develop their TPACK (e.g., Hofer & Grandgenett, 2012; Koehler & Mishra, 2005a, 2005b). However, a review of the literature reveals that an overwhelming majority of these studies only employed different variations of design teams, design projects, or faculty modeling to study the impact of the instructional intervention in relation to teachers TPACK development (Koh & Divaharan, 2011). Due to the complex nature of developing teachers TPACK, there is a need to extend from our current practices and research alternative instructional designs (Koh & Divaharan, 2011; West & Graham, 2007).

Although there have been prior studies looking into efficacy or impact of the use of video analysis in teacher preparation (e.g., Goldman et al., 2014; Kpanja, 2001; Rich & Hannafin, 2008), only two studies (i.e., Chase Martin & Sadera, 2011; Pierson, 2008) have explored the use of video analysis for TPACK development.

Author(s)	Description of Study & Findings
Chase Martin & Sadera (2011)	<ul style="list-style-type: none"> • Qualitative case study • 15 graduate students • 12 inservice teachers; 3 higher education instructors • All students were videotaped one time teaching for 15 minutes • Students were divided up into separate small groups • Each group selected one group members videotaped lesson to collaboratively create feedback using TPACK framework as a lens • Students highlighted the selected videotaped lessons strengths and weaknesses • Peer analysis • Data: edited videos & reflections • Enhanced students TPACK
Pierson (2008)	<ul style="list-style-type: none"> • Qualitative case study • 11 preservice teachers • All students were videotaped one time teaching for five minutes • Students were asked to edit and analyze their teaching videos collaboratively with their peers • No guiding TPACK framework was described in the study • Peer analysis • Data: videos & reflections • Enhanced students TPACK

In both studies, Pierson (2008) and Chase Martin & Sadera (2011) noted that the use of video analysis helped teachers develop their TPACK. Their studies discovered video analysis helped enhance preservice and inservice teachers TPACK by encouraging them to critically analyze and reflect on their own pedagogy, content, and technology (Chase Martin & Sadera, 2011; Pierson, 2008). Although these studies used video analysis, both studies followed prior TPACK development strategies by instructed their preservice teachers to work collaboratively in small work groups or design teams (e.g., Lu, Johnson, Tolley, Gilliard-Cook, & Lei, 2011). While Pierson (2008) and Chase Martin & Sadera (2011) found video analysis enhanced teachers TPACK, their studies did not provide insight into *how* video analysis specifically helped teachers develop their TPACK.

Developing preservice teachers Technological Pedagogical Content Knowledge (TPACK) is a complex endeavor (Koehler & Mishra, 2008). Additional research is needed to understand how specific instructional strategies (e.g., video self-analysis) impacts preservice teachers TPACK development (Thomas, Herring, Redmond, & Smaldino, 2013). This study aims to describe *how* the use of video self-analysis during a technology integration course impacts preservice teachers TPACK development.

This study will address the following question: How does video self-analysis impact preservice teachers’ TPACK development?

Methodology

Research Setting

This pilot study was implemented in a mandatory technology integration course at a large private university, located in the northeastern United States, in spring 2013. As the third and final course in a series of three technology integration courses, this course was designed specifically for preservice teachers who have had prior experiences student teaching and are entering their final academic year in the teacher preparation program. This course covered educational technologies such as virtual labs, mobile learning applications, learning management systems, open source online tools, and iMovie's video editing software. The course took place in a technology lab that has been outfitted with a smartboard, a projector, and 16 brand new Mac desktop computers.

Research Design

In order to understand video self-analysis impact on preservice teachers TPACK development; this study utilized a single case study design. Single case study designs are used in research "to determine whether the propositions are correct or whether some alternative set of explanations might be more relevant" (Yin, 2014, p.51). Case studies are also effective in "catching the complexity of a single case" (Stake, 1995, p. xi) by providing insight into a central phenomenon (Creswell, 2002; Yin, 2014). Unlike quantitative research methodologies, researching through a qualitative lens enables the researcher to better understand and explain participants meaning (Morrow & Smith, 2000).

Twelve preservice teachers enrolled in the technology integration course were asked to analyze two iterations of their videotaped micro teaching simulations of themselves teaching with technology. This technology course consisted of six class sessions that were distributed throughout the spring 2013 academic semester. Each session lasted for two hours and fifteen minutes. During sessions one, three, and four; preservice teachers are given autonomy to explore the four technology stations prescribed by the course instructor. Each station contained an educational technology that could be used to enhance teachers' content or instruction. During these sessions, the preservice teachers rotate through each station where they were directed to experience, practice, and explore the new educational technologies. At the end of sessions one, three and four; the preservice teachers were then directed to reflect on their experiences exploring the prescribed educational technologies. Each session's reflection was specifically designed to promote deep robust reflections (e.g., how would you specifically integrate technology "X" into your future classroom instruction; How would "X" technology enhance your content or students learning) from the preservice teachers. Before each videotaped micro teaching simulation, preservice teachers were asked to develop a technology enhanced 50 minute lesson plan. In designing and developing their lesson plans, the preservice teachers were specifically asked to think about selecting and integrating technologies into their lesson that would help enhance their instruction and students learning.

During sessions two and five, the preservice teachers were instructed to teach a technology enhanced micro lesson. Based on the preservice teachers technology enhanced lesson plan they individually developed as part of their homework assignment in sessions one and four, each preservice teacher was instructed to teach a five minute lesson based on their 50 minute lesson plan. The preservice teacher's five minute micro teaching simulations were digitally recorded by the course instructor using a flip camera. After every preservice teacher completed their micro teaching simulation, they were instructed to reflect on their micro teaching simulation in class. The *in class* reflection were specifically designed to have preservice teachers describe what they thought they did well, and identify areas they could improve their technology enhanced lesson based on the TPACK framework.

After the preservice teachers had completed their in class reflection, they were instructed to complete a video self-analysis assignment for their homework. For their video self-analysis homework assignment, the preservice teachers were instructed to log in and access the course Blackboard site, and analyze and reflect on their individual videotaped micro teaching simulation which was uploaded onto Blackboard. The preservice teachers were then instructed to watch and analyze their videotaped teaching simulation and reflect on their experiences teaching with technology. While watching their videotaped teaching simulations, the preservice teachers were prompted to use Hofer, Grandgenett, Harris, & Swan (2011) validated TPACK observation rubric to self-assess their TPACK. After self-analyzing their microteaching simulation, the preservice teachers were instructed to reflect on their lesson and think of strategies to improve their lesson based on their lessons learned from analyzing their videotaped micro teaching simulation.

Participants

Twelve (12) preservice teachers, who enrolled in a mandatory one credit technology integration course in spring of 2013, participated in this pilot study. Eleven participants were female (92%), and one participant was male (8%). All participants (100%) were in their final semester of their teacher preparation program, and have successfully completed their required field practicums.

Data Collection

For this study, data sources include course documents (e.g., preservice teacher reflections), videotaped micro teaching simulations, and observation field notes. Each participant in this study wrote seven reflections. The preservice teachers were then instructed to upload all assignments (e.g., reflections) electronically onto the course Blackboard site. All course document data was then directly downloaded from the course Blackboard site by the researcher. In all, 84 reflections were collected for this study.

The participant in this study completed two micro teaching simulations. Each micro teaching simulation was digitally recorded using a flip camera, and each micro teaching simulation lasted for five minutes. The 24 videotaped micro teaching simulations were then uploaded onto the course Blackboard by the course instructor. The researcher then accessed the videotaped micro teaching simulation data through Blackboard. In all, 120 minutes of preservice teachers' micro teaching samples were collected for this study.

Data Analysis

The researcher examined the impact of using video self-analysis in developing preservice teachers TPACK by investigating whether preservice teachers Technological Knowledge (TK), Pedagogical Knowledge (PK), and/or Content Knowledge (CK) advanced. To strengthen the reliability of this study, data was triangulated across the different data sources and analyzed for emerging patterns and trends using constant comparative analysis (Boeije, 2002; Glaser, 1964). Constant comparative analysis was used by the researcher to identify themes from the course documents, field notes, and videotaped micro teaching simulations. The researcher used a word processor program to color code and highlight the unique themes. After the themes were identified, individual memos were crafted for each unique theme. The memos were vital in helping the researcher elaborate the identified concepts and themes. Each memo included specific definitions, characteristics, and specific conditions under which the theme works. Propositions, illustrations, and negative cases were also developed for each theme.

Through this analysis, the researcher explored *how* video self-analysis impacts preservice teacher TPACK through three different knowledge domains: TK, PK, and CK. Based on the TPACK framework, this study will describe how video self-analysis impacted preservice teachers TPACK development. The following section presents the results of the study.

Results & Discussions

This section describes how video self-analysis impacted preservice teachers' TPACK. Using TPACK as a theoretical framework, the following section will discuss and describe how video self-analysis impacted preservice teachers TPACK through three knowledge domains: Technological Knowledge (TK), Pedagogical Knowledge (PK), and Content Knowledge (CK).

Impact on TK

All twelve (12) preservice teachers in this study indicated that the two iterations of video self-analysis helped them improve their Technological Knowledge (TK). This study found that the use of video self-analysis enabled preservice teachers to develop their TK by prompting them to observe and critically reflect on their TK during their self-analysis. Through this observation and reflection period, the preservice teachers confronted their own TK strengths and limitations; and began developing strategies to enhance their TK. The findings from this study corroborate with earlier studies on the value added of using video self-analysis to assess and enhance future instruction (e.g., Fadde, Aud, & Gilbert, 2009; Snoeyink, 2010).

By instructing preservice teachers to analyze and reflect on their micro teaching simulations, they were able to observe and identify their TK strengths and limitations. Through this reflective process, the preservice teachers in this study developed strategies to improve their TK and acquired a deeper understanding of how technology can be

leveraged to enhance classroom instruction. As one preservice teacher said: *“After watching myself teach, I have learned that I can integrate technology to enhance instruction to make it more exciting, engaging, and relevant to students. I have also learned that technology can be used to simulate events that may not be possible based on limitations within the classroom. For example, we used the FOSS [online virtual lab] to simulate tomato growth to show what factors (water, sunlight, soil) would affect the growth of tomatoes. This would be especially helpful in a school where it may not be possible to conduct in school if the school cannot afford the supplies”*.

Through video self-analysis, preservice teachers in this study recognized and described specific instances where the use of technology enhanced their teaching and their students learning. Video self-analysis also helped preservice teachers highlight instances in their micro teaching simulation where they needed to enhance or further develop their TK. Through self-analysis, preservice teachers were able to self-prescribe specific instructional strategies to enhance their future lessons by integrating technology into their instruction. When preservice teachers were asked to describe how video self-analysis helped them enhance their TK, one preservice teacher responded: *“I definitely improved integrating technology into my lesson [i.e., second iteration of videotaped micro teaching simulation]...because the technology I used this time allowed for students to be more interactive with the technology...this allowed the students to have the freedom to create their own story [e.g., using an online storyboard creator]”*. Through video self-analysis, preservice teachers became more mindful of how to effectively integrate technology into their classroom instruction. Preservice teachers in this study also became more aware of purposefully integrating technology into instruction, instead of arbitrary technology use.

Impact on PK and the Amalgamation of TK

All twelve (12) preservice teachers in this study indicated that the two iterations of video self-analysis helped them improve their Pedagogical Knowledge (PK). This study found preservice teachers were able to enhance their Pedagogical Knowledge (PK) through observations and prescribed reflection prompts. An analysis of the data shows preservice teachers improve their classroom management, student assessment, lesson planning, and future instruction by critically observing, analyzing, and reflecting on their videotaped micro teaching simulation. One preservice teacher described how video self-analysis impacted her PK by stating: *“I improved my students’ ability to use the Story Bird [i.e., online story board tool] more in my second lesson because of my improved explanation of how to use the program. For my second lesson, I modeled on the board how to get students to the website and modeled how they would start their story and how to add new pages and pictures to their story”*.

Through video self-analysis, preservice teachers were able to identify their individual PK strengths and limitations. This self-reflective process promoted preservice teachers to develop an individualized plan of action to enhance their PK in future instruction. Using constant comparative analysis on the preservice teachers videotaped microteaching simulations; this study found preservice teachers applied their lessons learned from their first video self-analysis to enhance their pedagogy in their second microteaching simulation. A preservice teacher describing how video self-analysis impacted their PK & TK stated: *“I feel like I did improve with integrating technology into my second lesson. This is because instead of having students watch a BrainPOP [i.e., online educational website] video, I used technology to review content as a way to assess their knowledge through Kidspiration [i.e., digital concept mapping tool]. I felt that using Kidspiration was more beneficial and a better use of technology.”*

As preservice teachers were instructed to describe how video self-analysis impacted their PK, a unique theme emerged. In addition to describing how video self-analysis enhanced their pedagogy, there were numerous examples of preservice teachers describing how they would specifically enhance their pedagogy by integrating technology into their instruction. Preservice teachers in this study began to recognize the importance of amalgamating specific pedagogical strategies and educational technologies as a mean to enhance their classroom instruction and students learning.

These findings align with prior studies, demonstrating the value added of using video analysis in developing preservice and inservice teachers’ pedagogical knowledge (e.g., Pellegrino & Gerber, 2012; Fadde et al., 2009) and technological knowledge (Chase Martin & Sadera, 2011; Pierson, 2008).

Impact on CK and the Amalgamation of TK & PK

In examining the preservice teachers reflections, videotaped micro teaching samples, and observation field notes, the researcher discovered video self-analysis not only impacted preservice teachers Technological Knowledge (TK) and Pedagogical Knowledge (PK), but also their Content Knowledge (CK). The data illustrates preservice teachers enhanced their CK by examining their CK strengths and limitations by critically analyzing their individual videotaped micro teaching simulation. Through their lessons learned, the preservice teachers began to develop

individualized instructional strategies to enhance their CK. One preservice teacher described how video self-analysis impacted their CK by stating: “*I did not expect to spell something wrong on the smartboard in my lesson. I wrote “then” instead of “than”... This just goes to show that even teachers make mistakes sometimes and it is ok as long as they learn from them... If I could go back and re-do my lesson, I would have prepared better for this lesson*”.

By providing preservice teachers the opportunity to analyze their microteaching simulation, they exhibited the ability to identify their CK gaps, and prescribe specific instruction to enhance their CK in the future. Through this iterative reflective process, preservice teachers demonstrated more awareness in their TK, PK, and CK; and this awareness led the preservice teachers to construct reflections that displayed their TPACK growth: “*I think that the integration of technology in my second lesson did and could have further improved. The one major change I would have made to the second lesson would be to complete the compound words as a class in order to further the practice of compound words and to go over the correct answers if students were having trouble with them. This would make the technology in the lesson more interactive and collaborative as a class. In addition, the smart board graffiti wall [i.e., online word art tool] could be extended into another activity in the lesson which would allow students to further their interaction with technology in the lesson.*”

Preservice teachers in this study were able to demonstrate their TPACK growth by identifying specific instances where they could enhance their TK, PK, and/or CK. Through video self-analysis, preservice teachers developed specific instructional strategies to enhance their TPACK. In addition to demonstrating their TPACK growth via personal reflections, preservice teachers in this study also demonstrated their TPACK growth by applying their lessons learned into their second microteaching simulation.

This study found evidence that video self-analysis may be a viable solution in helping preservice teachers enhance their TK, PK, and CK. By instructing preservice teachers to confront their own TK, PK, and CK via individualized videotaped microteaching simulations; preservice teachers in this study were able to identify their knowledge gaps, and prescribe specific instructional strategies to enhance their TPACK.

Conclusion

In this study, two iterations of micro teaching simulations and video self-analysis were implemented into an undergraduate technology integration course. To help develop preservice teachers TPACK, the researcher provided the preservice teachers with generative opportunities to analyze, reflect, and practice teaching with technology. This study found video self-analysis played a key role in helping preservice teachers develop their TPACK. By providing preservice teachers with generative opportunities to analyze their videotaped micro teaching simulations, the researcher found preservice teacher become more aware of their knowledge gaps (i.e., TK, PK, and CK). Through this increased awareness, preservice teachers in this study were able to develop specific strategies to enhance the three major TPACK knowledge domains (i.e., TK, PK, and CK). The findings from this study builds off and aligns with prior research findings of the value added of using video self-analysis and reflections in teacher development (e.g., Amobi, 2005; Sherin & van Es, 2005; Snoeyink, 2010).

Participants in this study were able to identify their knowledge gaps by leveraging their lessons learned from their prior technology, pedagogy, and content courses. Since the participants in this study were in their final semester of the teacher preparation program, and had extensive field practicum experiences; they were able to utilize their knowledge base to construct a technology enhanced lesson. Based on the finding from this study, it appears video self-analysis may be a viable option in developing preservice teachers TPACK.

However, further research is needed to better understand *how* video self-analysis specifically impacts preservice teachers TPACK development. Acquiring a deeper understanding of how video analysis impacts preservice teachers TPACK development, can help inform teacher educators and teacher preparation programs with a new instructional model that may help ascend preservice teachers TPACK.

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Use of the Flipped Instructional Model in Higher Education: Instructors' Perspectives

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Keywords: flipped classroom, active learning, students, instructor

Abstract

The flipped classroom model is an instructional model in which students learn basic subject matter prior to meeting in the classroom. Students come to the classroom with pre-class work finished, and prepared for active learning experiences. Previous research has shown that the flipped classroom model can 1) motivate students toward active learning, 2) improve their higher-order thinking skills and, 3) increase their collaborative learning skills. However, investigation into instructors' perspectives on using the flipped classroom model in instruction is lacking. This paper is a qualitative case study on instructors' experiences and perspectives on using a flipped classroom model in instruction. Structured interviews were conducted with eight faculty members who had completed a university training program on using active learning techniques and who either used or planned to use the flipped classroom model in their courses. The interview data showed different approaches by the instructors with regards to the implementation of the flipped classroom model in instruction, different perceived challenges, and showed the perceived need for outside support.

Introduction

The flipped classroom, which is also referred as an inverted classroom, is an instructional model in which the learning content is not presented during the in-class time (Strayer, 2007; Baker, 2000), but rather is learned by students prior to the classroom meeting through various forms of media (Bland, 2006; Foertsch, Mose, Strikwerda & Litzkow, 2002). This frees up in-class time for active learning, like practice exercises, problem solving, hands-on work, and collaborative projects (Baker, 2000; Lage, Platt, & Treglia, 2000; Zappe, Messner, Litzinger, & Lee, 2009; Demetry, 2010). In contrast to a traditional, lecture-based, instructor-centered instructional model, the flipped classroom model is composed of two phases of instruction that are "flipped", "inverted", or "reversed" from the typical sequence used in classroom instruction (Bergmann & Sams, 2012).

The first phase in the flipped classroom model is the pre-class learning phase. In this phase, basic subject contents and concepts are acquired by students before class. Students learn by viewing instructor provided learning materials in various media formats, such as online videos, podcasts, or text-format materials (Baker, 2000; Strayer, 2007; Strayer, 2012; Bergmann & Sams, 2012).

The second phase is the in-class learning phase. Because the introduction to basic knowledge content occurs in the first phase, in this phase student-centered active learning activities occur. Examples of these activities are interactive lectures, problem solving, laboratory experiments, collaborative designs and project creation (Gerstein, 2011; Strayer, 2012). A flipped classroom course can be taught in various physical facilities, not only a traditional lecture hall, but also in the technology-enhanced classrooms, in the studios, laboratories, computer labs, meeting rooms, outdoor settings, or in online learning spaces, such as Blackboard. Recent research indicates that students can be kept highly engaged when using the flipped classroom model (Gehring & Peddycord III, 2013; Dove, 2013). Students' motivation is increased by real-world, in-class, active learning activities (Zappe et al., 2009). A key advantage of the flipped classroom is that students can control their learning in terms of the learning pace and mastery of content (Alvarez, 2011). Research has shown that students take the responsibility for their learning, and come to the class better prepared than in traditional lecture approaches (Alvarez, 2011; Fulton, 2012). Research using post-class surveys also demonstrates that students perceived that the flipped classroom offers a unique, yet challenging opportunity to maximize learning effectiveness (Wagner, Laforge & Cripps, 2013; Demetry, 2007), and helps to improve problem-solving and application skills (Zappe et al., 2009). Gerstein (2011), Stuntz (2013), and Strayer (2011) reported that the flipped classroom model can provide an interactive atmosphere, which can improve students' in-depth communication and collaboration (Gerstein, 2011; Stuntz, 2013; Strayer, 2012).

Other research shows that the flipped classroom has a positive impact on students' learning (Gerstein, 2011; Strayer, 2012; Dove, 2013), demonstrated by increased student engagement in learning, increased higher-

order thinking skills, increased problem-solving skills, and improved collaborative skills (Demetry, 2010; Bergmann & Sams, 2012; Wagner, Laforge & Cripps, 2013; Stuntz, 2013; Strayer, 2012). However, from literature review, the authors found that current studies examined the influence of the flipped classroom on students' attitudes, perceptions, and experiences. These research contexts have been limited to one specific course in each case. No studies examined instructors' perceptions or experiences of using the flipped classroom model for instruction.

The purpose of this study was to discover how instructors define the characteristics of “the flipped classroom” instructional model, why they chose to use this model in their courses, and to discover their thoughts on the advantages and challenges associated with using the flipped classroom model. A qualitative case study approach was employed to investigate these instructors' viewpoints.

This study examined the following questions: (a) how do instructors define “the flipped classroom”; (b) why did instructors choose the flipped classroom model; (c) what key factors are associated with the effectiveness of the flipped classroom model; and, (d) what support did instructors view as important for successful implementation of the flipped classroom model?

Methodology

A qualitative case study method was used in this study, in order to gain intensive, rich, and in-depth analysis. This approach was selected as the research methodology because it can provide researchers with a deep understanding of the multiple aspects of a phenomenon in a natural setting (Yin, 2003). Further, it allows a holistic, more comprehensive understanding of meaningful context (Punch, 2005).

Participants

Eight participants were selected from 18 faculty members who attended in a Summer Teaching Institute sponsored by the Teaching and Learning Center at The University of Tennessee at Knoxville, and asked to volunteer in this study (Table 1). In the Summer Teaching Institute, a series of workshops on integrating technologies in instruction and student-centered active learning instructional strategies were provided for faculty members. Four faculty members who had implemented the flipped classroom model (F) in their courses, and four faculty members who were preparing to use the flipped classroom model (PF) in the coming semester were selected as the participants of this study. Additionally, these eight participants were from seven different academic disciplines (Table 1). This diversity enabled the researchers to have a more comprehensive investigation into the stories and viewpoints of university instructors at UTK.

Table 1. Summary of the participants

Flip model status	Course	Code
Flipped (F)	Foreign language	F1
	Foreign language	F2
	Business	F3
	Animal Science	F4
Pre-Flip (PF)	Mathematics	PF1
	Architecture	PF2
	Statistics	PF3
	Forestry	PF4

Interview

An individual structured interview was conducted with each participant. Table 2 contains a list of the interview questions.

Table 2. Interviewing Questions

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1. What lessons did you take from your participation in the Summer Teaching Institute?
 2. Elaborate how you implemented the flipped classroom model, or your plan of using it.
 3. What difficulties have you encountered, or foreseen in implementing the flipped classroom model?
 4. Tell me about the changes in time management you've made with relation to the flipped classroom model.
 5. What is your present definition of the flipped classroom model?
 6. In your mind, what concepts or characteristics of the flipped classroom model are essential?
 7. As an instructor, what advantages or disadvantages could you see of using the flipped classroom model?
 8. What, if any, resources or outside support, other than the Summer Teaching Institute, have or may influence your thinking about the flipped classroom model?
-

Specifically, participants were asked to define “the flipped classroom” according to their own experiences and understanding. They were also specifically asked their perceptions of the advantages and challenges associated with an actual or planned implementation. Additionally, they were asked to comment on what support they thought was useful in using the flipped classroom model in their courses.

Data Analysis

Interview data was audio recorded and transcribed into computer files, initially hand-coded, and then computer coded using NVivo software with identification of recurring phrases and regularities in the data (Miles & Huberman, 1994). All initial codes followed closely the concepts used by the interviewees to enhance the validity of this study (Punch, 2005). Each transcribed file was analyzed using the set-up codes, and new codes were added as new concepts were generated. The transcripts were analyzed again after the revisions of all the coding categories. a comparison was conducted in each category between different participants. Major themes were developed based on the comparison of codes regarding to different participants in the same category.

Findings

Perceived “flipped classroom” Definition

All eight participants generally understood “the flipped classroom” to be a teaching and learning model in which the subject knowledge concepts, which are the lecture material, are completed outside of class for students’ self-directed learning. After this “prior knowledge” is acquired students come to class to apply what they have gained from pre-class learning and do so in a more interactive and collaborative way than a typical lecture format. The following statements represent several participants’ definitions of the flipped classroom:

“What I think is the flip model is one in which the students not only study the verb conjugations at home but also study the grammar at home, and they come to class to do their homework. (F1)”

“The flipped classroom is to use the class time doing exercises instead of myself standing in front of them repeating what they could have read in the book. (F2)”

“The flipped model to me means the student does a lot of the groundwork outside of class and they bring their basic knowledge of the material to class, and then you actually have active learning, where they are engaged in using that material to solve problems.” (PF3)

“The flipped classroom is a model in which pushing out information [outside class] and putting more ownership on students, and students come in at a level of preparation. It's a bit more than just reading the material, because in many cases reading is not the level of comprehension that you want. You want them to already start thinking about the integration of facts and concepts, and then come into class. (F3)”

The participants had different focuses regarding the flipped classroom. F2 focused on the instructor’s role change in the flipped classroom and emphasized that the instructor is no longer the transmitter of knowledge in class. PF3 focused on students’ engagement in problem solving in class with the knowledge base gained during pre-class learning. F3 focused on students’ responsibility for their learning, and emphasized students’ preparation before class. All of the participants placed emphasis on the students’ acquisition of basic knowledge learning *before* class and the use of in-class active learning activities. These activities emphasize students’ enjoyment and knowledge application skills in the classroom setting.

The instructors described how they would implement the flip model in their courses. A common aim was to transfer students' passive learning to active learning, and to create more time and opportunities to apply the knowledge gained during the in-class sessions.

Foreign language instructors, F1 and F2, had students learn vocabulary before class. This is common for foreign language instruction and "similar" to a typical approach in the flipped classroom. They "flipped" their courses in order to give students more in-class time for "high level activities", such as "oral translation" and "writing exercises". Lower levels of learning such as "recognition" vocabulary and grammar would have occurred prior to coming to class. PF2, an architecture instructor, indicated that his/her aim was "to change students' passive learning style and to encourage students to engage in complex projects having as many 500 variables". P3, who taught different sections of a supply-chain business course along with several other instructors, expressed the aim of the flipped classroom as:

"We want students to be able to apply concepts and to make a very different level of learning. We want students to read, comprehend at a certain level and then come into class, and we'll start the discussion not about what the definition is, but really start talking about it in application, strengths, weaknesses and so forth; incorporate technology in instruction (P3)."

P4, an instructor in animal science, had previously implemented a "partial flipped course", in which only a proportion of the course was implemented as a flipped classroom approach. The flipped part of the course was in an online format. The students' pre-class learning assignment was to upload their presentations on a discussion forum. The in-class time was for face-to-face intense discussion of the pre-class uploaded online presentations. P4 perceived it as a way to "allow for much deeper delving into the learning content than using the class time to go through the presentations". The students "had no longer listened to others' presentations as audience", but "engaged into more intensive and detailed discussions about what each presentation said."

Moreover, all the instructors viewed improving students' self-directed learning skills as an additional aim of using the flipped classroom model in their courses

These instructors' perceived advantages of using the flipped classroom model in instruction could be summarized as: (a), freeing in-class time for students' active learning, (b) enabling students into an more interactive and more in-depth way of learning, (c) improving students' skills in application and problem solving, and, (d) improving students' skills in collaboration and self-directed learning.

Perceived Approaches for Making an Effective Flipped Course

Interview data revealed four major components instructors should do to make an effective flipped course. These were: (a) ensure students have prepared for in-class session prior to class; (b) have organized instructional design with good structural components; (c) design learning materials and activities based on students' feedback, and, (d) provide instant support and scaffolding of learning in class.

Ensure Students Have Prepared Prior to Class

All eight instructors highlighted the importance of students' pre-class learning. They stated that students needed to complete assignments in pre-class learning to ensure that they could get involved in the in-class active learning activities.

"It is a biggest issue to have students do the work outside class, so that they are prepared when they come into the classroom... If the students can do the work outside class within the lecture content, it means we [instructors] can devote a whole class to be in the field, developing vegetation sampling plans and wildlife monitoring plans... If the students haven't done those, they are going to find it is very difficult to follow classroom content. (PF4)"

"...want them [students] to already start thinking about the integration of facts and concepts... when they come into class if they've [prepared], if we've done the Flip correctly, that's kind of where we start. (F3)"

"That students really have done the pre-class work is essential to the flipped classroom model. Students need to learn the basic knowledge, not only reading the materials, but also answering the questions... I don't feel it is going to be hard to carry out the in-class active learning, if the class is pre-organized, pre-class materials are already delivered, and make sure the students have learned before class, then come to class prepared. (PF3)"

Instructors indicated that in order for the flipped classroom model to be effectively implemented, students must do the prerequisite learning phase before coming to class. Instructors identified this as the "biggest issue", "important", and "essential". Instructors believed that the pre-class learning equipped students with basic concepts

required for in-class active learning. The in-class sessions provided students the opportunities to apply, integrate, and interact the knowledge gained from pre-class learning.

In order to ensure students learned before class, all the participants indicated that requiring students to finish some pre-class assignments was necessary. In addition to quizzes, participants shared other approaches they used for pre-class learning assignments, such as asking students to take notes when viewing pre-class learning videos (PF1), posting writing samples before class (F2), and posting presentations online for instructors and teaching assistants to review (F4). F3 used the “carrot and stick” approach to increase student completion of pre-class assignments. The scores of the pre-class quizzes were calculated into students’ final grade. Students would lose the grade if they did not finish the pre-class quizzes. The grade jeopardy provided the “stick”. These quizzes were not difficult, so if the students had gained the knowledge through pre-class learning, it would be easy to get this 10% of the final grade. In this sense, it was a “reward”, or “carrot”, that brought students to a good level of preparation for the in-class phase.

F3’s statement corresponded with the summary of PF1, who was a pre-Flip instructor, planned to use the flipped classroom model in the coming semester. PF1 commented that the pre-class assignment was necessary. PF1 planned to take the grades of students’ pre-class assignments as a part in the final grade of the course, with the aim of promoting students to be prepared prior to class. However, PF1 suggested that the pre-class assignment should not be too difficult, or take too much time for students to complete.

Be Well-organized in Instruction

All the instructors commented that in comparison to the traditional instructor-centered, lecture-based model, the flipped classroom model required them to be better organized in instructional design and implementation. PF2 commented:

“You [instructor] need to be very well organized, have very clear objectives as to what they [students] are to do prior to class. (PF2)”

PF2’s comments focused on clear organization when designing and assigning pre-class assignments. PF1’s comments further illustrated the importance of a well-organized structure in the flipped classroom instruction:

“Structure, schedule of the course, activities, group arrangement, must be well-organized... You have to do a schedule. There has to be some organization in class during the group activities so that it's not just chaos. I've got to organize how I'm going to do that and just how we're going to get started each day. (PF1)”

PF1 indicated that instructors should be well-organized in all aspects of the flipped classroom instruction, such as the syllabus, schedule for activities, activities design, and grouping arrangement for the in-class collaborative work, in order to avoid chaos in class. This was in agreement with F4’s comments:

“You need to be organized, you need to plan ahead. (F4)”

Moreover, F4 comments on good organization on students’ evaluation:

“There is a deadline for submitting the presentations, then five days for reviewing and evaluating each other’s group presentations... The evaluation of this course was rubric guided. (F4)”

When designing and implementing the flipped classroom instruction, the instructor should have clear and detailed organization of what the students should do for the complete semester. Students should be guided by the instructor to know when they would have access to pre-class learning materials before a specific day, the deadline and requirement for submitting the pre-class assignment, the in-class activities requirement, grouping assignment, and how their learning would be evaluated.

In addition, F3 suggested that instructors should take the organization of students’ responsibilities assignment in group work into consideration:

“Success is marked by students taking responsibility...making sure that the students understand what their responsibility is...makes it [instruction] successful. Collaboration and shared learning are essential components, characteristics in Flip” (F3).

Based on the interviews, none of the participants expressed concerns on how to be well-organized in instruction, but indicated that it was not difficult, just to be careful in scheduling the instruction. PF2 seemed to be very confident in organizing the class by commenting that he/she felt “really good in standing up and orchestrating a jazz band”. PF2 indicated it was much better to have a general plan of the whole course, which would enable the instructor to respond to whatever came up in class.

Think as Students

Six of the participants indicated that when they considered the instructional design of the courses to be implemented in the flipped classroom model, getting to know more about students was important. Finding out students' characteristics and needs, viewing instruction from students' viewpoints, and getting feedback from students, would play a critical role in making instruction more effective.

Awareness of the students' needs motivated F3 and colleagues to think of using the flipped classroom in the supply-chain business course they taught. Comprehensive and deep probing into the learning styles and needs of students, described as "digital natives", provided them guidelines for their instructional design. F3 explained that the instructors learned to "think as students". They found that the students, who were better in using technology, got bored on the exams, and they were good in searching and communicating the exam answers, so approaches which could improve and test students' abilities in application and problem solving were necessary. The activities should not only "make students a different level of learning" (F3), enabling higher-order thinking, but also reduce students' workload, because most students "had to work more than 10 hours a week" (F3). As a result, instructors should build short time exercises to help students to learn and apply knowledge. F3 also suggested that instructors should "really start digging a little bit deeper" on how students prepare for class, how much effort they invest, and whether they know how to prepare for class.

F1 and F2 both suggested that when preparing the pre-class learning materials, instructors should look at the knowledge from students' perspectives.

"Instructors should look at them [pre-class materials] from a slightly different perspective, because students will learn when the instructor is not with them" (F1).

"Instructors always think some knowledge is simple, but not to the students. The instructor does not recognize it. Especially when instructors create videos, they don't have the students to judge if they can get all the knowledge understood via viewing them" (F2).

F1 and F2 suggested that when preparing pre-class materials for the flipped classroom, instructors should think of students' current knowledge level, and design the pre-class learning materials that students can understand.

Additionally, PF1 suggested that the pre-class videos should be kept short in order to keep students' attention on pre-class learning:

"...doing little quick things just to grab students' attention, or just a little brief lesson without overwhelming them with information" (PF1).

Most participants suggested that instructors should actively collect students' feedback on instruction. For example, F2 and F4 gave students' surveys during the semester to get their comments on pre-class learning materials, and made changes to improve instruction, PF3 "monitored students' feedback on discussion board" in order to make revisions on instruction.

Provide Instant Support in Class

All participants claimed that a big advantage of the flipped classroom model was that students could have instant support during in-class exercises. Illustrations of instant support in class are described below.

"Students can have instant help because the instructor, GTAs, and other students will be in there. So to me that seems like a huge advantage" (PF1).

"Students [will] practice more with support right there; they can actually work through problems and they are not trying to struggle through them on their own in their dorm at night with no help available" (PF3).

An instructor in the design stage of the flipped classroom, PF3, believed the application of skills would be improved over that of the students in traditional lecture-based model. This is because students would practice more and receive more immediate guidance and scaffolding in a just-in-time situation. PF1 mentioned this as "a huge advantage" highlighting the importance of instant support in class from not only the instructor, but also GTAs' and other students.

"Some exercises are difficult. I plan to challenge students, they have to think, they have to analyze. I work when they only if they have problems or instruction is not enough" (F2).

F2's comment demonstrated the rule of providing students instant support in class. PF2 felt that the instructor's support should motivate and guide students to think and explore by themselves. PF3 argued that it was a challenge for the instructor to "balance providing students freedom to be responsible for their learning and giving them support".

PF1 focused more on instructor's interaction with students:

“I really like to have interaction with students. I think FLIP will allow me to have interactions a lot more both with the class as a whole but then with groups of students and one on one...in-classroom activities is particularly appealing to me, rather than [standing] in front of the classroom and just lecturing” (PF1).

PF1’s instant support was similar to an in-class interaction with students. Instructors could flexibly interact with a whole class of students, interact among different groups when students were having collaborative work, or interact with a specific student.

Perceived Challenges

In the interviews, the participants were also asked to share challenges they had or foresaw with the flipped classroom model in their courses. The following are representative responses from the participants.

Motivate and Make Sure Students Have Learned Before Class

As mentioned previously, a critical factor for making an effective flipped course is that the students have learned the knowledge in the pre-class learning. All of the instructors were concerned with motivation of students toward preparation and learning before coming to class.

“The main obstacle is the fact that sometimes students do not read the material before class” (F1).

“My biggest concern is students [might] come to class without doing the video lecture at home, not be prepared enough to do whatever I have planned on that day, and get stuck in class” (PF1).

“I have tremendous trouble getting them to do assigned readings...Some of the work will be assessed, but some not, so how to generate incentive for students to do the outside classwork becomes a big challenge” (F2).

“I felt disappointed because it (the flipped classroom) put a lot of responsibility on students, but they show up not prepared...students have never been or really expect to be held accountable to that level of preparation...students will get lost, frustrated if they come into class without preparation” (F3).

Expressions such as “main obstacle”, “biggest concern”, “a big challenge”, and “tremendous trouble” illustrated instructor’s concerns they had about a lack of student engagement in the in-class learning activities. This was attributed to a concern about the possible lack of pre-class preparation by students.

F3 described that the instructors were very disappointed upon finding students “not accountable to the level of preparation” prior to class. This reduced the instructional effect of the in-class active learning activities. Students were not able to keep up and participate in the activities which required the knowledge that was supposed to be acquired before class.

During the interviews, several instructors shared their strategies to motivate students to prepare before class. These strategies included, checks of students’ basic knowledge learning through the use of clickers at the beginning of class, requirements of students to post their foreign language writing journals online, and calculating students’ pre-class quiz scores and note taking performances in final grades. F3 also shared the experience of letting students know how to prepare for in-class sessions and the amount of time that should be invested.

Not All Students Like Active Learning

Two instructors indicated that it was a challenge for them to implement the flipped classroom model because not all the students liked active learning format. Students, in general are used to a passive learning format.

“They are more used to the traditional lecture in which instructors stand in the front of the classroom and explain everything. They don’t ask questions when they have difficulties” (F2).

How to turn passive learners into active learners remains a challenge. This is especially true when instructors did not know whether the students who kept silent even if they had difficulties in learning, had acquired the required knowledge or not.

Instructors described ways they tried to motivate these passive learners to engage in active learning. F2 indicated that instructors should try to convince students from the beginning of the semester that active learning is good for them. In practice, F2 focused more on how to acquire “silent” students’ feedback. F2 suggested that it would make these students feel more comfortable if the instructor could give students feedback about the questions they asked in the journals they submitted, so instead of asking directly in class, students were “forced” to submit journals every week. PF4 in anticipation of flipping the classroom believed that there might have been a few students not used to it, because “the flipped classroom is new to students”. PF4 suggested that instructors should “gauge how students are receiving it [the flipped classroom model]” first, then “doing [implement] it [the flipped classroom model] in gradual stages”, giving students more and more responsibilities in the in-class learning

activities. The staging approach would give the instructor more time to evaluate how well students were buying into the idea the flipped classroom model. It would also help the instructor gain from the experience in how to improve future instruction.

Improve Students' Collaboration

Although the participants commented that the in-class active learning activities could bring students into a more in-depth learning, motivate students' learning interest, and provide convenience for students to refer to help in class, several instructors were concerned that students did not collaborate well in the in-class active learning activities.

"My challenge now is to create activities that force them [students] to work together, but some students would choose to do [the course work] by themselves" (PF1).

A concern of PF1 was that the students would not collaborate in class because they were used working alone. PF1 planned to use the "jigsaw technique" to promote collaborative activities in the classroom. The "jigsaw technique" requires students to do something on their own and then to work together. The aim is "getting everybody working together" and "learning from each other".

In contrast to PF1, F1 felt the jigsaw method of putting students' individual works together was a low level of collaboration. This was described as "working on their own and simply putting individual work together on their own, but never coming back for reflection, revision, or reviewing others' contributions." F1 expected students to learn not only how to do work, but also learn how to integrate, revise, and reflect on the work and learning done.

Huge Time and Effort Investment

All instructors indicated that time and effort investment on preparing using the flipped classroom in instruction was an additional challenge in comparison to traditional lecture, especially when instructors implement this model for the first time.

"Time is a major problem because I had to create the videos and at the end of the semester, but I didn't have time to finish" (F2).

"Making videos involves lots of time and effort to prepare, such as writing script, and practice... A lot more pre-thinking has to be used to put what you already do into an online video, which leaves out all the questions, and to provide the student what you might do in a lecture plus Q and A or in a hands-on environment... You must have lots of thinking about the outcomes and how to structure things in order to create those outcomes, but then be able to verify in some way whether they were achieved or not... Lots of more things to improve the course, more on editing the videos, and for future use" (PF2).

"Time is a big limitation for a new faculty member teaching four classes to prepare for FLIP, particularly the videos" (PF4).

The above statements demonstrate some instructors thought video creation was costly in both time and energy. This was true with both the process of technical creation and revision and also with the designing of the videos. Thinking and reflecting about what to put into the videos, how to combine the videos with the in-class activities, what the instructor expects students to achieve and how to help them achieve with the videos, all required large quantities of time and energy. Additionally, revising the videos to improve the instruction for future use would require yet more time.

"One of the things I would like to do but [would] not have time completely is to create mechanics to make sure that they do what they need to do" (PF2).

"For a fairly new faculty member, I think at least initially for me it's going to be a pretty steep learning curve" (PF4).

"From a time standpoint it [the flipped classroom] can consume you. I can't imagine if my department hadn't given me two years to set this course in place and get those things. It is a learning curve about really knowing how much is doable, hoping this semester my time investment is going to be less" (F3).

The phrase a "steep learning curve" was used by PF4 to express concern for the anticipated time and energy investment in learning and exploring to use the flipped classroom model in instruction. Similarly, F3 was astonished with the amount of time needed to initiate the flipped classroom model. However, F3 illustrated that it was a learning process for instructors and hoped that future time investment might be decreased with future classes and more time in-class would be freed up due to flipping.

“[Instructor’s time management] is about creating more time in the class to be able to cover more material...having better discussions and getting students really involved in a deeper layer of conversation” (F4).

F4 did not think time to be a disadvantage with the flipped classroom model, but a challenge, specifically with the belief that more time would be freed up for the instructor and the GTAs to prepare activities and to evaluate each student. (F4)

Overall, instructors believed that while preparation for using the flipped classroom model actually consumed more time than for the traditional lecture passive classroom that it was worth it, because the created materials could be used for future classes. They also believed that they would not have to spend so much time in future class development due to the experience gained with initial flipping preparation both of videos and in-class activities.

Support

All of the participants indicated that they had some support to use the flipped classroom model in their courses. This support came in the form of either, (a) online resources about the flipped classroom; or, (b) other instructors’ peer assistance.

Some instructors received good ideas from Internet resources, such as the online posts about other instructors’ teaching experience in the flipped classroom model on wikis and blogs. These ideas were modified for use in their own classrooms. Other instructors read journals on instructions of their fields, especially the papers on active learning with the same subject matter in the classroom. Even though some instructors commented that reading could help to provide some basic ideas, they indicated that peer assistance from other instructors was more useful and important to them.

F1 and PF2 participated diverse disciplines pedagogy groups. In these groups, they shared and read articles about teaching. These groups regularly met to discuss teaching, share ideas and challenges, and help each other to solve problems about teaching.

PF3, F3, and F4 asked the colleagues in their departments for suggestions and support because they felt more comfortable speaking with people in their fields. PF1 indicated very good collaboration with GTAs on instructional design as well. PF2 was more comfortable to ask support from a nephew and a sister who both used the flipped classroom model in K-12 schools.

All instructors participated in the same Summer Teaching Institute sponsored by the Teaching and Learning Center at UTK. They commented that the workshops and counseling services provided them with great ideas in teaching. They felt, however, that what was even more valuable to them was the opportunity for peer communication, reflection, and learning from each others about the flipped classroom model provided them by the Summer Teaching Institute.

Discussion

Research has shown that the flipped classroom model can improve students’ learning motivations, higher-order thinking skills, and problem-solving skills. The flipped classroom model can provide students opportunities for engagement in student-centered active-learning experiences. Warter-Perez and Dong (2012) state that the fundamental idea behind the flipped classroom is that more class time can be devoted to active learning and that the instructor can provide immediate feedback during the active learning session. All interviewees in this study highly praised the in-class learning activities’ role in motivating students to apply the knowledge they gained. This study indicates that instructors viewed motivating students to prepare for the in-class activities a most essential component of the flipped classroom model. This study also demonstrates that instructors perceived how to motivate students get engaged in pre-class learning as a major challenge in implementing the flipped classroom model in instruction. Most current research is on the investigation of the in-class activities, and there is little research on the pre-class learning in the flipped classroom model. This study highlights the importance of the effectiveness of the pre-class learning activities.

Current research on the flipped classroom centers on the instructional benefit of the flipped classroom model through students’ perspectives. Findings from the current research shows students’ attitudes toward their learning experiences in the flipped classroom courses, and their learning gains. In contrast, the present study centers on training of instructors and their observations of the critical instructional design connected with flipping. In interviews, instructors were not only concerned with the instructional performance of the flipped classroom, but also on how they would effectively prepare and use this model in a time-saving and effort-saving way. This study indicates the need for helping students to be prepared before class and for the provision of proper motivation toward

that goal. Instructors must be well organized in their instructional goals and design, must be able to think like students (viewing objectives from their perspective). They must also provide students with timely support in class. Instructors believe it takes large quantities of time and energy to prepare for the flipped classroom model for the first time. However, they believe it is probable that less time and energy would be required in future classes because they had already gained both learning materials and instructional experience. Ultimately, support and training of instructors on how to use the flipped classroom model efficiently will prove critical to the acceptance of this model. Future research should focus on instructor's support and training in adopting the flipped classroom model.

In the investigation into the support instructors had for using the flipped classroom model, this study revealed that peer communication and assistance between instructors, such as peer assistance among pedagogy groups, and communication with experienced colleagues, were perceived by instructors as an efficient support approach for helping them to use the flipped class by the instructors. Based on this, future training may need to provide opportunities for instructors to have peer assistance, and support in a more flexible and more comfortable way.

A limitation of this study is that all the participants were from the same university and had the training in the same Summer Teaching Workshop, so their backgrounds were similar. Future studies on training for using the flipped classroom model need to draw upon instructors from more diverse backgrounds. Future research might investigate how universities can better support faculty members in gaining knowledge and skills required for building more active, effective, and multi-modal learning environments and a faculty peer-assisted learning community.

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Evaluation of the “Let's Talk: Finding Reliable Mental Health Information and Resources” Pilot Program for grades 7 and 8 Students in three Ontarian School Boards and One Independent School in Quebec

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Introduction

Approximately one in six young people has a mental health problem that is severe enough to impair their functioning at home or at school and with peers or in the community (Waddell & Shepherd, 2002). Moreover, almost half of young people who are dealing with a mental illness have more than one disorder (School Mental Health ASSIST, 2012). It is critically important for youth who are dealing with mental illness to get help given that mental illness is the most significant risk factor for suicide (Weir, 2001) and that suicide the second most common cause of death for Canadians aged 16 to 24 (Navaneelan, 2012). However, a number of common myths about mental illness can make them less likely to seek help. One common myth is that mental illness is the “fault” of youths’ parents or of the young people themselves – who may be characterized as attention-seekers. The belief is that they could overcome it with the proper discipline or sufficient force of will. A related fallacy is that nothing can be done to treat mental illness. These two misconceptions are part of the reason why only one in five Canadian children who need help with mental health issues receive it (Canadian Mental Health Association, 2012).

In the context of mental health, the term stigma refers to an extra burden carried by people who suffer from mental illness, that is caused by how other people see them (and, in many cases, how they see themselves). Stigma has been identified as having as much of a negative effect on youth affected by mental illness as the illnesses themselves (Mental Health Commission of Canada, 2010). It has been observed that stigma exerts a particularly powerful effect in schools, where youth may fear teasing, bullying and ostracism if they come forward with mental health issues. As a result, stigma can make mental illness invisible and may force those who are dealing with it to do so alone (Canadian Mental Health Association, 2008).

The purpose of this project was to conduct an evaluation of the pilot program "Let's Talk: Finding Reliable Mental Health Information and Resources", which consists of both teacher training and the implementation of three specific lesson plans for students in Grades 7-8. Given considerable variability in definitions of program evaluation (Patton, 2008; Rossi, Lipsey & Freeman, 2004), for the purposes of this paper, evaluation was defined as a systematic inquiry leading to judgments about program merit, worth and significance, and support for program decision-making and knowledge production (Cousins, 2003; Weaver & Cousins, 2004). Though broad, this definition accommodates both summative, judgment-oriented evaluation questions as well as formative, improvement-oriented questions. This conceptualization clearly situates the evaluation as a systematic process guided by inquiry methods common to the social sciences. The results of the evaluation will be used to guide the improvement of the program prior to a national expansion of the program in 2015.

The evaluation of this pilot program is designed to identify any areas that need improvement and development. It focuses on both program process and delivery of program content, and short and intermediate term outcomes for teachers and students. For this reason, the current evaluation is formative, meaning that it is designed to provide feedback for improving the program, particularly as it pertains to the lesson content, the delivery of the program and the online framework for teachers. In this specific paper, we present results pertaining to student's accumulation of knowledge on mental health, and mental health resources as a result of participating in the lessons and using their multi-media platforms.

Program background

The bilingual program "Let's Talk: Finding Reliable Mental Health Information and Resources" was designed to enable teachers to connect mental health issues to the wider curriculum through media literacy and to help students recognize, find and authenticate reliable mental health information and resources online, and by using a variety of multi-media tools. The program is comprised of online training for teachers as well as classroom resources. Teacher training resources include a self-directed presentation and a teachers' guide. Using an online platform for this purpose allowed for more fullsome participation in a variety of Canadian cities. Classroom resources includes six teaching lessons that use a variety of multimedia tools that last an approximate duration of one class period for Grades 7-8 (three in English and three in French):

- Lesson One: *Authenticating Mental Health Information Online*
- Lesson Two: *Setting the Record Straight: Public Service Announcements on Mental Health and Illness*
- Lesson Three: *Social Support Networks and Help-Seeking*

In each of the three lessons in this program, students view a powerpoint presentation about mental health through which they are introduced to holistic and universalizing concepts, such as the mental health continuum. In Lesson One, using video students evaluate common misconceptions about mental illness and use reliable information that is provided to correct those misconceptions by watching and learning about public service announcements through online videos and YouTube. Students then have a chance to create their own using film or traditional acting. In Lesson Two, students learn media literacy skills by evaluating and authenticating content and websites on the Internet in order to locate reliable online information about mental health. In Lesson Three, students are guided to recognize and locate different mental health resources available to them within their communities. It is here where they use telephone and skype to access a help-seeking hotline, Kids Help Phone where they get to talk to a counsellor and ask questions during a live chat.

The program's learning objectives are as follows: 1) to encourage students to discover reliable public information about mental illnesses, which challenges common misconceptions and raises awareness about stigma; 2) to increase student awareness of social support networks and formal mental health resources found within their communities which should support help-seeking behavior; and finally, 3) to assist students in developing the necessary skills to locate and evaluate reliable information about mental health on the Internet, which in turn should help to increase awareness about mental health.

Research questions

1. To what extent has students' ability to understand media's influence on their understanding of, and attitude towards, mental health increased?
2. To what extent has the program enabled students to identify support networks available to them in the community and enabled them to cultivate help-seeking behaviours for mental health issues?
3. To what extent has the program enabled students to be able to find authoritative sources of mental health information on the Internet?

Methods

The methodology for the evaluation of the pilot program was based on a combination of teacher and student participation and was conducted in three phases.

Phase One: Evaluation Planning (January-June 2013)

This phase involved a thorough review of all relevant documentation for this program as well as a comprehensive review of the literature on program evaluations that are similar in scope, in context and in program content. This phase provided an understanding of the "Let's Talk: Finding Reliable Mental Health Information and Resources" program and led to a detailed evaluation plan. This plan included a sampling strategy to identify approximately 15 schools in 2 provinces (three school boards in the provinces of Quebec and Ontario respectively) and then to further select Grades 7 and 8 teachers or classrooms within those schools. Requests from school boards

to conduct this research were submitted in Ontario and Quebec in the late spring of 2013. Once school board approval was received, the Board sent an open invitation to all schools. Three school boards in Ontario and one independent school in Quebec agreed to participate in the evaluation of the pilot program and one of the three lessons was implemented in each school board based on a first come first serve basis:

1. CSDCEO (conseil scolaire catholique de l'est de l'Ontario): Lesson 2 "Setting the Record Straight: Public Service Announcements on Mental Illness";
2. OCDSB (Ottawa Carleton district school board): Lesson 1 "Setting the Record Straight: Authenticating Mental Health Information Online";
3. TDSB (Toronto district school board); Lesson 3 on "Social Support Networks and Help Seeking";
4. Externat St. Jean Eudes (independent school in the province of Quebec); Lesson 3 on "Social Support Networks and Help Seeking".

Phase Two: Instrument Development and Data Collection (September 2013 –June 2014).

Student learning was assessed via questionnaires with one pre-test (pre-lesson) as well as two post-tests (post-lesson) that were administered by participant teachers in the classrooms to assess students' acquisition of new skills and knowledge. The questionnaires were specific to each lesson. The first *post-test* was administered immediately after the lesson; the second post-test or *post-post-test* was administered two to three months following the lesson, in December 2013-January 2014. Codes comprising their mothers' phone number and name were assigned to the questionnaires and consent forms ensuring anonymity. This was for comparative purposes and for monitoring changes in desired behaviours and perceptions.

Teacher feedback was also considered by using an online survey and one-on-one interviews. While that aspect of this project is beyond the scope of this article, a few relevant findings from the interviews, in the form of quotations will be shared as they relate to student experiences of the multi-media platforms in the results' section followed by a more detailed analysis in the discussion section.

Phase 3 Putting it All Together (June 2014- August 2014)

This phase involved the analysis and synthesis of quantitative and qualitative data. The following types of analyses were used:

1. Repeated measures analyses (quantitative)
2. Paired sample t-tests (quantitative)
3. Thematic coding (qualitative)

Participants

Overall 669 grade 7 and 8 students from three Ontario school boards and one independent school board in Quebec participated in the evaluation. Parental consent as well as completion of all three questionnaires was obtained for 325 students. Therefore analyses and results are therefore based solely on these 325 students. The following is a specific breakdown of student participation by school board:

- CSDCEO (conseil scolaire catholique de l'est de l'Ontario): 107 students fully completed the evaluation with required consent;
- OCDSB (Ottawa Carleton district school board): 99 students fully completed the evaluation with required consent;
- TDSB (Toronto District School Board): 91 students fully completed the evaluation with required consent;
- Externat St. Jean Eudes (independent school in Quebec): 28 students fully completed the evaluation with required consent.

For the qualitative aspect of this study, 10 teachers across three school boards, excluding the independent school in Quebec, participated in one-on-one interviews about their training experiences and their perceptions of their students' learning.

Results

Research questions and corresponding results are presented by school board.

1. CSDCEO (conseil scolaire catholique de l'est de l'Ontario)

Teachers in the CSDCEO were instructed to teach Lesson Two: “Setting the Record Straight: Public Service Announcements on Mental Illness”.

Research question #1

To what extent has students’ ability to understand media’s influence on their understanding of, and attitude towards mental health increased?

Significant differences at the $p < 0.05$ level were detected in a repeated measures analysis regarding **students’ understanding of advertising** between the three assessment periods: pre-test, post-test and post-post-test. Next, paired samples t-test between each testing period showed that all three levels of understanding proved to be significantly different from one another, indicating that students’ understanding of advertising increased between the pre-test and the post-test ($p < 0.05$) and three months later ($p < 0.001$). Moreover, there was a statistically significant difference between the post-test and the post-post-test ($p < 0.001$).

Significant differences regarding **students’ understanding of mental illness** between the three test periods: pre-test, post-test and post-post-test (2-3 months after) were noticed ($p < 0.001$). Paired samples t-tests between each testing period revealed that two levels of understanding proved to be statistically significant, indicating that students understanding of mental illness increased between the pre-test and the post-test ($p < 0.000$) and the post-post-test ($p < 0.000$).

Teachers also expressed how the online access of the quality of this lesson and materials and video component made for a favourable and interactive learning experience for their students.

“Le fait que c’est accessible en ligne, ça c’était très gagnant, le fait qu’il y a avait les présentations à l’écran ou c’était pas juste lire un article. C’était très interactif, ça a été très gagnant. C’est quelque chose qu’ils ont l’habitude de faire à la maison. Déjà la, ça donnait un certain crédibilité au niveau de l’attention, je vais écouter parce que c’est youtube.”

Teacher 8

“I taught all three lessons and their favourite was the PSA. They really enjoyed the whole PSA experience. In the second one that we did, some of the kids wanted to turn it on its head and do anti PSA’s because we’ve been talking about technology and that kind of thing. So they were talking mental health issues and seeing it completely backwards. And the kids really enjoy that because they found when they did that, it was more explicit for them and they were able to talk about it.”

Teacher 4

“We did all the PSAs on ipads. They made imovies and then they edited them and did a really good job! They even presented their product to their health teachers and had a great response! They enjoyed the experience and sharing and it was fun to watch too!”

Teacher 4

2. OCDSB (Ottawa Carleton District School Board)

Teachers in the Ottawa Carleton District School Board (OCDSB) were instructed to teach Lesson One: “Setting the Record Straight: Authenticating Mental Health Information Online”.

Research question #2

To what extent has the program enabled students to identify support networks available to them in the community and to cultivate help-seeking behaviours for mental health issues?

A repeated measures analysis was statistically significant at the $p < 0.005$ level regarding **students' understanding of the Internet as a research tool**. Paired sample t-tests between each and every testing period indicated a statistically significant difference between the pre-test and the post-post-test ($p < 0.005$) and a trend between the post-test and the post-post-test ($p < 0.051$) regarding **students' understanding of the Internet as a research tool**.

Research question #3

To what extent has the program enabled students to be able to find authoritative sources of mental health information on the Internet?

A repeated measures analysis revealed statistically significant differences at the $p < 0.05$ level regarding **students' online search skills**. Paired sample t-tests between each and every testing period revealed a statistically significant difference between the post-test and the post-post-test ($p < 0.05$) and a trend between the pre-test and the post-post-test ($p < 0.054$) regarding **students' online search skills**.

The following quote depicts how students were able to learn from the variety of websites they accessed and their experiences in this lesson:

“the idea of searching the web was kind of an eye opener for them. Sites that they thought would have been legitimate before were no longer legitimate. Because they didn't have an official, like someone promoting like that kind of thing. There was no Dr. Oz, it was just some person writing something that they thought. So that for me, was the best thing and I felt that it worked the best because they were actually able to get in there and look things up and it allowed them to be more open with each other. It also helped bring a better classroom climate for my students because they are learning in the age of technology.”

Teacher 5

3. TDSB (Toronto district school board)

Teachers in the Toronto District School Board (TDSB) were instructed to teach Lesson Three: “Social Support Networks and Help-Seeking”.

Research question #2

To what extent has the program enabled students to identify support networks available to them in the community and to cultivate help-seeking behaviours for mental health issues?

A repeated measures analysis showed statistically significant differences at the $p < 0.01$ level regarding **students' understanding of mental illness**. Paired sample t-tests between each and every testing period demonstrated a statistically significant difference between the pre-test and the post-test ($p < 0.012$) and between the pre-test and the post-post-test ($p < 0.008$; 2-3 months after the lesson) regarding **students' understanding of mental illness**.

A repeated measures analysis was statistically significant at the $p < 0.000$ level regarding students' knowledge of Kids Help Phone. Paired sample t-tests between each and every testing period revealed a statistically significant difference between the pre-test and the post-test ($p < 0.000$), between the pre-test and the post-post-test ($p < 0.005$) and between the post- and the post-post-test ($p < 0.000$) regarding students' knowledge of Kids Help Phone.

The following teacher quotes depict how students appreciated the KHP call opportunity.

Highlights:

“The Kids Help Phone call was incredible. To me that was the highlight. When the date was set I went in the day before and told them they were going to have the opportunity to write questions that they wanted to ask on slips and I was going to ask a couple of volunteers to act as ambassadors to read or ask of the Kids Help Phone person. I then went through the slips and grouped them by similarities so as to avoid duplications”.

Teacher 2

“I thought going in to ask them, when I gave them the option to ask questions, and then going in and giving them the paper to ask questions, truly thought I would only get 5. I got like 50! Yeah I really thought I would only get a handful but the response was unbelievable and students were happy to be interactive.”

Teacher 1

4. Externat Saint Jean Eudes

The sole Quebecois school that participated in the program evaluation taught Lesson Three: “Seeking Help”. The following questions examine how students responded to the lesson regarding their understanding of mental illness, awareness of mental health resources and their knowledge of Kids Help Phone.

Research question #2

To what extent has the program enabled students to identify support networks available to them in the community and to cultivate help-seeking behaviours for mental health issues?

A repeated measures analysis showed statistically significant differences at the $p < 0.05$ level regarding **students’ understanding of mental illness**. Paired sample t-tests between each and every testing period revealed a statistically significant difference between the pre-test and the post-test ($p < 0.05$) and between the pre-test and the post-post-test ($p < 0.05$) regarding **students’ understanding of mental illness**.

A repeated measures analysis indicated statistically significant differences at the $p < 0.01$ level regarding students’ knowledge of Kids Help Phone. Paired sample t-tests between each and every testing period showed a statistically significant difference between the pre-test and the post-test ($p < 0.002$), between the post-test and the post-post-test ($p < 0.005$) and between the post- and the post-post-test ($p < 0.05$) regarding students’ knowledge of Kids Help Phone.

Discussion

Overall, this paper aimed to evaluate if student’s understanding of mental health problems, resources, and media involvement increased from the pilot program "Let’s Talk: Finding Reliable Mental Health Information and Resources" and it’s multi-media platforms. Each of the program’s three lessons were successful in enhancing students’ levels of mental health awareness. The following paragraphs will discuss the improvements associated with each lesson more closely.

Starting off, Lesson One, which was taught in the OCDSB, will be considered. The evaluation of Lesson One focused on students’ understanding of the Internet as a research tool. Results proved that there was a significant increase between the pre-test and the post-post-test signaling positive change in how students authenticate mental health knowledge online. There was also a significant trend in their understanding of Internet as a research tool between the post-test and the post-post-test, suggesting that the impact of the lesson has potential to grow over time. This is important knowing how much time youth spend on the Internet and how it can be used both constructively and destructively. Students’ understanding of the Internet as a research tool is therefore promising as this could enable them to use the web as a constructive tool when identifying support networks available to them in the immediate community and perhaps other international resources.

One of the teachers who taught Lesson One felt that students were able to closely identify with the learning and it’s exercise given that it was taking place in an online environment, a forum in which students are comfortable and well versed. This teacher found the experience to be an enlightening one for students as they were able to learn and appreciate the difference between trustworthy and untrustworthy online sources of information in their daily practice of web surfing.

Next, student learning in Lesson Two was assessed for the impact of advertising media on students’ mental health knowledge (CSDCEO school board). Analyses show significant differences for the three testing periods (pre, post, post-post) suggesting improvement in students’ mental health knowledge. Feedback from teachers made a link between this positive feedback and the video components of this lesson. More specifically, they expressed that watching PSA’s through YouTube gave the lesson materials and the program added credibility. Students were more encouraged and motivated to watch given that the PSA’s came from a web platform with which they were very familiar and comfortable. Students also thrived as their creative ideas and acting skills soared in the creation of their own PSAs using I Pads and some traditional skits. It allowed them to express themselves individually and amongst their peers and put the knowledge they acquired in to practice.

Lastly, the students from TDSB and the independent school in Quebec (Externat Saint Jean Eudes), learned about help-seeking through Lesson Three. Their knowledge and awareness of Kids Help Phone showed significant gains. However, one may caution that students' knowledge of this resource may not necessarily convert into its actual use because descriptive analyses showed that students would use this resource sparingly. That said, one may believe that "knowledge is power" because these students are more aware of this helpful resource which makes this tool relevant. As briefly touched upon in the results section of this article, teachers felt that the live phone call was truly a highlight in that it engaged students to actively write down questions, nominate ambassadors of the class to participate on the call, and access a live counselor in real time, a credible resource to whom they could ask all of their questions.

Overall, students from three school boards (CSDCEO, TDSB, Externat St Jean Eudes) significantly increased their understanding of mental illness such as definitions of anxiety and depression between the three testing points. These results are therefore relevant to consider when launching a national program of this kind, given that students were shown to become more cognizant and competent regarding key concepts and issues related to media products and mental health.

Conclusion

In conclusion, the lesson material in the bilingual program "Let's Talk: Finding Reliable Mental Health Information and Resources" was proven to be appropriate and efficacious for its student audience in all three Ontarian School Boards and the one independent school in Quebec. The results overwhelmingly affirm that the lesson materials and its use of multi-media platforms increased grades 7 and 8 student knowledge with regards to better understanding where to turn to and which sources to listen to when it comes to mental health. Media Smarts, having designed Let's Talk program lesson activities in conjunction with variety of different technologies, mainly video, the internet, and telephone was able to properly engage middle-school students and instill valuable information in their minds. The lessons are congruent with the recommendations of Canadian Mental Health Association and the Mental Health Commission of Canada who state that educational materials on mental health that engage the audience on a personal, emotional, and intellectual level have proven to be effective stigma reduction tools, as they increase favourable attitudes and decreases perceived dangerousness (Canadian Electronic Library, 2013).

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Touching Our Way to Better Conversations: How Tablets Impact Cognitive Load and Collaborative Learning Discourses

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Abstract

Recently, interest in touch-based tablet devices and collaborative learning has rapidly expanded around the world. This paper presents a conceptual framework that blends cognitive load theory and collaborative learning theory to discuss the impact of tablets on learning discourses. Research indicates using tablets requires fewer mental resources when compared to traditional computers. The disconnect between physical action and visual stimuli due to a keyboard and mouse is more mentally taxing than a gesture based interface. This extraneous mental effort can be detrimental to collaborative learning, where learners must also contend with the coordination, communication, and recombination of information. This paper discusses the potential to improve collaborative learning discourses by enabling direct interaction with learning content using touch-based tablet devices.

Introduction

Touch-based tablet devices, such as the Apple iPad, have gained significant traction and enthusiasm amongst educators, students, and technology leaders alike. Billions of dollars have been invested, and even entire schools have been created around tablets, yet little is known about how they are impacting learning (Evers, 2013; Mathis, 2013). These devices offer novel ways to teach, learn, communicate, and interact with digital content. In classrooms they are being used for a variety of learning tasks, including student collaboration (Simpson, Walsh, & Rowsell, 2013). The difficulty facing educators is the limited scholarly pedagogical supports on how tablets affect student learning. This paper explores available literature to develop a conceptual framework to describe collaborative learning with tablets through the lens of cognitive load theory.

Significance

The focus on collaboration was selected due to its longstanding widespread prominence in real world and academic settings. Johnson, Adams Becker, Estrada, and Freeman (2014) noted collaborative learning as one of the driving forces behind the latest educational trends in social media learning, online learning, hybrid or blended learning, and face-to-face learning. In non-academic contexts it is commonplace to work in teams and collaborate on tasks. Over time, collaboration has followed the general global shift towards digital formats and mediums evident in numerous aspects of learning.

The modern digital era has fostered an explosion of anytime-anywhere learning using mobile devices. Their portability, affordability, and always-connected capabilities have made them a popular choice (Johnson, Smith, Willis, & Levine, 2011). Mobile devices have triggered a cultural shift in the ways that people communicate, collaborate, learn, and interact. They have enabled great flexibility in synchronous or asynchronous collaboration discourses and tasks, without the geographical restrictions of traditional computers. What historically began as a choice between small functionally limited cellular devices, and larger more expensive laptops, mobile learners can now choose tablets as an effective crossover device (Johnson et al., 2013). More than simply an enlarged cellular phone or a shrunken laptop, tablets are a new dynamic and interactive form factor. Accessibility to the internet and social networking applications are often deeply integrated into the devices, leveraging the popularity of social media sites such as Facebook or Twitter (Johnson et al., 2013). The mainstream popularity of social media and a desire to shift away traditional 'learning in silos' models, has contributed to mounting pressure on educational institutions to incorporate more social and collaborative learning into education curriculums (Helfand, 2013). In response, some institutions have turned to tablets as one way to facilitate mobile and collaborative learning (Alberta Education, 2011; Cassie & Scott, 2011; Johnson et al., 2013).

The use of tablets in education is still largely in the preliminary stages, with limited supporting scholarly research available. Initial findings have reported enthusiastic satisfaction using tablets, noting benefits such as improved student engagement and the ability to collaborate in novel ways (Hutchison, Beschoner, & Schmidt-Crawford, 2012; Rowsell, Saudelli, Scott, & Bishop, 2013). Wang (2012) observed a relatively shallow learning curve for young learners using tablets compared to a traditional computer, allowing students to progress past the interface and focus on content more quickly. The researcher attributed this to the intuitive interface, which allowed students to directly interact with content, and mimic common real world gestures (e.g., swiping, dragging). Similarly, Paek (2012) argued that the physical interactions of the human body could have significant effects on cognitive processing. In their research, students performed multiplication tasks on tablets by manipulating virtual objects, known as virtual manipulatives. When compared to identical tasks on a typical computer, students performed tasks more quickly and accurately using tablets. These preliminary studies have found many positive results, but primarily focused on initial impressions with no consistent theoretical framework to support the reported findings.

Empirical studies on tablets have yielded mixed results, with some showing little or no difference in learning gains (Halliday, 2012), and some showing significant gains (Harmon, 2012). These findings suggest that perceived satisfaction or enjoyment might not be a definitive indicator of improved learning gains. As one of the cruxes of learning (Clark, Nguyen, & Sweller, 2006; Merriënboer & Sweller, 2005), cognitive load theory may be one way to dig deeper into understanding how the affordances of tablets are impacting learning. Moreover, with technology mediated collaborative learning as a persistent trend in education, there is a growing demand for theoretical supports to inform educators and decision makers on the use of tablets for learning. This paper seeks to answer this call by using the lens of cognitive load theory to explain some of the observations noted by researchers.

Cognitive Load Theory

Learning can be a challenging endeavour for students, especially concerning complex topics. One approach in the consideration of learning is cognitive load theory (CLT) (Clark et al., 2006; Sweller, Van Merriënboer, & Paas, 1998). This theory divides cognitive load into three types: intrinsic, germane (relevant), and extraneous (irrelevant). In brief, intrinsic load is a function of the complexity of the learning content, extraneous load corresponds to the mental effort required for all tasks not directly related to learning, and germane load corresponds to learning. Working memory is used to process the sum of these loads simultaneously, but is limited by a finite capacity, and if exceeded can hinder learning (Kalyuga, 2012). Thus, to maximize learning cognitive load needs to be managed and kept within the limits of working memory (Kalyuga, 2012; Mayer & Moreno, 2003).

Sweller (2010) also describes what is known as the modality effect. The underlying principle is that by using both auditory and visual processors (modes), working memory can be expanded. This benefit of dual-modality can be used to overcome situations where using a single mode exceeds the capacity of working memory. Reid, Strnadová, and Cumming (2013) observed that tablets could support dyslexic students, which typically have difficulty with language-based learning. Although they did not explicitly refer to the modality effect, they claimed that the combined visual and tactile sensory inputs of tablets allowed dyslexic students to learn more efficiently, suggesting some correlation with the effect.

Segal (2011) found that students using tablets reported a reduced mental effort when compared to using computers for an identical task. The researcher was able to show that gestural interfaces reduced cognitive load and improved learning. Using a mouse interface created a disconnect between physical movements and what was visually displayed. Conversely, tablets allowed students to directly interact with content using gestures that corresponded to physical movements, which yielded higher student performance. There are characteristic intrinsic loads associated with tablets, computers, and the learning content. Given that these are all interacting elements, when in use they consume a certain amount of human working memory. In the computer based scenario (of Segal's research), it is conceivable that the extraneous load was higher due to the additional working memory required to negotiate the physical/visual disconnect created by the keyboard-mouse interface. Conversely in the tablet scenario, the extraneous load may have been lower due to the intuitive use of gestures and direct interaction with content. For both cases the intrinsic load associated with the learning content remained unchanged. Returning to the dual-modality effect, the expansion of working memory only occurs when both modes directly correspond with each other. The two modes (physical and visual) of the mouse interface did not likely correspond, while for the tablet touch interface they likely did, possibly creating an expansion of working memory. This expansion would have allowed for increased germane load, and in turn improved performance (Sweller, 2010).

Novice computer users that must actively look at the keyboard and mouse during operation (e.g., children), may be especially partial to the extraneous load caused by splitting their attention between the interface and content (Sweller, 2010). Schrader and Bastiaens (2012) argued that if learners are able to minimize or even eliminate the

conscious acknowledgement of an interface, their attention on content can be sustained and learning may be improved. In their research on gaming environments, a high virtual presence (the feeling of being immersed in a virtual environment) made learners feel that game tasks were personally relevant to them, and heightened their engagement with the game. To realize gains in learning outcomes, they advised that games should be designed such that learners are engaged with learning content rather than just the environment or winning the game. Similarly, Hwang, Wu, Zhuang, and Huang (2013) attributed efficient access to information as a way to reduce intrinsic cognitive load and improve learning. In order to maximize learning, these studies emphasize the need to manage various aspects of cognitive load and keep it within the limits of working memory.

Collaborative Learning

Collaborative learning (CL) is generally considered beneficial under the assumption that multiple minds will be more fruitful than a single mind. Since there are many perspectives on what constitutes as collaborative learning, this paper assumes the broad definition offered by Dillenbourg (1999): “a situation in which two or more people learn or attempt to learn something together” (p. 2). Advocates cite discussion, constructive debate, deeper and more meaningful processing of information as some of the typical benefits of collaboration (Kirschner, Paas, & Kirschner, 2008). Despite these, researchers note that there are transactional inefficiencies in collaboration that also need to be considered.

The cognitive load that an individual can handle in working memory is finite, and some tasks may overwhelm that capacity. Thus, it can be reasonably argued that the larger collective mind of a group would be advantageous for complex tasks. In practice, the transactional costs of coordination, communication, and recombination of information creates extraneous cognitive load (Kirschner et al., 2008). The researchers note that for simple tasks, it is less efficient for a group to work collaboratively due to the transactional costs. In other words, from the perspective of cognitive economies, collaborative learning should be reserved for complex tasks to maximize benefits. The caveat of this perspective is that it is targeted at scenarios where the end goal is to complete a task in the most efficient way possible. In the case of brainstorming or concept mapping, the goal may instead be creativity or alternate perspectives, with efficiency being a lesser or non-existent concern.

Discourses

Language and discourses are key elements of collaboration, and are vital identifiers of learning (Gee, 2011). As Gee explains, language is underpinned by identity and intent. Without these, language and discourses hold no meaning. He describes identity as the role, agency, or perspective, while intent as the goal or objective that a person assumes when communicating. In addition, variations in language, vocabulary and intonation can help place learners along a knowledge level continuum between novice and expert (Gee, 2011). In a collaborative setting, differences in knowledge level will force learners to elaborate on their knowledge, and through the negotiation and justification of information with each other, gain a deeper understanding of the subject matter (Pfister, 2005). The authors also highlight that elaborative discourses among students are not usually spontaneous and require systematic supports (e.g., technology, pedagogy, direct human intervention or guidance) to improve learning.

Another perspective is academic discourse socialization, which describes the process of new or novice students being assimilated into existing academic discourses through social interactions (Marriott, Moore, & Spence-Brown, 2007). Observing and analyzing such interactions could allow for the identification of knowledge transfer and exchange. Ploetzner, Dillenbourg, Preier, and Traum, (1999) similarly describe the concept of ‘learning by explaining to others,’ as an effective approach to facilitate knowledge construction and deeper understanding. This exchange of knowledge works to achieve what is known as a common ground of information, where by the end of the interaction participants share a relatively similar understanding of the subject matter (Pfister, 2005). For example, Simpson, Walsh, and Rowsell (2013) observed an interaction between two elementary school students working on separate tablets to complete a reading task together. In the study, students used the tablet’s ‘pinch-tozoom’ to emphasize areas of interest on the screen to each other, and simultaneously used both oral and gestural interactions to collaboratively complete the task. Also in this instance, one student was more comfortable using the tablet and was able to navigate to a specific webpage more quickly than their partner. The partner, unsure of how to access the webpage, observed the more experienced student to guide their own actions. The bulk of the interaction was non-verbal and demonstrated one of the alternative ways that students can learn and interact with each other.

Tangibles

Interfaces embedded with some degree of computational power are known as tangibles (Price, 2013) or digital manipulatives (Manches & O’Malley, 2011). These technologies can take many different forms such as cubes

embedded with microchips (Manches & O'Malley, 2011), interactive multitouch surfaces (e.g., tablets, tabletops), or LightTables which use light beams and digitally enhanced blocks (Price & Jewitt, 2013). Tangibles offer novel ways for learners to interact with digital learning content. For example, interactive tabletops have been explored as a tool for facilitating collaborative learning (Battocchi et al., 2010; Morris, Fisher, & Wigdor, 2010; Schubert, Serna, & George, 2012; Stahl, 2011; Yuill & Rogers, 2012). These are large devices (e.g., forty or more inches diagonally) with multitouch surfaces, where multiple users may interact with the surface simultaneously. One of the advantages of these devices is that users are not restricted to a single point of control as with a mouse-based computer interface, where the physicality computers can make collaborating more cumbersome. Tabletops reduce or eliminate the need to explicitly negotiate which user controls the device at any given time (Higgins, Mercier, Burd, & Hatch, 2011). This negotiation could be classified as an extraneous load that is irrelevant to learning but necessary in a collaborative context (assuming group members alternate control of the computer). Interestingly, Do-Lenh, Kaplan, and Dillenbourg (2009) found that while students preferred using a tabletop interface, they actually performed better using a computer. They attributed this to the forced need for students to negotiate and communicate which student controlled the computer, due to its single point of control. Moreover, the physical constrictions prompted them to negotiate specific tasks and roles for students not controlling the computer. This may imply the poor performance was actually due to the poor organization of roles and task assignment, rather than the interface.

Martinez-Maldonado, Dimitriadis, Martinez-Monés, Kay, and Yacef (2013) studied verbal and physical interactions of learners collaboratively using a tabletop. Their findings showed that when there were high levels of simultaneous uncoordinated verbal and physical interaction, the quality of collaboration was low. Conversely, when students alternated between high levels of coordinated discussion and physical interaction, the quality of collaboration was high. Additionally, when one student orally accompanied or supported the physical actions of another student, collaboration quality was also high. The results of Do-Lenh et al. (2009) and Martinez-Maldonado et al. (2013), indicate that the benefits of a tabletop are most likely to be realized when there is a mutual understanding between users and their efforts are coordinated in unison. A similar approach could be taken with tablets to ensure that they contribute to learning rather than group dissonance.

Implications of Literature

The surveyed literature indicates that educators are enthusiastic on using tablets for learning. Initial findings are positive with increased engagement, portability, affordability, intuitive interface, and general satisfaction commonly cited as benefits. Empirical studies have found mixed results, with some showing significant improvement in student performance, while others showing little or no improvement. The principles of CLT suggest that tablet interfaces can have a significant impact on student learning. A combination of gestures, intuitive design, and the ability to directly interact with content all affect cognitive load. These effects are further emphasized during collaboration, when learners must also negotiate discourses and interactions. These theoretical perspectives provide insight into some of the ways that tablet interfaces are impacting learning and the ongoing cultural shift towards the increased use of mobile devices. The literature also reveals that further research is required to develop pedagogical supports to inform educators.

Framework

This framework proposes to explain how a multitouch tablet interface can impact collaborative learning from the perspective of cognitive load. Tablets offer unique affordances not readily available with other digital devices. They allow learners to directly interact with content using gestures, omitting the need for an intermediary input device (e.g. mouse and keyboard). In turn this intuitive interface may affect learning. Using a mouse and keyboard with a traditional computer requires a certain amount of mental effort. Users must determine which keys to press and where to move the mouse to achieve a task, all of which requires mental effort. For novice users negotiating these input devices can be especially distracting and detrimental to the completion of the task at hand (Clark et al., 2006), and even experienced users must expend some mental effort. In addition, there is an inherent disconnect between the user's physical actions and what is visually displayed. The mental effort required to use a keyboard and mouse can be classified as extraneous cognitive load (Sweller, 2010). For learners, this type of cognitive load does not directly contribute to learning but is necessary to complete a task using a computer. This extraneous load can hinder learning by forcing students to alternate their attention between the learning content and the input devices (Baker, 1999; Sweller, 2010). Under CLT learners must divide their limited working memory among three types of cognitive load: intrinsic, germane, and extraneous. Where intrinsic is fixed as a function of the complexity of the learning content, germane is used for learning, and extraneous is anything not directly related to learning.

The advantage of using a tablet compared to a computer is that students are able to reduce their extraneous load (Paek, 2012). As a result, students can learn more effectively by allocating more working memory to germane load. This reduction in extraneous load is due to the omission of intermediary input devices, allowing students to directly manipulate content. The benefit is further compounded when visual and kinesthetic stimuli correspond to each other, leading to the modality effect (Sweller, 2010). When this occurs working memory expands, allowing learners to negotiate tasks of greater complexity. Additionally, touch interfaces can facilitate the use of gestures such as swiping or dragging, which can reduce cognitive load and improve performance (Goldin-Meadow, Nusbaum, Kelly, & Wagner, 2001; Segal, 2011).

Collaboration

In collaboration, students work together to accomplish a learning task. This can occur in many different forms with and without technology. For simplicity, the following discussion is orientated around a scenario where two learners share a single tablet. To complete a learning task, students must use working memory to process the corresponding cognitive load from three primary sources: interacting with the tablet, interacting with the other student, and engaging with learning content (see Figure 1). The intrinsic cognitive load of interactions with the tablet and of the learning content is assumed to be largely independent of collaboration. This is because for a given task, the tablet interface and the learning content is constant, and does not become more complex when collaborating. Conversely, interactions with the other student can contribute multiple levels of complexity to the overall learning activity.

The interactions between the two students can be divided into three main categories (see Figure 1): verbal discourses, non-verbal discourses, and discourses supported (mediated or augmented) by the tablet. Typical verbal discourses can include negotiation and justification of information, elaboration (Pfister, 2005), explaining oneself to others (Ploetzner et al., 1999), general discussion, and constructive debate (Kirschner et al., 2008). Non-verbal discourses can include hand gestures while speaking, facial expression, gaze, and physical posture relative to the other student and the tablet (Gee, 2011). Discourses mediated or augmented by the tablet can include pointing to a point of interest while speaking, writing or drawing diagrams on the tablet as part of communication, and manipulating digital content to emphasize points of interest (e.g., 'pinch-to-zoom' or panning) or show alternate perspectives (e.g., rotating a three dimensional object) (Simpson et al., 2013). All of these interactions contribute to the overall cognitive load of the learning activity that must be negotiated by students. In scenarios involving highly complex tasks or more individuals, the cognitive load of interactions can be even higher. Thus, the cognitive load associated with using a digital device to support student interactions should be carefully considered so as not to overload the working memory of learners.

Another important factor in using digital devices for collaboration is the interface. A cumbersome interface (e.g., keyboard-mouse) can cause students to split their attention between the device and other students, making learning and interactions more difficult. Conversely, an intuitive interface (e.g., touch screen tablet) is able to fade into the background of students minds, allowing them to become more engaged with discourses and learning content

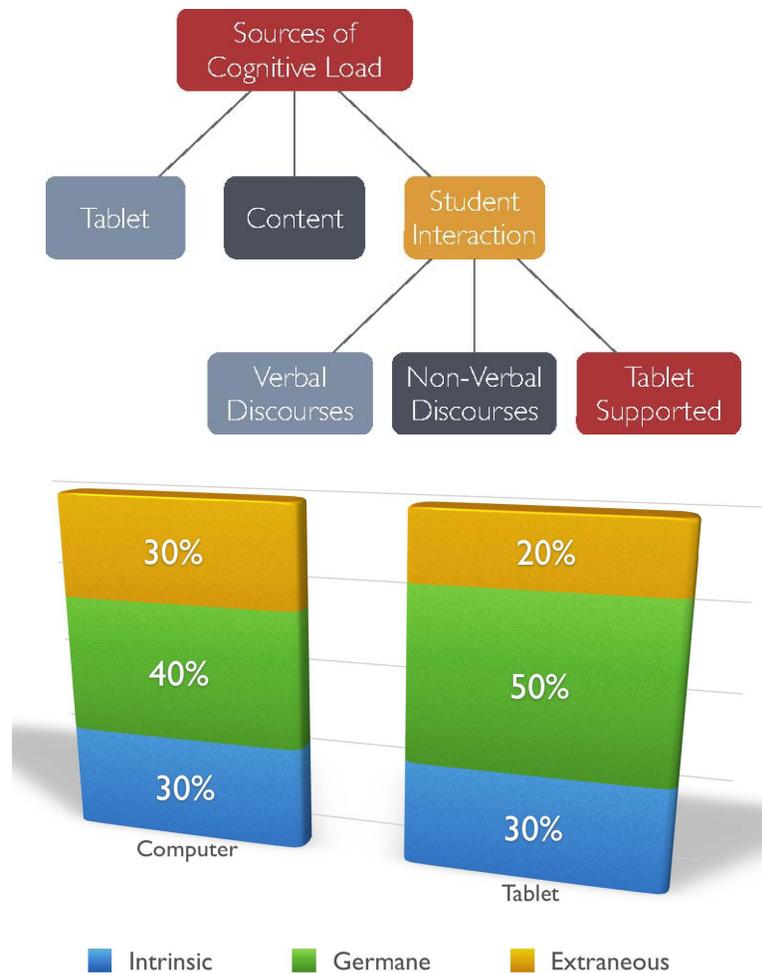


Figure 2: Hypothetical example of cognitive load distribution (percentage values are arbitrary) when comparing students collaboratively completing identical tasks on a computer and tablet. (Schrader & Bastiaens, 2012).

Deeper understanding and meaning making is most readily achieved when learners are able to sustain their attention on one thing at a time (Baker, 1999; Sweller, 2010). Compared to computers, tablets have the potential to reduce the cognitive load corresponding to the use of a device (see Figure 2). This reduction in cognitive load could allow learners to dedicate more working memory to interactions other people and learning content. Moreover student discourses could achieve higher quality and greater depth due to the increased availability of working memory to process germane load.

The benefits of using gestures to interact with content can also be extended to collaborative settings. Given the principles of the modality effect, it may be possible for students expand working memory by using tablets to mediate gesture-supported discourses. An easy to use human centered interface can promote students to communicate with the support of external representations more readily (Norman, 1993), and expedite the process of achieving a common ground of interaction (Baker, 1999). Developing and maintaining a common ground of information, interaction, and task completion strategy are important factors towards achieving high quality collaborations (Martinez-Maldonado et al., 2013; Oliveira, Tinoca, & Pereira, 2011). A tablet gesture based interface cannot only minimize the cognitive demands of using technology to support collaboration, but also enable instinctive discourse interactions.

Limitations

Many of the benefits of using tablets to support collaborative learning are dependent on the interface, which in turn is significantly dependent on the design of the software application that is used. A poorly designed application or simply

using an application that is not well suited for a given task can diminish many of the benefits. The careful selection of both hardware and software is a critical element in maximizing the advantages of using tablets.

This framework is situated around a specific scenario (i.e., two students sharing one tablet), and may require further considerations to transfer to other situations (e.g., more than two students, multiple devices, combinations of virtual and physical shared spaces). That said, the cognitive benefits of tablet interfaces, and the ability to use gestures can be applicable to other scenarios.

Implications and Future Directions

This framework offers educators one approach towards understanding some of the intricacies of collaboration using tablets. Through the lens of cognitive load, learning processes can be examined in-depth and paint a clearer picture of how tablets are impacting collaborative learning. Educators can use this knowledge to assist in the strategic selection of hardware and software that will be of the greatest benefit to students for specific learning tasks.

The practical validity of this framework has not been verified and is based on a synthesis of established theoretical models. A rigorous validation would be the next stage of development, although as other researchers have noted the complexities of collaborative learning are challenging to analyze (Martinez-Maldonado et al., 2013; Meier, Spada, & Rummel, 2007).

Conclusion

The literature and the proposed framework indicate that interactive technologies can reduce cognitive load, by allowing students to use gestures coupled with an intuitive interface to interact more directly with learning content. This reduction can improve learning and allow students to process information more easily. Regarding collaborative learning, this framework identifies three primary sources of cognitive load: tablet use, complexity of learning content, and interaction with others. The interactions with others are further broken down into three types: verbal discourses, non-verbal discourses, and tablet supported discourses. The relations between these elements all affect cognitive load and moreover learning. This paper develops a framework using cognitive load theory to describe some of the ways that tablets can impact collaborative learning. Collaborative learning and technology continue to be persistent trends in education with no signs of slowing down. To support educators and decision makers, theoretical pedagogies must continue to evolve and be relevant to the ongoing rapid developments in technology.

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The Effect of Self-Assessment on Achievement in an Online Course

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Abstract

The aim of this study is to research the effect of self-assessment on achievement in an online course at higher education level. The study was conducted with 688 participants (360 male and 328 female) at online Project Culture course at a foundation university in Turkey. A one-way between subjects ANOVA was conducted to compare the effect of self-assessment on achievement depending on attempt number. Our results suggest that when attempts to self-assessment increase achievement level increase as well.

Introduction

The concept of self-assessment is not new and is discussed in many instructional design textbooks (Gagne, Briggs & Wager, 1988; Gale 1984; Rowntree, 1991; Laurillard, 1993). Self-assessment, the process of understanding more about oneself is a valuable skill, both in life and when studying (Taylor, 1998).

The concept of open and distance learning suggests an educational approach designed to reach learners in their homes/offices/shops etc, provide learning resources for them to qualify without attending formal classes in person, or create opportunities for lifelong learning, no matter where or when they want to study (Letseka & Pitsoe, 2012). It is particularly important for distance education students since learners are in remote locations and isolated from instructors and other learners. Self-assessment can result in major benefits both for instructors and students (McConnell, 2006), specifically it is more oriented to students, provides instant feedback.

Furthermore, the students become less dependent on their instructors, responsible and autonomous; they take on a more proactive role and develop self-confidence (Ćukušić, Garača, Jadrić, 2014).

The aim of this study is to research the effect of self-assessment on achievement in an online course at higher education level.

Method

The study was conducted with 688 participants (360 male and 328 female) at online Project Culture course at a foundation university in Turkey.

Table 1: Number of Students in Project Culture Course

Gender	Number of Students
Male	360
Female	328
Total	688

Project Culture course is a foundation course of the university. The main point is to provide the basic information for the students to perform practicable projects in the direction of their real experiences and support them with producing new projects.

This course is chosen by the students studying on Bachelor programs (Faculty of Science and Letters, Faculty of Fine Arts, Faculty of Law, Faculty of Economics and Administrative Sciences, Faculty of Communication, Faculty of Architecture and Faculty of Engineering) or on Associate Degree programs (Vocational School). It is a compulsory course for students of all departments within each faculty and vocational school program. Number of student enrollment in terms of faculty and vocational school program in Table 2.

Table 2: Enrollment by Faculty and Vocational School program

Faculty	Number of Students
Faculty of Science and Letters	66
Faculty of Law	132
Faculty of Economics and Administrative Sciences	137
Faculty of Communication	60
Faculty of Architecture	79
Faculty of Engineering	123
Faculty of Art and Design	47
Vocational School	44
Total	688

Project Culture course is composed of 7 modules. There is a self-assessment quiz at the end of the each module. Self-assessment quizzes are designed for distance students in order to provide them with an opportunity to ascertain their mastery of particular topics. Due to their advantages the online multiple-choice (MC) questions are used. The purpose of self-assessment quizzes is to allow students to assess how much of the unit they understood. A self-assessment quiz consists of ten multiple-choice questions concerning issues raised by the related module. The quiz questions cover all of the main points of modules. Sakai CLE was used as learning management system. It incorporates functionalities for developing and processing online tests. For each module a question pool contain at least 100 questions was created. Students come across 10 different random questions at each attempt. After each attempt student was received automated feedback. Feedback includes a short explanation about right and wrong answers and refers to related topic in module. Number of attempts is not limited. Attending this self-assessment activity is voluntary.

A one-way between subjects ANOVA was conducted to compare the effect of self-assessment on achievement depending on attempt number to self-assessment activates in four conditions (Table 3), which are “No attempts to self-assessments”, “Attempts to self-assessments of some of the modules”, “One attempt to self-assessment of each module”, “Multiple attempts to self-assessment of each module”.

Table 3: Coding for attempts made to self-assessments

Code		# of Students
0	No attempts to self-assessments	51
1	Attempts self-assessments of some modules	234
2	One attempt to self-assessment of each module	173
3	Multiple attempts to self-assessment of each module	230
	Total	688

In Table 3:

- “No attempts to self-assessments” refers to participants who did not attempt to self-assessments and took none of the quizzes.
- “Attempts to self-assessments of some of the modules” refers to participants who took the self-assessment quiz of some the modules, not all of them.
- “One attempt to self-assessment of each module” refers to participants who made one attempt to self-assessment of each module and took the each self-assessment quiz once.
- “Multiple attempts to self-assessment of each module” refers to participants who made multiple attempts to self-assessment of each module and take the each self-assessment quiz more than once.

Results

First of all there is no significant difference between total course grade of female and male students, as seen in Table 4:

Table 4: Achievement of Students in Project Culture Course

Gender	N (688)	Total Course Grade Average
Male	360	72,17
Female	328	72,81
		72,48

Assessment is an important part of learning process. It is linked with learning experience of students. In this study, students assess themselves by taking self-assessment quizzes at the end of the each module.

A one-way between subjects ANOVA was conducted to compare the effect of self-assessment on achievement depending on attempt number (Table 5).

Table 5: Effect of self-assessment on achievement depending on attempt number

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	76382,68	3	25460,89	640,96	,000
Within Groups	27170,51	684	39,72		
Total	103553,19	687			

There was a significant effect of self-assessment attempts on achievement at the $p < .05$ level for the four conditions [$F(3, 684) = 640,96, p < 0.001$].

Table 6: Group summary details

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
No attempt	51	49,02	8,36	1,17	46,68	51,37
Attempts some of the modules	234	64,54	6,18	,40	63,74	65,34
An attempt for each module	173	74,18	5,94	,45	73,29	75,07
Multiple attempts	230	84,47	6,16	,41	83,67	85,27
Total	688	72,47	12,28	,47	71,56	73,40

Post hoc comparisons using the Tukey HSD test indicated that the mean score for participants who did not attempt to self-assessments ($M = 49.01, SD = 8.36$) were significantly different than participants who attempt self-assessments. Post-hoc tests also indicated that participants who Attempts self-assessments of some modules ($M = 64.54, SD = 6.18$) were significantly different than participants who made One attempt to self-assessment of each module ($M = 74.17, SD = 5.94$) and Multiple attempts to self-assessment of each module ($M = 84.46, SD = 6.15$).

Specifically, our results suggest that when attempts to self-assessment increase achievement level increase as well. The development of an assessment strategy should take into account the purpose of the evaluation results plus it should always be planned simultaneously with the preparation of learning activities.

During the process, assessment can be perceived as one of the enablers of innovation and change in an educational setting (Čukušić, Garača, Jadrić, 2014). The selection of assessment techniques and appropriate assessment tools is an integral part of planning the e-learning processes.

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Perceptions of the Role and Value of Interactive Videoconferencing and Chat Rooms in Supporting Goals of Cross-Cultural Understanding Among Three Educational Nonprofit Organizations

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1. Introduction

The increasing prevalence of information and communication technologies (ICTs) in the educational system of many countries has been accompanied by a proliferation of research documenting their significance for teaching and learning (Moos and Azevedo, 2009). “Blended” e-learning systems that integrate technology in classroom learning have been presented as a promising alternative learning approach (Graham, 2006). The emerging trend of integrating ICT tools, namely interactive videoconference, email, online chat, and digital and social media, in education emphasizes a collaborative construction of information and can support cross-cultural awareness, linking school experiences to real-life situations. These mechanisms and learning “spaces” can nurture the development of vital cognitive, social, and technical skills critical to the preparation of future citizens for the existing and emerging knowledge societies (Anastasiades, 2009).

This research paper seeks to contribute to an understanding of how international education programs that focus on cross-cultural interaction perceive the value, role, and challenges of information and communication technology in achieving their goals. The paper explores how different international education programs see the capacity of Interactive Videoconferencing (IVC) and chat rooms to assist in achieving their program goals, by examining three New York City- based nonprofit organizations. These organizations have similarly articulated goals, but their process of utilizing technology is distinct, informed in part by the age of the participants (middle school or university students) and the goals of the program (awareness building or attitudinal change in students).

The aim of this paper is to present the perspectives of key international education programs on the methodologies they employ in using ICT to connect students toward achieving goals of cross-cultural understanding. This exploration may serve as a valuable contribution to larger conversations on the pedagogical use of technology integration in international education.

The structure of this paper is as follows: The second part describes the key academic literature on the research topic. It is followed with a description on the methods employed in undertaking the research. In the fourth and the fifth parts, the major findings and their relevance and contribution to the broader conversation in this field are discussed. The last part of the paper presents the concluding remarks and provides food for thought for the readers.

2. Literature Review

According to Bacon and Kischner (2002), the goal of a new global curriculum for the twenty-first century must be to broaden students' perspective to the point at which they begin to view themselves as global citizens in a rapidly changing world, where they encounter, compare, and adopt multiple international views. Worldwide, there has been widespread expansion of technology-based education leading to an ever growing interest in how multiculturalism comes into effect (Garcia-Penalvo, 2013). The pedagogical design of interactive videoconference (IVC) contributes to the opening up of classrooms to new communities, and fosters familiarization with new learning and cultural experiences and alternative and innovative learning approaches (Anastasiades 2009). According to Anderson (2008), videoconferencing plays an important role in the networked distance education tool set. But as a stand-alone system, it does not provide the level of student engagement with teachers, other students, or content, sufficient to sustain their attention, enthusiasm and, ultimately, high levels of learning. As Clark (2000) mentioned, it is the application, design, and ways that the technology is used that determines its educational value – not the simple acquisition or use of the technology. Newman (2008) states that although the application of IVC and chat rooms in schools is increasing significantly, there is a lack of pedagogical design in the educational IVC projects. In a survey conducted by one of the studied nonprofit organization, a number of students expressed that they would like the length of the videoconferences to be longer than one hour to further delve into the subject matter. Furthermore, many students suggested that there should be a maximum of three schools participating in the conference at one time.

This research seeks to study perceptions of the role of technology in achieving cross-cultural understanding among students. It is interesting to note that Means (2003) believes that ICT probably holds more potential for university education than it does for K-12 school education. The research studies different organizations engaging both university and secondary school participants.

If one believes that IVC is like a conventional “face-to-face instruction,” he/she will be disappointed (Anastasiades, 2009). Evaluations of the effectiveness of the educational use of IVC indicate that it has not yet met participants’ expectations (Delaney et al., 2004). According to Ferran and Watts (2008), adult attendees of videoconferences must work harder to interpret information delivered during a conference than they would if they attended face-to-face. Participants do not share the same three-dimensional space, as they can watch only what the camera shows, so critical nonverbal contact among participants is often vague. Hearnshaw (1998) claims that IVC is considered to be beneficial in supporting dialogue, but may not be appropriate for decision-making. Students’ evaluations of their participation in videoconferencing with one of the three nonprofits studied in this research echoed that they were not pleased with the impersonal feeling of the videoconferences, coupled with the “ping-pong effect” which happens time-to-time in videoconferences.

It is worth mentioning that the biggest concerns of students in interactive videoconferencing were frustrations with schools who were not prepared to engage in dialogue due to their lack of familiarity or comfort with the subject matter; frustrations with technological lags, especially when schools in different countries operate on different bandwidth speeds; and language/accents challenges, which made the interaction difficult to understand.

While the educational programs engage groups through the medium of technology, Sim and Bovard (2004) believe that the quality of facilitation of discussion amongst the groups is highly correlated to the quality of experiences students have in online interaction. Sheingold (2005) comments, “there is a dearth in the research on what facilitators do in varied online learning environments or how facilitation contributes to interaction and learning.” Anderson et al. (2001) suggest that “effective online discourse must also be guided toward higher levels of learning through reflective participation, as well as by challenging assumptions and diagnosing misconceptions.” According to these authors, the online facilitator is the person who makes sure that learning happens and he has to maintain a teaching presence that in turn allows collaborative knowledge construction. This research explores program views of the role of the moderator/facilitator in online dialogues and projects. One of the educational nonprofit’s student feedback report (2009) reflects that in terms of the effectiveness of the moderators, students generally provided positive feedback, where 37.7% rated the moderators as effective. Nevertheless, 10% of students surveyed believed that the moderators were not effective, due to the fact that students did not get enough time to speak and interact with youth from other schools.

Punie (2007) offers a carefully reasoned projection of the future benefits of ICT for education by firmly grounding this technology in the changing social realities of the early twenty-first century. In the time when much of the world is transitioning from late industrial societies to knowledge-based societies, Punie argues that ICT will necessarily be located at the center of what he calls “learning spaces,” where the educational needs of learners will have priority. At the same time, however, the guidance of teachers will still be essential. Moreover, these new learning spaces will only be able to function properly if they are embedded in a cultural and social context that is firmly committed to ongoing innovation in all aspects of life. The author admits that ICT has not lived up to its educational promise yet, but he believes that it will do so in the near future. As Unwin (2007) observes, “it is not the availability of the technology which is important, but how it is used” (p. 300).

Considering the existing literature, this research seeks to contribute to the expanding conversation, in areas of international education programming, about the value and best approaches to utilizing interactive videoconferencing and online chat rooms to facilitate cross-cultural understanding.

3. Methods

Research Question: How do International Education programs that focus on cross-cultural interaction use IVC and chat rooms to achieve their goals?

A validation field study involving three global educational nonprofits was conducted. Multi-source data including interviews, surveys, live and archived videoconferences, classroom observations and small group discussions were studied. A combination of the case study method of Stake (1995) and the method of constant comparison outlined by Glaser and Strauss (1967) was used for data collection. Interviews coding and participants' evaluation were matched to increase the validity of the study. Four sub themes were identified across all the three organizations that serve as comparative findings of this qualitative research.

After the formulation of the research question, one of the three nonprofits was chosen as an observation site. Additionally, program director, assistant directors, and CEO of the three respective organizations were interviewed. All have direct observation experience, as well as extensive knowledge of the program and its goals and outcomes. A variety of difficulties were encountered throughout the methods process. Since it was originally difficult to secure an informative observation opportunity that would be relevant to the research question, it was concluded that the most realistic option was to choose a videoconference from these organization's online database. However, this form of observation lacked key components of a live observation and hindered the ability to observe all aspects of the interactions taking place. Instead, the video darts between four to five schools, and cut out at the most opportune times for crucial observation. It was difficult to pull significant conclusions from these observations considering the limited opportunities to witness extended dialogue between students. In addition to this, glitches, frozen screens, skipping and cutting out, obstructed the ability to observe an uninterrupted flow of dialogue.

There are also inherent limitations in the organization's program outcomes that were given by one of the organizations. There was only a small portion of schools/university students that responded to the online survey conducted by these studied nonprofits. Since this sample size is small in comparison to the number of schools which actually participate in the live videoconferences, the results of the survey could be skewed.

Observing a live videoconferencing session in one of the organization's office with middle school students who were on an educational tour from Dallas, Texas was the first-hand data collection experience. However, this videoconference had a number of technical issues that affected the observation. After couple of minutes into the live videoconference with Haiti, the office lost signal and the connection could not be restored with the other schools for the remainder of the videoconference. An intern did facilitate a discussion regarding the topic to be discussed with the group of students who were set up in the nonprofit office. An impromptu interaction was observed, although it reinforced the idea that technology comes with its own challenges which might not be controlled even after all the preparations for a fruitful student's interactions via IVC and online chat rooms were already planned.

4. Findings

In order to explore how three key international education programs understand the role and value of technology in helping to achieve their goals of cross-cultural understanding, it was critical to examine why and how they articulate their engagement of technology, and how they perceive its benefits and challenges in their work. It was found that while the programs articulated similar goals and sensibilities about the role of technology in achieving them, their approaches to process, conceptions of outcomes, and future visions for using technology varied. Ultimately, the findings may offer relevant indicators for how these technologies may expand, shape, and affect some of the most critical efforts in the field of international education now and in the future.

4.1 IVC Can Extend the Reach of Cross-Cultural Programming

The programs expressed common goals, which mirror those of the broader international exchange field, but which originated from ideas about how IVC and online chat rooms might be used to achieve them. In interviews, one of the nonprofit's program staff described the initial idea behind the program, saying "IVC can be such a bridge, because...people don't have a lot of money to do exchanges, so why don't we do more virtual exchanges and bring the world into the classroom..." (interview, educational program 1) and the other nonprofit described employing the "broadest way to kind of foster cross-cultural understanding" to "develop and support this global diverse community who use immediate technologies like IVC to foster cross-cultural understanding and respect" and a "broader online

social network intended to engage a diverse audience interested in social change” (interview, educational program 2).

While one organization expressed the broad goal of “connecting them (students) with these other parts of the world” (interview, educational program 1), the other organization staff focused on improving the U.S./Muslim world relationship, saying “it’s not necessarily natural that a young kid in the Bible Belt will connect with a young kid in Gaza...” (interview, educational program 2). The third organization staff shared that “post-9/11 there was a lot of funding from the State Department to foster mutual understanding...between teachers, students and their peers in the Muslim world, so we’ve put a concerted effort into ensuring that those relationships are happening” (interview, educational program 3).

In interviews, interactive videoconferencing emerged as an increasingly standard tool in the field of international education today, a way to extend the experience and benefits of exchange to new places and people. “Who is doing IE *without* technology?” remarked one program (interview, educational program 3). One of these nonprofits sees new media “just as a tool for promoting understanding and facilitating dialogue... It encourages more collaborative approaches,” but is “truly based on how you use those technologies” including “as a platform for engaging people for social change” (interview, educational program 2). One program noted that “especially in underperforming schools... it’s interactive so it keeps their attention” (interview, educational program 1).

4.2 Perceptions of the Role and Value of Facilitation Varied

The technologies employed by the three programs include live videoconference (used by all three), email, chat rooms, and social media. The data most closely examined interactive videoconference and chat rooms use and the experience. The research focused on how programs conceive the interactive experiences they support – and what emerged as a point of differentiation was how they discussed the fact of and approaches to structuring and facilitating the interactions themselves.

While it often seems there is a sense that new media and technologies themselves are a panacea for inclusiveness, the programs expressed that these spaces require attention or they can become, in the words of one of the organization staff, “communities like self-echo chambers” (interview, educational program 2). “There’s a lot of assumption that new media... opens up, as its about diversification and creation about choices. But in actuality, new media is used just as a tool.. People are not opening up for diversification and do not discuss information that create pre-existing biases...How one socializes within one own social network is how people want one to do” (interview, educational program 2).

All the programs, in slightly different ways, connect classrooms around the globe on topics of interest and importance to participants – but there was variation in their conceptions of the role of facilitating the interactive spaces and sessions.

Two of the three programs which were interviewed facilitated the interactive, live videoconference sessions that comprise the IVC tool used by all of them. One of the staff expressed that they “put of lot of attention into what kind of processes we need to follow in order to have new media connection so that people from diverse backgrounds can connect and communicate...to create a safe space for diverse community... dialogue” and sees the “critical role of facilitators to encourage fundamentally eager level of engagement” (interview, educational program 2). This role serves the program goals by “keeping things on track, making sure different voices are heard,” they described. While they admit this may be perceived as an “artificial process” it is instrumental to allow students to separate their views from their inner biases” (interview, educational program 2) – a clearly stated goal of the program.

Another organization’s videoconference sessions take a more hands-off approach, which they describe as “moderation” (interview, educational program 1). “It’s not our role to guide the debate,” describes a program staff. “We’ve never had to stop a videoconference, but some of them have gotten heated,” but “we just sat back and listened” (interview, educational program 1). Observations of this organization’s videoconference sessions (live and previously recorded) indeed showed groups of students engaging in a prolonged Q & A on a variety of topics (genocide, culture, Palestinian-Israeli conflict, etc.) with a moderator in a limited role helping repeat questions that were inaudible and telling the groups when it was time to move to the next question.

However, as observed in the Egypt/US/Canada session, this resulted in frequent rephrasing – as opposed to repeating – of questions that may have misconstrued the inquirer’s intent; and the highly managed Q & A format often had a “ping-pong effect” – where, though each question was asked and answered effectively, no real or sustained dialogue emerged. On occasion, follow-up questions were posed, but more often the response signaled the end to exploration of that topic. It was also observed that the Q & A and marginal involvement of the adult facilitator frequently resulted in a few most vocal students participation while others looked on (observations, educational program 1).

Some programs saw technologies used to supplement the live videoconferencing, such as online chat rooms, as ideal spaces for facilitating transformative dialogues: “with written communication you have time to reflect and de-escalate if needed– it brings out something that live might not if we’re in each other’s faces and we’re arguing and we don’t see the topic in the same way, sometimes the online communication can give people time to reflect before responding... people are really honest when you might never meet them...so it allows people to really say what they’re thinking” (interview, educational program 3). This organization expressed that they do not guide or facilitate the actual classroom/school interaction, but scan the online chat rooms and see the dialogues progress and participants self-police themselves in the interactive space. Its staff notes:

“(There are) so many examples where a student will post something inflammatory and someone else will respond and so a teacher calls attention to it or we see it ourselves - there’s just so few instances where we’ve gone in there ourselves and said – ‘children’ ... denied them access. It’s a community of students – so someone will come on and say, ‘I think you’re making generalizations and not all people are like this and I’m actually Irish and I’m not like that’ – and another one will come on and say, ‘I’m glad you said that because I’m also feeling that’...it’s amazing, they self-moderate.” (interview, educational program 3).

4.3 Technology Has Value, But Faces Challenges

Key benefits to using technology expressed in interviews focused on the value of extending the cross-cultural experience to people who might not otherwise have interacted, whether because of geography, politics, economics, or students’ own personal challenges.

One program stated the value as “access, the multiplier effect of using the technology – the cost of bringing one exchange student to the US for a year is nearly \$18-25,000. That could train – huge number of national trainings. And cell phones – I have been everywhere and no one doesn’t have cell phones. I feel like that about Internet too – not in each home, but there’s a little kiosk and they’re all gathered around it... So being able to have that far reach is completely due to the technology” (interview, education program 3).

From an international politics perspective, countries or cultures whose relationship in state or diplomatic spheres can find channels to interact and normalize relations at least while collaborating. “The fact that someone can be on a project involving so many countries... to the U.S./Russian example. You can be working with someone from wherever and you don’t have to say we’re partnering with them but we’re part of this environmental project and we’re all working together, so sometimes it allows groups that aren’t officially sanctioned to work together to still be in communication with each other” (interview, educational program 3). One program actually trains students to utilize new media to tell and share what they’ve learned. “A major challenge with young people connecting to sensitive issues of Muslims or Jews is that they have to reply to their parents and friend... that is the kind of bravery or courage we are trying to encourage. We put them with the skills and tool sets of how you shoot things with video camera, “digi” or “Flip” camera? How do you tell stories in a compelling and effective way? And how to get access and distribution to truly get these out to the world?” (interview, educational program 2).

Still, programs agreed that challenges to using IVC abound – both technical and substantive. “It works 80% of the time,” says one program, “it can be very slow, sometimes it freezes, it drops off” (interview, educational program 1). “The connection drops, they can’t go online, the computer broke... it’s constantly having to manage peoples’ expectations” (interview, educational program 3). In observations of both live and previously recorded videoconferences, “technical difficulties” required repeating of questions, as well as lagging camera focus so that students “cannot tell if there is a reaction” to their questions/responses (field notes, educational program 1).

While connectivity is increasingly pervasive, capacity and geography still present challenges. Especially when working with “poorer communities and rural areas in the U.S....it’s just getting them the technology,” while abroad, “it depends... in India, we have no problems. But certain parts of Africa, very challenging” (interview, educational program 1). All programs expressed the challenges of managing translation.

4.4 IVC’s and Chat Rooms Future in Cross-Cultural Programming

Beyond technical challenges, imagining the future of these programs and how they employ IVC and online chat rooms, programs emphasized expanding reach and longer term impact, translating the online experience to the real world.

One of the educational nonprofits sees their future use of IVC focused on connecting with people who haven’t had exposure but are really critical to the community to which they plug in to. “So we work really hard not

to just get already globalized young people who are important and great, we love them, but we also try to get who haven't had ability to connect cross-culturally" (interview, educational program 2).

Another organization articulated interest in connecting the online experience to offline international development efforts. "What we're trying to do is make our programs more sustainable...make more of our programs in the future tied to viable long-term development...How does the school work with continuing relationships?" (interview, educational program 1). For example, a program with Haiti involved "live link-ups, connecting them to school rebuilding projects and carrying that out so that in two years we can say that your funds have built fifty schools, look what you've done" (interview, educational program 1). The third organization also agreed that the connection between interaction online and action on the ground –behavioral change – is important: "did they go back to their communities and start doing community service projects?" (interview, educational program 3).

Engagement of existing new and social media is also on the minds and in the future plans of these programs. One of these nonprofits is experimenting with "taking things to a much different level – from Muslim broadcast publisher Al Jazeera to BBC...getting much bigger audience... We are kind of trying to leverage traditional and social media to have a bigger impact" (interview, educational program 2). But one of these organizations admits to struggling in making the argument to experiment in the space. "There's still convincing: people make an association that it's a pen pal organization or it's Facebook, or some of our funders say – this (online) Collaboration Center we work really hard to run, they say, 'why don't you just bring them all onto Facebook, use it to connect'... So I think it's still sort of a different model," (interview, educational program 3)

Findings	Educational Program 1	Educational Program 2	Educational Program 3
IVC Can Extend the Reach of Cross-Cultural Programming	IVC is seen as a bridge because schools don't have a lot of money to do exchanges, so why don't we do more <i>virtual exchanges</i> and bring the world into the classroom?!	IVC and a broader online social network are intended to engage a diverse audience interested in a <i>social change</i> .	Interactive technology has emerged as a way to extend the experience and benefits of <i>online project-based collaboration</i> to new students and places.
Perceptions of the Role and Value of Facilitation Varied	The <i>moderator has a limited role</i> helping repeat questions that were inaudible and telling the groups when it was time to move to the next question.	The virtual spaces require attention or they can become, in the words of the Program Director, "communities like self-echo chambers." <i>Facilitation has instrumental value</i> in helping adults separate their views from their inner biases.	<i>Participants are expected to be self-moderators</i> . A teacher who plays the role of a facilitator does not guide the actual classroom/school interaction, but scans the online chat rooms and sees the dialogues progress and participants self-police themselves in the interactive space.
Technology has value, but faces challenges	<i>Technical difficulties</i> during a live videoconference require repeating of questions, as well as lagging camera focus confuses students with if there is a reaction to their questions/responses.	A major challenge with young people <i>connecting to sensitive issues</i> of Muslims or Jews is that they have to reply to their parents and friends. The challenge lies in empowering youth with shooting with video camera so that they tell stories in a compelling and effective way.	Several times the connection drops, students can't go online or the computer broke. It's constantly having to <i>manage peoples' expectations</i> . IVC is a different model which still needs its acceptance amongst funders who think of it as a pen-pal system.
IVC's and chat room's Future in Cross-Cultural Programming	The program desires to be more sustainable by <i>tying online experiences of students with offline international long-term development efforts</i> .	The program sees its future use of IVC focused on <i>connecting with people who haven't had exposure</i> but are really critical to the community to which they plug in for a bigger attitudinal impact.	The program also aspires to build connection between online interaction and action on the ground as a result of <i>behavioral change in student participants</i> .

5. Discussion

Paulo Freire's concepts of democratic, inclusive, learning environments, driven by robust dialogues that reflect real world issues and encourage active engagement with them would find much to admire in these initiatives.

Exploring how these three programs perceive the value of and different approaches to using IVC and chat room helps to shed light on an area of educational technology that is growing and little examined. Key program discussion of variance in approach and method may serve to inform future pedagogy and anticipate how and to what extent these and emerging interactive technologies and techniques will be adopted in the future, across the field of international education.

5.1 Technology Challenges Are Surmountable, but Require Approaches Appropriate to the Space

The challenges represented in the data fell into categories related to the technical (mirrored largely in existing research), experiential, and sustainable, that is – how does a program extend and/or apply the online experience to the offline world.

Anastasiades suggests that “if one believes that videoconferencing is like conventional face-to-face interaction, they will be disappointed” – and students reported in evaluations “frustrations with technological lags” (educational program 1, evaluation report). But while programs ran into mechanical and media glitches which affected participant experiences, these did not seem to inhibit programs’ overall enthusiasm or sense that the issues would be worked out over time. However, certain instances can be problematic when participants are groups already sensitized to misunderstanding. In an observation of a one of the organization’s videoconference between US and Muslim students, the microphone on a Muslim girl with hijab was not functioning properly and she could not be heard – an achingly symbolic example with the potential to undermine the whole idea to dispel stereotypes about political and social practices. Further, the moderator was then required to rephrase each response, in effect, speaking for her – another unintended problem with larger significance among certain populations.

5.2 Deliberate Facilitation Can Be Important to Participant Experience

Existing research suggests that the application, design, and ways that technology is used to determine its value (Clark, 2000) and though the use of videoconferencing technology in education is increasing, there is a lack of pedagogical design (Newman, 2008). Further, there is a dearth of research on what facilitators do in varied online learning environments or how facilitation contributes to interaction and learning (Sheingold, 2005). This research attempts to contribute to that conversation.

The study’s data show that these international education programs are experimenting with and learning from different processes and pedagogical approaches to interactive engagement that serve their goals of mutual understanding. Their level of sophistication of process was often correlated to their goals. One of the program that expressed an interest in outcomes related to attitudinal change among participants, sees the “critical role of facilitators to encourage fundamentally eager level of engagement” and to “create a safe space for diverse community... dialogue” (interview, educational program 2). This group was the most cognizant of the larger default position among educational programs – suggested in the existing literature – to view new and social media particularly as a panacea, the tool as strategy whose mere existence is meaningful and effective. This organization, instead, articulated that they deliberately construct a conflict resolution model process and employ IVC that exhibits multiple screens at once, eliminating or mitigating many of the commonly noted challenges of the technology. This process is developed to address and achieve specific goals of attitudinal change, so it’s much more intricately structured to meet those ends.

On the other hand, the other organization,, whose approach is “not to guide the debate,” finds its participants are often frustrated with the brevity and “ping pong” effect of the videoconference sessions – which they construe as less conducive to deeper or sustainable dialogue on any of the issues the sessions aim to cover. Observations of these sessions showed a very simplistic structure of interaction that reflected very little deliberate shaping for the challenges of the technology. While this organization has much broader goals of connecting students – versus the abovementioned organization’s specific aims of attitudinal change – they articulated future intentions with IVC and other new media that reflected a greater attention to pedagogy. There was a marked sense of desire to insert more of their goals into the online/offline spaces.

Overall, the organizations expressed that they are finding, to varying degrees, that new media spaces require adjustments appropriate for the space – either to better approximate a live experience, to achieve their stated states, or to maximize the experience for participants.

5.3 Future Focus on Pedagogy and Sustainability

The most interesting and potentially valuable issues that the data may contribute relate to the challenge of making interactive spaces meaningful. Refining and adjusting pedagogy for these spaces – structuring them to extend the impact after the virtual experiences, will allow for greater sustainability and for programs to reach populations valuable to achieving their goals.

Anderson et al. suggest that effective online discourse must be guided toward higher levels of learning through reflective participation, as well as by challenging assumptions and diagnosing misconceptions. Further to the discussion of process, above, it seems that regardless of the character or complexity of their goals, the programs that employed any kind of moderator were interested in better managing their processes to fit the online space – and to more precisely accomplish their goals.

Data show programs considering how to connect online experiences with action in the real world. The literature suggests that learning spaces function best if embedded in cultural and social context committed to their innovation (Punie 2007) – and sustaining and applying the experiences that happen online, to the offline world was of interest to all of the programs. One of these organization talked about linking with development efforts for field work, and live visits and exchanges that happened as a result of the online experience. The other organization is trying to extend their reach to key populations by partnering with social and mass media outlets to engage them in their dialogues.

6. Conclusion

Those who believe that utilizing information and communication technologies, specifically videoconferencing in the classroom, is a tool of the future should take a careful look at the increasing number of international education programs that are employing technology as a basis for creating collaborative understanding across cultures. This research seeks to add to the current trends of how organizations perceive technology as contributing to their goals, and how this can be used in cross-cultural understanding in students. The research reveals how different international education programs engage IVC and chat rooms in distinctly different ways in order to achieve varying degrees of understanding based on specific programmatic goals.

Additional research would be need to be conducted in order to grant a clearer understanding of the long-term effects, and address techniques most suitable in creating a prevailing impact. The study was illuminating in many respects, but begs further research into how organizations will use IVC and facilitation to achieve long-term impacts from their programs. The research suggests following up with past participants of such programs, and determining if technology assists in achieving goals of the international education program. As well, it will be interesting to see if these technologies become a trend with a broader reach into more corners of the world to include more marginalized (geographically, economically, socially) populations.

A progressively shrinking world inevitably identifies the necessity for mutual understanding among global citizens. International education programs create a cross-cultural window of dialogue through linkages shaped by IVC, which strives to provide mutual understanding in a world where globalization is taking root. There is extensive use of information and communication technologies in the international education community when striving to achieve their program goals, which indicates an escalating reliance on tools like IVC and online chat rooms in the globalizing world.

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Pre-Service English Teachers' Achievement Goal Orientations: A Study of a Distance English Language Teacher Education Program

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Abstract

This study examined pre-service English teachers in relations to goal orientation theory of motivation. Embedded mixed design was used in the study. That is to say, quantitative data as a primary form was used to inform the qualitative phase. In the quantitative part of the study, data were collected on a questionnaire. On the basis of responses from 186 pre-service English teachers, qualitative data were collected in form of one-on-one interviews to understand the motivation and behavior variables of the pre-service teachers. The results indicated that the mastery and performance oriented pre-service teachers displayed different characteristics of motivation. However, some of the participant had more than one goal orientation. The results as well as their implications are discussed and suggestions for future research are presented.

Introduction

Teachers are one of the most significant components in education systems. And one of the main objective in education systems is to reach a goal. To achieve this goal, many variables interact with each other. The main variable that affects the teachers, the learners, and the teaching and learning environment is achievement goal orientation construct. Achievement goal orientation has been pointed to affect the teaching and learning environment in numerous studies (Butler, 2007; Coutinho & Neuman, 2008; Elliot & Murayama, 2008). This concept is about purposes and motives that individuals had in a task. This variable has been used to assess the students' motivation for learning but later it has begun to be used to understand the teachers' motivation, as well (Butler, 2007). According to Nitsche, Dickhäuser, Fasching, and Dresel (2011), teachers' goal orientation is a significant factor for teachers' individual development of competence. Retelsdorf et al., (2010) stated that achievement goal construct may also be useful for defining motivation of pre-service teachers as well.

Teachers' attitudes during education process affect their behaviors in teaching (Bandura, 1997). Recent studies done in the field of education have showed that knowledge and skills are not adequate for active teaching. Teachers' attitudes and beliefs have also been found to be contributing to their effectiveness as educators (Bandura, 1997; Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). Even though there are many studies on students' motivation for learning, there has been little research on teachers' motivation for teaching (Retelsdorf, Butler, Streblov, & Schiefele, 2010).

So far, there has been very little research on the pre-service English teachers' goal orientations and in an online learning environment. So, this research aimed to explore the pre-service English teachers' achievement goal orientations.

Literature Review

Achievement Goal Orientation Theory

Achievement goal theory is very common in the achievement motivation literature that affects the pre-service teachers. This construct is about the purposes and motives the individuals get in achievement task (Dweck & Leggett, 1988). It consists of four constructs. These are: mastery-approach, mastery-avoidance, performance-

approach, and performance-avoidance achievement goal orientations (Elliot & Murayama, 2008). Learners with approach goals try to master learning tasks and they do their best to completely acquire the subjects, while students with avoidance goals avoid negative results such as failure while mastering the tasks (Elliot & McGregor, 2001). In other words, in approach aspects (mastery-approach and performance-approach) learners believe in themselves to do well but in avoidance aspects (mastery-avoidance and performance-avoidance) these learners doubt about their ability to perform well (Coutinho & Neuman, 2008). Kucsera et al. (2011) reported that achievement goal theory affect many motivation and behavior variables in the student and work literatures, but it is still applied specifically to teachers and teaching. Nitsche et al. (2011) reported that teachers' goal orientations are significant factors for teachers' individual development of competence. Retelsdorf et al. (2010) cited that achievement goal construct may also be useful for defining motivation of pre-service teachers.

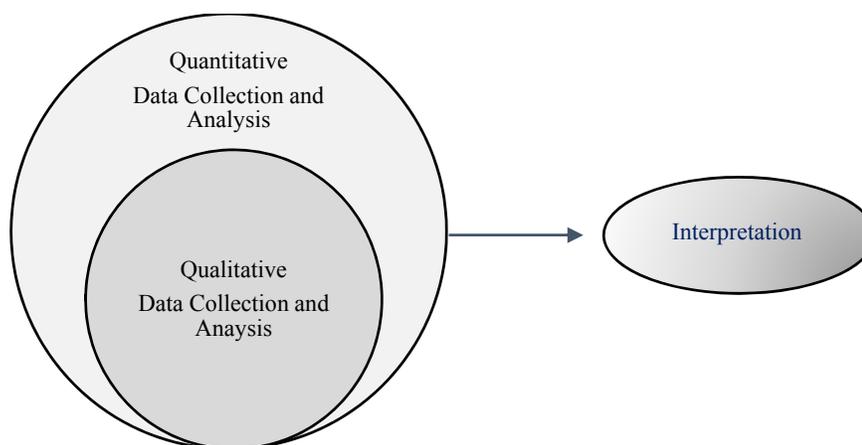
The literature provides proofs that achievement goal orientations are contributing factors of success of learners and pre-service teachers (Bandura, 1997; Coutinho & Neuman, 2008; Elliot & McGregor, 2001). However, there is a gap in the literature that identifies achievement goal orientation to pre-service teachers studying in an online environment. This study adds evidence and knowledge to the literature.

Method

Research Design

Embedded mixed design, which is one of the mixed method design, was used for this study. The purpose of the embedded design is to collect quantitative and qualitative data simultaneously or sequentially, but to have one form of data play a supportive role to the other form of data (Cresswell, 2011:544). In this study a sequential design was used with the embedded design. That is to say, quantitative data as a primary form was used to inform the qualitative phase. For the quantitative part of the study we collected data on Achievement Goals Questionnaire-Revised (AGQ-R) during a month. This quantitative information represented a major source of information for this study. For the qualitative part we collected data in the form of one-on-one interviews to understand the beliefs and perceptions of the pre-service teachers at first hand.

Figure 1: The study design



Participants of the study

The present study was conducted at the Department of Distance English Language Teacher Education BA program at Open Education Faculty, Anadolu University, Turkey. This program has a blended model of instruction, supplies both face to face, and online distance education. The first two years of the program are conducted mainly through traditional classroom instruction, and the third and the fourth year of the program are conducted by means of distance education supported by online courses.

Simple random sampling as a form of probability sampling was used for the quantitative part of the study. This method is often used with a population that has a small number of cases (McMillian, 2004: 109). This approach was convenient because the population was small and numbered. The population consisted of pre-service teachers enrolled at Distance English Language Teacher Education BA program. Participants were 186 senior students. In the

present study, there were 144 females and 42 males students. The age range of the sample was 21 years to 30 years. Table 1 provides the demographic information for the population, and for the sample used in this study. As seen in Table 1, the proportions of the gender and age within the sample are generally representative of the population.

Table 1: The Proportions of the Gender and Age Within the Sample and Population.

	Sample (n=186)	Population (N=588)
Gender		
Female	77.4%	76.7%
Male	22.6%	23.3%
Age		
21-23	53.2%	56.7%
24-30	46.8%	43.3%

Qualitative part of the study was consisted of two one-on-one interviews. Participants of the one-on-one interviews were 2 pre-service English teachers. The participants were purposefully selected from 186 pre-service teachers who completed the Achievement Goals Questionnaire - Revised (AGQ-R). The participants were selected for the one-on-one interviews because their scores on the scales identified them as the most representative of one of the two groups. The first group has high mastery (low performance) goal orientations while the second group has high performance (low mastery) goal orientation.

Data Collection Instruments

The data were obtained, primarily, via Achievement Goals Questionnaire - Revised (AGQ-R) (Elliot & Murayama, 2008). The participants also responded to the demographic questionnaire. For the qualitative part, data were collected through open-ended questions from one-on-one interviews.

The AGQ-R is a 12 item, 5-point Likert scale questionnaire used to measure achievement goal orientations. Participants who scored high on items associated with mastery-approach items indicated that they strive to thoroughly learn course materials. The mastery-approach goal is associated with higher performance and academic success (Elliot & Murayama, 2008). Participants who scored high on the mastery-avoidance approach items indicated that they attempt to master course material to avoid failure and recrimination (Elliot, 1999; Elliot & Murayama, 2008). Participants who scored high on performance approach items indicated they strive to master course material to outperform their peers. Participants who scored high on performance-avoidance items possess low motivation and fear of failure associated with negative outcomes (Elliot & Murayama, 2008). Based on the data from the sample used in this research, the Cronbach alpha coefficients of each subscale were; 0.82 for mastery-approach, 0.91 for mastery-avoidance, 0.83 for performance-approach and 0.89 for performance-avoidance. The AGQ-R's Cronbach coefficients were relatively high in Elliot & Murayama's study, too. These Cronbach alphas were 0.84, 0.88, 0.92, and 0.94, respectively (Elliot & Murayama, 2008). The demographic information section, which was developed by the researchers, includes questions about gender, age, educational background, and teaching and learning experience of the pre-service English teachers.

In qualitative one-on-one interviews, open-ended questions below were asked to the pre-service English teachers:

- How do you describe yourself as a teacher/student?
- What are your personal/academic/professional goals?
- What do you do when you faced a very difficult academic task?
- What do you think about the relationship between ability and success?

Procedure

A pilot study was conducted before the main qualitative study. The aims of conducting this pilot study were to check whether or not the data collection tool worked well, to learn whether an addition to the data collection tool was necessary, to find out whether the questions were clear or not and understandable enough. To conduct the pilot study, the researchers emailed all the senior students. Out of the 588 students, 38 consented to participate voluntarily to the face-to-face pilot study. After the piloting procedure, which lasted for a month, the researchers performed

minor revisions regarding to language and grammar of the survey. The survey link was then put on the online course room and the discussion board and participants were asked to complete the survey thoroughly and honestly. If the learner agreed to participate in the study, he/she completed the survey, and then submitted the completed the one-time survey through the secure online link. The participants voluntarily consented to participate in the study without incentives. At the end of the survey, which stayed for a month in the online course room, 186 participants were attended the study.

To support the primary quantitative data, supportive qualitative data were added. Out of the 186 participants, 2 pre-service teachers were purposefull selected for the one-on-one interviews. The representative pre-service teachers were contacted by telephone for the interviews and each interview was scheduled for an hour and took between 30 to 60 minutes. Content analysis was conducted in order to analyze the qualitative data obtained from the interviews. The answers to each question in the interviews were coded and categorized by authors.

Table 2: Achievement Goals

	High Performance	Low Performance
High Mastery	<i>High Mastery/ High Performance</i>	<i>High Mastery /Low Performance</i>
Low Mastery	<i>Low Mastery /High Performance</i>	<i>Low Mastery /Low Performance</i>

Findings

Quantitative Data

Descriptive statistics for achievement goal orientations and its subscales are presented in Table 3. The reliabilities computed for the subscales are also shown in Table 3.

Table 3: Descriptive Statistics and Cronbach Alpha Measures for Achievement Goal Orientations Scale (n=186)

	M	Sd	Min.	Max.	Cronbach Alpha
Mastery-Approach	4.21	0.93	1.00	5.00	0.82
Performance-Avoidance	2.88	1.44	1.00	5.00	0.91
Performance-Approach	3.18	1.35	1.00	5.00	0.83
Mastery-Avoidance	4.02	1.06	1.00	5.00	0.89
General AGO	3.60	0.93	1.00	5.00	0.89

According to Table 3, results indicated a difference in the pre-service English teachers' goal adoptions. Even though these results suggest that the pre-service English teachers adopt more than one achievement goal, most of the pre-service EFL teachers adopt mastery goals for learning. This result can be interpreted as positive since teachers adopting mastery goal orientations seek challenging tasks and do well in difficult situations. However, mastery goal orientations involve the development of competence through task mastery and the emphasis is placed on developing new skills (Lindsay, 2010). Moreover, the mastery goal orientations are positively related to self-efficacy beliefs.

The findings also suggested that there were not noteworthy findings between pre-service EFL teachers' achievement goal orientations and gender, age and work experience. However, the analyses also revealed no

statistically significant relationships between achievement goal orientation, and students' socio-demographic characteristics. Furthermore, the findings showed that nearly all of the pre-service teachers had more than one goal orientation.

Qualitative Data

Pre-service English Teacher Adopting Mastery Goal Orientations

How do you describe yourself as a teacher/student?

The pre-service teacher says "I am a hardworking student and teacher... and a quick learner." She also sees herself as a competent learner and therefore she learns efficiently. "I was always a successful student and I believe that if you study hard you do wonders." She emphasized that her aim as a teacher was to learn for learning and this is her primary aim.

What are your personal/academic/professional goals?

The teacher personal goal is to finish the school on time. She added "After I graduated I have to study harder to teach better... If I give up studying I couldn't teach deeply... so my goal is to be a perfect teacher." She thought that she is a successful teacher and her grades are proofs for this result. Her academic and professional goals were simple. She wanted to graduate with an honor degree and began to work as an instructor in a public university. She added that a teacher should be enthusiastic and wise. That's why she wants to be an enthusiastic and wise teacher when she begins to work.

What do you do when you faced a very difficult academic task?

The teacher believes that every student can be successful if he/she studies hard. When she faces a difficult task, first she gets the bottom of the subject. If she didn't understand then she asks her teachers or friends. She emphasized that she never leaves the task incomplete. She says "When I learn, I learn completely."

What do you think about the relationship between ability and success?

The teacher believes that one can succeed only when he/she studies hard. "This is a psychological situation... I believe that ability is nothing without studying... If the teacher has an ability he/she needs to study to succeed but if he/she has an ability this does not enough for success..."

Pre-service English Teacher Adopting Performance Goal Orientations

How do you describe yourself as a teacher/student?

The teacher says "I am not very smart student but I study all my lessons and I do my best in the exams... Mostly I get average grades ... I am a student like that... that's enough for me." She adds that "If I didn't study and get low grades I felt guilty... I don't want to let my family down... I try hard to make them feel happy."

What are your personal/academic/professional goals?

For academic goal, the teacher responded that she wanted to finish the school on time. "The grade point average doesn't matter for me ... I just want to finish my school and make my father happy and believe in me because he doesn't believe that I will finish the school on time." As a personal goal, she says "After I graduate, I want to study in an elementary school because I love kids a lot... And I want to spend all my spare time in my house... with my children... after I graduate I don't want to spend my time with challenging situations, exams... I feel tired of these."

What do you do when you faced a very difficult academic task?

The teacher says "It is hard for me to deal with that tasks... Mostly I lose my motivation on that occasions... so it is better for me not to think too much on that tasks." She added that she tried to understand and overcome it but mostly she chose to get it out of her way. "If I do the simple tasks and have an idea about the difficult ones that is enough for me."

What do you think about the relationship between ability and success?

The teacher responded that "ability is very important factor in success... for example when I am not good at subject or lesson, I know that I cannot do well, so I don't force myself because I know that I don't have the necessary ability." She says "I believe that I don't have much ability in English so I study hard before the exams

and mostly I get around 70 points... actually it is enough for me...some of my friends don't study hard and they get 80-90 points... because they have the ability for that .”

The pre-service English teachers describe themselves in terms of goal orientations. The differences exist between mastery and performance goal orientations are shown on table 4. As seen in table 4, learning aim, motivation, ability, effort, interest in learning and improvement are the characteristics identify the pre-service teachers.

Table 4: Characteristics of the Goal Orientations

Characteristics	Mastery	Performance
<i>Learning aim</i>	Competence, self-improve	Avoid failure
<i>Motivation</i>	Intrinsic	Extrinsic
<i>Ability</i>	Can be developed	Innate
<i>Effort</i>	To learn	Look-good
<i>Interest in learning</i>	High	Low
<i>Improvement</i>	Choose challenging tasks	Choose less challenging tasks

Discussions and Recommendations

The main purpose of this study was to describe the achievement goal orientations of the pre-service English teachers. The quantitative and subsequent qualitative data and analysis provided consistent results. In literature, studies about goal orientations found different thoughts and behaviors between mastery and performance goal orientations. In this study, the mastery and performance oriented teachers displayed different characteristics, too. The results in this study also supported the previous studies (Lindsay, 2010; Nitsche et al. 2011; Kucsera et al.2011; Pudelko & Boon, 2014). However, some of the participant had more than one goal orientation. These participants expected to be very successful as their motivations and achievement behaviors are high (Dweck, 1998; Yeung, Tay, Hui, Lin, & Low, 2014). In qualitative part, the themes namely learning aim, motivation, ability, effort, interest in learning and improvement led to differences when mastery and performance orientations compared. The learning aim and motivation came up as a powerful determiners in adopting goal orientations.

Further studies should be replicated with a bigger population to better assess and evaluate achievement goal orientation. In addition, qualitative studies in a long term may give different and deep results. Mastery and performance goals need further interpretation with male and female balanced studies. Besides, the four quadrants of goal orientations with a bigger group need to be studied. And more research is needed about how these orientations affect the students of these teachers adopting different goal orientations.

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Perceptions of Online Program Graduates: A 3-Year Follow-Up Study

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Abstract

This paper reports the findings of a follow-up study of eleven students who graduated in 2010 from the online MS in Instructional Technology (WebIT) program at the University of Tennessee. In the fall of 2013, these students completed an online follow-up survey to share perceptions of their program experiences regarding program attributes and post-program experiences. The nature of their program experience feedback from the follow-up survey was consistent with feedback given three years earlier in response to a program completion survey. Their comments were generally positive with few specific suggestions for program improvement and indicate consistency regarding their perceptions of the value of selected online program characteristics. The follow-up survey included several new questions regarding impact on student career progression. Discussion of results from the follow-up survey will be organized using the Community of Inquiry Model to illustrate the relevancy of this theoretical framework for classifying issues related to successful program design.

Perceptions of Online Program Graduates: A 3-Year Follow-Up Study

In the spring of 2010, eleven students successfully completed an online, 2-year Master's Degree program (WebIT) in Instructional Technology (IT) at The University of Tennessee at Knoxville (UTK). In the fall of 2013, these eleven students were asked to complete an online survey to share their program experiences and suggestions for program improvement. All eleven students agreed to complete the survey. This paper will describe the results of an analysis of the survey responses from these eleven program graduates. Though this is a small case study, the context of the case reflects the present state of elective student matriculation in new, online programs in higher education. The results of this analysis may be of use to others designing and implementing online instructional programs in similar contexts.

Background

Twenty-five students were recruited for the *first cohort* of the WebIT program in the spring semester of 2008. Only eleven of the students completed the cohort at the end of the spring semester 2010, an attrition rate of 56% (Waugh, DeMaria, & Trovinger, 2010). The WebIT program was organized using a cohort model in order to provide the students with an opportunity to benefit from the potential of increased social engagement with a consistent group of classmates. This organization was planned as a means to increase the likelihood of the development of a Collaborative Learning Community, or academic Community of Practice (Hung & Chen, 2001), among the students.

Literature Review

Community of Inquiry Model. A major challenge for online education that has been cited in numerous prior studies (e.g., Daves & Roberts, 2010; Mayes, Luebeck, Ku, Akarasriworn, & Korkmaz, 2011; Moore, 2013;

Palloff & Pratt, 2007), is students' lack of sense of community in virtual space. It is not uncommon that the physical separation among students in an online learning environment can result in online learners feeling isolated, disconnected and disengaged (Palloff & Pratt, 2007). This isolation can become a major cause of student dissatisfaction and may lead to increased program attrition. The Community of Inquiry (CoI) model was first introduced by Garrison, Anderson, and Archer (2000) to provide an explanation for how this lack of physical presence, connectedness and interaction might affect the emergence of an Online Learning Environment (OLE). The CoI theory posits that communication and interaction in online learning environments is crucial to the development of higher order thinking skills among online learners. The model itself provides a framework for classifying the important interactional patterns in online learning environments. The CoI model consists of three main elements: social presence, cognitive presence, and teaching presence (see Figure 1). These three elements overlap with one another to some extent, while each of them characterizes a distinct type of human interaction in an online learning environment.

Teaching presence, an essential element of the CoI model, directly impacts the quality of the educational experience. This element consists of three characteristics: design and administration, facilitating discourse, and direct instruction (Anderson, Rourke, Garrison, & Archer, 2001). Teaching presence and instructor roles in OLEs determine online learning satisfaction and success in the sense that they significantly influence how students engage in deep learning in an online setting (Garrison, Cleveland-Innes, & Fung, 2010; Villagran-Glover, 2012). Mayes, Luebeck, Ku, Akarasriworn, and Korkmaz (2011) synthesize instructor roles into five major categories: the manager, the technical advisor, the facilitator, the social director, and the educationalist.

Social presence is the element of the CoI model that represents the set of social interactions that enable participants to create a viable community. Social presence is what allows independent individual activities to become part of a collaborative process. This element encompasses three characteristics: affective communication, open communication, and group cohesion (Garrison, 2011). Projecting an effective social presence in a virtual environment, can help online learners successfully collaborate with each other in order to more effectively learn together.

Cognitive presence is defined as “the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained communication” (Garrison et al., 2000, p. 89). This is the key element of CoI. Garrison and Cleveland-Innes (2005) provide valuable guidelines for creating and sustaining cognitive presence in an effective OLE. The cognitive presence component of the CoI model represents students' ability to construct meaning through communication.

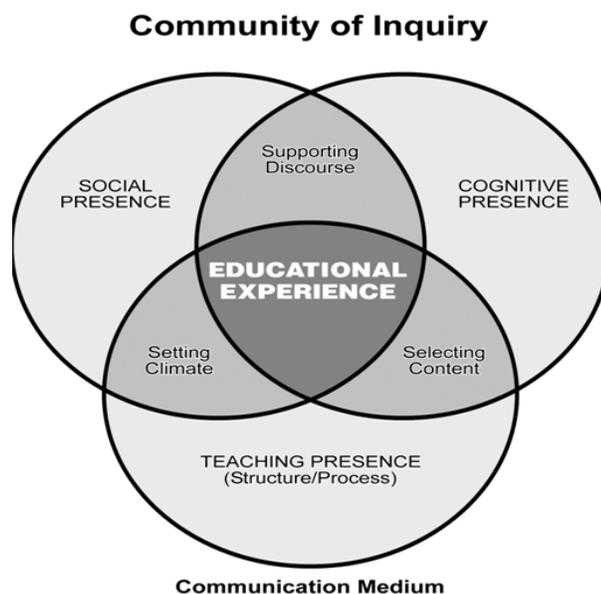


Figure 1. Community of Inquiry Model (reprinted from Garrison, Anderson, & Archer, 2000, p. 88)

In summary, Garrison et al. (2000) emphasize that in order to build a Community of Inquiry, an effective Online Learning Environment, instructors should establish an educational experience by employing neither a traditional "sage on the stage" nor a "guide on the side" approach. The goal should be to shift the traditional roles of students and instructors, and to highlight group dynamics, that is, to let all participants interact and contribute to the learning as a member of the community. Garrison et al. (2010) revisited and tested the CoI model using a survey instrument based on the CoI conceptual framework. The results of their study confirmed that the CoI model is a valid and valuable theoretical tool to help online educators understand the complexities of the essential interacting factors of teaching, social and cognitive presence in online education settings. Swan and Ice (2010) compiled a number of CoI studies conducted during the last decade after the emergence of the CoI model, and concluded that the development of the CoI model has made major contributions in moving online education forward. Garrison and Akyol (2013) drew the same conclusion in their review of a series of studies on CoI. In the present study, most of the comments shared by the WebIT students also can be classified according to one or more of the three main elements of the CoI model.

Method

The gathering of long-term follow-up data from program participants is critical for understanding the lasting impact that instructional programs can have on program participants (Ruspini, 2002). Data gathered long after the graduates might have any concerns regarding possible negative consequences from their honest assessments, provides another perspective in evaluating the suitability of program attributes and characteristics. Though similar data are often gathered in other contexts, to date, no other studies have been found that report the long-term perceptions of online education graduates regarding their program experiences. Such data are important because they can inform program designers about the longer-term value of online curricula. Additionally, follow-up data provide an opportunity for program graduates to provide details regarding the degree to which intended program outcomes match with current employment requirements.

This follow-up study was conducted as part of a larger case study (Stake, 1995) to determine the viability of the WebIT curriculum model. The follow-up data collected for this study took place during the fall semester of 2013, three years after the students graduated from the program. The follow-up survey sought to address the following broad research questions: (a) How did the graduates perceive selected online program attributes? and (b) What recommendations would they offer regarding program format, curriculum pacing, student workload, and instructional design?

Limitations

The data from this follow-up study provide a small, non-random view of the specific circumstances perceived by the participants in the first cohort of the WebIT online program. The perceptions of these students are typical insofar as they represent an actual sample of students who were attracted to an online program leading to a Master's degree in Instructional Technology at a state university in the southeastern United States. The range of ideas expressed represent one set of all possible student feedback. The proportions associated with response patterns are simply one possible sample and may or may not reflect a true proportion of student perceptions in similar contexts. While these are significant limitations, the data reported are a "real" characterization of the responses of typical students to one specific online learning environment and as such illustrate a snapshot of student concerns about the characteristics and effectiveness of an online learning environment.

Selected Findings

The WebIT 3-year follow-up survey instrument included a total of 18 items, 13 of which were open-ended questions (see Table 1). Selected findings and discussions are presented in this section. Based on the survey results, six thematic categories of student perceptions of WebIT emerged: (1) benefits of online learning, (2) professional impact and development, (3) teaching presence, (4) social presence, (5) cognitive presence, and (6) program design.

A number of the students' follow-up survey responses were highly consistent with their program completion survey responses from three years earlier (Waugh & Su, 2011). The 2010 WebIT Online Program Completion Survey asked for these graduates' feedback to the WebIT curriculum designers, instructors and IT faculty. Both the 2010 and the 2013 surveys obtained information regarding student perceptions of their

expectations and actual online program experiences, although the survey questions were worded slightly differently in the two surveys. The 2013 survey specifically asked about how their program experiences prepared them for their current employment (See Table 1). The student responses to both of these surveys indicated a high degree of satisfaction with the WebIT experience. In particular, students reported a high degree of satisfaction with the cohort program structure and the collaborative components of the OLE. However, they also proposed recommendations for future WebIT program improvement, such as clearer, more detailed activity/assignment instructions, and a higher level of faculty involvement.

Table 1
The WebIT 3-Year Follow-Up Survey

1: What is your gender? [f/m]
2: What is your approximate age? [20-30/31-40/41-50/51-60/61 years old or older]
3: Please tell us about your current employment situation and whether or not this has changed since you completed the WebIT program.
4: Did the WebIT program help to prepare you for your current work responsibilities? [n/y]
5: [If respondent answered "y" to Q4] How did the WebIT program prepare you for your current work responsibilities?
6: How, in your opinion, could the WebIT program have better prepared you for your current work responsibilities?
7: Please tell us about any professional development activities (enrollment in academic degree programs, attendance/participation at professional conferences, participation in job-related training, etc.) you have engaged in since completing the WebIT program in 2010.
8: Please describe any characteristics of the WebIT program that you found to be of value to you.
9: Please describe any characteristics of the WebIT program that you feel could be improved to better meet your personal needs.
10: Do you have any recommendations for how WebIT might be improved to better meet your professional needs?
11: Would you recommend a program like the WebIT program to other students with similar professional interests? [n/y]
12: Having experienced both online and face-to-face academic program format, which do you prefer? Why?
13: Would you enroll in another <u>online</u> academic degree program? [n/y]
14: [If respondent answered "y" to Q13] Why would you enroll in another <u>online</u> academic program? What characteristics of online programs make them desirable to you?
15: [If respondent answered "n" to Q13] Why wouldn't you enroll in another <u>online</u> academic program? What characteristics of online programs make them less than desirable to you?
16: What academic program characteristics, i.e., how a program is organized and delivered, do you feel best meet your needs as a student?
17: Please tell us about your interactions with other members of your WebIT cohort since completing the WebIT program in 2010. In what ways have you communicated with or continued to be involved with the other members of the cohort?
18: Please share any additional thoughts you may have about your experiences as a student in the WebIT program. Tell us anything you would like for us to know about your experiences in WebIT.

Benefits of Online Learning. A majority of the students (10 out of 11) identified the most critical aspect of online format of the WebIT program to be its *flexibility and convenience in accommodating their academic needs and time constraints*. This theme was identified through their responses to Q8, Q12, and Q14. This finding is consistent with those reported by other researchers regarding online learners' common perceptions of the benefits associated with online learning (Carr, 2000; Chen, 2013; Mayes et al., 2011; Moore, 2013). Mayes et al. (2011) summarize many of these important strengths of online learning as "a powerful and previously unavailable professional development alternative" for educators and learners who are financially or geographically restricted. A number of comments illustrate the importance of flexibility and convenience to these students.

Response to Q8: The most important thing for me was the fact that it was online.

Response to Q12: I like the flexibility we had with the online format, we could work on our own time and find ways around conflicting schedules to get together and work collaboratively.

Response to Q14: convenience is the most important reason I would enroll in an online program [sic].

Response to Q14: The rigor of this program The convenience for the working individual [sic].

Response to Q14: When done right they [online programs] can bring great advantages, such as better time management & time flexibility (you can find the best time for you to work on assignments, study, take tests, etc - also don't have to fight traffic and try to find parking around campus) [sic].

Response to Q14: Flexibility. On demand. Less travel [sic].

Response to Q14: The time factor, mostly—I think if I had an infinite amount of time and attention, I'd ultimately prefer face-to-face classes, but with the realities of adult life, online classes are more appealing: even though the actual workload may be a little more strenuous, the benefit of not having to travel and being able to work on my own timeframe (to some extent) far outweigh the extra work [sic].

Professional Impact and Development. Q3 and Q5 asked about students' employment situations and any perceived relationships between their participation in the WebIT program and their current employment. About half of the students (5 out of 11) reported that the WebIT program had a *positive impact on their technology knowledge and job performance*. A majority (9 out of 10) reported that since completing the WebIT program, they were engaged in additional professional development activities such as professional conferences and in-service training sessions, many of which were electronically-mediated. In response to Q7, they linked their post-graduation participation in such activities to their engagement in similar activities during the WebIT program. One specific recommendation, in response to Q18, was for the program to integrate a professional internship experience. Several students provided the following elaborative comments:

Response to Q3: I have become a lead teacher since completing the program.

Response to Q3: I am the STEM teacher at my school which is Grades 4-7. This position was created after the WebIT course and I by far was the most qualified for it [sic].

Response to Q3: Just recently I have been named the multimedia center manager and. Score that I was able to change my position. The web it program was indeed the reason I was able to go further [sic].

Response to Q5: I believe that the program enabled me to become a more technologically advanced teacher which [sic] brought me to the attention of the administration who asked me to become a lead teacher.

Response to Q5: Participating in the WebIT program gave me numerous skills I, otherwise, wouldn't have gotten with ease. It prepared me for the majority of the career positions I hold now. It's playing a key role in continuing to reach for other career goals [sic].

Response to Q7: I have attended the TETC conference twice.

Response to Q18: There could be a sort of internship class where for 1 semester the students are required to volunteer with a school or company and do a tangible and relevant project and present their progress and completed product to the class or something [sic].

Teaching Presence. When asked about the characteristics of the WebIT program that the students felt could be improved to better meet their personal needs (Q9), 6 of the 11 students mentioned that *some aspect of course organization or program design could be improved*. These comments specified the need for more course organization, use of rubrics, less constructivist and more direct instruction strategies. Two other students criticized the WebIT program because it did not provide enough full-time faculty involvement in the teaching of the courses, relying instead upon Graduate Teaching Assistants (GTAs) as the primary instructors for specific courses. These two students' comments illustrated their struggle with this issue.

Response to Q9: Assignments given need to have clear, concise rubrics for grading [sic].

Response to Q9: I was a little disappointed that almost all our classes were led by grad assistants. I would have liked to have had more interaction with the professors. This is not to say that the assistants did not do a good job [sic].

Response to Q9: I feel I could have learned so much more if the actual professors had been actively involved in the program. The GTA's were a great bunch of people, helped us a lot and everything, but I think I missed out on the professors teaching us and sharing their experiences with us ... [sic].

Both instructors and students are key participants in building a successful online educational process. Garrison et al. (2000) stated that the teacher takes the primary responsibility for performing two general functions in teaching presence. Although the WebIT faculty seem to have fulfilled the first function, the design of the online educational experience, some students perceived that the faculty neglected the second function, facilitation. These students felt that the use of GTAs as primary instructors was not as desirable as using professors in these teaching and support roles. These student comments indicate that the multiple instructor roles (Mayes et al., 2011) were not

performed to the satisfaction of all students, which impacted the perceived quality of these students' experiences to some extent. The CoI framework emphasizes that for creating effective OLEs, instructors must play all their simultaneous roles (Swan, Richardson, Ice, Garrison, Cleveland-Innes, & Arbaugh, 2008). Additionally, for the student's experience to be optimal, the student must *perceive* that this is the case. This finding also begs the question of how students might perceive differences among the different classifications of "faculty". If GTAs are not perceived by students as fully qualified teaching faculty (in some sense) then how might students perceive the qualifications of part-time or adjunct faculty? This characteristic of an online program—student perceptions of faculty quality—might well be linked to overall student satisfaction and program retention.

Social Presence. The element of Social Presence is reflected by the fact that half of the students (5 out of 10) responded to Q8 that they found *the cohort program organization model valuable in helping them to complete the program*. In this instance one student shared no comment and one other student mentioned valuing how the instructors handled the cohort, but the comment did not convey quite the same sense of personal valuing as the other 5 student comments. However, 6 out of 9 who responded to the question made some mention of their perceived value of the cohort model.

Response to Q8: I enjoyed my cohorts. You really got to know people in the cohort [*sic*].

Response to Q8: I enjoyed the cohort, online classes fit my schedule, flexibility [*sic*].

Response to Q8: The collaboration among "cohort-mates" - it was encouraging to know there were more people struggling just like I was ;) and also knowing we understood what we were going through and how we could help each other [*sic*].

Response to Q8: Not having to leave home for classes and forming a close cohort [*sic*].

Response to Q8: The online factor, of course—not having to travel for classes was a huge plus; I liked the "cohort" aspect—working with the same people from class to class, and having a definite timeline mapped out [*sic*].

Response to Q8: I really valued the intimate way the instructors and directors handled the cohort, classes, processes and interactions.

A majority of the students (10 out of 11) responded to Q17 that, since completing the WebIT program, they stayed in touch with one another via electronic means. These responses demonstrate that, even after graduation, the students shared a strong sense of group identification and affinity; and valued what Lehman & Conceição (2010) describe as "being there" and "being together". A number of studies (e.g., Daves & Roberts, 2010; Kim, Kwon, & Cho, 2011; Swan et al., 2008; Walton, Cohen, Cwir, & Spencer, 2012) have examined how social connectedness greatly affects the nature of learning. These studies report similar findings about the perception of interpersonal connections with online peers serving as an important indicator in online learning success. According to Palloff and Pratt (2007, p. 237) "it is the relationships and interactions among people through which knowledge is primarily generated". Understanding the value of online social presence, can help online learners effectively and successfully collaborate with each other (Garrison et al., 2000; Gayol, 2010).

Response to Q17: I have had personal conversations with one of my cohorts and have had random interactions on social media with 3-4 others. I attended a conference at one cohorts workplace [*sic*].

Response to Q17: I am sorry to say that I have talked very little to any of my cohort members. I keep up with a few of them on facebook but that is about it [*sic*].

Response to Q17: Communicate with my two closest classmates a few times a year via email

Response to Q17: I have had limited but regular contact with other cohort members. I have seen them at conferences and even presented with one at a conference after our graduation.

Cognitive Presence. Garrison, Anderson, and Archer (2000, 2001) consider cognitive presence as the most basic CoI element. Cognitive presence is an indicator of learners' ability to construct and confirm meaning through sustained reflection and discourse. The authors (2001) present the Practical Inquiry (PI) model (see Figure 2) that operationalizes cognitive presence. The PI model, defined by two axes, consists of four phases of critical inquiry: the triggering event, exploration, integration, and resolution.

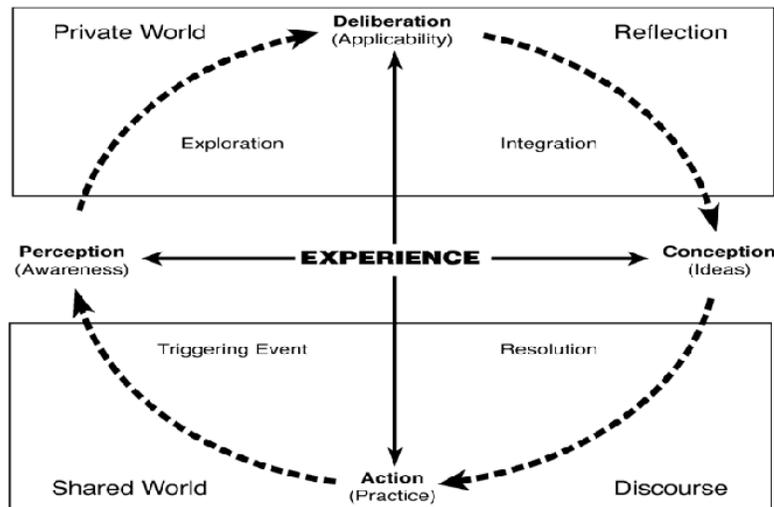


Figure 2. Practical Inquiry Model (reprinted from Garrison, Anderson, & Archer, 2001, p. 9)

The Cognitive Presence element of the CoI model can be seen reflected in the comments from the WebIT students reporting that their experiences in WebIT contributed strongly to their post-graduation ability to solve technical and other problems on their own. The students' comments show evidence of the final phase, resolution, where learners settle on a solution and test the solution through real-world implementation. Resolution is the most demanding of the four phases of practical inquiry. The WebIT student feedback conveys a clear image of their successful knowledge-building processes during and after their online learning in WebIT. Their experiences since completing the WebIT program reveal that cognitive presence and growth occurred during their program experiences and transferred to new contexts beyond program completion. Several WebIT students provided the following elaborative comments:

Response to Q5: When teachers are planning online activities, I have more knowledge of tools, things to consider when setting up, and I am better able to help teachers consider how to implement or plan. By learning online, I also can consider the end user point of view.

Response to Q5: I've used many of the technical skills that I learned in the program. I have become a better problem solver.

Response to Q5: Help with networking and terminology, ideas for using Internet for education.

Response to Q5: I think it gave me the foundation for good course design, thinking critically, exposing me to different ID theories and views, the ADDIE model, etc.

Response to Q5: Knowing how to prepare new curriculum and working with tons of new computer software. Especially [*sic*] managing and maintaining that software in our computer labs.

Response to Q5: Opportunity to explore/try different technology tools; confidence/footing to propose different technology solutions to administration

Response to Q5: The knowledge that I gained from the program allowed me to be [*sic*] competitive. It also allowed me to learn management skills in project management etc.

Response to Q18: I loved this program. It is an experience that I cherish and am very proud of. I owe my professional success to the program, and in a way I owe a lot of who I am to the program. I learned more than just content, I learned how to learn in a way I had never experienced before. I became a critical thinker. The program was truly a life changing event for me.

Program Design. Because the means of communication differ between face-to-face and online learning environments, different pedagogical approaches need to be applied in online teaching as compared to face-to-face teaching. When answering Q16, five (out of 10) students recommended that the WebIT online program provide very clearly structured instructions, rubrics, and assignments in order to support their learning.

Response to Q16: Projects are outlined at the beginning with a clear rubric that will be used for grading [*sic*].

Response to Q16: I want a class to... have clear objectives have challenging but reasonable assignments have a fair grading system provide feedback in a timely manner [sic].

Response to Q16: Online but structured Material available in the beginning so those who work can work on it as they need to [sic].

Response to Q16: Clear expectations Clearly defined rubrics [sic].

Response to Q16: There are clear expectations.

As Naidu (2013) pointed out, appropriate instructional design is especially important in online educational settings since the flexibility and openness feature of OLEs further complicates teaching and learning processes. Instructional designers need to be particularly aware of delivery instructions, rubrics, and assignments “in the most valid, reliable, equitable, and secure manner” (pp. 270-271). Instructional designers need to ensure that students’ learning is optimized through careful consideration of the instructional design attributes incorporated into the OLE. Some students will likely value course and programmatic structural elements to a greater degree than others (Waugh & Su, 2011), but this aspect of an OLE is critical to a student’s perception of success.

Conclusion

The 3-year follow-up survey responses from the WebIT cohort graduates provide data about their perceptions and views of the program characteristics of the WebIT program, and their experiences in the program. This paper demonstrates how the WebIT student perceptions and experiences reaffirm the importance of the critical elements of the Community of Inquiry model.

The results of this follow-up study may be of some benefit to administrators and program designers who seek to understand more about potential online students and online program design. The data from the study show that the WebIT students prefer a program format that is flexible and convenient; and minimizes experiences that require specific time constraints. The students felt that the WebIT program had a positive impact on their attainment of new skills and knowledge, and that this was demonstrated by successful on-the-job application. The students also shared the view that some aspects of the WebIT program design could be improved. Specifically, students would prefer more structure within courses to guide independent and group work. Lastly, the students viewed the cohort model as a highly valuable organizational model that provided them with many opportunities for meaningful collaborative work in pursuit of program goals.

This follow-up study contributes to a very limited body of literature related to longitudinal perceptions of students regarding their online educational experiences. The data from this small case study may not be fully generalizable to other contexts, but it is likely that some findings will be common across similar contexts. More online programs of study should incorporate a longitudinal evaluation as part of their operation. Such evaluations can provide meaningful data to guide decisions regarding program revision and ongoing program delivery.

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Course Structure Design Decision to Solve Academic Procrastination in Online Course

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Online education, Procrastination

Abstract

This paper showcases how slight modifications to course design helped reduce student procrastination and increase effectiveness of their time management practices in an online, primarily self-directed, capstone course. In this course, a learning contract was required to be developed by the students to help them better plan and control their learning activities throughout an entire course. Multiple virtual residency sessions were scheduled to help students solve problems in the beginning weeks of the course so that they were able to move on to the next steps in completing their assignments. The course was designed to require a minimum of instructor intervention and greater flexibility for students to determine how and when they would complete assignments.

Context

An online advanced (capstone) instructional design and technology (IDT) course was transformed from a classroom-based laboratory course to an online platform. The design assumptions were based on theoretical evidence that adult learners who are nearing the end of their study programs look for learning experiences that are related to their workplace and minimally disruptive of their time (CAEL, 2010). Adult learning theory (Knowles, 1986) suggests that learners will identify the work they need to do and plan appropriately to manage their learning.

Learners were expected to create a lesson and materials for three supporting activities using three different technologies (Mindtools) to engage their students in deep learning of subject matter. The format of the course was primarily self-directed, with three synchronous virtual sessions within the first few weeks, and a rich set of scaffolding resources. The course menu was designed to visibly present activities and resources in an order that was helpful in moving learners forward, at their own pacing. Readings, tutorials, self-assessments, project guidelines and examples, and grading rubrics were provided to help learners absorb the subject matter and complete assignments with confidence that they met course expectations.

Learners were prompted to develop schedules, choose assignment topics and tools, and determine which resources they would use throughout the course. They were required to attend three virtual sessions and submit their projects by the last day of the course, or earlier. The course was designed to engage learners deeply in course content, provide them with authentic and meaningful design experiences resulting in deliverables they can use in the workplace, and facilitate them in developing project management skills and confidence to apply IDT competencies. (Souid, Wu, Hall, & Koszalka, in press).

Academic Procrastination

Academic procrastination, or needless delays in completing academic assignments, tends to happen when students lack time management competencies (Solomon & Rothblum, 1984). Time management is an important factor that influences academic grades in traditional educational settings (Trueman & Hartley, 1996). Research indicates that a negative relationship exists between academic procrastination and academic performance and achievement (Michinov et al., 2011; Rotenstein, Davis, & Tatum, 2009). Online procrastinators tend to perform worse

than non-procrastinators in traditional face-to-face classroom (Tuckman, 2005).

In online courses, which are generally designed with less supervision and more self-directed and learner-centered activities, time management thus becomes essential to students identifying sufficient time to complete course work and avoiding procrastination. Although the flexibility of an online self-directed learning course can engage adult learners in developing their own learning progress to suit their schedules, good time management skills is necessary to be successful (Kerr, Rynearson, & Kerr, 2006).

Few investigations have focused on how course structures can be designed to help students better manage their time, reflect often on their learning, and complete self-directed online courses. This study presents ideas based on evidence collected from two offerings of an online IDT course that included a variety of time management scaffolds.

Literature Review

Sloan-C (1997) suggested that learner-centeredness and project-based learning activities can be key elements for effective online learning. These basic recommendations for online learning, however, were not accompanied with an explanation of how to successfully engage students in completing course activities and achieving learning outcomes. One approach to scaffolding learning activities in online learning can be seen in the work of Greene & Land (2000). They experimented with instructional scaffolds to support student learning by developing guided questions to assist students in accomplishing their projects. Another approach was to use learning contracts to help students define how they would make progress in completing courses. Learning contracts, generally a work plan, are created by students and given to the instructor to define how and when coursework will be completed. Learning contracts are considered effective tools for students to help them personalize and manage their own self-directed learning given their learning and life priorities (Hiemstra & Sisco, 1990).

In the two iterations of this online course, which provided a flexible work schedule, it was evident that students who created learning contracts did not follow them. They often waited until the end of the course to submit all projects, rather than following their plan to complete and submit projects intermittently along the way. Subsequent project reviews and the final course evaluation suggested that most students condenses a semester worth of work into a short period of time (a few days of crunch time) at the end of the course to complete their project work; they procrastinated until the end of the semester. Reigeluth (2012) suggested that attainment-based progress is one of the core ideas that help with maximize learning. Comparing attainment to time-based progress, Reigeluth posited that students tend to move forward when they achieve rather than when a certain amount of time has passed. The crunch-time approach of the students thus may suggest that they did not maximize their learning, rather rushed to meet the goals of submitting projects by the last day of the course.

Research Question

While course deliverables were satisfactory in the end, it appeared that learners procrastinated until the last moment, rushing to complete and post assignments. Hence, learners may have developed assignments without taking enough time to reflect on and learn about what they were producing. Thus, the question is, what course design features might be used in online courses to help learners better use the flexible timelines available to reduce procrastination, engage more deeply in content, and increase focus on attainment over time?

Design Decisions

This required graduate-level capstone course was specifically designed for students to "take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and materials resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes" (Knowles, 1975, p. 18). One of the most significant issues noted in observations and evaluation data from earlier versions of this course was that students appeared to have insufficient time management skills; they often struggled to get work submitted by the end of the course. Upon review of course interactions, learning contracts, and actual submission dates it was discovered that, in general, students did not physically engage with provided course resources over the length of the course. Thus, it was not clear if they spent much time reflecting on their own learning throughout the course or just took time in the last few days of the course to create and submit their projects.

Knowles (1986) proposed contract learnings as a tool to help adult learners organize their learning time. When adult learners set up their own learning objectives, they will have a better understanding of their preferred learning styles so that they are able to customize their learning to better access learning content (Boyer, 2003).

In this course, learning contract frameworks were provided to scaffold student progress and project management. A template for creating a learning contract was provided so that learners could indicate which deliverables they would be working on throughout the weeks of the course and when they would plan to submit their projects. Given the tenet of flexibility of the course, there were no intermittent due dates for project, rather students were required to submit a learning contract where they defined when they would post their projects. They were encouraged to review their contracts often and update their progress. Although students created the contracts with dates for submissions, they still tended to wait until the end of the semester to start their work, they spent a minimal amount of time with the course resources, and they submitted their projects on the last day of the course.

The initial design of this online course included only one due dates for projects, the last day of the course. Learners, however, were able to complete and post their projects, thereby finishing the course, the day after the last required virtual session (generally about 3 weeks into the 8 week course). Dedicated time over a 2-3 week period was sufficient to complete all projects, if learners had the dedicated time. One synchronous, virtual session was required at the beginning of the course to set context for the course and describe the capstone project requirements and course resources. Two optional virtual sessions were also offered within the next two weeks to answer questions and review progress. No other communication or activities requirements were included to the course so that learner time was focused on completing the capstone projects to demonstrate program competence.

Upon review of student reflective journals, instructor reflective journal, and course formative feedback, it was suggested that more online virtual sessions would be helpful to guide students in keeping on track to complete the course work. Students requested discussion boards to share among themselves and communicate more often, however when provided during the courses they went unused. Therefore, the synchronous virtual sessions design was modified.

In this current design, three required sessions were included with in the first three weeks of the course. Each was re-designed to include a specific purpose requiring learners to share progress on projects. Although a loss of flexibility, the session requirements provided initial goals, helped learners manage their time more effectively, and helped learners feel more confident about their projects.

A virtual session was facilitated at the beginning of the course. It provided an introduction to the course and engaged learners in a series of short activities to introduce resources and project requirements. The second virtual session focused on learners sharing initial drafts of their project, next steps they will take, and questions about the projects they were currently developing. The third virtual session encouraged group problem-solving of issues encountered in projects and a discussion of the final requirements to complete the course. Time was allocated in all sessions to engage learners in discussing concepts from readings, tutorials, and project guidelines, thus encouraging learners to spend time in the course materials in preparation for the virtual sessions. Finally, time was also allocated to sharing progress and modifications to learning contracts. Such techniques can be helpful in encouraging attainment-based progress.

Learners were also able to contact the instructor about specific questions outside of the virtual sessions. It was observed in these course iterations however, that the instructor spent a great deal of time responding individually to learners about similar questions. Thus a Frequently Asked Questions (FAQ) section of created for the course to respond to logistical, content, and project questions in between or after the virtual sessions. Learners could then access the FAQ area before contacting the instructor and waiting for a response. This helped students develop a more independent approach to problem solving and become more efficient of their own time.

Compared to the initial course design, these enhancements in the course structure design enabled students to manage their time in shorter intervals. They no longer needed to plan the entire course schedule upfront, which often led to ignoring the plan and reacting to dates.

Research

A developmental research approach was used to investigate this iterative re-design process. Multiple types of data were collected from three primary resources: course data, learning contracts, final learner projects. The course data consisted of self-reports of learner pre- and post-thoughts on instruction and learning in this course and distance education experiences in general; post-thought on the virtual residency sessions; formative feedback on specific aspects of the course, summative course evaluations, and course site statistics. Learning contracts documented learners' proposed learning activities and assignment submission date. The fourth part of the data, final learner product critiques, provided information from the project deliverables.

A majority of the course-related data were quantitative, while data from journals and projects were

primarily qualitative. Data were coded and tabulated to identify themes in response to questions.

Result and Recommendation

According to a preliminary review of the data on learning contracts it was determined that the learning contracts were not very successful in supporting the self-directed learning. All learners enrolled in the course submitted their learning contracts on their proposed date.

- Less than 20% of the proposed learning activities on the contracts were followed.
- More than 50% of the proposed learning activities were completed more than 10 days *later* than proposed date.

Learners who submitted assignments on the day they proposed in their learning contract were logged as zero. Those who posted projects earlier than their proposed date were logged as positive. Those who posted projects later than their proposed date were logged as negative.

Of the 8 learners...

- one followed the submitted learning contract fairly closely with a value of -0.6,
- one partially followed the submitted learning contract with a value of -3.7,
- six did not seem to follow their learning contracts at all with an average value of -27.8.

Note that there is no data suggesting whether students had finished projects early but did not submit them until the end of the semester. Moreover, 3 of 8 learners proposed in their learning contracts that they would complete the optional content self-assessments (quizzes), yet there is no evidence showing that they completed any of these optional self-assessment (Hall et al, in press).

Table 1 summarizes three different learning contracts, proposed by different learners, showing learning activities and milestones with proposed dates for completion and submission. See Table 1.

In summary, Learner A appeared to follow the learning contract closely, with an average submission of less than one day late compared to proposed submission dates. Learner A independently planned and self-directed activities throughout the course session and had final products that were well designed, developed, implemented and evaluated earning a final grade of A. Learner B appeared to partially follow the learning contract. Learner B's final products were also well designed, developed, implemented, and evaluated resulting in a final grade of A. Evidence suggests that Learner B did fairly well in self-directed activities. Learners C did not seem to follow the learning contract. The final projects were submitted all at once and after the final due date of the course. The projects were not rated highly, resulting in a final grade of B-. It appeared that Learner C did not perform well in a self-directed environment.

The other data from the courses provided feedback about the virtual sessions and learning contracts that may provide rationale for the use of learning contracts and other design features that may help learners reduce procrastination tendency in self-directed online instruction. For example, during each of the three virtual sessions, learners had opportunities to share their projects, describe their progress, and ask questions. After each session learners completed post session learning experience surveys and at the end of the course completed an evaluation that contained questions about the learning contracts and virtual sessions. Learners appeared to agree that the virtual sessions were helpful to promote critical thinking, to keep them engaged in learning about the course outcomes, and to develop an understanding of their strengths and weaknesses. The virtual sessions also helped students feel motivated to explore content related questions that would help them create their projects. However, in the absence of the virtual sessions many students seem to begin procrastination activities, as a majority waited until the end of the course to post projects. In the evaluations some suggested that they were holding projects until the last due date. There seemed to be confusion about the purpose of the learning contract and learners seemed to think about it as a necessary activity with little value... there did not appear to be a connection to the idea that such a tool could support their time management.

Given the themes that emerged from the data the team is strongly considering eliminating the learning contract from the course, extending the length of required virtual residency sessions, engaging learners in more review of (practice with) course resources during the virtual sessions, and developing some interim schedules for project submissions. Although these prompts may remove some of the flexibility in completing the course, the additional structure may help engage the learners in more reflection on each project. Project feedback will still be primarily provided during the virtual sessions where students will be prompted to share their projects while all

provide comments. This will provide learners with synchronous feedback and hopeful support ongoing reflection as they move forward. These design modifications, will hopefully help learners avoid procrastination and assist them in developing confidence in preparing and defending their design decisions.

Table 1. Learning Contract Summary

	Proposed		Final	
	Date	Goal	Date	Comment
Learner A	May 27	Submit Learning Contract	May 27	Submit on proposed date
	May 27	Complete Prototype 1 draft	NA	no data
	Jun 3	Submit Prototype 1	June 6	Submit 3 days late
	Jun 17	Write/Submit final Eval Report	June 17	Submit on proposed date
	Jun 17	Submit Prototype 2	June 17	Submit on proposed date
	Jun 24	Submit Prototype 3	June 25	Submit 1 day late
	Jun 24	Complete course surveys /evals	June 25	Submit 1 day late
Learner B	May 27	Submit Learning Contract	May 26	Submit on time
	May 27–Jun 1	Draft Prototype 1	NA	no data
	May 27–Jun 1	Complete self-assessment	June 20	completed self-assessments did not follow proposed dates
	Jun 4–5	Submit Prototype 1	June 8	Submit 3 days late
	Jun 9–13	Conduct test of Prototype 1	NA	no data on draft completion.
	Jun 14–16	Write/Submit final Eval Report	June 25	Submit 9 days late
	Jun 9–16	Submit Prototype 2	June 17	Submit 1 day late
	Jun 21–22	Submit Prototype 3	June 29	Submit 7 days late
Learner C	Jun 23	Complete course surveys and evaluation	June 29	Submit 6 days late
	May 27	Submit Learning Contract	May 27	Submit on time
	May 27	Complete Prototype 1 draft	NA	no data on draft completion
	May 31	Complete Prototype 1	NA	no data on completion date. could have finished earlier but not submitted.
	Jun 5	Complete/Submit Prototype 2 for comment	NA	no data, may have finished earlier, not submitted
	Jun 15–17	Conduct test of Prototype 1	NA	no data
	Jun 18–19	Write/Submit final Eval Report	July 5	Submit 16 days late, late submission, final date 6/30
	Jun 18–20	Submit Prototype 2	July 1	Submit 11 days late, late submission, final date 6/30
	Jul 1–2	Submit Prototype 3	July 1	Submit on time, late submission, final date 6/30
Jul 3	Complete course surveys and evaluation	July 2	Submit 1 day earlier, late submission, final date 6/30	

Conclusions

As this course is continually enhanced based on evidence from previous offerings we hope to determine better ways to support adult learners in taking charge of their own learning and developing confidence in their thinking and products. In the earlier course designs, attempts to help learners progress and use time wisely did not seem to work well with a variety of learners in the course. The enhancements in course structure enabled some learners to manage their time in short intervals, while others procrastinated.

Design enhancements in the future offerings will hopefully help us move closer to resolving procrastination issues and enhancing confidence building while maintaining the earlier principles of flexibility and self-direction in

online instruction that increases learner-centered decisions and management of learning and minimizes instructor time. Although learning contracts were thought to be valuable in promoting self-directed learning, in this case most of the learners completed the contract but did not appear to see value in its use. Concentrating on designing more learner-focused types of activities (e.g., sharing projects and progress, practice in identifying provided resources of value, emphasizing the need for reflecting on learning) may be more valuable in supporting adult learners' to take control and drive their choices in terms of establishing and meeting their own learning goals.

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