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Nova Southeastern University, North Miami Beach, Florida

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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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1980	Denver	194061
1981	Philadelphia	207487
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1983	New Orleans	231337
1984	Dallas	243411
1985	Anaheim	256301
1986	Las Vegas	267753
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VOLUME 2 - SELECTED PAPERS ON THE PRACTICE OF EDUCATIONAL COMMUNICATIONS AND TECHNOLOGY

Evaluation of Education and ICT Network (EBA) Based on Web Content Accessibility Guidelines 2.0

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Abstract

Due to technological developments and the spread of the Internet, educational institutions need to constantly adapt to changing technology on how knowledge is delivered in order to provide their learner populations with flexibility. Evaluating the accessibility of new learning environments on the Web emerges as a need. The purpose of this study is to evaluate Turkey's Education and ICT Network (EBA), an educational Web portal where e-content developed for FATIH project is published, based on Web Content Accessibility Guidelines (WCAG) 2.0. The study evaluated the accessibility of the e-content published on EBA by January 2014. As a result of the study, the accessibility level of EBA was determined according to the criteria specified in WCAG 2.0 and some recommendations were made so that EBA could be more accessible.

Introduction

One of the areas affected most by the rapid change in the production and delivery of knowledge is education. In line with this development, the Republic of Turkey initiated FATIH Project in education in November, 2010. It is the largest and most expensive ICT-supported education project ever initiated in Turkey. The term FATIH stands for the initials of "Increasing Opportunities and Improving Technology Movement" in Turkish. FATIH project aims to provide equal opportunities in education and ensure technology integration in schools by achieving effective use of ICT tools in teaching-learning process (Republic of Turkey Ministry Of National Education, 2012). EBA is related to the "provision and management of e-content" component of FATIH project and serves as an online interactive educational platform. These e-contents are offered to the use of teachers, students and other shareholders of education (EBA, 2012).

Accessibility refers to the ease of access to man-made and natural physical environment, as well as socio-economic and cultural environments and the ease of the use of the services provided in these environments and of the capability to contribute to these services. The need to adopt 'an accessible web design' approach "has been driven by the increasing complexity of the design and delivery of Web-based information, moving from a predominantly text-based interface to a dynamic, multimedia interface offering visual, audio, and interactive ways to access and use the information provided" (Brophy and Craven, 2007, p. 951).

On the launch of World Wide Web Consortium's (W3C) initiative to develop guidelines to promote accessible website design for all, Tim Berners-Lee, W3C Director and inventor of the World Wide Web, noted that "The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect" (W3C, 1997, http://www.w3.org/WAI/). Unfortunately, those responsible for integrating ICT and e-learning in teaching-learning environments, "in the rush to integrate technology into teaching, fail to think about the accessibility needs of

students with various disabilities" (Bissonnette, L. A., 2006 in Fichten, C. S., Ferraro, V., Asuncion, J. V., Chwojka, C., Barile, M., Nguyen, M. N., Klomp, R., & Wolforth, J. 2009, p. 242). To illustrate, students with hearing impairments might have problems with a video clip posted on an educational web portal with no subtitles or transcript.

Web accessibility refers to the ease of access and use of the Web by all users, especially users with disabilities. Research suggests that a design that is good for people with disabilities results in a design that is good for everyone (Dellaporta, 2007, p. 19) and achieving accessibility contributes 'a design for all'.

WCAG 2.0 was developed in 2008 by Web Content Accessibility Guidelines Working Group (WCAG WG). WCAG 2.0 serves as a technical standard for any Web content that a user wants to access and it is based on four principles: perceivable, operable, understandable, and robust (W3C, 2008). There are 12 guidelines under the principles. These guidelines represent the basic goals that web developers should work toward in order to make content more accessible. For each guideline, there are testable success criteria, which are at three levels of conformance: A (lowest), AA, and AAA (highest) (W3C). This is a hierarchical structure consisting of three priority levels based on the checkpoints' impact on accessibility. Conformance to these guidelines will help make the Web more accessible to users with disabilities and will benefit all users. On the other hand, as Witt and McDermott (2002) suggest, adherence to these guidelines "does not guarantee accessibility for every individual. Developers need to think in terms of 'inclusive design' or of applying the guidelines so that design does not automatically exclude any group of individuals" (p. 43).

Evaluation of Education and ICT Network (EBA) Based on Web Content Accessibility Guidelines 2.0

WCAG was used in this study because it offers general-purpose accessibility guidelines and the e-content published on the EBA website is intended for users with all abilities and disabilities. Also, WCAG 2.0 is regarded as the most recognized web accessibility standards in the world (WAI, n.d.). There are also some other evaluation tools such as anyybrowser.com, Bobby by CAST or Lift by UsableNet. However, these tools tend to offer automated checking and determine the accessibility of websites in terms of mechanical aspects such as software, link validation, compatibility with various browsers etc.

The aim of this study was to evaluate EBA based on WCAG 2.0 guidelines. On the other hand, "while the W3C site is comprehensive, extracting the desired information can be confusing" (Witt and McDermott, 2002, p. 42). For this reason, many educational organizations come up with their own version of these guidelines customized for their specific needs. For example, most of the European countries conduct websites evaluations based on the W3C/WAI Web Content Accessibility Guidelines (European Commission, 2006). In this regard, the authors produced a simplified version of WCAG 2.0 to make an evaluation regarding primarily critical areas of the design by which e-content developed for EBA is delivered (see Appendix). Also, as mentioned above, the WCAG checkpoints are divided into priority and conformance levels (i.e. 'A': Priority 1; 'A-A': Priority 1 and 2; and 'A-A-A': Priority 1, 2, and 3). The simplified version of WCAG 2.0 used in this study was developed based on the 'A' Level of WCAG 2.0 because satisfying this checkpoint is considered as a basic requirement in terms of accessibility.

The authors evaluated the accessibility of the EBA website manually based on the checklist and determined that the EBA website conforms to 16 guidelines out of 25 guidelines in total.

Principle 1 – Perceivability: The EBA website provides explanations for video clips and alt-text for images, and, therefore, it provides alternatives for non-text content. The website does not provide transcripts for prerecorded audio-only and video-only materials. It allows downloading audio-only materials, but lack of transcripts for video-only materials decreases accessibility. Also, the fact that there are no captions for any video clips on the website is another factor that significantly decreases perceivability of the content. In addition, there are not any audio descriptions or other media alternatives for any materials on the website. Therefore, users have to access content via a single type of media. The website provides a hierarchical order of headings and logical arrangement of content, which contributes to the effective use of assistive technologies like VoiceOver. Although an evaluation to be performed with automatic validators yields some minor errors caused by tab-index order, this does not have a negative effect on access to the content on the website.

The content on the website is divided into sub-headings marked with html header texts, clear labels are used in the forms, and, in this regard, the website seems to be accessible, meaningful and predictable for all users. In terms of meaningful sequence, information and structure can be separated from presentation. On the other hand, the website does not provide sufficient instructions and the interface management is based solely on visuals such as arrows and buttons. The website does not have a site map and there are no instructions guiding users about navigation. The existing instructions are only in written form, the buttons provided for instructions only use texts, and the website does not provide any icons or audio elements. As a result, in terms of sensory characteristics, the website needs accessibility improvement because it only addresses visual sense.

The design of the EBA website makes it easy to distinguish foreground information from its background. The website's use of color is balanced and the instructions, buttons, texts and graphics are arranged in a way that makes it possible for them to be distinguished from the interface easily. The website does not have sounds that play automatically and there are sound controls for audio content playing more than three minutes.

Principle 2 – Operability: Keyboard accessibility is vital for any website, but navigating the EBA website with keyboard is impossible for users. The website does not make any functionality operable via a keyboard interface. In terms of adjustable timing, on the other hand, the website allows users to control time on their reading interaction. The website neither sets time limits nor provides control options for live video streams, but users can control timing options for these video clips according to their own pace when they are stored in archives. However, the main page of the website provides a total of 10 scrolling and blinking headings presented as images. These headings are presented in very large sizes and they do not have an option to pause, stop or hide them. According to WCAG 2.0, an accessible webpage shouldn't flash more than three times/second. The EBA website is accessible in this sense as it does not have any flashing. An accessible website needs to allow its users to directly go to where they want on the site without getting lost. This can be possible by providing 'skip to content' links. The EBA website, however, provides neither an option like 'skip to content" links nor special links for screen readers. The web page titles on an accessible website should allow its users to know what page they are on and what the page is for. The web page titles on the EBA website are descriptive and provide users with correct information about the page they are on and its content. There are different titles for each of the web pages of EBA and these titles are descriptive enough even for the content at the lowest level. On the other hand, although few pages have 'general/broad titles", the EBA website meets web page title criteria of WCAG 2.0 in general. On an accessible website, users can find their way in a sequential and meaningful order. The EBA website consists of a lot of links and images; in this case, there may not a need for a particular sequence to be understood and this situation can be regarded as an exception. On the other hand, those web pages of EBA that do not consist of links and images do not have a focus order. Moreover, it is almost impossible for users who do not use a mouse to navigate on the EBA website. Hyperlinks on an accessible website should inform users about the content of the link. In other words, hyperlinks that are clear and easy to understand help users figure out where they are going. The hyperlinks on the EBA website can easily be distinguished from their surrounding content and they give clear information about their content. In this sense, the EBA website meets the criteria about link purpose clarity.

Principle 3 – Understandability: Automated tools should be able to identify the natural language of the documents on an accessible website. For this reason, there are ISO language codes for all languages. The ISO language code of the EBA website is set <html lang= "tr-TR" xmlns= "http://www.w3.org/1999/xhtml>. On an accessible website, when users reach site components such as forms, videos or other interactive things, it is essential that these elements not change automatically. To achieve this, a website shouldn't automatically open links on focus or pop-ups. In addition, an accessible website shouldn't automatically submit forms 'on input. There are not any actions taking place without users' control on the EBA website. Therefore, the e-content on the website is organized consistently from 'page to page' and its interactive elements act in the way users expect them to. According to WCAG 2.0 Guideline 3.3 "Input Assistance", an accessible website should help users avoid and correct mistakes. The EBA website meets this criterion. All the input areas on the website are labeled in detail and these details help users to navigate on the website. In general, the instructions on the website are clear enough to be easily understood by users.

Principle 4 – Robustness: When the EBA website is checked according to HTML 5, we can see no major HTML errors. Only few pages of the website contain some minor tab-index order errors. This shows that the EBA website meets "Parsing" criterion of WCAG 2.0. In terms of WCAG 2.0 guideline "Name, Role, Value", the EBA website does not meet this criterion although its format promotes accessibility in general.

Conclusion and Recommendation

This study evaluated the accessibility of Turkish ICT Network (EBA) website according to a simplified version of WCAG 2.0 guidelines produced by the authors. This evaluation was carried out manually and it was determined that the EBA website conformed to 16 guidelines out of 25 guidelines in total.

Regarding the **"Perceivability"** principle of WCAG 2.0, which suggests that information and user interface components must be presentable to users in ways they can perceive, the EBA website was found to conform to the guidelines in terms of "Non-text content", "Info and relationships", "Meaningful sequence", "Use of colour", and "Audio control" dimensions. However, the EBA website needed to improvement in terms of "Audio-only and video-

only (pre-recorded)", "Captions (pre-recorded)", "Audio description or media alternative (pre-recorded)", and "Sensory characteristics" dimensions.

Regarding the "**Operability**" principle of WCAG 2.0, which suggests that user interface components and navigation must be operable, the EBA website was found to conform to the guidelines in terms of "Timing adjustable", "Three flashes or below", "Page titled", and "Link purpose (in context)" dimensions. On the other hand, the EBA website needed to improvement in terms of "Keyboard", "No keyboard trap", "Pause, stop, hide", "Bypass blocks", and "Focus order" dimensions.

The EBA website was found to conform to all of the guidelines under the **"Understandability"** principle of WCAG 2.0, which suggests that information and the operation of user interface must be understandable. Therefore, the website was considered accessible in terms of "Language of page", "On focus", "On input", "Error identification", and "Labels or instructions" dimensions.

Regarding the **"Robustness"** principle of WCAG 2.0, which suggests that content must be robust enough that it can be interpreted reliably by a wide variety of user agents including assistive technologies, the EBA website was found to conform to the guidelines in terms of "Parsing" dimension whereas it needed to improvement in terms of "Name, role, value" dimension.

In conclusion, this study found that the EBA website could be considered accessible in terms of more than half of the guidelines covered in the simplified version of WCAG 2.0. On the other hand, considering the fact that this version was developed based on the 'A' Level of WCAG 2.0, satisfying this checkpoint is considered as a basic requirement in terms of accessibility. In other words, WCAG 2.0 Level A (Priority 1) can be regarded as the minimum level of accessibility that developers of EBA should aim for. Therefore, we could suggest that there are still some areas that needs improvement so that the EBA website can be more accessible. Since this study evaluated the EBA website based on the data by January, 2014, future research can evaluate the accessibility of the website in the following years.

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Factors That May Influence Instructors' Choices of Including Social Media When Designing Online Courses

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Introduction

With increasing use of social media to connect, collaborate, and learn, higher education institutions are following suit by more frequently incorporating these communication tools within online courses. However, the reasons underlying this shift are unclear. Reasons to incorporate communication tools through social media could be many. Some reasons might include the instructors' perception of the opportunity to enhance learning and increase interest in learning by utilizing the social media tools available. Others might include using social media tools to make the online course current. However, the focus for this paper is to consider if using the social media tools chosen by instructors is for increasing the connectedness between students and the instructor and/or between students. These questions suggest that exploration into possible factors, particularly, connectedness, that may influence higher education instructors' choices for using social media within online learning environments is worth studying. Furthermore, not only is it important to focus upon and discuss potential influences of why certain social media tools are chosen and how frequently they are used, but also the instructional design implications for online courses. In this paper, there is some discussion of the growth and influence of social media choice, the increase in online courses within higher education, social media use in online courses, factors that influence social media use, connectedness factor, and importance of connectedness in online courses. Specifically, this paper will focus on the factors influencing instructors' choices of including social media in online courses related to connectedness. The factors of focus are personality and engagement.

The Growth and Influence of Social Media

Social media is defined as a collection of various Internet applications that allow for ideological and technical creations, collaboration, and exchange of content using Web 2.0 features (Whiting & Williams, 2013). Social media network sites allow for social media applications. Social media network sites (SNS) is defined as Internet sites that allow for individuals to create either public or private spaces (profiles) within a bounded system and also allow for lists of individualized users in which to share content with (Boyd & Ellison, 2008).

Since the early part of the 21st Century, social media network sites such as MySpace, Facebook, and Twitter have gained tremendous popularity in use with people of all ages (Donelan, Kear, & Ramage, 2010). Moreover, many other social media network sites such as Google+, Instagram, Pinterest, and Reddit, have emerged in popularity and others will continue to surface on the Web as more individuals use social media in their day-to-day activities (Bullus, 2014). Furthermore, social media sites have become a means in which people develop, maintain, and strengthen social connections, interactions, and relationships (Aral & Walker, 2011; Riedl, Kobler, Goswami, & Kremar, 2013). Social media allows for people to keep up with the activities of individuals of interest, reach out to experts, and express their opinions and ideas (Bullus, 2014; Riedl, et al., 2013). Moreover, with many individuals using social media daily, much of commerce is conducted through social media sites (Bullus, 2014; Riedl, et al., 2013), meaning that social media is becoming an integral part of people's lives in many aspects and social media is far-reaching globally.

Current statistics from a Pew Research Center survey on users of social media and global locations is important to note as its importance impacts decisions and its importance continues to rise (Bullus, 2014). According to Jeff Bullus (2014), all of the following statistics represent current 2014 numbers and most represent U.S. data.

- Internet users active on social media represent 72%
- 18-29 year old users represent 89%
- 30-49 year old users represent 72%
- 50-60 year old users represent 60%
- 65+ year old users represent 43%

- Time spent online in Facebook per hour, per country (top three countries): U.S. at 16 minutes; Australia at 14 minutes; and Great Britain at 13 minutes
- Mobile device use for accessing social media is 71%

Facebook currently has over 1.5 billion users with 23% of Facebook users logging in at least five times a day. Furthermore, many Americans (47%) say that Facebook is their number one influencer of purchases while 70% of marketers claim that they use Facebook to increase new customers. Facebook has been the most favored social media website of late, but predictions are that by 2016, Google + will far surpass Facebook as the premier site for social sharing (Bullus, 2014). According to Bullus (2014), Google+ has over 1 billion users with an expected 33% growth in new users, annually. Likewise, Twitter has gained significant popularity with over 550 million registered users with growth in users of 44% over the last two years. Additionally, Twitter's use has accounted for 34% of marketers using Twitter to generate new customers (Bullus, 2014). Other up-and-coming popular social media sites include Pinterest with over 20 million active users, Instagram with over 150 million users, and Reddit with over 20 million users (Bullus, 2014).

Additional uses of social media represent a more human side of sharing with others. In a study investigating "Why people share on social media," responses from over 12,000 global participants aged 18-64 revealed the following top reasons:

- to share interesting things (61%)
- to share important things (43%)
- to share funny things (43%)
- to let others know what I believe in and who I really am (39%)
- to recommend a product, service, movie, book, etc. (30%);
- to add my support to a cause, an organization, or a belief" (29%)
- to share unique things" (26%) (Wiltfong, 2013)

The findings from a smaller exploratory study involving 25 in-depth interviews focused on uses and gratifications for social media use were similar (Whiting & Williams, 2013). Specifically, ten uses and gratifications emerged: social interaction, information seeking, pass time, entertainment, relaxation, communicatory utility, convenience utility, expression of opinion, information sharing, and surveillance/knowledge about others (pp. 364).

With all of the increase in the use of social media and the importance social media has in the social interaction and relationship building among individuals, there are many opportunities to use social media effectively in online courses (Rennie & Morrison, 2013). As online courses are increasing within higher educational institutions, social media use in online courses will likely rise as well.

Online Learning Environments Increasing in Higher Education

Current online learning environments, also labeled as distance education, within higher education are increasing and evolving (Clark, 2005; Oncu & Cakir, 2011) as global, technological, and economic levels impact the environments in which higher education institutions operate. Over the last decade in the United States, online learning environments have increased at an all time high within higher education with the proportion of online students taking at least one online course (32%), representing the number of enrolled online students in 2002 at 570,000 to now totaling 6.7 million (Allen & Seaman, 2013). Furthermore, more than 69% of chief academic leaders within higher education state that online courses are critical to long-term strategic initiatives and are expected to continue to rise in importance in an effort to competitively sustain enrollment (Allen & Seaman, 2013; Grandzol & Grandzol, 2010; Oncu & Cakir, 2011; Ward, Peters, & Shelley, 2010). Additionally, an estimated 80% of higher education institutions reported demand for online programs in 2012 (Allen & Seaman, 2013).

Online learning environments are a single delivery system that includes a multitude of multimedia content located on blogs, wikis, websites, or in an online learning management system (LMS, e.g., Blackboard™). Multimedia includes content in the form of text, audio, video, graphics, simulations, or games, for example (Hawkes, 2007; Rennie & Morrison, 2013). The online learning environments may be a synchronous delivery system (communication occurring at the same time) as in some distance education learning or an asynchronous delivery system (communication occurring at different times). Additionally, online learning management systems involve instructors and students in one environment system (Oncu & Cakir, 2011).

Distance education is defined as either a synchronous or asynchronous system involving instructors and students that are separated geographically and from two-way interaction, but connected through an online communication network via, an audio or video medium through the Internet (Angelino, Williams, & Natvig, 2007; Oncu & Cakir, 2011; Rennie & Morrison, 2013; Spector, Merrill, Van Merrienboer, & Driscoll, 2007). Online learning management systems also involve instructors and students separated geographically, but allow for both asynchronous and synchronous exchange of resources through a communication network (Oncu & Cakir, 2011).

Incorporating social networks is becoming more common in online learning environments (Rennie & Morrison, 2013). Traditionally, learning environments involved only face-to-face interactions including synchronous and online learning environments involved both face-to-face and non-face-to-face (including asynchronous). However, with emerging social media technology, online learning environments can now include communication tools such as discussion forums, social networking sites, blogs, chats, wikis, and a form of online face-to-face meetings such as with Skype or Google+ Hangout. However, to take a look at what is actually being used in online courses within higher education and to see what factors are influencing the choice of social media tools for collaboration, communication, and connectivity (Kear, 2011) between instructors and students is important to research.

How online learning environments will change is unknown; however, growth in online learning environments is evident and emphasis will be placed in identifying how higher educational institutions can create more effective learning environments, especially as it relates to student engagement through the use of social media for communication purposes. Thus, discussion of social media use in online courses is relevant.

Social Media Use in Online Courses

Online learning management systems (LMS) such as Blackboard, Angel, and Desire2Learn, are beginning to provide more robust and interactive tools beyond the static discussion boards and blogs, but do not yet provide the interconnectivity that some social media sites allow. Virtual collaborative communication tools within social media that support online learning environments and experiences of users are worth exploring to incorporate into higher education courses (Kear, 2011; Rennie & Morrison, 2013). Web 2.0 technologies are applications found on Websites or through the Internet and allow for collaboration in a social environment. Examples of Web 2.0 technologies are interactive websites for sharing information and collaboration, blogs, wikis, and video and audio sharing websites (Ching & Hsu, 2010; Cress & Kimmerle, 2008; Kear, 2011; Rennie & Morrison, 2013; Watkins, 2005). Additionally, with the increase in virtual face-to-face applications tools within social media sites, Google + Hangout and other social media sites can allow for collaboration and communication within online courses (Kear, 2011; Rennie & Morrison, 2013).

In one study, Facebook was used in an online course for the purpose of collaboration among undergraduate students and the instructor. The study found that the instructor's use of appropriate humor and self-disclosure about related topics increased student collaboration and engagement in the undergraduate online course (Imlawi & Gregg, 2014). Additionally, another online course collaboration through Google+ allowed for an Indonesian international business class to interact with and research and collaborate with a U.S. undergraduate business class and produce research projects displayed in Google+ (Alderson, Lowther, & Martindale, 2013).

Social media collaborative communication tools will continue to increase, evolve, and become more ingrained into societies' social network environments. Thus, higher education will continue to use these Web collaborative tools within learning environments as a way to engage students. However, what factors influence the type of social media and the frequency in which it is used online?

Factors That Influence Social Media Choice

Besides the tools that are available for use in online learning management systems, what other possible factors are there in influencing online instructors' choice of certain social media communication tools for connectivity with students? Certainly, the more complex and technical nature and context of the online course will influence instructors' social media choice, but not much research has looked at the factors of personality and engagement as a partial explanation of why social media is chosen to encourage connectedness in online courses.

Personality Factor

Much research is conducted examining personality factors influencing positive organizational retention and productivity outcomes (Perrewe & Spector, 2002) and personality factors of learners online (Chen & Caropreso,

2004). However, few, if any research studies have been conducted to look at personality factors that may influence instructional design decisions when choosing to include social media tools in online courses. The first natural question is to examine the instructors' own perception of their affiliation with being more or less outgoing (extraverted/introverted), as one dimensional personality trait. According to Lewis Goldberg (1992), developer of the Big-Five Personality traits, extroversion is defined as one being predominately concerned with obtaining gratification outside oneself by engaging in frequent human interactions through social groups or external environments. Extroverts are considered to be those individuals that prefer being with others rather than being alone (Goldberg, 1992). Conversely, Introverts tend to prefer being alone more so than being with others. Introversion is defined as one being predominately concerned with one's own mental life through self reflection and prefer less interaction with others or less interactions in external environments (Goldberg, 1992). Examining instructors' perception of their personality trait of extroversion/introversion might be related to why an instructor would choose to use social media in online learning environments. However, what about the psychological need to connect with others? Will the need (or lack of need) influence the type of social media chosen? Examining personality factors such as the extroversion/introversion dimension of the Big 5 Personality Traits (Perrewe & Spector, 2002) has implication on instructors' choice of social media tools chosen and how a course is designed for an online learning environment. Thus, a closer look at connectedness is defined and its presence in online courses is examined further.

Connectedness Defined

Connectedness is the desire and capability to initiate ongoing meaningful social relationships (Bekker & van Assen, 2006). According to Kohut (1977), a sense of connectedness means the ability to identify with others who may be perceived as different, while feelings of safety and comfort are present without threat against self-esteem. Conversely, those that believe they are disconnected with others struggle with feeling different and distant from people (Kohut, 1984). Social connectedness, however, is a concept found in the field of psychology and suggests one's affect towards group attraction where intimacy and a sense of sharing are present (Riedl, et al., 2014). This definition presumes the notion of humans having the fundamental need to belong and feel connected. Furthermore, with social connectedness present, the opportunity for creating bonding relationships can yield in people relating to others and creating healthy societies (Riedl, et al., 2014). Questions to answer in relation to designing online courses to include social media would be: 1) does a sense of connectedness need to be present in order for students to engage in online courses? And 2) does the instructor choose a social media tool in order to promote more of a sense of connectedness among students and the instructor? Additionally, does a sense of connectedness predicate one's engagement in an online course?

Engagement Factor

For face-to-face interactions, student engagement is noted as a psychological process of learning effort that involves attention and interest of the student (Imlawi & Gregg, 2014). Student engagement is defined as the learners' efforts towards assigned activities in an educational environment and may include social interaction. Many researchers posit that student engagement is a predictor of achievement and achievement and retention are dependent upon engagement (Oncu & Cakir, 2011). Student engagement can be from the perspective of what the student does within a learning environment, what the faculty member does within the learning environment to influence engagement, and what the content within the learning environment is, pedagogically (Sansone, Fraugton, Zachary, Butner, Heiner, 2011; Ziegler, Paulus, & Woodside, 2006).

According to Ziegler et al. (2006), from the student perspective, engaging within an online environment could involve; 1) engaging within the online platform by becoming familiar with the online environment and understanding established norms, 2) engaging with others through threaded discussions and other online activities, 3) engaging with groups and experiencing the cohesive and synergistic phenomena of group interaction, and 4) engaging in content of the online course by relating to meaningful assignments through reflection and interjection of personal experiences.

From the instructor's perspective, purposeful attention towards course design, course content, and instructor interaction with student can be an influencing factor towards engagement within the online learning environment (Sansone et al., 2011). Results of some research reveal that student engagement is affected by instructor preparedness with course content, course organization, clear and understandable course content, and personally meaningful content (Sansone et al., 2011). Furthermore, even though some research has been done linking effective non-verbal behavior of the instructor to student engagement in face-to-face learning environments (Madaus, 2013; Sansone et al., 2011), not much research is available that examines the instructor non-verbal

behavior within online learning environments. By examining both instructor and student non-verbal behaviors within online learning environments, discovering how it relates to student engagement and if it could be achieve through the use of social media, would be worth further exploring. In one study, instructors noted that student engagement by means of participating is more likely in an online course rather than a traditional class because the student is expected to participate and respond to online discussions, but can choose not to participate in traditional classrooms . Additionally, the online course tends to allow for the students to voice their ideas and opinions that otherwise would not occur in traditional classes (Madaus, 2013). Furthermore, engagement through participation can be tracked in most online LMS.

Connectedness and Communication

The importance of communicating with others and engaging in dialog is what Vygotsky based much of his social learning theories, in particular, the Zone of Proximal Development theory(ZPD), Social Development theory, and More Knowledgeable Other theory (MKO) (Moll, 2013). According to Vygotsky's MKO and ZPD theories, students learn best and can better complete tasks when interacting with more experienced and knowledgeable peers and mentors (teachers) whereas alone, students are at a deficit (Bell & Zaitseva, 2005; Moll, 2013; Vygotsky, 1978). Moreover, since social interaction profoundly influences the process of cognitive and cultural development (e.g., interpsychological) (Moll, 2013; Vygotsky, 1978), having the means to allow for such peer and social collaboration in the learning environment can be achieved through tools in which allow for rich and frequent communication. Vygotsky's theories support contextual learning environments in which students take an active role in learning and thus, utilize their higher-order thinking skills (Moll 2013; Vygotsky, 1978). Additionally, communication and collaboration among peers is as old as the Socratic times in early 300 B.C., allowing for engagement in thought and understanding (Bures, Schmid, & Abrami, 2009). Having a learning environment that allows for frequent and accessible collaboration among peers and instructor for igniting idea generation, problem solving, general communication, and feedback is a desirable goal for instructional designers. Furthermore, tools that allow for frequent and accessible communication can create this type of desired environment. However as researchers and instructional designers, discovering and creating environments that promote the higher-level thinking and learning, one must discover and ask what collaboration and dialog-engaging environments do participating members work best under. One question to consider is it that participating members need to feel a connection or an affect towards others in a collaborative environment in order to achieve engagement and spur higher-level thinking? If so, is it the sense of connection towards others what spurs engagement into collaborative discussions? Furthermore, if there is a link or relationship with feelings of connectedness and social collaboration, is that connectedness, personality, or engagement factor the reason for instructors' choices of using social media in online courses?

While this paper touched on the growth of social media and increase of online education, the focus is primarily around many questions related to instructors' choice for using social media in online courses. While there are many reasons for why an instructor would choose social media within online courses, the authors of this paper would like to further explore the notion of human connectedness, personality, and engagement factors as reasons for social media choice in online courses. Furthermore, if a sense of connection is perceived by both instructor and students, then engagement might be possible, and thus, positive learning outcomes are possible and its implications for instructional design for online courses.

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A Proposed Framework for Designing MOOCs Based on the Learning Sciences and the First Principles of Instruction

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Introduction

Since the advent of the new technology trend, Massive Open Online Courses (MOOCs), speculation and interest in MOOCs in higher education has been quite high. Whether educators are for MOOCs or against them, this new trend is on the rise. Numerous universities and professors are eager to start a MOOC. According to Shah (2013), "the number of courses offered has grown from about 100 MOOCs in 2012 to almost 700 starting in 2013, with an average of nearly two new MOOCs starting every day. More than 1200 courses have been announced so far" (para. 4). In early 2011, subjects of the offered MOOCs were primarily Computer Science and Engineering; in 2013, Humanities and more Education courses were also developed (Shah, 2013).

Designing an effective learning environment is the most important, yet most difficult task, for instructors in higher education. Informed by recent research on learning, information delivery approaches to designing large lectures, specifically the instructor delivering content to passive students, are giving way to more experiential and active learning approaches. In the design of a MOOC, one challenge is to resist the information delivery approach to instruction in favor of deliberately designing for more active and experiential learning. Designing effective MOOCs that promote retention and successful completion is not an easy task. Problems of low completion rates and instructional design issues cause concern about the range of MOOCs available (Grover, Franz, Schneider, Roy, & Pea, 2013). The average completion rate for a Massive Open Online Course can be less than 7 percent (Parr, 2013). Some instructors have excellent teaching experience in face-to-face lectures and/or regular online courses; however, most instructors design their MOOCs based on their previous experiences, without taking into consideration that as a new trend MOOCs require a new design framework. Sandy McAuley (in her narrative introduction) explained that, "the social and pedagogical structures that could transform the massive open potential of the Internet to viable learning experiences on a similarly massive scale were lacking" (McAuley, Stewart, Siemens, & Cormier, 2010, p. 27) in many of the MOOCs offered.

This concept paper proposes a framework for designing effective MOOCs through the lens of Learning Sciences principles (Sawyer, 2006) and the First Principles of Instruction (Merrill, 2002). The paper starts with a review of the literature, and then focuses on discussing the proposed framework. The need for further research will be established throughout the paper.

A Review of the Literature

In this section of the paper, the literature review helps to define what a MOOC is and why it is attracting attention of higher education. Next, the review examines the factors that contribute to successful MOOCs, and identifies the need for a framework for designing MOOCs. This literature review also examines the Learning Sciences principles and the First Principles of Instruction for designing MOOC learning environments.

What is a MOOC and why is it Getting Attention?

Massive Open Online Courses, or MOOCs, are defined as: "An online phenomenon gathering momentum over the past two years or so, a MOOC integrates the connectivity of social networking, the facilitation of an acknowledged expert in a field of study, and a collection of freely accessible online resources. Perhaps most

importantly, however, a MOOC builds on the active engagement of several hundred to several thousand "students" who self-organize their participation according to learning goals, prior knowledge and skills, and common interests" (McAuley, et al., 2010, p. 4). Another MOOC definition is " an online course with the option of free and open registration, a publicly- shared curriculum, and open-ended outcomes. MOOCs integrate social networking, accessible online resources, and are facilitated by leading practitioners in the field of study" (McAuley, et al., 2010, p. 10).

In part, MOOCs are getting the attention of educators in higher education for the unique learning experience, open resources, and social network offered. MOOC enrolment is also fascinating to higher education leaders and educators, as it can reach as high as 154,763 students, such as edX's and MIT's first MOOC, "Circuits and Electronics", in 2012 (Breslow, Pritchard, DeBoer, Stump, Ho & Seaton 2013). Another high enrollment MOOC was offered by Duke University, "Bioelectricity", in the fall of 2012; the number of students who registered reached 12,175 students (Yang, Sinha, Adamson, & Rose, 2013). The numbers also indicate how students are attracted to free and open MOOCs. A persistent trend, however, is the high attrition rate that plagues most MOOCs, which will be discussed in a subsequent section. The factors that contribute to a successful MOOC are discussed in the next section.

Factors for Successful MOOCs

According to Beaven, Hauck, Comas-Quinn, Lewis, and de los Arcos (2014), a successful MOOC promotes students' collaboration, motivation and their self-determination to finish the MOOC. Success in online learning in general, Bouchard (2009) argues, mostly relies on the learners themselves. Bouchard outlines four factors that contribute to a successful learning experience in a MOOC, which are the psychological issues such as motivation, pedagogical issues such as goals and evaluation, and two issues with contextual matters (as cited in Fournier, Kop & Durand, 2014).

Teacher and Learner Roles

One factor that can contribute to a successful MOOC is shifting the teacher and learner roles. Specifically, MOOCs can be designed to enabled peer supported learning. Waite, Mackness, Roberts, and Lovegrove (2012) studied the perception of novices and experienced learners in the MOOC, "First Steps in Learning and Teaching in Higher Education", (FSLT12); this MOOC did not require learners to provide peer reviews of each other's work, nor were they required to build a community, unfortunately, this reflected negatively on novice learners. Data collected from interviews with focus groups indicates, "it was suggested that a core group of experienced volunteers could take responsibility for supporting individual groups within a cohort of novices, moderate back channels and build community at a micro level" (Waite, Mackness, Roberts & Lovegrove, 2012, para. 51); proving that learners play an important role in MOOCs. Learners can build community, support each other (particularly the novice), exchange feedback on their work, and collaborate; thereby, contributing to an overall successful MOOC experience.

Conversely, the study by McAuley, Stewart, Siemens, and Cormier (2010) on the Edfutures MOOC described the importance of the learner's role to build a community and to network in the MOOC, "our premise is that the digital economy is no longer the purview of the information and communications technology (ICT) sector, but rather of web-based collaborations and networks, of which Massive Open Online Courses (MOOCs) are an example" (p. 8).

Bonnie Stewart (in her narrative introduction in McAuley et al., 2010) explained her experience as a student in a MOOC. She was blogging and sharing ideas on the MOOC's wiki, and using different areas of the course's main site to support her learning. She described how she built ties with other people based on collaboration and the exchange of ideas, which leads discussion to the next factor in successful MOOCs - social network integration.

Social Network Integration

One important factor to make MOOCs successful for students is the integration of social media as a way to exchange ideas and build relationships. Yang, Sinha, Adamson, and Rose (2013) studied the social engagement of students and how levels of engagement influenced drop out rates. The researchers used standard social network analytic techniques to analyze the behavior and social positioning in discussion forums. The research showed different paths through the course for cohorts who began at different times. Cohorts that started the MOOC earlier and completed more of the course were less likely to drop out, while cohorts who started the MOOC later tried to catch up with the discussion and material, leaving them less engaged and more likely to drop out (Yang et al., 2013).

The most important finding in Yang's study is that the students who started in the MOOC later than other students had trouble getting into the community discussion, "the analysis was able to reveal that whereas both

information and emotional support are important, emotional support appears to be far more critical to formation of commitment to remain active in the community" (Yang et al., 2013, p. 4). The results of the study indicate that social factors can affect student dropout rates and suggests that earlier social engagement and commitment to support results in fewer dropouts. The authors argue that some MOOCs fail to reach their transformative potential because "they fail to provide the kind of social environment that is conducive to sustained engagement and learning, especially as students arrive in waves to these online learning communities" (Yang et al., 2013, p.1). The study provides valuable information for MOOC designers, and from the previous literature, we can see how important it is to socially engage students in MOOCs and build on each other's knowledge, which is considered a significant factor in successful MOOCs.

Understanding Student Background and Intention

Kizilcec, Piech, and Schneider (2013) studied learner backgrounds, characteristics, and intentions for enrolling in MOOCs, while also measuring their engagement or disengagement during three different MOOCs. Researchers focused on the interaction with course content, and measured and analyzed each student's interaction in the courses. Furthermore, they described how this formative data can benefit MOOC designers and researchers. Knowing who the students are from an early stage in the course can help instructors make adjustments during the course. For example, some students may just watch videos and engage in the discussion, but not do any assessments. Instructors might choose to not send these students reminders of assessment due dates as a strategy to not stress the students. This could discourage them from following an alternative engagement method.

The three courses studied by the researchers were: "Computer Science 101", covering high school level content (HS-level); "Algorithms: Design and Analysis", covering undergraduate level content (UG-level); and "Probabilistic Graphical Models", a graduate level course (GS-level). The results of the study show that the HS-level courses had the highest number of participants, the most female participants, and the highest number of participants who actually completed the course, in part because of the wide accessibility of the entry-level content. The study also indicated that the main reason for enrolling was because the course was fun yet challenging, and the second reason was to enhance their resumes. Furthermore, the majority of the participants for the courses, overall, were well-educated males from the US; perhaps, because of the technical nature of the courses. Also, high enrollments may be related to the broadband access required. For example, potential participants from countries with low or medium- HDI may have slow bandwidth, restricting their engagement with the videos in the MOOC (Kizilcec, Piech and Schneider, 2013).

Betsy Williams focuses on the importance of making good use of MOOCs' big data, understanding student background, and how increasing student knowledge would be useful for business and planning, instruction, and research (AIED Workshops Proceedings, 2013). Williams stated, "unfortunately, MOOCs are not making the most out of their big data because they are not collecting enough data on students' backgrounds" (Williams, 2013, p. 11). Williams emphasizes the importance of collecting core demographic information, including year of birth, gender, and race/ethnicity. MOOC providers could also ask users for their current city or place of residence to provide more accurate location results than the IP address. Questions about place of origin and native language can also provide a sense of student history and culture (Williams, 2013). This information can be valuable data for researchers and operators of course platforms. It could also help provide specific course recommendations to students based on why they are taking the course. Furthermore, knowledge about students can help instructors build on their existing knowledge and tackle any issues or potential errors; this is part of Pedagogical Content (Williams, 2013).

The Need for Further Research

Online learning in all forms, like MOOCs, will become more prevalent in higher education for many years to come. According to Hill (2012), "online technology and its associated delivery models, like MOOCs, will continue to evolve at an accelerated pace, at least compared with the experience of the past decade" (p. 96). Online courses will also play an important role in institutions that have avoided them previously and will help create new institutions (Hill, 2012). In Fall 2011, there were 572,000 more online students in the United States than in 2010 with an increase of 9.3 percent in the number of students taking online courses than the previous year (Allen and Seaman, 2013). According to Bujack, Paul, and Sandulli (2012), more research is needed to guide the development and implementation of MOOCs, and to demonstrate and evaluate the educational benefits. In addition, Parry (2010) states that MOOC providers don't yet know the best way to implement successful MOOCs, even though there is evidence that many factors can contribute to that success. McAuley et al. (2010) stated that the new educational forms are pedagogically and technically different, and these differences create a need for new learning methodologies and frameworks.

From a review of recent research, one can discern many factors that make the experience in MOOCs successful. There is a need for a framework to design MOOCs and help address the massive number of students, their different backgrounds, and intentions within the design. It is our position that educational technology researchers need to bring together principles from the Learning Sciences with an effective instructional design framework in the design of MOOCs in order to promote student engagement and active learning in a successful learning experience. We propose that by drawing upon the foundations and research of the Learning Sciences to guide the implementation of activities based on the First Principles of Instruction framework, that designers can create learning environments that support student learning and engagement and enhance retention. The new framework will emphasize how designers can improve their existing MOOCs.

The Proposed Framework for Designing MOOCs

The Learning Sciences is an interdisciplinary field of study that draws on multiple theoretical perspectives and research paradigms to advance knowledge and the application of knowledge about human learning and ways in which learning may be sponsored in intentionally designed environments. One element of the Learning Sciences is an openness to multiple perspectives on learning, including theories and approaches from other disciplines, particularly those that focus on and understand learning as a collective endeavor and not just the property of an individual (Hoadley & Van Haneghan, 2011). Openness is necessary because it takes multiple perspectives to understand the complex ecologies in which learning is situated. A second element of the learning sciences is a commitment to building solutions to problems in teaching and learning in formal and informal learning contexts. Learning scientists want to have an impact on learning and that means taking on the real world and its complexities. A third element is that knowledge of learning and instruction that is generalizable and meaningful can be acquired by studying the design in context and is not just the province of experimental and correlational research undertaken in laboratory settings (Hoadley & Van Haneghan, 2011). A fourth element of the learning sciences is studying learning in formal, informal and non-traditional contexts. The fifth element is that learning scientists look to how emerging technologies can be used to inform and transform how we teach and learn. Learning Scientists focus on studying learning in authentic contexts, and focus both on the individual as learner and also knowledge building and learning in community (Bereiter and Scardamalia, 2006). "The goal of the learning sciences is to better understand the cognitive and social processes that result in the most effective learning, and to use this knowledge to redesign classrooms and other learning environments so that people learn more deeply and more effectively" (Sawyer, 2006, p. xi). The learning sciences draw upon different disciplinary approaches and learning theories, such as constructivism, cognitive science, educational technology, and socio-cultural approaches to studying learning (Sawyer, 2006).

The Learning Sciences emphasize the importance of learners' quality of life, preparing citizens for the 21st century's technical and scientific needs and increasing social interconnection between diverse groups (Roschelle, Bakia, Toyama, & Patton, 2011). Sawyer (2006) identified key features of the learning environment that apply research from the learning sciences. He stressed the importance of building on the learner's prior knowledge to develop new ideas and understandings so learners go beyond simply memorizing information to pass the test. Those who design learning environments need to focus on developing deeper conceptual understandings and usable knowledge, and then modify learning designs based on the contexts in which new ideas are taught. Students can reach deep conceptual understanding by engaging in their own learning; however, it is difficult to achieve deep learning through lecture alone. .Students learn better when they have opportunities to express their developing knowledge through conversations with peers or by writing a reflection paper or collaboratively applying ideas to solve authentic problems. Students acquire deeper knowledge when they engage in academic activities related to the everyday practices of professionals who work in the discipline. For example, students can do historical inquiry rather than simply memorizing events and dates (Sawyer, 2006).

The First Principles of Instruction Framework

"The science of instructional design involves both theory and research. Theory is about describing phenomena and predicting (hypotheses) consequences from given conditions. Research is applying appropriate methodology to test these predictions" (Merrill, 2007, p. 5). Instructional design theory emerges from the attempt to understand the best conditions for learners in order to acquire specific knowledge and skills, instructional goals and learning outcomes while the use of the research is to have method for empirically testing and verifying these predictions (Merrill, 2007). There are a number of instructional design models that are well developed and effective for design, such as the ADDIE model (Branch, 2009), layers of design (Gibbons and Rogers in Reigeluth (2009)), and First Principles of Instruction (Merrill, 2009). The First Principles of Instruction (Merrill, 2009) is defined as a

relationship that is true under appropriate conditions. According to Merrill (2002), the First Principles of Instruction are:

- Task centered principle: learners are involved in solving real-world problems.
- Activation principle: learners recall, describe, or demonstrate related prior knowledge.
- Demonstration principle: instruction demonstrates the three types of generalizable skills - how to, what-happens, and kind-of.
- Application principle: learners engage in application of the new knowledge.
- Integration principle: learners demonstrate their new skill or reflect on it.

Merrill (2009) explains that the principles are not meant to be used individually, nor are they a method or model for instruction; rather, the principles should be used together, and with the principles, models or methods can be implemented. The effectiveness of instruction is determined by the degree to which the principles are implemented.

Gardner (2011) tested the use of First Principles of Instruction as a framework for organizing multiple strategies of active learning in an online biology course for undergraduate students. The course consisted of two modules, "the First Principles Module" and "the Traditional Module". Students chose one module to participate in during the course. The traditional module consisted of a conventional online approach, providing information and explanation of the subject with a few examples. Study results showed that the learning gain from pretest to posttest at the remember level was significant for the traditional group and was also significant for the First Principles group. In addition, the pretest to posttest gain at problem solving for the First Principles group was significant. Finally, when students rated their confidence in solving future problems, those in the First Principles group were significantly more likely to predict future success (Gardner, 2011, p. 1).

The use of the First Principles of Instruction in designing learning environments, as with most multi-step models, has advantages and disadvantages. According to Clark, one of the advantages in the Activation Principle is that instructors can help students become actively engaged in a course and stay engaged by helping students connect their own goals and interests to course goals. By discussing the usefulness of course goals and the consequences of not achieving these goals, instructors can help students sustain their confidence in achieving the course goals by demonstrating previous experiences that successfully applied those same goals (as cited in Merrill, 2002). Furthermore, the First Principles of Instruction is a flexible framework that can be applied to different learning environments. It's easy for designers to apply the First Principles of Instruction in their practice, because it starts from a designer's point of view. The First Principles of Instruction is not as complicated as other multi-step models. Finally, since the principles are problem-based, the learning is more practical for the user (Merrill, 2007).

One of the disadvantages of using the First Principles of Instruction is that it does not take the learner's perspective into consideration when designing the learning environment. The designer needs to be careful and think about learner reaction when using this model. Sometimes the steps are not clear enough to distinguish, making the design process bulky. If the problem that needs instruction is very difficult, it could impact the instruction itself (Merrill, 2007).

The First Principles of Instruction is an established approach for designing a learning environment. It is appreciated for taking into consideration the designer's point of view at each step. Since the First Principles of Instruction is not a stand-alone model or method of instruction, designers can integrate principles in any method or model that suits their situation. The First Principles of Instruction is also supported by research and each principle included is based on an instructional design theory. Also, the principles are general and can be applied to all teaching and learning situations under any educational philosophy or theory (Merrill, 2009). In a study conducted by Cropper, Bentley, and Schroder (2009) to evaluate and measure the reliability and validity of Merrill's First Principles with award-winning online courses the researchers agreed the principles were valid for evaluating the quality of online courses. The researchers stated, "From the results to date we believe that Merrill's first principles should be included in the myriad of criteria for determining online course quality" (Cropper, Bentley & Schroder, 2009, p. 139), which is strong validation.

The authors have decided to use the First Principles of Instruction in this framework as the foundation, or outline, to design the learning environment, and to integrate Learning Sciences principles at each step of the design process to make the MOOC design more flexible and conducive to active learning and student engagement according to the contemporary research on learning in education. The next section provides a description of each part of the new framework.

The Task-Centered Principle

The task-centered principle means that learning is acquired when instruction is based on a progression of

whole real-world problems or tasks (Gardner, 2011). According to the proposed framework, students will be taught progressively more complex knowledge, so learning tasks should move from less difficult to more difficult tasks (Merrill, 2002). Building on the learner's prior knowledge before introducing new knowledge is a concept from cognitivism and an important principle in the Learning Sciences. .It is also considered to be part of the First Principles of Instruction (Sawyer, 2006; Merrill, 2002). For these reasons, the concept of building on the students' prior knowledge will be the first step in the MOOC.

Activation Principle

In the activation principle, students will be required to recall and build upon their previous knowledge. To activate their learning, students who register for the course will be sent a quick online survey during registration week to measure their familiarity with the course subjects and their professional level. Simple questions will be included in the survey, such as what is your educational background? Are you familiar with the course's topics? These kinds of questions will help instructors to make adjustments to the course based on the registered student population. Also, the survey will ask about the students' intention of enrolling into the MOOC. It is align with the recommendation in the activation principle that learning is promoted when learning goals are consistent with the learners' goals (Merrill, 2002).

Demonstration Principle

In the demonstration principle, the instructor demonstrates the new knowledge based on the concept of "how to", or "what-happened", or "kind-of". The First Principles of Instruction works particularly well with MOOCs that are problem or task-centered where students are involved in solving real world problems (Merrill, 2002). The demonstration principle supports enhanced student learning by guiding them to relate their new knowledge to specific examples and by observing a demonstration or application of knowledge consistent with the content taught. The proposed framework will adopt these concepts into the design of the MOOC by preparing videos for learners and posting them in the MOOC. Peer-demonstration and peer-discussion will be implemented into the design to enhance student learning, as learners will be asked to respond to each other's questions. Students will interact with one another and exchange and build upon each other's ideas to construct collective knowledge through the use of social media, discussion threads, and blogs in the MOOC. The use of the social media can be very helpful in MOOCs as it is beneficial in building learning communities. This concept of participatory learning and learning communities is consistent with learning sciences principles (Merrill, 2009; Sawyer, 2006).

Application Principle

The application principle promotes the application of the knowledge acquired by using it to solve problems. Students will apply their new knowledge to solve problems or to make collaborative decisions or to complete an assignment. To enhance peer-collaboration, students will work on the assignment in groups and provide constructive feedback to the other groups after posting their own work online. Students will also receive instructor feedback on their work that focuses on continual improvement. According to Merrill, "learning is promoted when learners are guided in their problem solving by appropriate feedback and coaching, including error detection and correction" (Merrill, 2002, p. 49). Student collaboration and peer feedback / formative assessment are fundamental principles in the Learning Sciences. Learning scientists, like Bereiter and Scardamalia, have used the terms knowledge building to describe this collaboration that focuses on building knowledge in community. The concept behind the knowledge building is that knowledge advances through continual idea improvement in community rather than as an individual act. The learners' role also changes when building knowledge in community and each learner is treated as a contributing member of the community. Knowledge building should become a consistent effort to introduce students into a knowledge creating culture according to Scardamalia & Bereiter (2006).

It should be noted, however, that while the theories from the Learning Sciences on sponsoring learning in designed environments is meant to motivate students and cognitively engage them through collaborative assignments and active learning while using the technology, sometimes the actual application of the theory is much harder. The characteristics of this learning environment can actually decrease student engagement, even for those who were originally engaged at the beginning of the course, because students may not be accustomed to the new rules, norms, and procedures like the openness of MOOCs, the deeper engagement in knowledge building and the demands of collaborative learning. Students need to be committed to collaborating and be self-regulated to ensure their ability to construct their learning and knowledge. Students will need to adjust to their work, idea, and artifacts being critiqued through course activities in order to thrive. Students will also need to get used to the instructor acting as a facilitator to learning rather than as a primary source of information (Sawyer, 2006).

Integration principle

The last principle is the integration principle. In this part of the MOOC design, learners will integrate what they have learned into their everyday world by reflecting on, discussing, presenting, or defending their new knowledge (Gardner, 2011). In order for learners to work in groups and collaborate successfully, the MOOC instructor needs to consider the learners' backgrounds and intentions in the division of groups' assignment for example. Learners have to have similar interests to the subjects and motivation to succeed. According to Oliveira, Tinoca and Pereira (2011), in this sense in order for the collaboration to take place there must be a motive and space for negotiation; collaboration in a community is characterized by participants who share a common goal, are at a similar level and can perform the same actions while working together.

MOOC designers should conclude the course with wrap-ups where all information and course material are summarized and aligned with the course goals. We argue if the course is designed with this framework in mind, it will be very active, it will engage students, and be learner-centered. Based on the proposed framework designers should be selective when choosing the best practice, activities, and resources for their learning environment. Designers need to consider student values, motivation, and readiness for a subjective approach to learning. The design of the MOOCs, if based on the Learning Sciences principles and the First Principles of Instruction should be successful if all of the principles and concepts are integrated and applied to the MOOC design (Sawyer, 2006).

The First Principles of Instruction	The Learning Sciences Principles
The task-centered principle	• Building on the student's prior knowledge
Activation principle	• Students recall their previous knowledge
Demonstration principle	• Building continues communities • The use of the social media
Application principle	• Peer feed-back • knowledge building
Integration principle	• The learners' background and intentions

Figure 1. A Framework for Designing MOOCs Based on the Learning Sciences and the First Principles of Instruction

Conclusion

This concept paper proposed a framework for designing MOOCs, based on Learning Sciences principles of Knowledge Building and Active Learning, and the First Principles of Instruction. It provided a literature review and discussed the need for a new framework. The use of a contemporary instructional design model, the First Principles of Instruction, provides the designed learning environment with a strong base and core for the design. In addition, the Learning Sciences principles provide the openness and the move towards contemporary methods, approaches and concepts for sponsoring learning. The research of learning sciences demonstrates that the use of its concepts and principles will help students achieve their learning goals and acquire the necessary knowledge that MOOCs are designed to provide.

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Renaissance 2.0: Connecting Dots

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Abstract

Rise of ICT and especially Web technologies have changed the nature of learners and learning and as a result, a need to revisit existing educational approaches to deal with technology enhanced learning was appeared. As a natural consequence of this need, this paper analyzes new learning paradigms and portraits the 21st century learning dynamics. Throughout this paper, based on a systematic review, relationships among Web 2.0, digital natives, and connectivism were explained and presented with a holistic portrait. On these bases, the purpose of this paper is to explain what's happening in educational domain after technological landscape in terms of learners, learning environments and pedagogy.

1. Introduction

Both society and individuals have been influenced drastically since the globe met with online technologies. Overwhelmed by information and communications technologies (ICT), 21st century was called interchangeably as digital age (Rosenberg, 2001) or information age (Castells, 2011) which can be further defined as *digital information age*. In this technology driven era, the terms digital natives (Prensky, 2001) and netizens (Hauben, 1996) have been used to define the generation who internalizes technology as a routine of their casual life and to indicate their interpretation and perception of the technology (Bozkurt, 2013). This new generation regards computers, internet, mobile and ubiquitous technologies as a natural part of their daily lives. In their perspective, learning occurs as a consequence of their experiences (trial and error); doing is more important than knowing; multitasking is a way of life; staying connected is essential and there is a zero tolerance for delays (Oblinger, 2003). In addition to that, this generation has unique characteristics: They use technology as a tool for self-reflection and self-expression; in other words to create and form their digital identities. As well as creating digital identities and expressing themselves on Web, this generation use Web 2.0 platform to discover, create, gather, remix, present and share the data.

Web 2.0, with its attributes, appears to be a premising learning medium for the generation in digital knowledge age. It seems that digital natives followed the *white rabbit* and discovered *the Wonderland* in our networked globe. In this discovery, Web 2.0 represents the Wonderland with many opportunities as well as many challenges.

2. Web 2.0: Always On

Web 2.0 has many names such as wisdom Web, people-centric Web, participative Web, and read/write Web (Murugesan, 2007). All of these definitions indicate a structure which is based on creating collective knowledge. In addition to its collective nature, Web 2.0 has many other qualities, for instance:

- It is an attractive platform which enables independence and autonomy (Franklin & Van Harmelen, 2007; Greenhow, Robelia and Hughes, 2009);
- it promotes personalization, customization and creativity (McLoughlin & Lee, 2007);
- increases social interaction (Murugesan, 2007), and
- allows cooperation and collaboration (McLoughlin & Lee, 2007; Murugesan, 2007; Dede, 2008).

These qualities of Web 2.0 achieve Tim Berners Lee's dreams for a single, global and collaborative information space (Anderson, 2007) which can be interpreted as Renaissance 2.0. The opportunities that came up with Web 2.0 became possible with the innovative "Web as a platform" idea which was outlined by inventors of the term as a platform where software applications are built on the web instead of the desktop (O'Reilly & Battelle, 2004).

3. Meta Cognition in Global Brain

In an online participatory culture (Jenkins et al., 2006), basically there are two types of individuals: producers and consumers who can be defined as "prosumers" (McLoughlin and Lee, 2007). Prosumers have multiple roles. They are netizens of the Web culture, creators of the collective intelligence and members of the "wisdom of crowds" (Surowiecki, 2004). They use Web 2.0 tools and services in the content creation process with active participation (Usluel and Mazman, 2009). Some of the Web 2.0 tools (Web based applications) and services (Web based works or performances) are social networking, blogging, podcasting, data/web mash-ups, wikis and collaborative editing tools, virtual worlds, tagging, curating, media sharing, media manipulation, syndication, instant messaging and chatting. Web 2.0 platform, with its tools and services, provides a digital environment that allows individuals interact, communicate and create interchangeably both with other peers and digital environment itself.

Interestingly, even though learners on networks are more independent, self-regulated and self-directed in their knowledge quest, they eventually produce a collective result (Anderson, 2007) as the principles of the Web 2.0 are about linking minds, communities and ideas (McLoughlin & Lee, 2007).

In today's world, with the opportunities provided by Web 2.0 tools and services, it can be said that Web 2.0's most significant attribute is harnessing collective intelligence and acting like a global brain (O'reilly, 2005). On Web, data is being collected, presented, and acted upon in real time with a constantly increasing amount of participation (O'Reilly & Battelle, 2009) and in this process, individuals began to act like organic sensors to feed the global brain.

4. Pedagogy 2.0: Combining Technology and Education

It is obvious that what, how and with whom we learn is reformulated by Web 2.0 (Dede, 2008). Even though not designed for educational purposes in essence, Web 2.0 services and tools as a primary source of knowledge and content (Maloney, 2007), has changed the nature of learning and learners (McLoughlin & Lee, 2007). Web 2.0 activities put the learners in the center of online activities and provided educational opportunities (Thomas, 2008).

Web 2.0 platform "enables hybrid learning spaces that travel across physical and cyber spaces according to principles of collaboration and participation" (Greenhow, Robelia and Hughes, 2009: 247). It has an educational potential (Bower, Hedberg and Kuswara, 2010) to further enhance the teaching and learning environments (Ajjan and Hartshorne, 2008); and to support active and social learning (Ferdig, 2007).

From now on, knowledge is distributed on networks rather than being isolated within individuals (Dede, 2007) and open to anyone who demands it. With this purpose, lifelong learners are circulating between formal, informal and non-formal learning environments (Greenhow, Robelia & Hughes, 2009). Web 2.0 with all these attributes emerges as a great learning platform and provides a rich environment distributed on networks which demands active participation of learners to harness it.

Under these conditions, a need for new educational approaches and pedagogies is felt (Fischer & Konomi, 2005) to make learners active participants rather than passive consumers of the content, and to empower learning as a participatory social process supporting personal life goals and needs of individuals (McLoughlin and Lee, 2007). Therefore, it is a necessity to examine and explain learning and learners under new conditions brought by Web 2.0.

5. Understanding How Learning Occurs

The paradigm shift affected and changed learning environments, learner characteristics and pedagogy as well. Learners' exposition to technology shaped their learning styles, strengths, and preferences (Dede, 2005) and this required to revisit and update what was known about learning. To be able to understand how learning takes place, we should explain how learning occurs in digital information age with digital learners. Therefore, there is as a necessity to revisit Bloom's Taxonomy and to examine connectivism.

5.1. Bloom's Taxonomy

Bloom's Taxonomy (Bloom, 1956) is a widely accepted framework with six cognitive processes. Bloom thought this taxonomy as a work in progress (Munzenmaier and Rubin, 2013) and therefore the original version was updated for 21st century learners and learning paradigms (Anderson and Krathwohl, 2001) (Figure 1). Though it seems minor, new version presents quite significant changes and meets today's educational needs offering educators a great tool to design their lessons (Forehand, 2010).

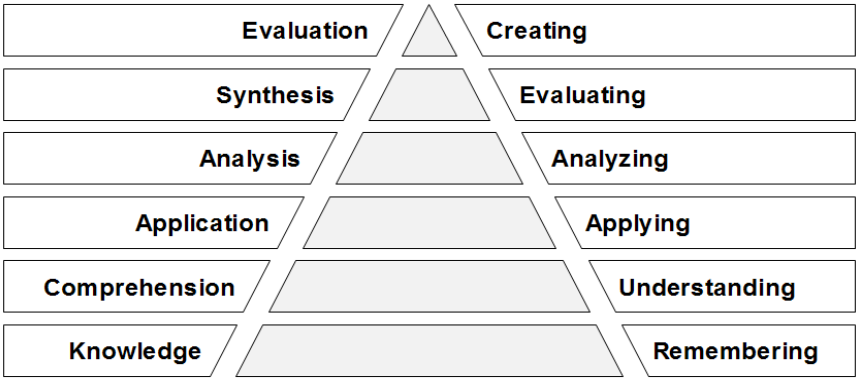

Figure 1. Bloom's Original Taxonomy vs. Bloom's Revised Taxonomy

Anderson and Krathwohl's (2001) revised taxonomy presents a context-free model and focuses on learning rather than the technology (Bower, Hedberg and Kuswara, 2010). Bloom's Original Taxonomy was revised with the intention of making it up to date and more compatible with new learning requirements. However, with the idea that "what determines cognitive level is not the tool itself, but how the technology is used" (Munzenmaier and Rubin, 2013: p.26), Churches (2008) went one step further and updated Blooms Taxonomy again for 21st century digital skills, Web 2.0 and digital learning. In updated version (Figure 2.), new action verbs were added (written in italics) to point how technology use is related to relevant skills.

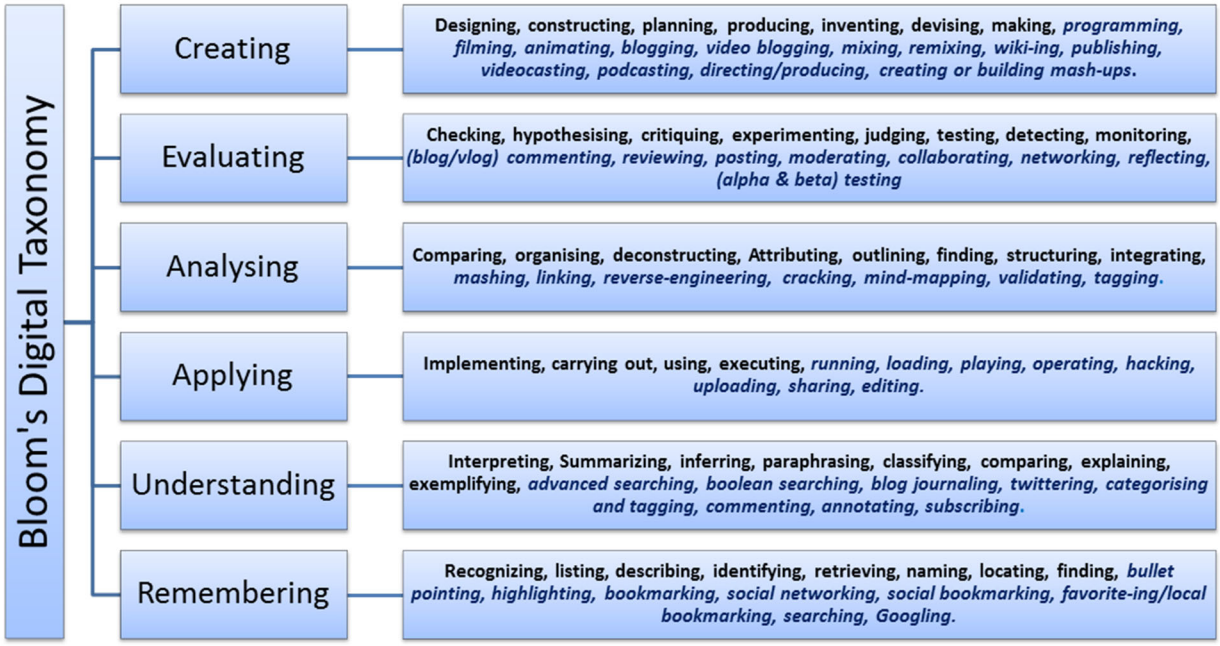

Figure 2. Bloom's Updated Taxonomy for Web 2.0 and 21st century learners
(Adapted from Churches, 2008)

By using updated version of Blooms Taxonomy, educational institutes may provide best strategies and educators can use targeted teaching methods to help learners analyze, synthesize and communicate information. Achieving these objectives can be possible when pedagogies and technologies are grounded in how students learn (Solomon and Schrum, 2007).

5.2. Connectivism: A Learning Theory for the Digital Age

After the rise of Web 2.0, connectivism, as a learning theory for the digital age, appeared to explain learning on networks. Connectivism is the integration of principles explored by chaos, network, complexity and self-organization theories (Siemens, 2004). Connectivism claims that "knowledge is distributed across a network of connections, and therefore that learning consists of the ability to construct and traverse those networks" (Downes, 2012: p.9).

In digital information age, the life-span, accuracy and validity of knowledge are shortening (Clinton, Lee and Logan, 2011; Kop and Hill, 2008) even though the amount of the knowledge is constantly doubling (Gonzalez, 2004). So, "the ability to seek out current information, and the ability to filter secondary and extraneous information" (Kop and Hill, 2008: p.2) is an important skill needed in digital information age. It is also stated that there is a fast and dense information flow in information ecology, that's why it is difficult and also unnecessary to learn everything and store them. Considering that we expose to information ceaselessly, the ability to draw distinctions between important and unimportant information is vital and our ability to learn what we need for tomorrow is more important than what we know today (Siemens, 2004). Based on these ideas, principles of connectivism are as following (Siemens, 2004):

- Learning and knowledge rests in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances.
- Capacity to know more is more critical than what is currently known
- Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
- Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision.

George Siemens (2004) states that connectivism is successor to traditional learning theories: Behaviorism, cognitivism, and constructivism. As the pioneers of connectivism Siemens (2004; 2006) and Downes (2005; 2012) claim that these traditional theories are incapable of explaing learning in digital era. Traditional theories have their focus on traditional learning environments (Shriram, and Warner, 2010) and they cannot explain adequately what happens in Web based learning environments (Clara and Barbera, 2013). It is further highlighted that traditional educational theories are outdated and incapable of dealing with technology enhanced learning anymore.

Traditional theories have some limitations as they mainly concentrate on internal learning processes and are incapable of to explain learning with technology and how learning happens within organizations (Siemens, 2004). According to Siemens (2004), behaviorism, cognitivism, and constructivism mainly focus on how learning occurs (internal process), on the other hand connectivism focuses on where the knowledge is (external process) (Table 1.) The digital paradigm shift gives us a message that what happens in pedagogy today is a change from biological to digital theories which reflects characteristics of web culture, digital learners and learning.

Table 1. Prominent learning theories and connectivism (Siemens, 2009)

Property	Behaviorism	Cognitivism	Constructivism	Connectivism
How learning occurs	Black box—observable behavior main focus	Structured, computational	Social, meaning created by each learner (personal)	Distributed within a network, social, technologically enhanced, recognizing and interpreting patterns
Influencing factors	Nature of reward, punishment, stimuli	Existing schema, previous experiences	Engagement, participation, social, cultural	Diversity of network, strength of ties
Role of memory	Memory is the hardwiring of repeated experiences—where reward and punishment are most influential	Encoding, storage, retrieval	Prior knowledge remixed to current context	Adaptive patterns, representative of current state, existing in networks
How transfer occurs	Stimulus, response	Duplicating knowledge constructs of "knower"	Socialization	Connecting to (adding) nodes
Types of learning best explained	Task-based learning	Reasoning, clear objectives, problem solving	Social, vague ("ill defined")	Complex learning, rapid changing core, diverse knowledge sources

Though there are some debates whether or not connectivism is a theory, approach or pedagogic framework, connectivism today is the idea that deals with learning on networks. Some base their argument on idea of connectivism ignores dialog and inner processes of learning. Contrary to that argument, learning on the Web made possible dialog of the individuals with learning environments, peers and the most importantly individual itself. It is better to remember that connectivist learners are autonom, self-regulated, self-directed and independent. The dialog of the individuals with other peers is important, on the other hand connectivism points out the dialogue between the self and network. As long as the link between the self and network is strong; meaningful and active learning occurs as a result of the dialogue, interaction and communication between individual and connected network. What makes connectivism collaborative, cooperative and participant is all about nature of networks; not individuals connected to them. As indicated before, even though connectivism emphasis the interdependence and autonomy of the self, what connectivist learners have on networks is finally a collective result.

6. Conclusion

Birth of internet was a beginning. By time, Web evolved from a static to a dynamic structure and this evolution ended up with the revolution which is called as Web 2.0. The effects of the Web 2.0 observed in many aspects of the life, society, individuals including human learning (Figure 3). Though it is within blurring borders of educational transformation, new millennium is beginning of a digital knowledge age in which educational paradigm shifts have happened. Higher order learning was redefined and Bloom's Taxonomy was updated as a necessity. Netizens or widely known digital natives exhibited unique characteristics particular to net generation. In netizens' technology oriented world, new learning theories were introduced to explain how learning occurs on Web and networks.

	TRADITIONAL	WEB 1.0	WEB 2.0	WEB 3.0
KNOWLEDGE IS	PACKED	DIVERSED	DISTRIBUTED	PERVASIVE
ESSENCE IS	KNOW WHAT	KNOW HOW	KNOW WHERE	KNOW HOW/WHEN/WHERE
EDUCATOR IS A	TEACHER	GUIDE	ORGANIZER	FACILITATOR
LEARNERS ARE	DEPENDENT	AUTONOM		INDEPENDENT
STRUCTURE IS	CLOSED		OPEN	
LEARNING IS MOSTLY	FORMAL	FORMAL AND INFORMAL	FORMAL, INFORMAL AND NON FORMAL	
ENVIRONMENT	TRADITIONAL	COMPUTER BASED	NETWORKS	UBIQUITOUS
LEARNING IS	TEACHER CENTERED	LEARNER CENTERED	LEARNING CENTERED	
TECHNOLOGY	AS A TOOL	FOR ASSISTANCE	AS AN ENVIRONMENT	
DELIVERY	TRADITIONAL LEARNING	E-LEARNING	E/M-LEARNING	E/M/U-LEARNING
ACTION	STAND OR SIT ALONE	LEAN BACK	MOVE FORWARD	JUMP IN
COMPUTERS	AS A CALCULATOR	ON DESKS	MOBILE	WEARABLE
LIFE IS IN	REAL WORLD	REAL+DIGITAL LIFE	REAL+DIGITAL WORLD	REAL+DIGITAL UNIVERSE
APPROACH	JUST	ONLY	BOTH-AND	ANY
CONTENT	RARELY UPDATED	FREQUENTLY UPDATED	CONSTANTLY UPDATED	REAL TIME SYNDICATION
INDIVIDUALS ARE	CONSUMERS		PRODUCERS AND CONSUMERS (PROSUMERS)	
FOCUS IS	SOCIETY	ORGANIZATION	COMMUNITY	PERSONAL
CONTENT	OWNERSHIP		SHARING	CREATION AND CURATION
GROWTH STAGE		CRAWL	WALK	RUN
PUBLICATION	DIARIES	HOME PAGES	BLOGS	LIFESTREAMS
LIMIT	STORE	DOWNLOAD	DOWNLOAD-UPLOAD	IMMERSION
PEDAGOGY	BEHAVIORISM, COGNITIVISM, CONSTRUCTIVISM		TRADITIONAL + MAINLY CONNECTIVISM	
WEB IS		READ ONLY	READ-WRITE	SEMANTIC
PROGRESS AS A CONTINUUM: ALL CONNECTED, INTEGRATED				

Figure 3. Progress of Web and other learning dimensions.

Traditional theories claim that learning takes place biologically in human brain and connectivism ignores this point to some degree. Yet, it is believed that Web is a global brain, a living structure connecting everyone in it. From this perspective, while the Web is not organic, each and every single individual connected to Web functions like a nerve system and organic sensors. Web functions as *a digital nest* where we explore, discover and learn. In contrast to traditional theories claim, learning also occurs on an artificial digital nest where *meta cognition* has been built and fed by biological living beings. In our digital nest, *Renaissance 2.0* reasoned a new kind of species called as *Homo Iunctus* who lives in a connected world and forms a superior connected being for the promise of the big data.

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In the Learner-focused Course Design: Games and Sims 101

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Abstract

The instructional games and simulations course curriculum, described in this paper, enables learners to explore games and simulations by focusing on the evaluation, design, and infusion of games and simulations in instructional settings. The activities for this course approach the topic of instructional games and simulations from multiple perspectives: readings discussions, game analyses, presentations, game projects, and research papers (for graduate learners). However, the power of the course's impact is in its learner-focused design.

Introduction

The multi-billion-dollar games industry is ubiquitous in today's society. The traditional console- and computer-based games have gained forces with handheld and mobile games in offering diversion and exploration (Gibbons, 2009). What was once seen as appealing to youths is now pervading those of all ages from toddlers to senior citizens. From their inception, games have been leveraged for educational purposes (Betrus & Botturi, 2010). Early card and dice games were used to teach math skills. Board games evolved into platforms for learning educational content. The evolution of computer games has enabled educators to expand content-specific learning with problem-solving strategies and immersive, virtual-reality simulations. The challenge for educators and instructional designers is to leverage games for effective instructional uses.

The instructional games and simulations course curriculum, described in this paper, enables learners to explore games and simulations by focusing on the evaluation, design, and infusion of games and simulations in instructional settings. The activities for this course approach the topic of instructional games and simulations from multiple perspectives: readings discussions, game analyses, presentations, game projects, and research papers (for graduate learners). However, the power of the course's impact is in its learner-focused design.

Trends and Issues	Game Characteristics				Process
	Formal Elements	Dramatic Elements	Visual Elements	System Dynamics	
Educational Value Educational Infusion Gender Diversity Violence Wellness	Players Objectives Procedures Rules Resources Boundaries	Premise Character Story World Building	Layout Color Typography Graphics Motion	Conflict Challenge Functionality Accessibility Balance Fun	Conceptualization Prototyping Playtesting

Table 1: Core Knowledge

Core Knowledge and Objectives

At the heart of any course is the core knowledge that is to be covered. For the Games and Sims 101 course, that includes trends and issues, formal elements, dramatic elements, visual elements, system dynamics, and process knowledge (see table 1). Upon completion of the course, all learners must have mastered all of these areas at an intermediate level. The course objectives (see table 2) require learners to discuss, analyze, evaluate, apply, and

interpret their knowledge of the content areas. However, depending upon the learner-centered choices they make, learners will master, at a deep level, specific knowledge areas and objectives that correspond to their focus.

Course Objectives:
1. To discuss the infusion of games and simulations in instructional settings.
2. To analyze and evaluate games and simulations.
3. To apply the principles of designing game- or simulation-based educational experiences.
4. To discuss trends and issues regarding games and simulations.
5. To interpret research regarding games and simulations in written and verbal forms (graduate learners).

Table 2: Course objectives

Learner-Centered Activities

Through a learner-focused curriculum, the instructional games and simulations course allows learners to explore the topic of games from their own perspective through choice and collaboration with others. According to Weimer, "Having some control also affects how learners learn the material. It makes it easier to connect with the content, to see its relevance, and to want to apply what's being learned" (2013, p. 97). The learner analysis (Dick, Carey, & Carey, 2009; Morrison, Ross, Kalman, & Kemp, 2011) for this course identified both undergraduate and graduate learners, with different areas of study, individual learning purposes, and a wide range of experience with gaming. Each of these characteristics shaped the course activities (summarized in table 4).

In order to cover all the core knowledge areas and to account for individual learning purposes, the learners have two books and supplementary lectures. One book is the official textbook for the course, *Game design workshop: A playcentric approach to creating innovative games* (Fullerton, 2014), that covers formal elements, dramatic elements, system dynamics, and the game design process. The second book is of the individual learner's choice from a list of approved readings that focus in more depth on one of the core knowledge areas. For **readings discussions**, learners will read a book chapter on instructional games and simulations, write a summary and reaction to the reading, and discuss their reading with their fellow learners. If a particular readings discussion is on a chapter in the textbook, the instructor guides the learners as they negotiate their individual interpretations to arrive at a communal understanding of the topic. For readings discussions on chapters in learner-selected books, the instructor guides the learners in their forming of unique perspectives on games and simulations. Supplementary lectures present the core knowledge areas not covered in the official textbook: educational value, educational infusion, issues, and visual elements.

Game Genre	Personal Computer	Console	Handheld	Phone	Tablet
Action and Adventure	X	X	X		
Card and Board	X	X	X	X	X
Driving and Flying		X			
Education	X	X	X	X	X
Exercise, Dance, and Fitness		X			
Fighting and Shooting	X	X	X		
Music and Singing		X			
Puzzle and Strategy	X	X	X	X	X
Role Playing	X	X	X	X	X
Simulation	X	X			X
Sports	X	X	X		

Table 3: Video game genre availability on gaming devices used in class

This course attracts learners with a wide range of experience with games and simulations. Some learners have only watched others play games and are complete novices. On the other hand, other learners are experts who

have conquered multiple games. However, few learners are proficient in all the game genres. Therefore, one third of each class session focuses on **game experiences**. PCs, game consoles, handheld consoles, and smart devices are available so the learners are required to play games themselves (see table 3). Each class session has a genre of game or simulation to experience. In mixed ability groups, the learners are collaborative. As each one plays, the members of the group give each other tips and strategies. At the end of the game experience session, the learners analyze and evaluate the game experience: the characteristics of the game, the potential educational value and applications of the game, and issues relating to the game.

Activity	Corresponding Course Objectives	Corresponding Knowledge Areas
Readings Discussion: Learners will read a book chapter on instructional games and simulations. They will write a summary and reaction to the reading and will discuss their reading with their fellow learners.	1, 3, 4	Trends and Issues Game Characteristics Process
Game Experiences: Each class period, a section of time will be set aside for learners to play games from a specific game genre on a variety of gaming devices. Learners will discuss their experience with the game, the elements of the game, and any issues relating to the game.	1, 2, 4	Trends and Issues Game Characteristics
Game Analyses: Learners will play games and simulations that are new to them. They will analyze the structure, substance, functionality, and instructional value of a game or simulation, in comparison with a second multimedia product.	2, 3	Trends and Issues Game Characteristics
Game Project: Learners will select one of three game and simulation projects: (1) the design and full production of an instructional board game, (2) the design and pre-production of a multimedia educational game or simulation, (3) the development of a series of game- or simulation-infused lesson plans and supporting materials. They will write a 2-3 page reflection paper regarding their design process and design decisions.	3	Trends and Issues Game Characteristics Process
Topic Presentation (Undergraduate Learners Only): Undergraduate learners will present for 10-15 minutes on a topic related to (1) characteristics of a particular game genre, (2) infusion of games and simulations for a particular educational subject or age level or (3) the trends and issues of games and simulations.	3, 4	Trends and Issues Game Characteristics
Research Paper (Graduate Learners Only): Graduate learners will write a 10-12 page review of research on (1) an aspect of game and simulation design (2) infusion of games and simulations for a particular educational subject or age level or (3) the trends and issues of games and simulations, using APA style. This will correspond with the research paper presentation.	1, 3, 4, 5	Trends and Issues Game Characteristics
Research Paper Presentation (Graduate Learners Only): Graduate learners will present a 10-15 minute review of research on (1) an aspect of game and simulation design (2) infusion of games and simulations for a particular educational subject or age level or (3) the trends and issues of games and simulations, corresponding to their research paper.	1, 3, 4, 5	Trends and Issues Game Characteristics

Table 4: Course activities, corresponding course objectives, and corresponding core knowledge

Game analyses require the learners to play a game for several hours. They analyze the structure, substance, functionality, and instructional value of a game or simulation, in comparison with a second multimedia

product. The comparisons address mobile and console games, educational and non-educational versions, and mature and inclusive titles. Although learners have to complete all the types of analyses, they have access to a game library with over 400 games and simulations from which to choose, allowing them to select products that is similar to the ones they will work with in the future.

This course attracts learners from diverse programs. The primary audience is from various programs in the College of Education. Whereas, the secondary audience is from programs in business information systems and computer science. Consequentially, the learners have different individual learning purposes for their current or future roles as teachers integrating games into the classroom, instructional designers integrating games into training, and game designers preparing for game programming courses. Therefore, the **game project**, has three tasks for the learners to choose, including (1) the design and full production of an instructional board game, (2) the design and pre-production of a multimedia educational game or simulation, (3) the development of a series of game- or simulation-infused lesson plans and supporting materials. Whichever project task they choose, learners write a 2-3 page reflection paper regarding their design process and design decisions.

As a split-level offering, both undergraduate and graduate learners attend this course. Undergraduate courses are marked by an emphasis on pragmatics, while graduate courses are marked by more emphasis on research, theory, and their applications. Both types of learners select their own readings on games and simulations for their **readings discussions**. However, the list of selected readings for the undergraduates focuses on ways to create games and infuse them into curricula, and the list of readings for the graduate learners focuses on research studies and theoretical underpinnings of games. Both types of learners also give presentations relating to game characteristics, the infusion of games and simulations for a particular subject or age level, or trends and issues surrounding games and simulations; however, undergraduate **topic presentations** are descriptions and demos of different types of games, and graduate learners write a **research paper** and give **research paper presentations** that focus on the existing empirical research.

Reflections

Some of the challenges the author has encountered involve managing multiple learner activity paths, ensuring that readings are an appropriate match for the learners, and keeping activity requirements and evaluation criteria balanced. As Weimer writes, "Each option must achieve the assignment's overall goals, and each option must be equally time-consuming and intellectually challenging" (2013, p. 99).

Throughout the three semesters this learner-centered curriculum has been implemented, learners have high levels of motivation in completing their activities, they participate well in discussions, they master the core knowledge, they take ownership for their work, and their project work is at a very high level. Because they coalesce their different perspectives, the class group develops a strong sense of community. The learner-centered approach takes much effort, but the author highly recommends it.

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Anatomy of the MegaTech Project: A goal-based scenario for computing fundamentals

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Abstract

A Goal-Based Scenario (GBS) (Schank, Berman, & Macpherson, 1999) is an instructional strategy that conveys content knowledge and problem-solving skills in a motivating way. A GBS has seven components: learning goals, mission, cover story, role, scenario operations, resources, and feedback. This paper delineates the GBS instructional framework for the MegaTech Project, a unit project for teaching computing fundamentals to college learners.

Introduction

A GBS is an instructional strategy that conveys content knowledge and problem-solving skills in a motivating way. Within a GBS, learners carry out a mission using their previous knowledge and provided resources. Schank et al. (1999) proposed that the GBS should address its seven components: learning goals, mission, cover story, role, scenario operations, resources, and feedback. This paper delineates the GBS instructional framework for the MegaTech Project, a unit project for teaching computing fundamentals to college learners.

The MegaTech Project was designed for an introductory course in computing applications that addressed the three IC^3 certification areas: computing fundamentals, key applications, and living online. The instructional materials focused on the first module for the course on computing fundamentals, specifically computer components, storage devices, input devices, output devices, software, and computer protection issues (Morrison & Wells, 2013). Since the course was online, the instructional materials had to be self-instructional.

Learning Goals

The first step in the GBS design process (Schank et al., 1999), is to identify the learning goal. The most important goal for learning about computing fundamentals is to be able to leverage the appropriate computing equipment for appropriate tasks. The specific learning goal for the MegaTech Project is practical: to be able to select and justify the purchase of computing equipment for a given person's needs. The project has learning objectives in three areas: computing fundamentals content knowledge, process skills for completing the GBS, and computer use skills for completing the GBS. The content knowledge focuses on different types of computer software and hardware and their uses, specifically computer components, storage devices, input devices, output devices, software, and computer protection issues (Morrison & Wells, 2013). As the learners complete the GBS, they must use several process skills: analyzing a user's computing needs, designing a personal computing system, and justifying the purchase of personal computing system components in writing. Although the GBS goal is not focused on computer use skills, some are necessary to complete the GPS, such as renaming a file, entering information in a table, and submitting an assignment using TurnItIn.

Mission

According to Schank, et al. (1999), "The mission should also be something that requires the skills and knowledge that you wish to impart, in order to achieve the goal successfully." The mission of the MegaTech Project is for the learner to create a list of items a person should purchase and to develop a written spiel for convincing them that those items are the best choice. This is accomplished by analyzing a given person's computing needs, selecting

items from the MegaTech Store ad, and justifying the purchase of personal computing system components in writing.

Jeanmarie Miller

Jeanmarie Miller has a family with three children. They are all under twelve, so she wants a computer they can use for their schoolwork and for entertainment. While she doesn't use it much in her day-to-day life, Jeanmarie's oldest daughter is already using productivity software at school to type assignments, write stories, enter calculations, and make slides that go with her book reports. Her teacher told her that she can work on projects at home, if she has some way to take her working files back and forth to school. One of Jeanmarie's hobbies is taking photos at family gatherings. She is a photography nut and buys just about anything such thing...as long as she can justify the purchase to her lovable, but frugal husband. Although she has great kids...kids are kids! She wonders if there are any things that can help keep her active children's imaginations busy on rainy days. She knows that the internet a key to the future for her children. Since their auntie lives in Germany, the whole family would like to do connect with her over the internet, but don't know what they will need to do this. One of the things she desperately needs is something to help the kids and herself stay away from the dangers of the internet.

Figure 1: Jeanmarie Miller's Story

Cover Story

The purpose of the cover story should be a motivational and interesting scenario that "creates the need for the mission to be accomplished"(Schank et al., 1999, p. 174). For the MegaTech Project, the learners are first introduced to the problem they are about to solve with the following introduction: "You will select one person's story (see figure 1), figure out what computer equipment they need, check out the MegaTech Store ad, make a shopping for the items you suggest they buy, and convince the person to buy them."

Role

The role for the learner in a GBS has to match the skills they are asked to perform and should be a role they theoretically could play in the future (Schank et al., 1999). At the beginning of the MegaTech Project, learners are presented with their role, as follows: "Whenever you tell someone that you have taken a computer class, they say, 'My best friend desperately needs to purchase a computer—would you be willing to help them?' This project will give you the experience to confidently answer, 'Yes!'"

Brain Ticklers: Software

1. What productivity applications do you think they would use? (e.g., word processor, spreadsheet, database, or presentation software)
2. What other kinds of software programs do you think they would use for school or work tasks?
3. What kinds of software programs do you think they would use in their spare time?
4. What kinds of software would make them be safer?

Figure 2: Tickling your memory questions

Scenario Operations

In order to complete the mission, the leaner needs to complete activities, called scenario operations (Schank et al., 1999). In the case of the MegaTech Project, some of the activities are inherent to the mission goal, such as selecting a person to help, preparing the quote, and writing out the spiel. However, two of the scenario operations

are logistical: naming and saving the submission file and submitting the assignment in Blackboard Learn. One scenario operation, tickling your memory (see figure 2), was added to reduce cognitive overload (Paas, Renkl, & Sweller, 2004). This activity consists of answering questions that related to terms used in the learner's textbook about computing fundamentals to things the person described might need.

	 ML-100 Laptop Computer	 ML-200 Laptop Computer	 ML-300 Laptop Computer
RAM	4GB	8GB	8GB
Processor	1.8GHz	2.4GHz	2.3GHz
Display	15.6" Built-in	17.3" Built-in w. high definition	15.5" Built-in
Hard Drive Size	500GB	500GB	1TB
Optical Drive	DVD±RW/CD-RW	DVD±RW/CD-RW	DVD±RW/CD-RW
Blu-ray Player	No	Yes	No
Digital Media Reader	No	Yes	Yes
TV Tuner	Yes	No	No
Built-in Webcam	Yes	Yes	Yes
Wireless Networking	Yes	Yes	Yes
Bluetooth-Enabled	No	Yes	Yes
External Display Capability	Yes	Yes	Yes
Speakers	Internal	Internal	Internal
Microphone	Built-in	Built-in	Built-in
Dock Connector	Yes	Yes	Yes
Laptop Weight	5.5 lbs	7.2 lbs	4.6 lbs
Battery Life	3.6 hrs	2.9 hrs	4.2 hrs
Included Devices	Touchpad	Touchpad	Touchpad
Extras	Free basic laptop case; free 4MB USB drive.	NVIDIA 2GB dedicated video memory; high-definition widescreen display; integrated illuminated keyboard	Free bluetooth mouse; integrated fingerprint reader; free 500GB external backup hard drive.
Price	$399.99	$999.99	$1,259.99

Figure 3: MegaTech Store ad

Resources

There is a fine line to follow, when selecting the resources for a GBS. The designer needs to provide all the information to complete the mission in a seemingly authentic form without causing undue cognitive overload (Schank et al., 1999). During the MegaTech Project, learners have access internal resources: instructions for the GBS, stories of people to help, brain tickler to various questions, a MegaTech ad (see figure 3), a pre-formatted submission file, tutorials, and the course textbook. If they require additional help, they can also access two external resources: http://www.ehow.com/ehow-tech and http://www.bestbuy.com/.

Feedback

The feedback structure for a GBS is formalized as consequences of actions, coaching during the process, or domain experts' stories (Schank et al., 1999). For the MegaTech Project, the consequences of actions are the primary feedback structure. If the students integrate the content from the textbook and the person's story, they will be able to answer the brain tickler questions. If they have answered the brain tickler questions correctly, they should be able to find the hardware and software equipment in the MegaTech Store ad to complete the quote. If the items on the quote directly meet the person's needs expressed in their story, then the spiel should be well justified. If the results do not flow one to the next, the learner are made aware that they might have to make revisions to previous decisions.

Conclusions

There were many benefits from using a GBS structure for the MegaTech Project. Rather than being a reiteration of the concepts from the textbook, the learners said that the project made them think. Their overall grades for the assignment were the highest of any work they completed for the semester. They found the task relevant to their future, as one student remarked, "Eventually, I will have to do this."

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Meaningful stimulus for a segmented instructional animation: Reflection versus prediction

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Descriptors: segmenting principle, reflection, prediction

Abstract

This study examined the effects of five different types of pauses in a segmented instructional animation. During each pause between the segments, five different types of activities were presented: waiting message, passive reflection, active reflection, passive prediction, and active prediction. The results showed that reflection groups outperformed other groups on retention tests, while there was no differences in recall test. The findings of this study provide valuable implications for effective ways of using pauses between segments in instructional animations.

Introduction

Instructional animations presenting dynamic graphics have been increasingly used because they can be effective to describe the change of events over time (e.g., motion and procedures) (Lin & Atkinson, 2011). However, the animations are not always superior to the corresponding static images, because they may impose additional cognitive load demands (Mayer, Hegarty, Mayer & Campbell, 2005; Spanjers, Wouters, van Gog & van Merriënboer, 2011). Additionally, some information from complex or fast-paced animations may be too transient to be attended, encoded, or remembered. Working memory is limited to simultaneously process much amount of information, hold the information in working memory, and retrieve it from long-term memory (Lusk, Evans, Jeffrey, Palmer, Wikstrom, & Doolittle, 2009). Because the capacity of working memory is limited, the processing of information is not always successful (Baddeley, 2007). To overcome the cognitive overload, the segmenting principle has been proposed to reduce cognitive overload by presenting animation in pieces (i.e., segments) (Mayer, 2009; Spanjers et al., 2011).

Most segmentation studies have provided pauses between segments with either learner-controlled or system-controlled pace so that learners can have more time to process information presented in the previous segment (e.g., Hasler, Kersten, & Sweller, 2007; Mayer & Chandler, 2001; Mayer, Dow, & Mayer, 2003). On the other hand, the previous study applied meaningful stimulus, such as reflection guide or recall test, during pauses, and results showed the superior test performance of using the free recall test pause as a reflection activity, embedded between meaningful segments of an instructional animation (Cheon, Chung, Crooks, Song, & Kim, 2014). Unlike reflection activity that requires learners to retrieve previously processed information, prediction activity could be another type

of stimuli that can be employed between segments. Prediction is a meaning way for learners to refine existing knowledge, articulate their understanding of a certain phenomenon, and promote relational knowledge (Hegarty, Kriz, & Cate, 2003; Lim, Buendía, Kim, Cordero, & Kasmer, 2010). However, there have been little studies on a comparison of different stimulus in segmented instructional animations. In this study, we examined the effects of six different pauses inserted between the segments of an instructional animation with system-controlled pace. Specific research questions are presented as follows:

- What types of pauses in an instructional animation are effective for learning performance (i.e., recall, retention and transfer tests)?
- Do types of pauses in an instructional animation influence mental effort?

Method

Participants

We collected data from 115 undergraduate students at a large southwestern university (Female: 63, Male: 52; Freshman: 6, Sophomore: 24, Junior: 42, Senior: 43).

Instructional animation

The instructional animation used in this study was about the science of persuasion. It introduces six shortcuts (i.e., principles) to be persuasive with animation and narration as shown in Figure 1. It is a 694 second-long animation and consists of an introduction part and six more parts for each shortcut: (a) Reciprocity (106 seconds), (b) Scarcity (64 seconds), (c) Authority (113 seconds), (d) Consistency (96 seconds), (e) Liking (85 seconds), and (f) Consensus (154 seconds). The whole animation was divided to seven chunks based on the principles.

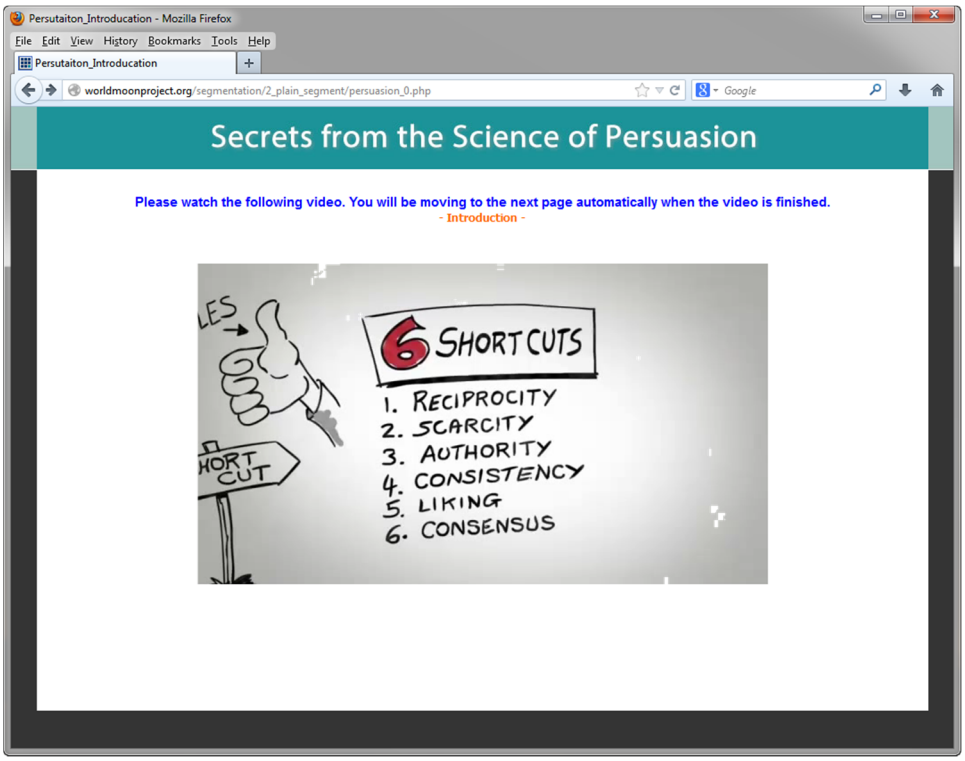

Figure 1. A screenshot of instructional animation

Data collection

There were one control group and five experimental groups depending on segmentation condition. All six groups spent the exact same amount time on the instructional animation (1,312 seconds: 21 minutes and 52

seconds). For example, the group 1 watched the animation twice, but the introduction part (76 seconds) was not included in the second time. For all five other groups, the time for each pause and segment were identical. The group 2 was provided a plain pause between segments. More specifically, there was a message "You will be moving to the next animation." Next, group 3 and 4 were asked to reflect what they learned from the previous segment. The active reflection group was asked to write the summary of what the principle means in the context of persuading others, while the passive reflection group was asked to rehearse what they watched without writing. Group 5 and 6 were asked to predict what each principle means before watching the animation for the principle.

The participants were randomly assigned to one group and were asked to complete questionnaire about demographic information and prior knowledge. Next, they took the instruction about the secrets from the science of persuasion. Last, they were asked to take three different types of tests. The recall test had six multiple-choice questions to name each principle of persuasion. The retention test consisted of six multiple-choice questions to recognize the principles and another six questions to find appropriate concepts to the principle. The transfer test was open-ended questions. In addition, the participants were asked to rate their mental effort during instruction and tests.

Results

Regarding prior knowledge, there was no significant difference among all groups ($F(5, 109) = .677$, $p = .642$). Table 1 shows the means and standard deviations for each of the learning outcome. One-way ANOVAs were conducted on all measures.

Table 1. Means and Standard Deviations for All Measures

	Repetition (n = 14)	Plain Pause (n = 17)	Passive Reflection (n = 23)	Active Reflection (n = 23)	Passive Prediction (n = 19)	Active Prediction (n = 19)
Recall Test	5.29 (0.99)	5.18 (0.95)	5.74 (0.54)	5.70 (0.63)	5.63 (0.60)	5.63 (0.76)
Retention Test	4.96 (1.12)	4.42 (1.53)	5.39 (0.72)	5.43 (0.61)	4.81 (1.00)	5.02 (0.86)
Recognition Questions	5.36 (1.15)	5.00 (1.54)	5.74 (0.54)	5.74 (0.45)	5.53 (0.69)	5.47 (1.02)
Conceptual Questions	4.57 (1.45)	3.82 (1.63)	5.04 (0.98)	5.13 (0.97)	4.11 (1.63)	4.58 (1.02)

* Standard deviations are presented in parenthesis

There was no significant differences in recall test scores ($F(5, 109) = 1.799$, $p = .119$). However, analysis of variance showed a main effect of pause types on retention test, $F(5, 109) = 2.946$, $p = .016$, $\eta_p^2 = .119$. The effect size (i.e., partial eta-squared score) is medium. Post-hoc analyses using Tukey's HSD indicated that both passive and active reflection groups have higher scores than the plain pause group ($p = .027$, $p = .018$). The difference of the retention test was caused by the significant difference in the scores of the concept questions ($F(5, 109) = 3.175$, $p = .010$, $\eta_p^2 = .127$) rather than recognition questions that was not significant ($F(5, 109) = 1.675$, $p = .147$). The participants' responses to six open-ended questions in the transfer test are being scored now.

Discussion

The results of this study suggest the superior retention test performance of using the *reflection* pause, embedded between meaningful segments of an instructional animation with system controlled pace. Interestingly, pause types did not affect mental effort both during the instruction and the test performance.

Based on the segmenting principle, pauses between segments of the animation were predicted to reduce the burden of concurrently attending to the continuous instructional unit (Mayer & Moreno, 2003; Moreno & Mayer, 2007). The previous study found that active pause type (i.e., free recall test) significantly improved learning performance, while the passive pause types (i.e., waiting messages and self-reelection guide) did not affect learning significantly (Cheon et al., 2014). In this sense, this study employed prediction stimuli between segments.

Among six different pause types, the repetition group outperformed the plain pause group presenting a waiting message on all test scores (See Table 1), even though the differences were not significant. The result

confirms that pause may not be effective unless meaningful cognitive activity is not ensured. Regarding different stimulus during pause, the reflection was more effective than prediction between segments. We conjecture that the prediction was mere guess rather than elaboration, because it might be hard for learners to predict clear concepts with only the names of shortcuts presented in the introduction part (Goldberg, Casenhiser, & Sethuraman, 2005). Instead, the reflection activity provides learners with an opportunity to reorganize all shortcuts with examples and definition from the previous segment they watched. Within each different stimuli, there were two different activities, and we called them active and passive depending on the way to process information. The writing and rehearsal activities failed to differentiate learning performance. In a nutshell, the findings imply that a reflection stimulus may be useful for learners to process transient information in instructional animation.

Several limitations were found in this study. We used a specific subject of psychology, the science of persuasion, and the six shortcuts are not procedural knowledge. So, learners were not able to predict the next step based on the previous step, and the introduction part might not provide learners with adequate information that can be used to predict each principle. Future study may use a different learning topic that contains sequential steps so that learners can predict next step more easily. Next, the distinction between the terms, passive and active, need to be defined clearly. The active stimuli in the previous study meant providing free recall test during pause, while the current study asked students to write their own summary of what they watched. The unclear definition of passive and active stimulus may cause the inconsistent results.

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A National Study of School Library Websites: Preliminary Design & Usability Guidelines

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Abstract

This study examined the basic design layout, content, and usability of 300 randomly sampled elementary (n=100), middle school (n=100), and high school (n=100) library websites in the United States. Of the schools selected 102 of the school librarians also completed a survey examining their libraries' information and service priorities, site maintenance, and primary users. The results found that the majority of sites were intended for students but rated low on recommended youth-oriented website standards for cognitive, affective or emotional, and general design best-practices. General design layouts and content were identified and major implications include a best-practices checklist and preliminary design and content guidelines for school library websites.

The Usability of School Library Websites: Student-Centered Web Design

This study explores how best practices identified through the growing body of research in cognitive information seeking behaviors and website design are applicable to the general usability of school library websites. Research suggests significant differences between how adults and youth seek information and in their preferences in seeking information in online digital environments (Blowers & Bryan, 2004; Large & Beheshti, 2005; Cooper, 2005; Nielsen, 2005; Buckleitner, 2008; Cai & Zhao, 2010; Considine, Horton, & Moorman, 2009). Given the growing body of knowledge about these differences, our study sought to explore several questions – What does a typical school library website look like in terms of design and content? How do they compare to research-based best practices? And, were they designed more for youth or adults and how usable were they?

Literature Review

These information seeking differences between adult and youth information seekers are largely due to affective and cognitive factors and widely variant goals. Adults are generally more confident, able to process and sift through large amounts of less concrete information, and, in general, are goal-oriented (Nielsen, 2005). Youth, on the other hand, are less confident, need more assurance and support, are less able to process large amounts of

abstract information, and are more exploratory than goal-oriented when seeking information (Cai & Zhao, 2010; Large, Beheshti, & Rahman, 2002; Milligan & Murdock, 1996).

Youth Information Seeking Behaviors

Youth, in fact, can be broken down into four discrete information seeking groups defined by their ability to read and Piaget's cognitive developmental stages: 1) *Pre-readers* (3-5 years old) are in Piaget's sensory motor stage; 2) *Beginning readers* (5-8 years old) are in Piaget's pre-operational stage and in preschool or early elementary school; this phase is characterized by "ego-centrism" where children are self-centered and expect the world to operate through their world view and perspective (Cooper, 2005); 3) *Intermediate readers* (9-12 years old) are in Piaget's concrete operational stage; these pre-teens understand the world through concrete objects and trial-and-error learning (Huitt & Hummel, 2003; Cooper 2005); and 4) *Advanced readers* (13-17 years old) are now teens and in Piaget's formal operational stage where symbols associated with abstract concepts are meaningful as teens begin to emerge into adult information seekers (Huitt & Hummel, 2003; Blowers & Bryan, 2004; Dubroy, 2010).

Cai and Zhao (2010) contend that youth store and retrieve information based on their cognitive ability and face two primary information processing deficiencies. Children who are pre-reader or beginning readers around seven years old or younger tend to suffer from meditational deficiencies and are considered *limited processors*, which reflect this age group's inability to use effective information storage and retrieval strategies. Youth that are intermediate readers around 7-12 years old tend to suffer from production deficiencies and are considered *cued processors* who are able to begin using more effective storage and retrieval strategies but only when they have cues guiding them. Youth older than 12 or 13 tend to be advanced readers and outgrow these cognitive deficiencies and are referred to as *strategic processors* (Cai & Zhao, 2010), which reflects adult information seeking tendencies.

Pre-adolescent web information seekers (10-13) prefer visual cues over dense text and their information seeking behavior focuses more on exploration rather than strategic searching for clearly defined information goals; sites that keep this age-group's attention use bright colors and are visually appealing with common use of animation, sound, and visual graphics and icons (Large, Beheshti, & Rahman, 2002; Nielsen, 2005). This age group does not like to scroll, prefers to browse over using search engines, and becomes quickly frustrated with lack of success (Large, Beheshti, Nesset, & Bowler, 2006).

Adolescent web information seekers (14-18) still prefer to browse, rather than conduct specific key word searches (Large, Beheshti, Clement, Tabatabae, & Yin Tarn, 2009). This group also like sites that have "cool" graphics, are interactive where they can socialize with others and leave their mark on the site through online quizzes, voting, blogging, and games (Nielsen, 2005; DiMichele, 2007). As this age group has begun to more closely reflect adult information seeking behavior, teens like to scan pages quickly looking for visual cues that allow them to quickly determine whether the site is a usable site for them – relevant with high quality information (Fidel et al, 1999). Like adults, most teens find moving images, sounds, and other scrolling information "distracting" and tend to ignore them with some disdain (Nielsen, 2005; DiMichele, 2007).

Designing Websites for Today's Digital Natives

Prensky (2008) coined youth born with digital access to computing and the Internet *digital natives,* while older generations represent *digital immigrants* (Prensky, 2008). Too often teachers make the mistake of assuming that being a digital native is synonymous with information seeking expertise because, "their extensive use of ICT (Information and Communication Technology) often creates a false sense of competency, as well as the misperception among many adults that contemporary youth are "media savvy" (Considine & Horton, 2009, p.472). Often adult web designers design sites largely intended for youth with adult users in mind (Chow, 2011; Chow, Smith, & Sun, 2012; Lin, 2007). Design goals for youth such as "cool," "engaging," and "age-appropriate" defined using an adult-centered paradigm are usually off target. Chow, Smith, and Sun (2012) referred to the process of more accurately operationalizing youth ideas and meaning into youth-oriented websites as *concept actualization*. A growing body of research suggests working with youth throughout the lifecycle of a website (Druin, 1999; Large et al, 2006; Harding et al, 2009) – analysis, design, development, implementation, and evaluation – is the appropriate way to ensure youth perspectives and priorities are appropriately included.

A thorough review of the literature suggests there are three domains to consider when designing websites for youth – cognitive, affective, and design. Taking account the *cognitive domain* reflects age-appropriateness of the youth the site is intended for which entails seven primary factors: 1. Amount of text on a page (Bilal, 2005), 2. Vocabulary (Cooper, 2005; Dubroy, 2010), 3. Graphics (Large, Beheshti, & Rahman, 2002), 4. Cues (Rose, Rose, and Blodgett, 2009), 5. Pictorial searching (Rose, Rose, and Blodgett, 2009), 6. Icons to represent ideas (Cooper, 2005; Dubroy, 2010), and 7. Games (Nielsen, 2000).

The *affective domain* involves ensuring an emotionally safe environment (Bilal, 2005; Kuhlthau, 1991) that minimize uncertainty and fear of failure by providing feedback and using clear organization (Bilal, 2005). Establishing a positive affective environment for youth on the web involves seven factors: 1. Images that youth can relate to and are comforted by (Cooper, 2005), 2. Sounds that provide feedback and reflect interaction (Cooper, 2005), 3. Interactivity with others (Teo, Oh, & Lui, 2003; Bilal, 2005; Dubroy, 2010), 4.Personalization (Large, Beheshti and Rahman, 2002; Dubroy 2010), 5. Play (Dubroy, 2010; Large et al., 2002; Cooper, 2005), 6. Open exploration (Bilal, 2005), and 7. Self-paced (Cooper, 2005).

The *design domain* involves actually incorporating identified best practices that help make a website an inviting, age-appropriate digital environment designed to maximize interest and present information that youth can effectively search and with which they can engage. The four primary design factors to account for are: 1. A child-centered, youth-oriented approach (Druin, 1999; Bilal, 2002; Large, Beheshti, & Rahman, 2002; Large, Beheshti, Nesset, & Bowler, 2004), 2. Allow youth to control the pace and create their own, unique paths (Cooper, 2005), 3. Ability to leave a footprint (Bauman, 2009; Large et al., 2002; Dubroy, 2010), and 4. Simple layouts (Cooper, 2005; Nielson, 2002). Youth-oriented design layouts include - Bright colors (Bilal & Kirby, 2002; Bilal, 2005; Dubroy, 2010; Large, Beheshti, & Rahman, 2002; Large, Beheshti, Nesset, & Bowler, 2004), site mascots (Bowler, 2004), creative icons (Bowler, 2004; Large et al., 2004), a fun name (Large, Nessit, Beheshti and Bowler 2004), animation and graphics (Bowler, 2004; Large et al., 2002; Dubroy, 2010; Large et al., 2004; Nielsen, 2002), characterization (Bowler, 2004), a logo in upper left corner (Nielsen, 2004; Nielsen, 2010), a homepage search box with keyword searching (Nielsen, 2004), no splash page (Nielsen, 2004; Nielsen, 2010), and horizontal breadcrumbs (if used) (Nielsen, 2004; Nielsen, 2010).

Chow, Smith, and Sun (2012) utilized these three domains as a best-practices checklist to create age-appropriate websites for middle school and high school youth as part of the NSF funded STARS Alliance focused on broadening participation in computing and information technology. Working with youth design partners, the middle school site, see Figure 1, was defined by bright colors in the background and foreground, smiling faces, sound effects, animation, and access to online games and fun quizzes. The high school design, see Figure 2, was a bit less colorful based on high school student feedback and focused more on social communication (blogs and polls), careers, and answering more specific questions such as types of jobs, salaries, and sharing real stories.

Figure 1 - Middle School Website (www.uncg.edu/MSZ)

Figure 2 - High School Website (www.uncg.edu/HSZ)

Usability

The International Organization for Standardization (ISO) formally defines *usability* (standard ISO 9241-11) as the "extent to which the product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use." *Effectiveness* is the "percentage of goals achieved, percentage of users successfully completing tasks and average accuracy of completed tasks," *efficiency* is the "time to complete a task, tasks completed per unit time and monetary cost of performing the task," and *satisfaction* is a "rating scale for satisfaction, frequency of discretionary use and frequency of complaints."

In practice, the concept of usability is experienced on the Web in two measures. The first measure is the utility of a website and its ability to meet the information needs of its users. The second measure is the ease-of-use, which is experienced as relatively "pain free" information seeking free from lots of mental effort, confusion, and having to search too hard to find what a user is looking for. Application of this concept is difficult, however, because different users have both different information needs and preferences in how they search for information on the web. In essence, the path towards web usability is paved with a design that reflects the integration of high priority needs of its different user groups (referred to as feature checklist) and organizational priorities along with a design that is focused on its specific user groups and their unique preferences in the cognitive, affective, and design domains.

School Library Websites

Tips and strategies for building school library websites are offered in practitioner-based publications (Johnson, 2009; Minkel, 2003; Valenza, 2006). There is a smaller body of research literature about school library website content, use, and exemplars. Valenza (2007) developed two taxonomies for describing Features and Characteristics of school library websites, based on a Delphi-method investigation of exemplary school library websites. This study emphasizes the use of the library website by students and teachers in fulfilling curricular objectives for content areas as integrated with digital literacies. To this end, among the recommendations of the study was that additional training may support school librarians in making websites more "accessible and engaging" for students (p. 127). Also addressing the instructional potential of school library websites, Jackson (2006) studied the information literacy needs of a group of high school students. Based on the results, Jackson (2006) designed school library webpages with instructional scaffolds for cognitive, metacognitive, procedural, and strategic processes. Jurkowski (2004) conducted a content analysis of school library websites in Missouri, and identified categories of basic, school-library specific, content-area, and "interesting features" of the websites.

School library websites may be studied in comparison to other library websites and websites designed for children, but it is also helpful to consider school library websites as part of general K-12 school website development and use. Hartshorne, Friedman, Algozzine, and Kaur (2008) developed a checklist for evaluating elementary school websites, with categories of Design, Structure, and Content. In applying this checklist to 50 existing school websites, researchers found that the majority of school websites followed basic web design elements effectively. The websites earned good checklist scores in efficiency and ease of navigation, and scores dropped for not having group-specific pages. Also of note was that overall, the sites showed limited use of websites to show

student work (which the authors assert is an important potential use of school websites, per related research findings) and no indication of adherence to accessibility guidelines (2008).

As the knowledge base of how to effectively develop youth websites continues to mature and evolve, our study sought to explore how well school library websites were incorporating these findings. We have found a scarcity of other studies in the literature examining youth website design applied to school library websites. Initially this study began as a funded summer project at a university in the southeastern United States and evolved into a nationwide study that sought to answer four central research questions: 1) What does a typical school library website look like? 2) Who are school library websites designed for? 3) How do school library websites compare to recommended best practices? and, 4) How usable are school library websites?

Method

Sampling and Participants

Sampling involved seeking a representative sample through random selection of school districts from one rural and one urban county across the United States and then random selection of one elementary, middle, and high schools in each of these selected districts.

Sampling. In order to ensure a representative sample of school libraries to evaluate, a random selection of one rural (a population of less than 50,000) and one urban county (a population greater than 50,000) (US Census Bureau, 2010) from every state was first selected from the US Census Bureau website. From each of these selected counties one elementary, middle, and high school was randomly selected for evaluation by identifying them through each district's website.

Participants. A total of six school library websites were selected and evaluated in each of the 50 states (three from a rural county and three from a urban county) in the United States (n=300; 33% elementary, 33% middle, and 33% high school) using an instrument created for the study, the *School Website Checklist*. In addition, each of the school libraries selected were sent an online survey and 102 school librarians (33% elementary, 25% middle, and 42% high school) responded, which represents a 34% response rate.

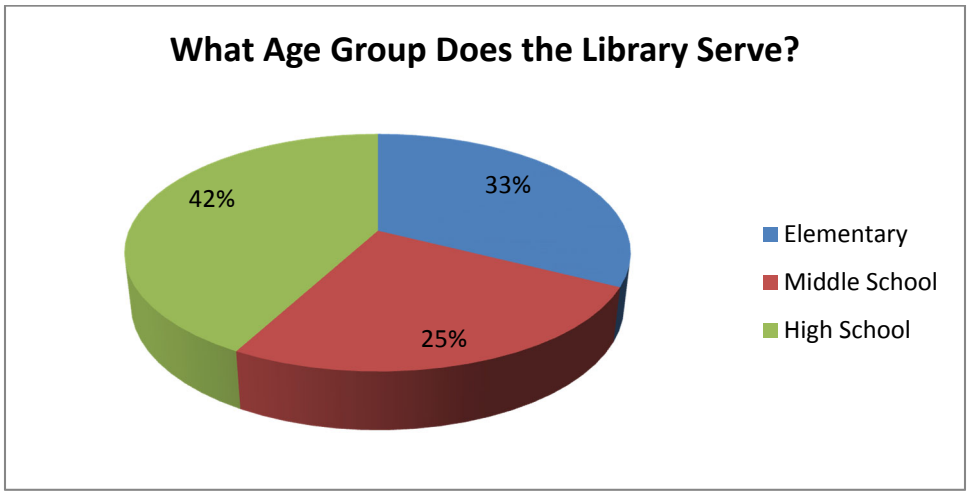

Figure 3 - Librarian Sample

Instrumentation

The study utilized two instruments for the study – a school website checklist and a school library survey.

School Website Checklist. This is a 38-item online checklist developed for the study derived from the literature. The checklist was organized into seven areas - site information, cognitive elements, affective elements, design, feature placement, content, and site ratings. See Appendix A.

School Librarian Survey. This survey was comprised of nine-items examining the library's web site design and management, as well as the top five information and service priorities of the library. Each school that was randomly selected was emailed an online survey to complete. See Appendix B.

Results

The majority, or 82% (n=240), of the 300 schools evaluated had a school library website. Overall the sites evaluated appeared to be designed more for adults (50%, n=112) than for youth (13%, n=30), while many also appeared to be geared to both adults and youth (37%, n=83).

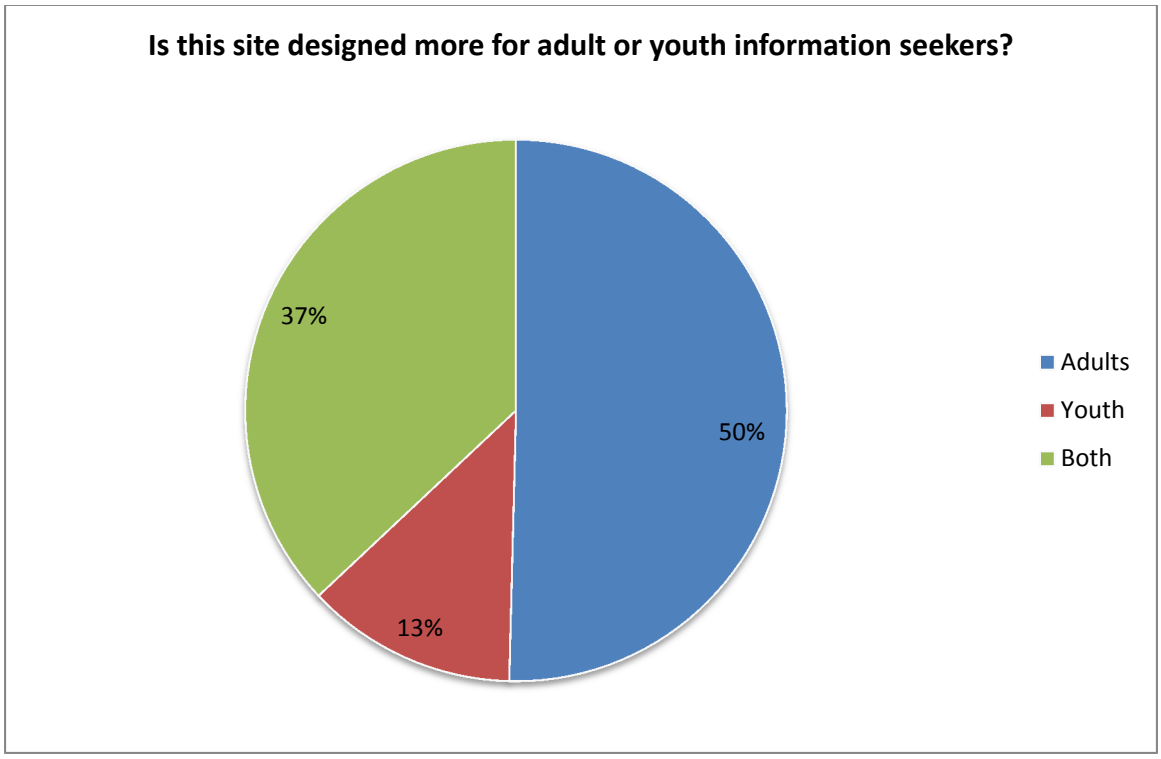

Figure 4 - Who was the School Library Website Designed for?

Cognitive Design

In terms of best practices for cognitive design as identified by the literature, ratings for youth were extremely low. For example, sites rated low on a 10-point quantitative scale (1=low, 10=high) for use of symbols that represent concrete objects (M=3.3), bright and engaging colors that attract attention and keep the youth interested (M=3.3), well thought-out portal names (M=2.9), creative and significant icons (M=2.6), and animation (M=.82). The two factors that rated highest were age-appropriate graphics and vocabulary (M=5.0) and access to electronic resources including databases, online reference, and e-books (M=4.4).

Affective Design

The overall ratings for affective design were similarly low. Sites rated low for the opportunity to play and learn (M=3.1), encouraging exploration (by being open-ended) (M=2.3), active designs (M=1.8), user control (M=1.7), allowing for and responding to child input (M=1.5), the ability to leave their footprint on the site (M=.60), and opportunities for social interaction (M=.60). The highest rated factor was reducing cognitive load by limiting distracting information and presenting only the information desired in a prominent, singular fashion (M=4.6).

Table 1 lists the mean ratings for all factors evaluated.

Table 1 - Cognitive, Affective, and Design Ratings for School Library Websites

Web Factor	Mean Rating
Are graphics and vocabulary age-appropriate?	5.01
Does the site reduce cognitive load by limiting distracting information and presenting only the information desired in a prominent, singular fashion?	4.61
Is there a link to access electronic resources including databases, online reference, and e-books?	4.46
Does the website use symbols related to concrete objects?	3.34
Does the site use bright and engaging colors that attract attention and keep the youth interested?	3.24
Can users enjoy themselves through play and learning?	3.07
Does the site have a well thought-out portal name?	2.92
Are there search tips or instructions for searching?	2.72
Does the site use creative and significant icons?	2.61
Does the website's design encourage exploration (by being open-ended)?	2.28
Does the website balance familiarity with novelty?	1.76
Is the website design active?	1.75
Does the website design emphasize user control?	1.70
Does the site offer quick feedback?	1.64
Does the website allow for and respond to child input?	1.50
Does the site have a URL that's easy to remember?	1.24
Does the site use animation?	0.82
Does the site allow for trial-and-error with physical, not abstract, objects?	0.67
Can users leave their footprint on the site?	0.62
Does the site support social interaction?	0.56
Does the site allow for progressive levels of expertise facilitating competence while offering new challenges?	0.52
Does the website involve multiple senses?	0.44
Does the site use sound effects?	0.19

Design: What Does a School Library Website Look Like?

In comparison to identified best practices for basic website design in terms of cognitive, affective, and design domains only 1% (n=2) were considered top tier (upper 33%), 17% were considered mid-tier (mid 33%), and 81% were considered lower tier (lower 33%). The most common features available were access to databases (76%, n=120), access to information literacy resources (77%, n=123), library hours (47%, n=74), access to an OPAC (Open Public Access Catalog) (62%, n=98), book recommendations and reviews (46%, n=73), library news and events (45%, n=71), library policies (40%, n=64), and access to a personal account (39%, n=62).

The majority of school library websites have their main navigation located on the left side (66.2%) or top center (52%). In terms of name and logo, 77% have them either located at the top center (43%) or center (34%) of the page header. Some libraries also had their name and logo on the top left (16%) of the page. The majority of school libraries, however, did not have their library contact information on the homepage (60%) while those that did located it on the center (21%) of the page. In terms of library location information and business hours, again the majority of sites (64%) evaluated did not have this information available; those that did had this information placed at the bottom center (13%) or bottom left (9%) of the page. Table 2 shows the content found on school library websites.

Table 2 - School Library Website Content and Services

Answer Options	Response Percent	Response Count
Access information literacy resources	79.6%	187
Access databases	73.6%	173
Access an OPAC	63.0%	148
Find library hours	48.1%	113
Find book recommendations/reviews	43.4%	102
View library news and events	42.6%	100
View library policies (checkout, overdue policies, etc.)	41.3%	97
Access personal account	38.7%	91
View the library	35.7%	84
Receive help with research from a librarian	6.0%	14
Sign-up for a class with the librarian	4.3%	10
Renew library materials	4.3%	10
Reserve a library resource online	3.4%	8
Schedule a classroom	3.0%	7
Reserve technology	1.7%	4
Search for available hardware and software	0.4%	1
None	0.4%	1
Other (please specify)	8	

Figure 5 shows an example of one of the higher rated school library websites evaluated. The site contained the primary design layout, color scheme, and innovative use of technology that engages students.

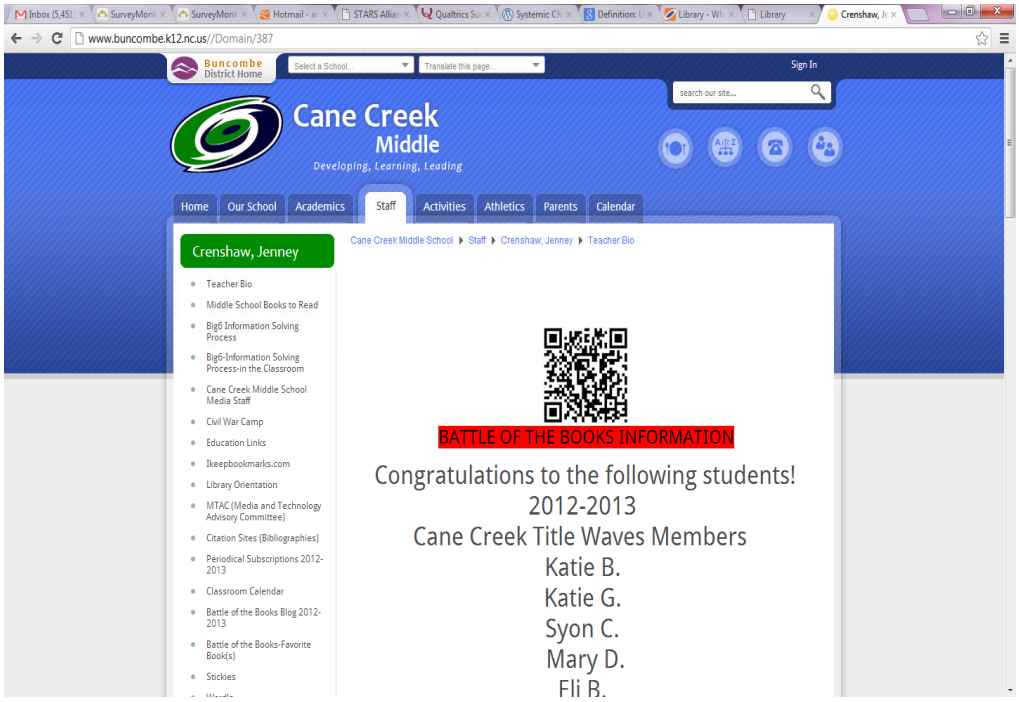

Figure 5 - Cane Creek Middle School (http://www.buncombe.k12.nc.us//Domain/387)

School Librarian Perspectives

Websites designed for students. For the librarian survey, 92% (n=84) of the respondents said they had a website. Overall, librarians felt their websites, on a scale of 1-7 (1=low, 7=high), were designed mostly for students (M=6.4), teachers (M=5.8), parents (M=5.2), and administration (M=4.8). See Figure 6.

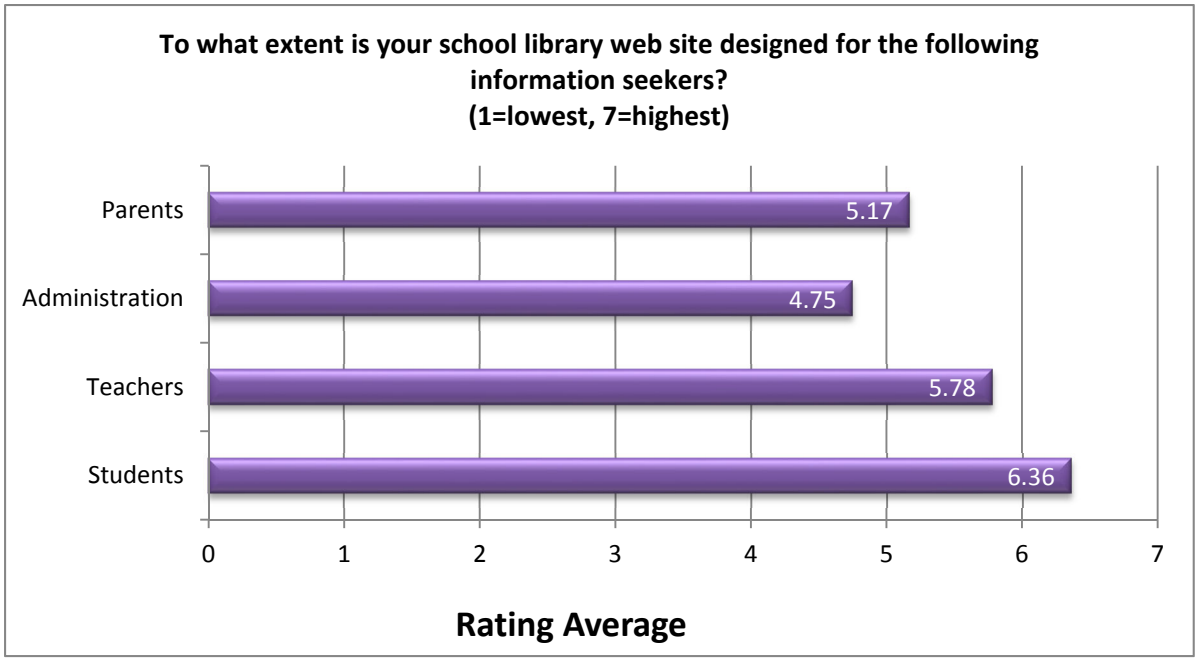

Figure 6 - Who are School Library Websites Designed for?

School library services. In terms of services, school libraries provided books, journals, and other print materials (100%), online databases (96%), computers or other technologies (94%), instruction and training (92%), areas for studying (89%), meeting spaces (87%), and technology support (85%). See Table 3.

Table 3 - School Library Services

Services & Resources Provided by School Libraries	Response Percent	Response Count
Books, Journals, other Printed Materials	100%	80
Online Databases	93%	74
Instruction/Training	90%	72
Computers/Technology	90%	72
Studying	88%	70
Meeting Space	85%	68
Technology Support	75%	60
CDs or other Media	74%	59
Testing	61%	49
Socializing	60%	48
Access to Social Media	18%	14
Access to Gaming	14%	11

High priority services. Overall the main services used by patrons and library priorities were similar. Librarians felt that both their number one goal and students' and teachers' highest priority goal were books and other print materials (M=1.47 ranking for patron usage). Whereas computers or other technology was the next highest priority for patrons (M=2.06) librarians felt that instruction or training was their second highest priority. Librarians also held their online databases as a higher priority (M=3.11) than for patrons who valued a place to study (M=3.38) slightly higher. See Table 4 for a comparison between what librarians felt were patron goals versus library goals.

Table 4 - Highest Priority Services for Patrons and Librarians

School Library Services	Library Priority	Patron Usage
1. Books, journals, and other print material	4.47	4.61
2. Computers or other technology	2.79	3.55
3. Instruction or training	3.53	2.68
4. Studying	1.62	2.0
5. Online databases	2.47	2.25
6. Technology support	1.48	1.69
7. Meeting space	1.63	1.61

Figures 7 and 8 show librarian perceptions of patron priorities in rank order.

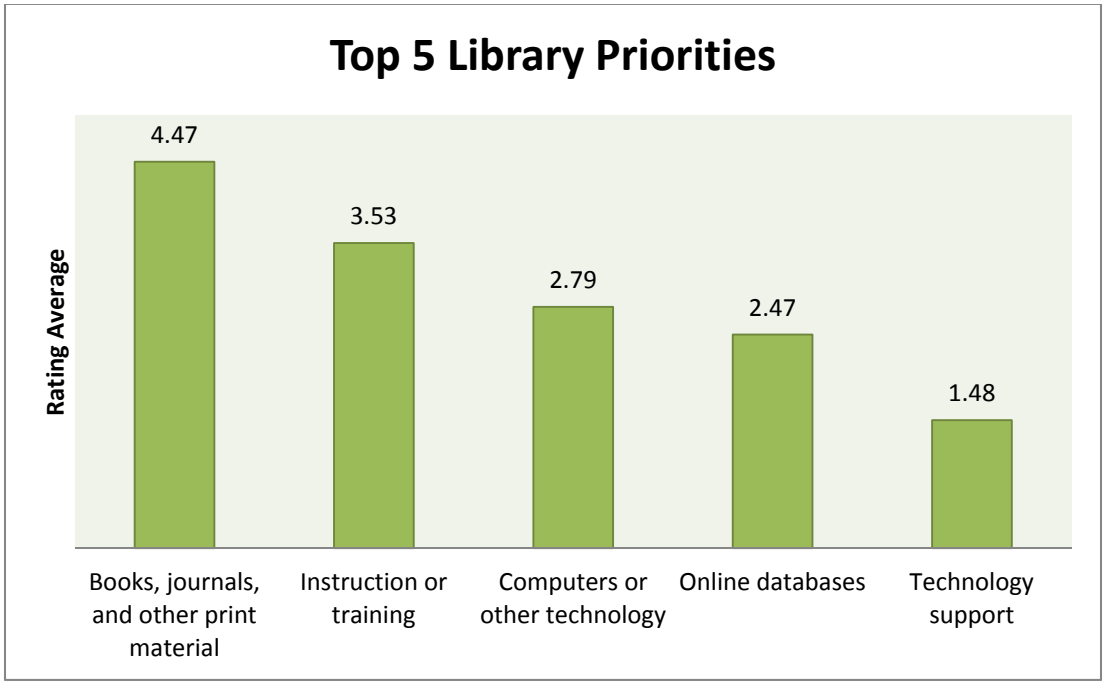

Figure 7 - Top 5 Library Priorities

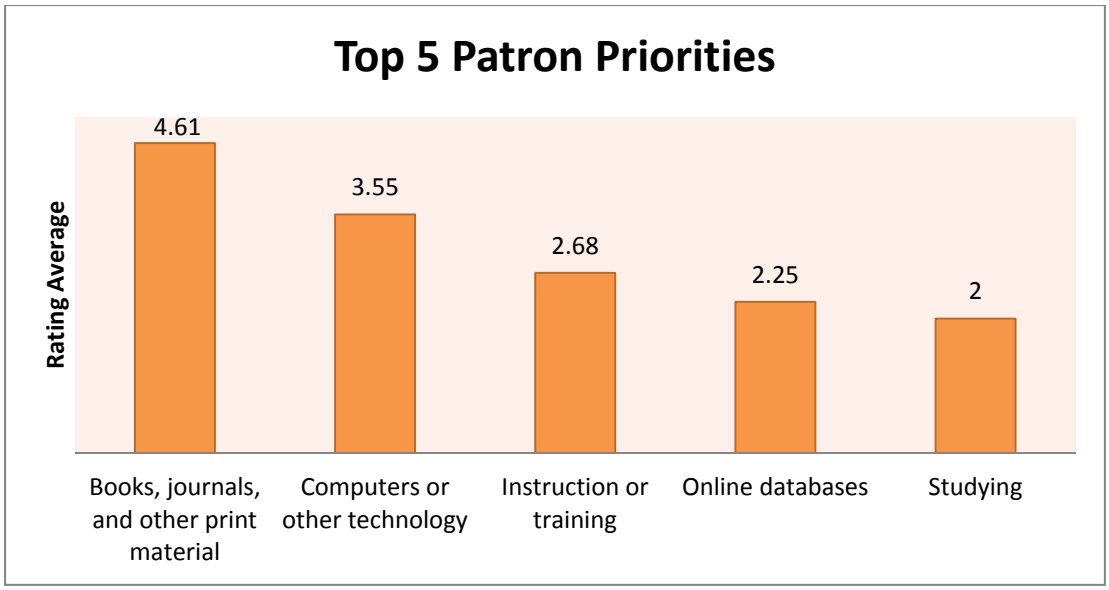

Figure 8 - Top 5 User Priorities

The perceptions of librarians also helped provide, however, some disagreement into their regard for some services typically enjoyed by students. When asked, "*What are, in rank order, your library's top five priorities (regardless of user preferences- 1=highest, 5=lowest). Please only choose five*," *Social Media*, *Access to Gaming*, and *Socializing* were in the bottom of the ranks. Out of eighty librarians who responded to this question, only four individuals rated *Social Media*, while ten people rated *Socializing*. No one chose *Access to Gaming* as one of their top five priorities. When asked, "*What are, in rank order, the top five school library resources and services (choose only five) for patrons in terms of usage (1=highest, 5=lowest):*" The count of librarians who chose these three areas increased, however, not by much. Of eighty responses, eight librarians rated *Social Media*, five librarians rated *Access to Gaming*, and seventeen individuals rated *Socializing* in the top five resources and services for patrons.

Librarians manage their own websites. School librarians are, for the most part, the site developers (83%) followed by school IT staff (11.5%) and district IT staff (10.3%). See Figure 9.

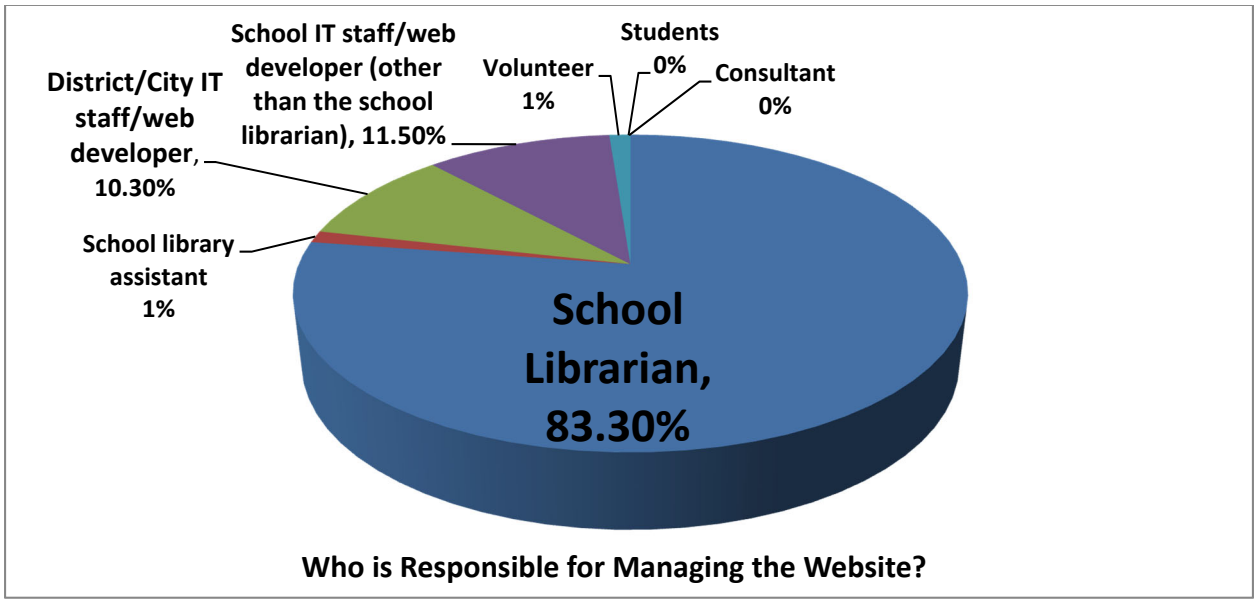

Figure 9 - Who Manages School Library Websites?

In general, school librarians felt that they had autonomy to change and update their content and design (M=5.61 out of 7), their website does a good job of serving the information needs of its users (M=5.4), they have adequate resources to maintain their site (M=5.0) and they have the proper training to manage their websites (M=4.7).

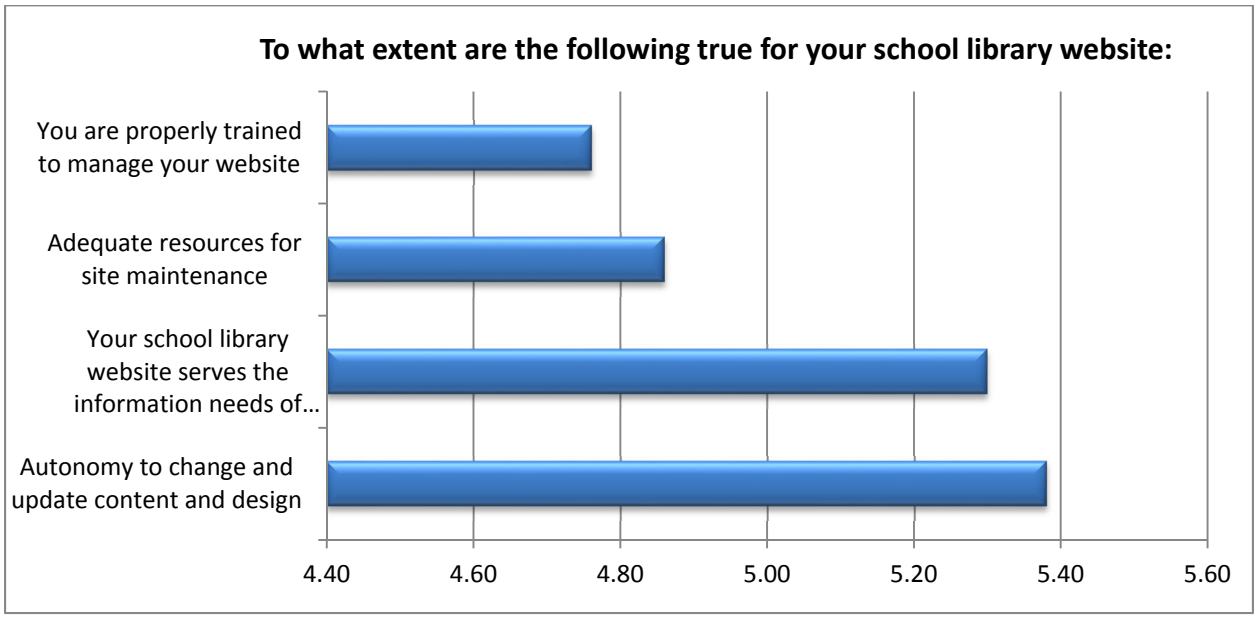

Figure 10 - School Librarian Perspectives on Their Websites

One school librarian stated articulated the growing demand of her position that is making it more difficult to spend time on the website:

> Since we are in a state of transition, this was difficult for me to answer. When I started my page 10 years ago, I received a lot of training and support. I had one planning period a week to update and maintain the site and there was additional assistance available. In the past 5 years, I have had additional responsibilities placed on my shoulders and there has been no compensation for this service or time for maintenance. I was unable to take additional training that would be paid for and supported by either the district or my building. I finally had to pull back because I was leaving later and later from my job and the webpage was apparently one of those tasks that were not viewed as important by my administration (School Librarian, 2013).

Discussion

Examining a random sample of urban and rural school library websites across the United States complemented by input from librarians has established a picture of what a typical school library website looks like, who it is designed for, how well they compare to best practices recommended by the literature, and how usable they actually are, in relation to the needs of the users and the goals of the library.

1) What does a typical school library website look like?

The study's results suggest that, although there are some common trends, there is really no typical school library website design. There are similarities, however, to an academic or public library website (Chow, Bridges, & Commander, 2014) in terms of navigation elements, as two thirds of the sites evaluated had navigation on the left side of the page or top center of the page and their name and logo at the top left or center of the page. In terms of services, school library websites tended to have access to information literacy resources, databases, and an online public access catalog from their homepage. The majority of school library websites, however, did not have library contact information, location, or operating hours on the homepage. Furthermore, access to other expected services were also not found on the majority of websites – library policies, news and events, images of the library, access to personal accounts, ability to renew library materials, or reserve technology or library space for classes or testing.

2) Who are school library websites designed for?

Like most websites, school library websites are designed for multiple groups. School librarians felt that their websites were predominantly designed to serve students followed by teachers, parents, and administrators, respectively. The major services school libraries offered were access to books, journals, and other print materials, online databases, access to computers and other technology, instruction or training, a place to study, and a meeting space; technology support and testing were also identified as frequent services.

Comparing what librarians felt were the highest priorities for patrons with what they felt were the library's highest priorities suggests a high degree of alignment. These primary services also represent a checklist of information that patrons may expect to be included on school library websites. While access to databases and an OPAC were found on the majority of school library websites, information about computers and technology, instruction or training opportunities, technology support, and testing were not commonly found.

3) How do school library websites compare to recommended best practices?

School library websites did not compare favorably to recommended best practices for youth website design. In terms of cognitive design only one factor – age-appropriate graphics and vocabulary – rated a mean rating of 5.0 (on a 10 point scale) followed by providing access to electronic resources. The following major cognitive factors affecting youth information seeking rated extremely low: use of symbols for concrete object, use of bright colors, well thought-out and catchy site names, and use of animation or sounds. It would appear there are no central goals for school library websites although approximately half served as content provider for resources.

Ratings for affective or emotional design were rated even lower. Designs that encouraged exploration, allowing for and receiving student input, and social interaction were all factors that rated extremely low. The highest rated factor was reducing cognitive load (M=4.6) due to the tendency of many school library sites to serve as information portals.

4) How usable are school library websites?

The usability of school library websites can be viewed from two different perspectives. The first is providing information that is central to the needs of the users and the primary goals of library. Librarians identified information provision of books and other information and databases as their top priority and over three quarters of the websites independently examined did provide access to this information. The problem, however, is that information about other major library goals were not typically provided on school library websites. This would suggest that the overall relevance and usefulness of school library websites are only focused on providing information on one primary library goal – books and other information sources. This is problematic and in contrast with recommended web design standards that identify prioritization of functionality or what users want from a website as the central focal point of good web design (Nielsen & Loranger, 2006). The mission of the school library program as articulated by *Empowering Learners* (AASL 2009) is "to ensure that students and staff are effective users of information." Access to materials addresses only one component of this mission; library websites can do more to "empower students to be critical thinkers, enthusiastic readers, skillful researchers, and ethical users of information," including instruction and support for diverse needs and the development of skills to use, evaluate, and create information and ideas (2009, p. 8).

The second perspective is examining school library websites using general best practices as guidelines for how to age-appropriately develop information spaces for youth. School library websites did not compare favorably to either cognitive, affective, or design conventions. School library websites appear to be driven by content and although librarians report designing for students it would appear this emphasis is focused more on content than any of these three dimensions. This most likely impacts the usability of school library websites negatively because of the unique needs of youth when seeking information on the web. In addition, other major content areas identified outside of books and traditional information resources that would prove useful for parents, teachers, and administrators are not typically provided at all.

Implications and Limitations

The implications of the study's findings center on taking a broader perspective for effectively providing information on the Web and how websites may help both facilitate and supplement school library programs. First, the representativeness of the sample studies based on random sampling and the inclusion of both urban and rural

districts and the perspectives of some of these school librarians helps triangulate the data and build both internal and external validity and reliability to the study's findings and conclusions. Second, our findings suggest some commonality of navigation and branding as well as gaps across sites. Third, school librarians helped identify what they see as the primary goals of school libraries and who they are trying to serve through their websites. Lastly, the study provides preliminary design and content guidelines for school library websites that may prove useful nationwide.

The study also has some limitations to consider. First, the study does not include input from actual school library website users, only school librarians. Feedback from students, teachers, parents, and administrators need to be collected, which will help determine a respective site's usability and the specific information they are looking for on a school library website. Second, is a low sample size and response rate of school librarians; a larger sample will add validity to the study's findings and conclusions. In addition, the results are not differentiated by urban and rural or high school, middle school, and elementary school participants at this time. They have only been analyzed in the aggregate. These results will be sorted and analyzed separately for future publication.

Finally, although this study applies a checklist of youth-centered web design principles to the school library websites, additional considerations may be incorporated into best practices for school library website design, such as curricular objectives, *Standards for the 21st-Century Learner*, district initiatives for reading, literacy, and/or implementation of Common Core State Standards, and considerations for website users with special needs.

Future research will involve reanalyzing the data based on stratifications as well as reaching out to actual school library website users to further triangulate the study's findings. Directions for related studies may also consider school library website usability as aligned with other priorities for school librarianship and evolving trends in students' technology and information needs, such as usability and access via mobile device; usability for varied user groups and purposes, e.g., supporting librarian/teacher collaborations or emerging readers; and capacity of school library websites to support students' transliteracy skills such as creating content and digital citizenship.

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Appendix A – Insert School Library Website Checklist PDF

Located: https://docs.google.com/file/d/0BwvwkdQsb9nJRVVvcEV4cmlPZHc/edit?usp=sharing

Appendix B – Insert School Librarian Survey PDF

Located: https://docs.google.com/file/d/0BwvwkdQsb9nJLU83cG4yNTRTUDA/edit?usp=sharing

Designing a Responsive e-Learning Infrastructure: Systemic Change in Higher Education

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Keywords: eLearning, systemic change

Abstract

A university-wide study involving 130 participants examined the e-Learning perceptions and needs of faculty, students, and staff as part of a needs assessment of the e-Learning unit. Results suggest that faculty recognize the importance of e-Learning, students covet it for its convenience and that real-time technology support was the top priority. Both the school and university resources, however, are not well aligned to meet these needs and remain largely separate and un-integrated.

Introduction

At a mid-sized university in the southeastern United States, enrollment of traditional campus-based students has begun to decrease, budget cuts continue statewide at alarming rates, while e-Learning continues to grow in prominence and strategic importance. Despite an emerging e-Learning infrastructure, this university has seen a 154% increase in undergraduate online course offerings and a 143% increase in graduate online course offerings over the past five years, figures that are more than double the system-wide average of 68.5% for undergraduate courses and 79% overall for graduate online courses.

Similarly, e-Learning continues to grow in U.S. higher education. In 2013, 32% of all college students had taken at least one online course and "online enrollments have increased at rates far in excess of those of overall higher education" (Allen & Seaman, 2013, p. 4). In 2013, 69.1% of universities saw online learning as strategically important (Allen & Seaman, 2013). Despite this rapid growth, 45% of administrators believe e-Learning takes more time and effort for faculty than traditional courses and only 30% of faculty have accepted e-Learning as a learning modality (Allen & Seaman, 2013).

The majority of research presented in the online learning literature has focused at the micro level on teaching and learning. Very little research exists that has taken a macro, systems level approach to understand how alignment of all facets of the organization must occur in order to develop and sustain an online learning

infrastructure. Reigeluth (1992) explained that there are two types of educational change – piecemeal, singular changes or solutions, or systemic, holistic change that accounts for all aspects of the system to ensure alignment occurs. Without alignment, organizational effectiveness and efficiency cannot be achieved and, when faced with multiple and often contradictory goals, systemic change cannot occur.

Using a case study approach, an in-depth examination of the current and evolving state of online learning was conducted at a mid-sized public university in the southeastern United States to determine if goals and organizational elements necessary for e-Learning were in alignment and to identify specific needs of faculty and students relating to e-Learning. For the purposes of this study, e-Learning is defined as a type of distance learning in which the instructor and students are physically separated and the primary form of interaction and course content delivery occurs over the internet. Data sources include interviews with key informants at the university, online surveys of faculty, staff, and online students, and focus groups with instructional technology consultants (ITCs).

Theoretical Framework

To assess the online learning infrastructure at this institution, Kaufman's Organizational Elements Model (OEM) (1988) was utilized as a guiding framework. According to Kaufman (1988), "…all individual accomplishments within an organization must combine to provide a useful … contribution; some results are 'building blocks' for larger, overall ones" (p. 80). The means (resources committed to attaining a goal) and ends (the goal to be accomplished), can be described by five organizational elements – inputs, processes, products, outputs, and outcomes (Figure 1). Kaufman's (1988) model recognizes the need for clearly established ends or outcomes, the alignment of means necessary to attain them, and illustrates the interrelatedness of the organizational elements.

Figure 1: Organizational Elements Model (Kaufman, 1998)

	Inputs	Processes	Products	Outputs	Outcomes
	(New Material)	(how-to-do-its)	(en-route results)	(products of system / deliverables)	(effects of out-puts in and for society and community)
Examples	Existing human resources; needs, goals, objectives, policies, regulations, laws, money, values, societal/ community characteristics; quality of life.	Means, methods, procedures; searching for "excellence," teaching; learning; human. res. dev., training, managing.	Course completed; test passed; competency acquired; accomplishments of learner & instructor; production quota met; performance "building blocks."	Delivered automobiles, sold computer systems; program completed; job placements; certified licenses, etc.	Safety of outputs; profit; dividends; continued funding; self-sufficient, productive individual; socially competent & effective, contributing to self & to others or to substances; financial independence
Scope	Internal (Organization)				External (Societal)
Cluster	Organizational Efforts		Organizational Results		Societal Results/Impacts

Literature Review

A key component of the OEM model is the alignment between institutional goals and organizational elements. At the university level, alignment of e-Learning goals and organizational elements must occur at multiple levels within the organization including administration, faculty and staff, and students. Further, identifying and addressing the specific needs of faculty and students relating to e-Learning is essential for organizational alignment.

Institutional e-Learning Goals and Perceptions

Institutional acceptance of e-Learning is reflected by strategic commitment among institutional leaders (Allen & Seaman, 2013; Hillman & Corkery, 2010; Piña, 2008; Soderstrom, From, Lovquist, & Tornquist, 2012). As institutions perceive online learning to be a useful means by which to sustain or increase enrollment, their acceptance of online learning is reflected through the development of strategic vision statements that outline institutional goals related to online education (Rovai & Downey, 2010). These strategic goals inform planning and budgeting for online education.

While many university administrators recognize and support the work of faculty who are early adopters to online teaching, institutional leaders are beginning to realize they must embrace and institutionalize online learning or run the risk of being left behind (Cox, 2005; Gaytan, 2007, 2009; Hillman & Corkery, 2010; Olson & Hale, 2007; Piña, 2008; Shea, Pickett, & Li, 2005; Soderstrom et al., 2012). However, research findings suggest university administrators remain skeptical about the quality of online education. In a multi-institutional study of university administrators, Gaytan (2009) noted that all participants preferred face-to-face over online learning and reported the quality of online instruction to be inferior to traditional, face-to-face instruction.

Acceptance of online learning must also occur at the academic unit (school/department) level, and may be reflected by the inclusion of online learning as part of the unit's strategic mission and plans. Units that accept online education attend to faculty needs including issues relating to faculty load, time, and compensation (Orr, Williams, & Pennington, 2009; Sellani & Harrington, 2002).

Faculty and Staff e-Learning Goals and Perceptions

A successful e-Learning infrastructure also relies upon the acceptance and adoption of online education by faculty and instructional staff. Many faculty members question the legitimacy of online education, learning outcomes, time factors, technical concerns, and continue to favor face-to-face instruction to online (Allen & Seaman, 2013; Olson & Hale, 2007; Orr et al., 2009; Sellani & Harrington, 2002; Shillington et al., 2012). While many faculty members acknowledge that distance education is more convenient, the perception persists that the quality is "just not the same as the richness of the personal class experience" (Graham & Jones, 2011, p. 219).

Closely associated to acceptance of e-Learning is the self-efficacy of faculty and staff to develop and teach online courses. Throughout the online learning literature, research regarding instructional self-efficacy is scant. In the face-to-face teaching context, instructional self-efficacy has been found to directly correlate to student achievement and motivation (Pajares, 1996; Schunk, 2012; Woolfolk & Hoy, 1990). Research findings suggest that instructional self-efficacy influences teachers' activities, effort, and persistence with students (Ashton & Webb, 1986). Teachers with higher self-efficacy tend to show stronger commitment to their work (Chan, Lau, Nie, Lim, & Hogan, 2008) and are likely to have a positive classroom environment, support students' ideas, and address students' needs (Ashton & Webb, 1986). These studies suggest that instructional self-efficacy may be closely related to faculty and instructor attitudes, regardless of the teaching context.

Prior online teaching experience may also be associated with attitudes about online learning. In a study of 137 higher education faculty, Ulmer, Watson, and Derby (2007) found that experienced online faculty promoted and recommended engagement in distance education and viewed it as superior to traditional education to a greater degree than less experienced faculty. These findings suggest that as online instructional self-efficacy increases, so too may attitudes about and acceptance of online learning.

While online instructional self-efficacy and experience may influence perceptions about e-Learning, having the required support and services available to design and teach online courses is critical for acceptance and successful implementation of online learning opportunities (Cox, 2005; Gaytan, 2007). The needs of online faculty and instructional staff are many and include financial compensation, workload and faculty time, assessment of the quality of online learning, and course development (Cox, 2005; Gaytan, 2007; Meyer & Barefield, 2010; Orr et al., 2009). Unless these needs are addressed, perceptions about and adoption of e-Learning as a viable and credible teaching modality are anticipated to be low.

Student e-Learning Goals and Perceptions

A growing body of literature suggests students value access to online learning for a number of different reasons, including access to professional qualifications, removal of geographical barriers, and independent and diverse life-style oriented courses and learning opportunities (Bacon, Bowen, Guthrie, Lack, & Long, 2012; Islam, Kunifuji, Hayama, & Miura, 2011; Lei & Gupta, 2010). For some, work or family commitments, scheduling conflicts, or physical distance from campus may be a determining factor. For others, external factors including feedback from peers or instructors and unavailability of classes in face-to-face format are motivating factors (California Community Colleges, 2011; Gould, 2003; Pastore & Carr-Chellman, 2009). Online courses are not only appealing to the non-traditional student with limited ability to attend classes in a face-to-face context, but also for the traditional residential student; flexibility afforded by temporal and physical separation in online classes can save time and money for those who would otherwise need to commute (Bacon et al., 2012; Gould, 2003; Lei & Gupta, 2010; Pastore & Carr-Chellman, 2009).

Positive prior experiences with online education, ability to study at their own pace, broader selection of online courses, quality of the program, and potential savings of time and money are also appealing to students. It is well established that the benefits afforded by online education are crucial for students when making a decision to enroll in online courses (Dutton, Dutton, & Perry, 2002; Pastore & Carr-Chellman, 2009). Convenience, in terms of ability to complete course requirements in a setting of the student's choice, maintain current employment, and having easy access to course content at any time, is often considered to be the most important motivational factor for students to enroll in online courses (Dutton et al. 2002; Dyrbye, Cumyn, Day, & Heflin, 2009; Fredrickson, Pickett, Shea, Pelz, & Swan, 2000; Mellon & Kester, 2004; Pastore & Carr-Chellman, 2009; Small & Paling, 2002; Wyatt, 2005).

While convenience draws students to online learning, the unique needs of online learners are often left unmet. Student needs are defined primarily by two factors: student interaction and support (Moore and Kearsley, 1996). Tinto's (1997) model of institutional departure suggests that academic student persistence is driven largely by the degree of academic integration (e.g., performance, academic self-esteem, identity as a student, etc.) and social integration (e.g., personal interaction, connection to academic community, etc.). Online student attrition is largely attributable to feelings of isolation, lack of self-direction and management, and eventual decreases in motivation (Abrami & Bures, 1996; Rovai & Downey, 2010, Melguizo, 2011).

According to Tait (2000) support for online students can be conceptualized using a scaffolding framework that is centered on three domains: cognitive, affective, and systemic. Scaffolding, grounded in Vygotsky's (1978) developmental theories and zone of proximal development (ZPD), involves, "…providing learners with more structure during the early stages of a learning activity and gradually turning responsibility over to them as they internalize and master the skills needed to engage in higher cognitive functioning" (Palincsar, 1986; Rosenshine & Meister, 1992). The need for support and assistance is immediate and real-time as a ZPD that remains unresolved through the assistance of others can quickly turn into frustration and cognitive load. Scaffolding provides structure, functions as a tool, extends the range of the learner, allows the learner to accomplish a task that would otherwise not be possible, helps ensure the learner's success, motivates the learner, reduces learner frustration, and can be removed when the learner is ready to take on more responsibility (Greenfield, 1984; McLoughlin & Mitchell, 2000; Wood, Bruner, & Ross, 1976; Ludwig-Hardman & Dunlap, 2003).

Some suggest that the majority of support services for online learners should emphasize the organizational and transactional by focusing on services that reflect "…systemic characteristics – access to the administrative processes and procedures of the educational provider in a timely and accurate manner (such as) how to register for courses, tracking individual progress on a degree plan, etc." (Ludwig-Hardman & Dunlap, 2003). The cognitive domain that consists of "guidance, counseling, assessment, coaching, etc.," however, is often ignored; online students have a multitude of cognitive needs including "the need to belong, to interact with each other, and to be a part of a community" (Maslow, 1987; Stacey, 1999; Vygotsky, 1978).

Study Purpose

The authors were asked by the university's e-Learning unit to conduct a needs assessment to examine overall faculty, student, staff, and administrator perceptions. Was there alignment in terms of goals and organizational elements? What were the specific needs of faculty and students? This study seeks to examine the overall perceptions of administrator, faculty, staff, and students with regard to e-Learning and to determine if there is alignment in terms of goals and organizational elements. Further, the study seeks to identify specific needs of faculty and students relating to e-Learning. Therefore, the purpose of this study is to seek answers to four research questions:

RQ1: What are the administrator, faculty, staff, and student perspectives on the current state of online learning at one mid-sized public university in the southeastern United States?

RQ2: What are the specific needs of faculty and students with regard to e-Learning?

RQ3: What organizational elements are currently in place to support e-Learning at this institution?

RQ4: Is there alignment between administrator, faculty, staff, and student goals, needs, and organizational elements to support e-Learning?

Method

At a mid-sized public university in the southeast, a mixed methods study design was used to analyze the e-Learning needs of the university. A total sample of 130 participants took part in interviews (n=24) and surveys

including administration and staff, online learning university support staff (n= 24), faculty (n=32), and students (n=50) over a one year period.

Participants and Instrumentation

Interviews - 24 interviews with university administrators (provost, associate provost, registrar, department chairs), faculty, and staff were conducted at both school and university levels from April to July 2013. At the school level, interviews with five department chairs were conducted using a semi-structured set of 21 questions – one open ended and 20 scale items intent on examining current needs of each academic department. At the university level, 19 interviews were conducted using a semi-structured set of eight questions looking at macro university level needs.

Surveys – An initial 18-item survey was used to measure the comfort level of faculty (n=32) at the school level focused on three main areas – attitude, self-efficacy, and capacity - around online learning from April to June 2013. The same instrument, with minor adjustments to reflect a staff perspective, was also administered to the university's division of continual learning (n=24) during the same time. A separate 13-item survey was used to query the school's graduate students (n=50) on their thoughts around e-Learning and their specific needs from April to May 2013. All survey scale items in this study utilized a 7-point Likert-type scale.

Results

e-Learning - Faculty and Administrator Perspectives

> *"I have no inclination to teach online. I feel that it benefits the university financially, but does not benefit students or faculty. What's the incentive? I have NO TIME to do this. I am already stretched to the limit with all I do. Therefore, the second part of the survey is a little less relevant--what do we need to support online teaching? I'd rather not support it."*

> *"There is a lot of variance in our department's preparation to teach online. It's hard to say whether or not the department needs support or just some of its members, like me."*

> *"The quality of online learning is equal to face-to-face instruction when instructors make sure that it is as rigorous and use a variety of means to convey info. Help desk real-time technology support -> This has been very helpful this semester! I tend to prefer teaching online courses with a synchronous component as opposed to a completely asynchronous format. I find it much more engaging and easier to evaluate student learning through synchronous conversations versus discussion boards."*

Faculty appeared to be less than enthusiastic about online learning although they felt it was already or, soon-to-be relevant, in their field (M=4.9), somewhat prepared to teach online (M=4.8), somewhat confident in using technology to teach online (M=4.8) and that the appropriate level of support was already present (M=4.6). Two big issues, however, were that they remained skeptical that online learning was of equal quality to face-to-face (M=3.1) and that they had enough time to design and develop their online courses (M=2.7).

In terms of online learning needs, technology support overall was the top priority. Faculty ranked multimedia development support as the top priority (M=5.6), followed by real-time help desk support (M=5.3) and student technology training and orientation (M=5.0). Other priorities included overall course design (M=4.7), assessment of the quality of online learning (M=4.7), marketing and recruitment (M=4.6), and enrollment management (e.g. class sizes) (M=4.5).

Department chairs, however, felt a little more strongly that online learning was or would soon be a priority (M=5.3 vs. 4.9 for faculty) and less confident that faculty were prepared to teach online (M=3.7 vs. 4.6 for faculty), and use technology in teaching (M=3.7 vs. 4.5 for faculty). They also felt less confident that enough support was available (M=3.3 vs. 4.5). Interestingly two points of agreement were high levels of skepticism that faculty have enough time to design and develop online courses (M=2.3 and 2.7, respectively) and online learning was of equal quality to face-to-face instruction (M=3 and 3.1, respectively).

In terms of overall priorities, the department chairs felt strongly that appropriate incentives for faculty and departments to participate in online learning was the top priority (M=6.7). This was followed closely by the need for marketing and recruitment (M=6.3), strong course design (M=6.0), real-time help desk support (M=6.0), and assistance in how best to transition from face-to-face to online teaching (M=6.0).

e-Learning - Staff Perspectives

Not surprisingly, staff who support online learning rated online learning through the lenses of their own work - multimedia development for courses was rated as the highest priority (M=6.7) followed by identifying existing models of online learning (M=6.4), assessing quality (M=6.5), providing general overviews regarding trends in the field (M=6.4), online learning in general (M=6.2), and marketing and recruitment (M=5.8). Interestingly, some of their lowest priorities were class sizes (M=4.4), enrollment management (M=4.9), student technology training (M=5.2), advising and mentoring students (M=5.5), and real-time help-desk support (M=5.5).

e-Learning - Student Perspectives

> *"It is important that I can speak to someone when I am having trouble with the technology. Someone should be available 9AM-10PM at least."*
>
> *"Please, please offer more online courses. I love the flexibility for learning they allow. They cut time, stress from travel, and use of paper way down. WE already use Blackboard and other virtual tools for learning - why not expand to the virtual classroom?"*
>
> *"The technology help desk is HUGE....especially in the evenings and on winter break when some students take winter courses. It is frustrating to have an online course and have elluminate or something to that effect run really slow or shut down frequently."*

Students viewed online learning as a positive option because of its *flexibility* and *convenience* and they like having the option of taking both face-to-face and online courses (M=5.0) as opposed to only online (M=2.5) or face-to-face options (M=3.0). They also reported being somewhat confident their faculty were able and willing to teach online (M=4.5) and also in using a computer as their primary tool for instruction.

In terms of online learning needs, they valued a technology help desk (M=5.7) followed closely by a high level of student support services (M=5.5) (e.g. academic advisor, real-time chat, etc.) and faculty virtual office hours (M=5.4). Students would consider taking an online course if it was offered (M=5.7) because of its convenience (M=6.2) although they would not expect it to be of equal quality to a face-to-face course (M=3.9).

The results of a study of university stakeholders suggest answers for each of the four main research questions.

RQ1: What are the administrator, faculty, staff, and student perspectives on the current state of online learning at one mid-sized public university in the southeastern United States?

A quote from a top level university administrator helps summarize the study's overall findings:

> *"…what's missing still is a very clear view from (the University) as to what it wants to be in online learning. Do we want to… deliver the premium experience… I'm not sure the university knows where it wants to go with online learning. I do think that the environment and economic situation defines what we'll do for a while as well. So, we may be wanting to do this, but we may not be able to do so, so that we have to meet somewhere in the middle" (University administrator, 2013)*

Interviews with the University's administrative online support unit found a major division among users and decision-makers around whether its role should be one of support and entrepreneurship or innovation and laboratory for best practices. Students wanted a seamless experience centered on *convenience* so they could complete their courses and degree with minimal disruption; faculty seemed resigned to the fact that online learning is a major part of future instruction regardless of discipline and recognized the need to develop expertise in this area; staff responsible for supporting faculty were concerned that faculty would simply not have enough time to design and develop "quality" online courses. All agreed e-Learning is important now and into the future. However, the experience for providing for and receiving an e-Learning education was not seamless at this university.

RQ2: What are the specific needs of faculty and students with regard to e-Learning?

University faculty members rated *help desk real-time support* as their highest priority, followed by *faculty and department incentives*, *assessment of the quality of online learning*, and *multimedia development for courses* (Chow, 2013). At the School level, five department chairs reported that online learning was a strategic priority for their departments, but believed overall faculty interest in online learning was lukewarm compared to students. Consistent with the literature, the department chairs felt that to increase their online presence, it was important for increased program evaluation and assessment, technology support, faculty incentives, and professional development to take place (Chow & Croxton, 2013). ITCs felt that although faculty and instructors have enough instructional and technology support to teach online, they were concerned about whether faculty had enough time to design and develop online courses (Croxton, 2013).

For students, despite viewing face-to-face courses as having superior quality to on-line classes, they wanted the option to take online courses in their degree programs. They believed this format was more *convenient*. Students also prioritized adequate technology support through a *help desk*, *real-time support services*, and *real-time faculty office hours* (Chow & Croxton, 2013).

RQ3: What organizational elements are currently in place to support e-Learning at this institution?

A study conducted by the Educational Advisory Board (EAB) (2013) found that instructional design support services are underutilized as 85% of faculty prefer to work alone, only 24% utilize the IT office, and 20% utilize some type of media support unit. Furthermore, most universities tend to have duplicative and/or competitive support units comprised of a Center for Teaching and Learning, Continuing Education, and IT Academic Technology Unit, all of which provide some redundant resources as well as have their own limitations. The university studied reflected this exact configuration where each of the three units responsible for faculty training, continuing education, and IT support were separate units. The EAB report (2013) recommended combining the services of these three units to increase efficiency and effectiveness of services. At the school level, there were also two separate departments, instructional technology and online learning, that provided support for faculty, staff, and students. Consistent with the literature, however, very few faculty reach out for help and students tend to reach out to the university level IT support desk.

RQ4: Is there alignment between administrator, faculty, staff, and student goals, needs, and organizational elements to support e-Learning?

The number one priority for both faculty and students was *live*, *just-in-time technology support*. The type of technology support, however, was different as student needs focused more on access and course-related technology problems while faculty were looking for more instructional technology support in terms of both skills and technology as needed. University administrators were clear that the continual learning unit had traditionally been seen as a new student and entrepreneurial income-generating department and was not set up for either direct student or faculty technology support despite it being the top priority for both. The continual learning unit also expressed frustration over the often conflicting goals between the entrepreneurial goals of administration and the support goals of students and faculty. The bottom line, however, was that this unit was funded to be entrepreneurial and not support focused.

From the perspective of Kaufman's Organizational Elements Model, there is some misalignment between university goals, organizational resources, and processes. While faculty, staff, and students are seeking help, especially technical support for e-Learning, the university's e-Learning unit is focused on entrepreneurial projects and design and development activities. The university's administration recognizes that the intended purpose of the distance learning unit has changed and the other existing support units – IT services and faculty training - remain separate. The overall outcomes of the university as an educational system are student graduation and career success, but its inputs, activities, and outputs are not currently well aligned to the e-Learning needs of its faculty, students, and staff.

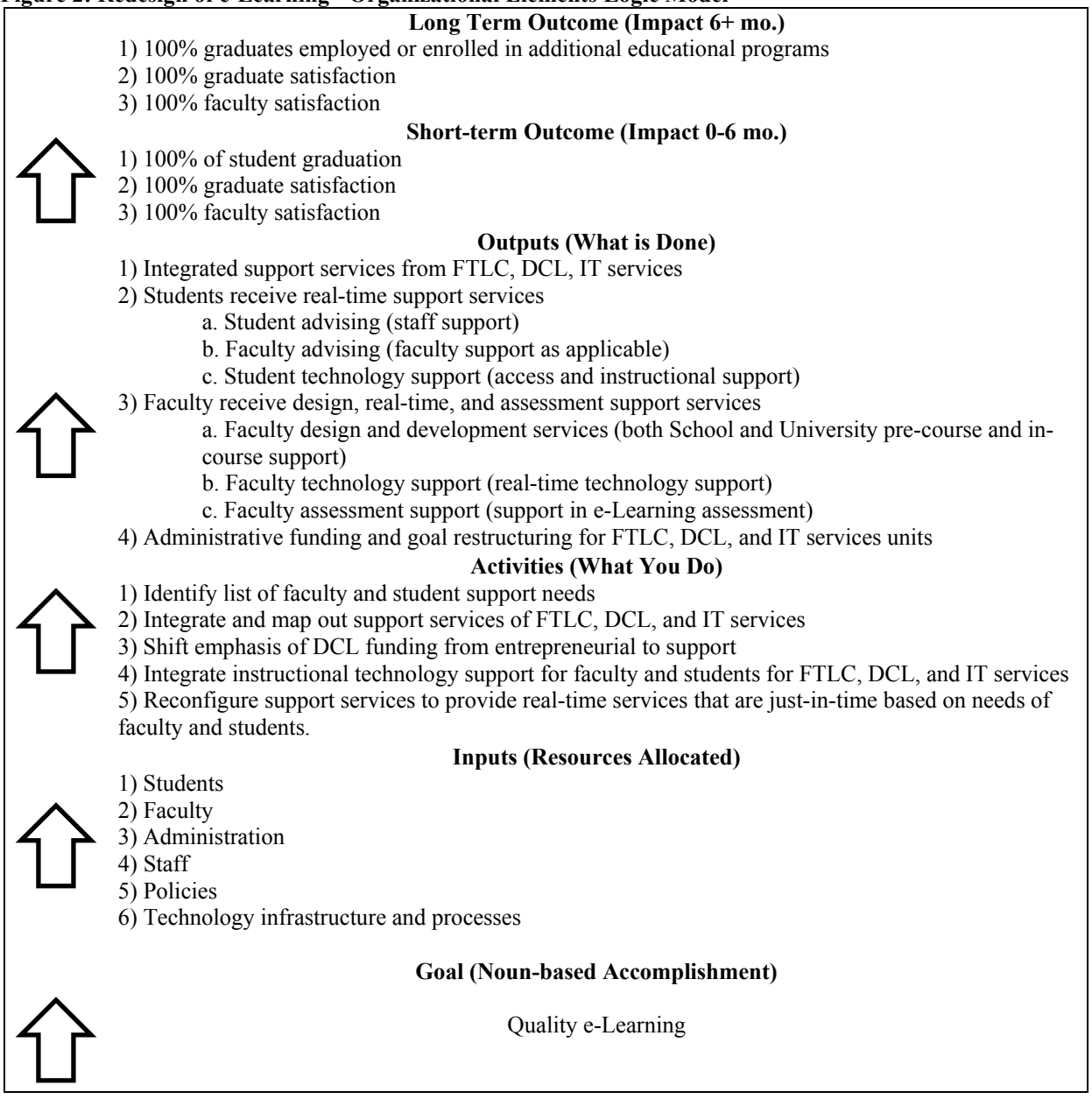
Implications

This study reports the findings of a university that is in transition when it comes to e-Learning. The University does not have clear goals for what it wants and its primary support unit is unclear on whether it is expected to be entrepreneurial or to support faculty and staff. Faculty and students, however, are quite clear that they

desire robust technology help-desk support, with faculty feeling they lack the expertise or the time to design and develop quality online courses. This opinion is shared by instructional technology consultants. Students are more optimistic in the increased access online courses represents in completing their respective degrees.

As e-Learning continues to increase exponentially, Kaufman's Organizational Elements Model (1988) represents an ideal framework for more closely aligning the University's services with the needs of faculty, staff, and students. Figure 2 illustrates how the needs of the University's primary stakeholders should drive how it is ultimately configured and organized for support.

Figure 2: Redesign of e-Learning - Organizational Elements Logic Model



Given the discrete set of needs as identified in this study, there are four primary recommendations the University could consider to bring its organizational elements into alignment with the needs of its users. First, identify a clear set of e-Learning needs for students, faculty, and staff. Second, identify how to efficiently and effectively address these needs through university and school level services. Third, organize these resources around

provision of these identified services. Fourth, assess the efficacy of services and overall system continuously for continuous improvement.

Conclusion

The continued emergence of e-Learning has led to a rapidly changing landscape for higher education. Students, faculty, and administrators alike are attempting to understand how to respond to these changes. The University researched for this study reflects a typical disconnect between how it is organized and the ability to meet the shifting demands of its primary stakeholders. A systems approach provides an organizational framework from which to both understand and react systematically to these changing demands. Students and faculty want convenience and access to just-in-time support services on an as-needed basis.

These new needs introduced through teaching and learning in a technology-enriched online environment require universities to consider integrating its existing services to ensure both resources and the process of support are aligned appropriately to how and when the support is needed. Regardless of how much e-Learning is shifting the paradigm of teaching and learning in higher education, ultimately the end goal remains the same – a quality educational experience for students and the dedicated faculty, staff, and organizations that support them.

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Using ADDIE and Systems Thinking as the Framework for Developing a MOOC: A Case Study

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> ***"****In my opinion, the overall instructional design is the magic of a successful MOOC. True quality instruction cannot be just designed on paper, but must be an expression of both the expertise of the instructor as well as the art and scientific expression of creativity and constructivist creation as they design and develop a course in a digital world"* (A. Chow, personal communication, October 14, 2014).

Introduction

The Internet has "happened" to education and it is changing the way students and instructors engage with one another and the way the "business" is done. Higher education as we know it is undergoing major paradigm shifts. In order to meet demands of increasing globalization in an era of shrinking budgets, while addressing issues of social mobility and access to education for all (Jongbloed, Enders, & Salerno, 2008), higher education institutions must embrace systemic change and clearly reorganize and align their resources around changing goals, access, and demand. In a recent interview, George Siemens, Associate Director of the Technology Enhanced Knowledge Research Institute at Athabasca University, explained that the "functional elements of higher education have been pulled apart and are waiting to be remixed" in ways not yet realized (Grush, 2012). While this remixing will not take one form or have a single solution, current trends suggest technology and the Internet will play a critical role. Chris Dede, Harvard University professor, explains, "… real gains in the productivity and effectiveness of learning will not come until universities radically reshape those structures and practices to take full advantage of the technology" (Waldrop, 2013).

As universities struggle to re-conceptualize education, innovators in higher education are developing and offering massive open online courses (MOOCs) that provide learners across the globe with free access to university faculty and content. Pappano (2012) explains, "The shimmery hope is that free courses can bring the best education in the world to the most remote corners of the planet, help people in their careers, and expand intellectual and

personal networks" (n.p.). From an economic perspective, many people believe that MOOCs will address the fundamental challenge to contain the costs of teaching more students using fewer resources (Fischer, 2014). While MOOC development began in many of the United States' elite institutions, including Stanford, UC Berkeley, Harvard, and MIT, MOOC development is beginning to occur in mainstream higher education institutions across the world. Though higher education leaders are faced with the pressure of either entering the MOOC environment or running the risk of being left behind, the purpose and goals of offering MOOCs are often unclear.

In their simplest form, MOOCs can be considered higher education courses with open, often massive enrollments that offer free education to all. While the design of MOOCs varies widely, they share some commonalities, including "…blended learning, open educational resources, and crowd-sourced interaction" (Johnson, Adams Becker, Estrada, & Freeman, 2014, p. 11). Because anyone with an Internet connection can enroll in a MOOC, enrollment often exceeds tens of thousands, therefore faculty cannot respond to students individually. Thus, the presentation of material and interactivity built into course design is of utmost importance. Classmates may be required to lean on one another in study groups organized in their towns, in online forums, or even for grading work (Pappano, 2012).

The purpose of this paper is to present a case study of how systems thinking and the ADDIE (analysis, design, development, implementation, and assessment) model were used to design and develop one of the first MOOCs at a mid-sized university in the southeastern United States. Contemporary issues surrounding MOOCs at both the macro university level and the micro instructor level are explored. Further, use of the ADDIE model to bring about a user-centered, meaningful, and well-designed MOOC is examined in this time in which MOOCs and systemic change are being called for in higher education.

Literature Review

Brief History of MOOCs

In their brief existence, MOOCs have received a great deal of attention in both higher education and in mainstream news. The term Massive Open Online Course was originally coined in 2008 by Stephen Downs and George Siemens and came into broad use in 2012 (Johnson et al., 2014). The first MOOC, an online course in "Connectivism and Connective Knowledge," was offered by the University of Manitoba in 2008. The course enrolled a small number of paying students and was also offered to a group of online "auditors" who participated in the course for free. Unexpectedly, enrollment exceeded 2000 auditors (Sandeen, 2013). The first US-based MOOC was offered in 2011 by the University of Illinois, Springfield and enrollment exceeded 2,500 (Defining a MOOC, 2013).

Since the first MOOCs were launched, prestigious public and private universities as well as for-profit providers (Heller, 2013; Lewin, 2012) have enrolled millions of students around the world in these courses. Rapid growth in enrollment has occurred, in part, by the emergence of three leading platforms in the MOOC market – Coursera (founded by Stanford University professors), Udacity (progeny of Palo Alto), and edX (jointly founded by Harvard University and MIT). Illustrating this trend, when a Harvard University professor offered his popular course, "Concepts of the Hero in Classical Greek Civilization" via HarvardX (Harvard's proprietary line of edX) in Spring 2013, enrollment exceeded 31,000 (Heller, 2013).

While the number of and enrollment in MOOCs is on the rise, the majority of higher education institutions (53 percent) report they are undecided about MOOCs (Allen & Seaman, 2014). Less than one-third (33%) of these institutions say they have no plans for MOOCs. In their 2014 report on the state of online learning in the United States, Allen and Seaman (2014) noted that the percent of higher education institutions that currently have a MOOC increased from 2.6 percent to 5.0 percent over the previous year. In this same report, Allen and Seaman (2014) noted that only 23 percent of academic leaders believe that MOOCs represent a sustainable method for offering online courses, down from 28% in 2012.

Contemporary Issues Surrounding MOOCs

While MOOCs were widely embraced in 2012, the low completion rates (5-16% overall) reported in 2013 brought about a major change in attitude about the quality of education MOOCs can offer (Johnson et al., 2014). MOOC skeptics questioned how engaging such learning environments actually are (Fischer, 2014; Johnson et al., 2014). As leading MOOC providers analyzed the reasons for these low completion rates, they have begun to realize that a "more expansive, human-centered support structure is key to helping students retain information, stick with the course – and finish (Westervelt, 2013). John Dewey (1938), early reformer in education, explained that learning is based on discovery guided by mentoring, rather than transmission of information. Thus, learning approaches must

move beyond traditional lecture style pedagogies typically found in MOOCs and instead focus on providing students with opportunities to engage with their teachers to feel comfortable, confident, and successful.

Analyzing the movement of a million MOOC users through 16 Coursera courses offered by the University of Pennsylvania from June 2012 to June 2013, researchers noted that only about 50% of those who registered for a course ever viewed lecture materials and only about 4% completed the courses, with user engagement falling off dramatically in the first two weeks of enrollment (Stein, 2013). While many MOOCs are heavy on course content, the engagement piece for learners may be lacking. Ray Schroeder, director of the Center for Online Learning, Research and Service at the University of Illinois, Springfield, suggested three things matter most in online learning: quality of material covered, engagement of the teacher, and interaction among students (Pappano, 2012). While quality content does not appear to be an issue, creating opportunities for instructor connection and student interaction creates a significant challenge when there may be thousands of students enrolled in a single course.

Need for a User-Centered Design Approach

Creating a MOOC that is satisfying, engaging, and meets the needs of learners calls for a user/learner-centered design approach. User-centered design is the process of designing a tool (e.g., course) from the perspective of how it will be understood and used by the user (Nielson & Loranger, 2006; Usability First, n.d.). By employing user-centered design approach to MOOC design, a course can be offered that is more efficient, satisfying, and user-friendly for the learner.

MOOCs, designed largely to be media driven and asynchronous in nature, provide a teaching/learning environment that fits nicely with the application of user-centered instructional design principles. Asynchronous communication is that which does not require all parties involved in communication to be present and available at the same time (e.g., online discussion boards). With a learner-centered rather than teaching-centered approach, the ADDIE model is an ideal framework that can be utilized in MOOC design that can help to make courses more applicable and meaningful for learners (Culatta, 2013; Peterson, 2013). While successful use of the ADDIE model in online course design has been documented in the literature (Evans & Lockee, 2008; Summerville, 2003; Wang & Hsu, 2009), there is currently no reference that has been identified by the study's authors with regard to the use of the ADDIE model in MOOC design.

The ADDIE framework (Figure 1) is a cyclical, iterative process consisting of five stages: analysis, design, development, implementation, and evaluation. In the **analysis** phase, the main consideration is the target audience (MOOC students) and the determination of what they know and what they need to know by the end of the course (Peterson, 2013). During the **design** stage, course developers must determine the objectives of the course, how objectives will be met, how they will be assessed, and the methods that will be most effective in delivery of the objectives (Seels & Glasgow, 1988). If the goals, objectives, and assessments of a course do not align, learners may find themselves losing interest in the course and influencing perceptions of instructional quality (Peterson, 2013). Students' participation during the design phase can contribute to their overall course satisfaction and plays an important role in determining whether students continue in a course (Murphy, 1999).

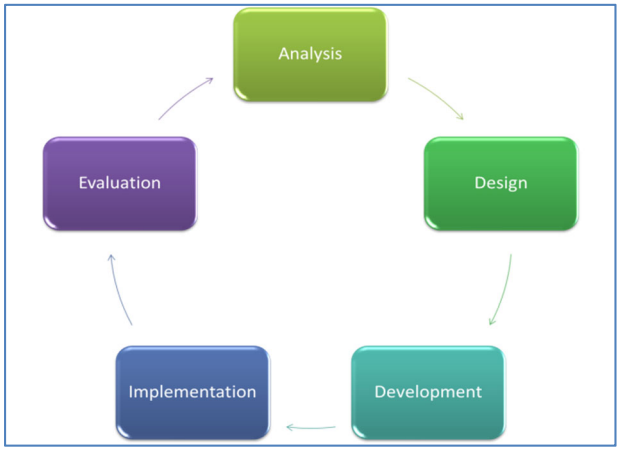

Figure 1: ADDIE Model

Referring to results from the analysis and design phases, course designers in the **development** phase construct the course for delivery of information while, at the same time, determining if students will learn from the course and how it can be improved before implementation (Peterson, 2013). In the **implementation** phase, course developers, learners, and the instructor actively work together to analyze, redesign, and evaluate the course and make instantaneous modifications to the course to ensure effectiveness. Finally, during the **evaluation** phase, the course designer must determine if the objectives have been met, evaluate the impact of the course through summative and formative evaluations, and make changes necessary for future delivery of the course.

In a time which MOOCs and systemic change are being called for in higher education, this case study explores how a systems thinking approach and the ADDIE were utilized to develop one of the first MOOCs at a mid-sized university in the southeastern United Stated. More specifically, the authors sought to answer three primary research questions:

RQ1: What is the process for designing and developing a MOOC?
RQ2: What impact did using the ADDIE model have on MOOC design?
RQ3: What is the relationship between instructional design and MOOCs?

Method

The instructor and co-author of this paper were closely followed throughout the MOOC design and development process. Through a lens of instructional systems design and systems thinking, a case study of the development of a MOOC designed to teach web design and usability principles and skills at a public, mid-sized regional university in the southeastern United States was undertaken. Throughout development, interviews were conducted with administrators, the design team, a user group that provided input throughout the process, and the first student completer of the MOOC. The instructor also added his own perspectives throughout the project, detailed the goals and purposes of the MOOC, the process of design and development, and the challenges and implications faced throughout the project.

Results

The university had been following the evolution of the MOOC and wanted to test out the space. Initially, two pilot courses, "Web Design and Usability" and "The Soul & the Search for Meaning" were identified for development, to be offered Spring 2014. This study reports the conceptualization, development, and implementation of the "Web Design and Usability" course. The results of the case are presented according to the three primary research questions for the study, using the key elements of the ADDIE model (analysis, design, development, implementation, and evaluation) throughout.

RQ1: What is the process for designing and developing a MOOC?

To develop this course, a full design team was assembled at the onset of the project and included a project manager, instructional designer, graphic designer, video production team, and the lead faculty member, Dr. Anthony Chow. Chow, as the faculty member of record made sure the ADDIE process was followed throughout the project. The university provided $13,000 for the development of this MOOC, which included $3,500 for faculty compensation, with the remaining funds allocated for production costs.

Analysis Phase

At the onset of the analysis phase, University leaders, the Chancellor, production team, and lead faculty member met and decided upon the goals of the MOOC. Ultimately, the following two goals were identified that aligned closely to the University's larger mission.

1. **Teach, free of charge**, how to **design a website and basic usability concepts** and **methodology**.
2. **Publicize and brand the university.** Because the MOOC was designed to be a free course and statistics continue to show that retention among students who enroll in MOOCs is not very high, it was decided that the MOOC would be used as a way to brand the university as a place people might consider attending as a campus-based or online student. With this in mind, the production team tried to ensure the university was branded throughout the course through logo placement, video clips recorded throughout the campus with Chow wearing university branded clothing, and a university mascot presence throughout the course to "keep it light."
3. **Serve as test case for different instructional strategies.** As a free, open course, the MOOC provides an opportunity to test the efficacy of different instructional strategies with a large number of learners. This provides the opportunity to experiment with different techniques and measure their effectiveness.

Early market analysis identified young, male, tech-savvy professionals as the primary target for this MOOC, thus the course was developed primarily with this user group in mind. With the goals of the course and the primary target population identified, the design phase of the course was ready to begin.

Design Phase

With the analysis phase underway, the production team met on two occasions during which time they identified course objectives, created a project timeline, and established the basic architecture of the course using an outcomes map (Figure 2). The production team decided that the course would be comprised of five asynchronous units (Usability, User-Centered Design, ADDIE Process, Evaluation and Testing, and Web Designed) that included a variety of ways of presenting information. On average, each unit was to have between 2 - 5 sections (15 altogether for the course) that would also undergo the ADDIE process and emphasize hands-on application throughout.

All main units and sections were designed to include a video introduction with Chow as the presenter (closed-captions and written transcript provided for all videos), unit review sessions comprised of five multiple-choice questions, online discussion, hands on activities, and readings. Finally, being under the assumption that students would want to know how "…we practiced what we preached," video case studies were designed for inclusion as final components of each unit.

An important element of instructional design is deciding upon what constitutes acceptable performance. Because the design team wanted to give all individuals who successfully completed the MOOC a certification of completion (no university credit awarded), a basic concept of mastery learning (90% or above) was utilized. Each unit section had five questions and each unit had a test that included the section questions. In order to earn the certificate of completion, students had to earn at least 90% on all unit tests as well as on a final MOOC exam.

Development Phase

A key element of the development phase of the MOOC was creating the introductory videos for all unit and section introductions as well as lectures (Figure 4). Creating the videos were high production affairs. Because the production team staff had expertise in video production, all videos were filmed and edited by expert videographers, using high-end video equipment as well as a teleprompter from which Chow read pre-prepared transcripts. In a recent interview, Chow noted, "…one of the hardest things was writing out the introductions and lectures and reading these off the teleprompter" (A. Chow, personal

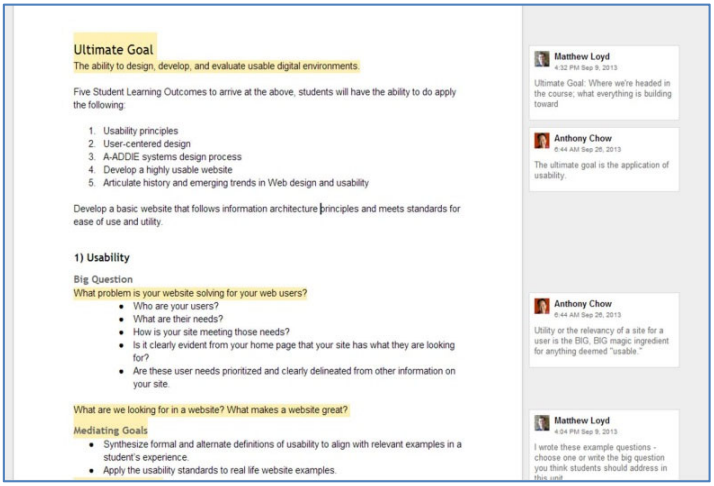

Figure 2 - Outcomes Map refined using Google Drive by the Design Team

Figure 3: Co-authors Chow and Croxton at a design meeting

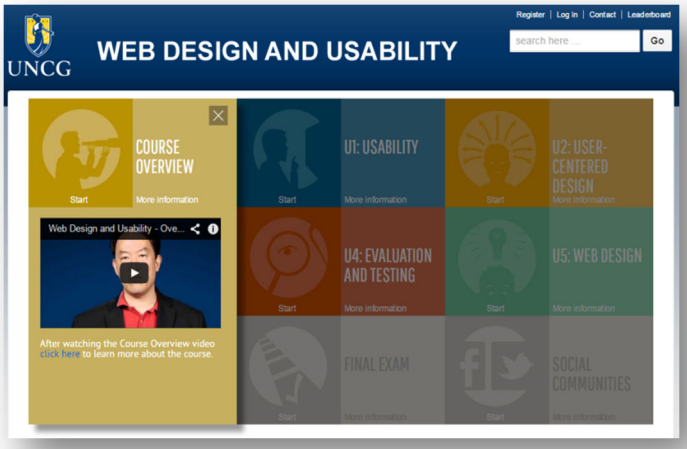

Figure 4 - All units had brief one minute introductions

communication, October 14, 2014). The online software, WordPress, was used for course development because of the flexibility of the program as well as the widgets that were available. The widgets were utilized to create the discussion forums as well as the multiple choice online review sessions.

An essential component of the development phase of any instructional project is to determine if students will learn from the course and how it can be improved before implementation (Peterson, 2013). With this in mind, a group of usability reviewers analyzed the course after the first functional unit that included videos, content, review questions, and a discussion forum was complete (Figure 5). While the usability group should ideally have included young, tech-savvy male professionals (target population identified in the market analysis), the production team did not have ready access to these types of individuals, as most of the users were female.

As a result of the usability reviewer feedback, numerous modifications were made in the MOOC's design. The most significant changes to the course related to the videos recorded for the course. One of the struggles when designing online content is the ideal length of videos. Initially, videos were shortened to be 15 to 20 second clips, with numerous clips following one after another in a single **introduction. According to user feedback, this was too much and** too short. As a result, the production team moved away from short clips to longer instructional videos that were kept purposefully, relatively short (average 3-4 minutes, longest was 10 minutes). Additionally, some individuals in the user group indicated they would prefer to read a video transcript instead of watching a video, thus transcripts as well as closed-captioning were created and made available for all videos.

During the implementation phase of the MOOC, the first version in the first section of the course was reviewed by over 60 graduate students enrolled in two courses within the university's master of library and information studies program, "Instructional Design" and "Library Management." Overall, the users' feedback was good, indicating to the production team members that they had heard the user group and had responded positively. The positive feedback received from the reviewers gave the production team the confidence to move forward and create the remaining 14 sections.

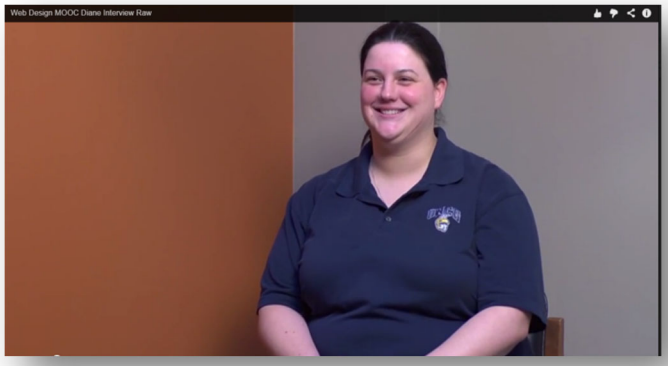

Figure 5 - User Group Interview

Figure 6 – MOOC Welcome Screen at moocs.uncg.edu/wdu

Figure 7 – Section or Module Home Page

Implementation Phase

The MOOC was first released with a quiet rollout to ensure any remaining problems were ironed out which included the entire registration to course completion process.

The MOOC begins with an introduction page where prospective learners can gain a clear overview of what the course has to offer (Fig. 6).

Each unit begins with a brief introductory video along with a full transcript. Feedback suggested that some learners would prefer to read rather than watch a video while other preferred the video over text. In addition, the MOOC navigation was designed to clearly orient the learner to where they were. A right side bar also provided learners with easy access to all other units (Figure 7).

For each of the five unit introduction videos, an attractive area of campus was chosen and also Spyro the UNCG Spartan was introduced as both a way to brand UNCG as well to bring a bit of fun into what otherwise was more academic and intellectual content (Figure 8). Each section or module within a Unit was presented in the right side bar for easy access and orientation.

Each section is comprised of a brief instructional video, a five question review session or assessment, threaded discussion, applied activity (posted on the discussion board), and readings and supplemental resources.

Review sessions involve mostly multiple choice questions (Figure 9). While more interactive questions were intended, most ended up as simply multiple choice due to time and resource limitations. In addition, despite being basic the questions were intended to create reflection and cognitive processing of the main points of each section. The MOOC's final exam involves all combination of all section review sessions. A learner has to pass this exam at 90% or above in order to receive a Certificate of Completion.

Within each section, learners are encouraged to apply learning concepts to their daily lives or something applied. This helps create a learning community around each section that allows each learner to contribute their individual perspectives and world views to the instructional material and content. While everything is optional, learners are presented with hands-on activities at the end of each section working toward the ultimate goal of creating a website at the end (Figure 10).

Learners are presented with additional resources that are open access. Because learners are not formally UNCG students they are not allowed access to library resources.

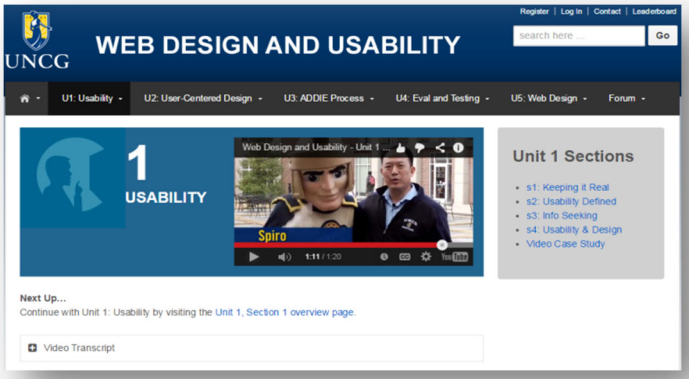

Figure 8 – Dr Chow and Spyro the Spartan

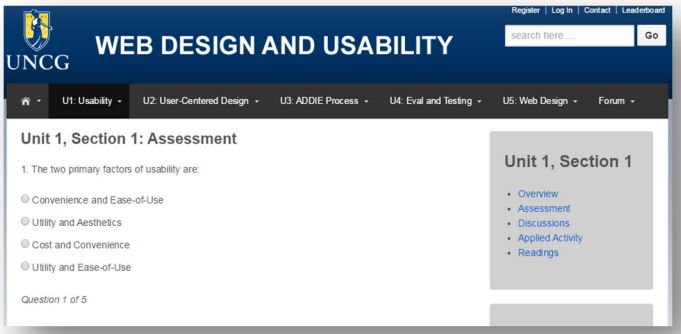

Figure 9 – Section Review Session

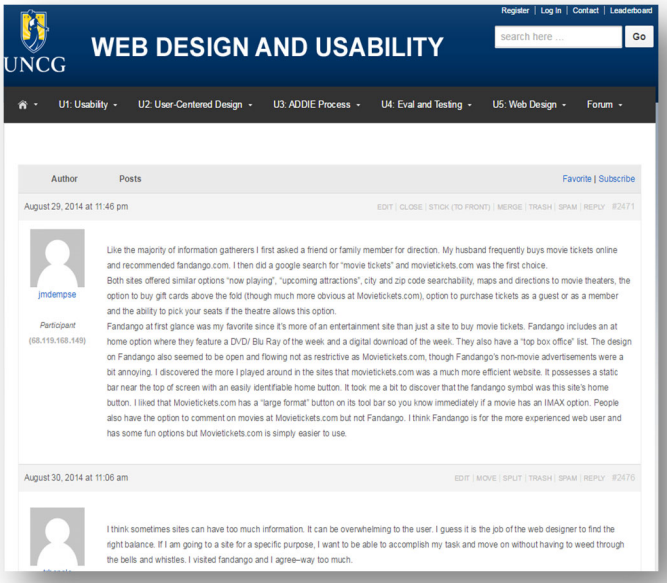

Figure 10 – Learners present results of applied activity and discuss with other learners

Each unit has two to four sections each. At the end of each unit we also provided a case study that detailed how each unit was designed and developed and process that was used. Another goal of the MOOC was to facilitate

the creation of long term learning communities and social networks for all learners. Facebook, Linked-in, and Twitter accounts were created to help support the formation of such communities (Figure 11).

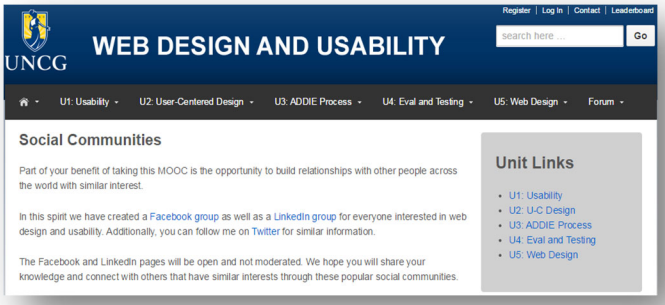

Figure 11 – MOOC Social Networking Communities

Evaluation Phase

Throughout the MOOC design and development, the usability process reflected the "evaluation" in the ADDIE model, which required that the production team constantly evaluated how they were doing. The MOOC was launched in July 2014 with a soft roll out, with official launch in August 2014.

Anecdotal evidence from a learner who is the first person to earn the certificate of completion suggests the course has been an initial success. In a recent interview, this student indicated she appreciated the flexibility the MOOC offered, noting, "The freedom to pick up and plow through parts of the MOOC at moments where I had free time/during my lunch break at work made it easy to get through the process (A. G. Bradley, personal communication, October 20, 2014). She further stated that the MOOC has helped her gain skills and knowledge that have been applicable to her work, stating, "Thanks to the MOOC (and working with Dr. Chow), I am undertaking a user-centered study with the State Library … I have also implemented the Aunt-ADDIE based user-design principles into my own work…" Reflecting on opportunities for engagement with other students enrolled in the MOOC, this same student noted, "…I admittedly rushed through this [the discussion portion of the course] because of time constrains my summer course load placed on me." Finally, when asked about her impressions of MOOCs in general, this student explained,

> I am admittedly torn on a MOOC; I appreciate the ease of use and ability to complete the assignments at my own pace, but I miss the in-person interaction. It feels a bit detached for me. I am enrolled in an upcoming … MOOC (to keep my skills fresh) and am interested in comparing the two. MOOCs will continue to grow and evolve based on technology and the needs of users. They are still in their relative infancy when compared to other educational technology (A. G. Bradley, personal communication, October 20, 2014).

The end of MOOC evaluation results suggests that learners are for the most part satisfied rating it a 6.5 (n=36) out of 7.0.

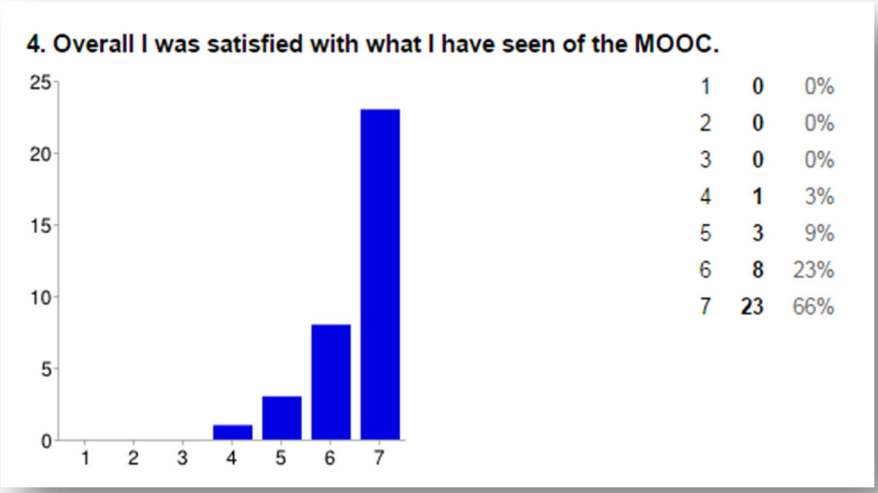

Figure 12: Learner Satisfaction with MOOC

Some user comments include:

> "As a "digital native" I was able to figure out the website within about a minute, but those not as comfortable with technology might have some problems without instruction. Having used moodle and blackboard, however, I would say that this is much more intuitive."

> "This should be well received by all learner-types."

> "I felt the examples were appropriate and relatable. Good ways to illustrate the concept of usability. I think the discussion questions and applied activity question are good ways to further think examples from one's own life."

RQ2: What impact did using the ADDIE model have on MOOC design?

In direct response to this research question, Chow explained,

> The best thing about a model is that it gives you a process by which to structure what otherwise is a very tiring and complex process. In any kind of production, there are timelines, deadlines, and stress involved. The MOOC was an add-on to an already busy schedule" (A. Chow, personal communication, October 14, 2014).

The ADDIE process helped to keep the team focused, because as they developed the course, the ADDIE process required that they constantly evaluate how they were doing (the "E" in the ADDIE).

Essentially, the ADDIE model helped to:

A: Ensure goals are clearly defined
D: Create a timeline and outline the needs of the project so the production staff knew what resources (human and financial) they needed to encumber.
D: Keep the team to a timeline by which they would have something functional by a certain date.
I: Encourage feedback after initial implementation that gave production team confidence to move forward.
E: Create an environment for periodic feedback that allowed for continuous refinement.

Dr. Chow was the leader of a production team and the ADDIE model and process allowed him to keep the entire moving throughout an eight month design and production process.

RQ3: What is the relationship between instructional design and MOOCs?

One of the key factors in MOOC design is to accept the fact that a MOOC is intended to have such a large number of students that it eliminates the instructor's ability to provide feedback to most students. This, Chow explains, "makes the need for careful instructional design very important" (A. Chow, personal communication, October 14, 2014).

In Chow's opinion, courses that are primarily lecture based, as is typical in many MOOCs, depart from sound instructional design principles. He explains that, while there is something to be said to listening to a lecture from a well-known, captivating speaker,

> …no matter how captivating one is, the experience of listening to someone on a video screen as opposed to in person is a tremendous difference. On top of this, lecturing for very long is not very good as far as attention and retention. So, in this course we tried to do something different by applying instructional design principles to the MOOC" (A. Chow, personal communication, October 14, 2014).

The key element of instructional design is placing the learner at the center of what is trying to be accomplished and designing the learning activity in such a way that is value added and allows the student to learn the material in a way that it is actually used. Instructional design principles require that courses are designed with

clear learning objectives and are implemented with activities that include learner engagement, cognitive processing, social interaction, opportunities to review and react, and include a diverse set of learning experiences. In the online context, these learning experiences often include multimedia, traditional reading, some basic assessment, and provide a social context of providing input and sharing ones experiences with others. According to instructional design principles, these elements together create a strong learning environment.

In the MOOC discussed in this case study, all of the instructional design elements noted above were included – video introductions and lectures, readings, assessments, hands on activities, and social interaction via online forums. Because it is essential that students have the opportunity to practice what they have learned, hands-on activities are included throughout each section of the course. Learners are asked to apply some hands on skills and post their results to the discussion board to encourage peer to peer feedback. To encourage social connections, Facebook, LinkedIn, and Twitter groups were created to encourage networking among students. In addition, because literature has found that student retention in courses tends to be higher when people have a start/end date that is formal, a cohort model was initially planned that would require students to have a particular start and end date. This plan, however, fell through in actual implementation. However, there are recommended guided experiences that begin every six weeks, though adherence to this guideline is not required and students may enroll and begin the course anytime they wish.

Implications

Systems thinking and systemic change were used as the guiding frameworks for understanding both the macro organizational goals and micro issues dealing with design and development involved with creating and offering a MOOC. A critical facet of systems thinking is to ensure there is alignment between institutional goals and organizational elements (Kaufman, 1988). Additionally, it is highly recommended that a well-qualified team of both faculty and production specialists is assembled, properly compensated, and works together throughout a carefully implemented instructional design process such as the ADDIE framework that allows for a constant feedback cycle between users and the production team. This is not always an easy process, as Chow explained in a recent interview,

> There is an inherent conflict between how a faculty member intends to deliver instruction and how the production process works. This is very important for those considering developing MOOCs. The production team must work closely with the faculty member in such a way that the faculty member doesn't feel directed in a way that shifts the paradigm of what he is used to – a great deal of autonomy and creativity" (personal communication, October 14, 2014).

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Video Games and Learning: What Boys Learn from Video Games and Can it Map to the Common Core Standards?

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Abstract

The boy crisis in American education (Martin 2002) is due in part to the rejection of boy culture (Carr-Chellman, 2011). Gaming in traditional classrooms has the potential to bring schools toward a more accepting culture. This phenomenological study explores the potential for video gaming within traditional educational settings. Interviews focused on learning outcomes and findings were mapped onto the Common Core Standards (CCSS). Initial findings indicate great promise from gaming for culture and learning changes.

Introduction

Our education system is facing a crisis, in part, due to the rejection of boy culture in traditional schools (Carr-Chellman, 2011; Martin, 2002). Video games are embedded in today's boy culture (Cassel & Jenkins, 1998) and may be a tool to re-engage boys in traditional schools (Carr-Chellman, 2011). Taking boys where they are entails respecting their culture, which embraces individual accomplishments, fantasy violence and competition—all hallmarks of gaming culture. Literature has shown promise on the potential of video games to enhance human capabilities.

Among effects of games on cognition, video games have been shown to improve spatial visualization and mental rotation skills (Doval, & Pepin, 1986; Okagaki & Frensch, 1995; Subramanyam & Greenfield, 1994). According to current findings, gaming has shown to help fight dyslexia, and shows great potential towards reversing cognitive decline among others (Franceschini, Gori, Ruffino, Viola, Molteni, & Facoetti, 2013; Wolinsky, 2012). Some skeptics of video games however, say that they do not prepare students for real life events (Reddy, 2013) or to transfer learning to traditional classroom outcomes. Further conflict is seen in the over diagnosis of ADHD, as boys are treated at six to nine times the rate of girls. Video games may provide a new way of looking at academic and behavioral performances of boys and ADHD (Bruchmüller, Margraf, & Schneider, 2012).). In addition research by Green and Bavalier reveal that video game players have enhanced attentional capacities in targeted tasks (2003). This study looks to address these concerns, determining if the learning that occurs in commercial-off-the-shelf (COTS) video games can apply to traditional learning goals.

Specifically this proposal reports a "Work in Progress" on the significance of Commercial Off the Shelf (COTS) gaming to specific kinds of learning for boys, to an audience of educators, instructional designers and those interested in game integration in education. This study will utilize a website to visually demonstrate process, learned outcomes, and video interviews with young men gamers. We anticipate that the video presentation will actively engage audience members and invite rich data for inquiry and interactive discussion. Furthermore this

study documents where COTS games map learning experiences to Common Core State Standards (CCSS) ("NGA & CCSSO", 2012).

Methodology

This study explores an interpretive understanding of the experiences of middle and high school boys between 10-17 years old. Because our intent is to understand the lived experiences of boy gamers, in relation to their learning, we used a hermeneutic phenomenological approach (Groenewald, 2004; Lester, 1999;Van Manen, 1990). The theoretical lens utilized for this approach was cultural historical activity theory (CHAT) (Roth & Lee, 2007). Being a socio-cultural approach, CHAT is founded on the perspective that individuals are constantly being formed by their social contexts (Roth & Lee, 2007, p. 189). In this way, drawing off of the tradition of Vygotskian ideology, material and symbolic instruments mediate subjects and objects in human activity (Rogoff & Lave, 1984). We see this relationship in video game play as the core concepts of activity theory including subject, object and activity (Lee, 2007; Jonassen & Rohrer-Murphy, 1999) were demonstrated throughout this study. We applied the object concept to our goal of *learning*. The activity of *video game play* consisted of a goal directed hierarchy of actions, used to accomplish the object (Jonassen & Rohrer-Murphy, 1999).

Data Collection and Procedure

The primary method for this study was the use of semi-structured video taped interviews with boy ages 10-17. Using earlier interview responses from phase I of this study as a baseline, the team constructed individual protocols to uncover the depths to which the participants could describe learned content and relevance of tools. These individual protocols were designed to not only uncover content specific to common core but also the means by which they arrived at these learning outcomes. Drawing from our CHAT lens, we incorporated cultural identity as both boys and as video gamers, historical relevance within game spaces and sociocultural constructs that impacted learning accounts. Individual protocols would include a line of questioning intended to understand deeper relationships between the boys and the content learned such as: "In our last interview you mention that reading is important to game success. Can you describe the text that you read and what it means to you? How does the reading in the game space compare to classroom readings and what do you think about that? What impact does the author play in how the text is structured? Can you describe the main arguments that the author makes and how it may change if the source changes?" These responses were video recorded with the focus of the camera on the respondents to capture descriptions reflecting the depth of learning accounts and emergent themes.

Data analysis

Data was gathered using individual semi-structured interviews (Drever, 1995). Like phase I, the analysis for this study coded learning accounts using a framework that utilized a CHAT lens. That study drew on the work of DeVane and Squire (2012, p. 260) who advocate and lay out a description of using CHAT's lens for digital media. They claim that the minimal unit of analysis is a person engaged in an activity with tools and resources in some social context. Furthermore that knowing is action as knowledge is stretched across material tools, resources and people within a social construct (DeVane & Squire, 2012). As such this CHAT lens was conceptually developed to code for culturally relevant learning based on learner interests, mediated through the activities within game play that included tools, resources and social constructs. Applying a coding scheme that utilizes a CHAT analysis, allowed us to see our participants as *subjects* who participated in the gaming system "to experience pleasure, be challenged, develop skills, and perhaps expand their social networks" (DeVane & Squire, 2012, p. 261). As compared to Phase I, this study utilized a more developed and comprehensive framework particularly interested in the depth to which learned accounts were mastered. The team applied CCSS to develop codes, identifying *products* (Jonassen & Rohrer-Murphy, 1999) within the transcripts that emerged as a result of the boys' activity of video gaming. These included identifying themes and vocabulary acquisition among others. The coding framework allowed the team to perform open coding, to discuss and consolidate emergent codes. The team coded both separately and collectively with each individual interview. After this initial analysis, interviews were grouped together, analyzing multiple interviews at once. This iterative process of individual and collective coding illuminated diverse perspectives and refined our results to more trustworthy learned descriptions.

In the second analysis, the team isolated learning accounts based on games, and identified the extent to which these accounts overlapped with the CCSS ("NGA & CCSSO", 2012). We relied on a hermeneutic thematic analysis based on the work of Van Manen (1990) to guide the positioning of our Phenomenological Analysis. The

research team did not attempt to suspend the researcher perspectives or impact on the analysis—rather seeing the task as an interpretive one, and the researcher as primary instrument. However we found great use in the outline that Moustakas (1994) provides. Therefore we used a Phenomenological Thematic Analysis (PTA), which included a phenomenological reduction, imaginative variation and synthesis approach for each game in our prior analysis, extracting both textural and structural data (Moustakas, 1994). This allowed the team to dive deeper into the boys' learned experiences and further analyze thematic content by individual game. Ultimately our PTA application allowed the team to illuminate the emic perspectives (Rossman & Rallis, 2012) of the boys, giving rich descriptions of learned accounts. Ultimately, this detailed analysis enabled the team to identify and report learning accounts with which we mapped to the CCSS ("NGA & CCSSO", 2012).

Findings

Our findings show that there are several areas where COTS learning overlaps with CCSS beyond mere comprehension. The boys' self reported descriptions showed clear ties to the "English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects" standards. Examples include: identifying and analyzing key Ideas/themes as well as authors point of views in games such as *Assassins Creed* and *Borderlands*; reading and comprehending informational texts, phrases and concepts in all games, with a heavy involvement in community languages; integrating knowledge in the form of information literacy in *World of Warcraft*; using problem solving strategies (Steinkuehler & Squire, 2012); among several others ("NGA & CCSSO", 2012). Among our findings we discovered several key skills that lie beyond the CCSS. These various traits are recognized as valuable such as the development of collaboration, problem solving and information literacy.

Phase 2 of this work is ongoing, but initial findings and analysis show a broader depth to which the games have impacted learning in boys than originally anticipated. Not only were we able to map learned content to more content, but also had the ability to traverse upward in grade level of content. This speaks to the ability to learn more detailed and complex content. In our previous study we were able to clearly see that students were able to **acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when encountering an unknown term important to comprehension or expression (CCRA.L.6).** This study has shown that boys had the ability to move into areas that were not previous matches such as **describe how a text presents information (e.g., sequentially, comparatively, causally) (RH.6-8.5).** Even further and more specifically *Assassins Creed* was a game that had originally shown ties to 8th grade standards, however after further investigation Brad revealed that with his experiences in *Assassins Creed,* he was able to align with the 11-12th grade standards.

> Interviewer: Where you searching for what was real?
> Brad: No they they sorta make it obvious what's real and what's fake in the actual game. Because in the game there's uh like, there's a database. Like in in inside the game that you can like like look into that tells you the actual events in history. It tells you what actually happens and stuff like that.
> Interviewer: So the actual facts are embedded in the game itself.
> Brad: Yea
> Interviewer: So does the game encourage you to actually look at those facts and,…
> Brad: Yes
> Interviewer: the real facts?
> Brad: Yes It shows, it tells you that you unlocked a certain piece of information and then you can go read it and as you unlock certain pieces of information you become, you you get the full history of the time by the end of the game. Or at least the full history of every really really important thing that happened during that time.
> Interviewer: Is the information in the written form; is it all, can you read it?
> Brad: Yes it's all, it's all, it's like an encyclopedia inside the game that you can look at
> Interviewer: How much of that would you say you've read?
> Brad: Uh probably a good half of it because once you beat the game it it's just wandering around and doing nothing. So while I was doing nothing I figured I'd do something and read.
> Interviewer: So what is the text like?
> Brad: The text is like very straightforward. It told you what happened, it told you why it happened, it told you who was involved. And it and it tells, it told you what year it happened. It doesn't get into like specifics because back in like The Renaissance months were like still like all weird but it tells you like

the year it happened and like I said who was involved and what and what caused what happened to happen. Like what actually caused it to happen.

This conversation demonstrated Brad's ability **to analyze how a text uses structure to emphasize key points or advance an explanation or analysis (RH.9-10.5)** Brad could identify that the information was factual and as such held the structure similar to that of encyclopedias. He was also able to describe the types of information that was present in a historical document that seemed to be relevant and in line with factual information as he uses the word "straightforward". Not only was commenting on structure, but he also began to take interest in the content of the material as a result of playing. Brad's connection to the game drove his motivation to read the content, which seems to be a designed game component. He mentions that the game informs the player that they have unlocked historical information. This implies that the game not only provides factual literature on historical accounts, but also encourages its use. Although this passage demonstrates Brad's ability to analyze textural structures, this passage does not speak to the depth to which Brad has understood the material. Speaking to comprehension as well as a comparison between game reading and school reading, we look to the following passage.

Brad: Well like there's a biography for like Leonardo da Vinci. And it went into how he was a painter and he before he before he got into architecture and like art related architecture and building things and it told about how he was not really accepted by anybody until after he was dead. And how he was sorta like in the shadows all the time and sorta and religious, religious leaders didn't like him because he didn't rely on religion he relied on science. Which was one of the reasons why a lot of people didn't like him back then until after he died and he realized he that a lot of the stuff he said was right.
Interviewer: How did these, text in the game relate to the text that you found in the classroom?
Brad: A lot of it's similar except it's not in book form. Like you experience it then you get to read it. Once you experience that you like hey I kind of want to know more about this and then you look into it. When you're in the classroom teacher told you to read it you read two sentences get bored and then decide not to read it.

Brad's response shows that he is not simply regurgitating information gained from text. He states that de Vinci was "in the shadows" and how he "relied" on scientific methods, the casual use of these colloquial words suggests that these ideas have been internalized. Brad was able to clearly align with the 8th grade standard of **identify key steps in a text's description of a process related to history/social studies (RH.6-8.3).** The process we are referring to in this example is the rise of fame of one of the most prolific and known figures of the Renaissance periods in Leonardo de Vinci ("History", 2014). Brad's passage even further shows his ability to map to the 11-12th grade standard of **determining the central ideas or information of a primary or secondary source; provide an accurate summary that makes clear the relationships among the key details and ideas (RH.11-12.2).**

This knowledge acquisition is not merely isolated in the game space. At times it can have a direct impact on the lives of boys especially as it relates to academic matters. Blake demonstrates the ability games have to spark an interest in boys and maintain it to the extent that it may unlock a boy's full potential in conventional school settings. He describes how video games inspired his interest in searching out literary works as they help unlock more information on his interests.

Interviewer: Have the games God of War or Assassins Creed made you more interested in history?
Blake: Absolutely I mean I, I never dreamed of taking AP history in my entire life. Uh But once I found out that we were going to start to going back to the A, you know, early AD's where uh you learn about not Greek mythology but you know Roman history. Uh I was able to expand it and learn about the heritage and the and the origins of these gods that I have come to hate, and hate through the games. I wanted to see what the truth was and that got, God of War directly read, directly lead me into reading the Percy Jackson series cuz it was Greek mythology, I thought 'Oh gods! Cool' and that that lead me to reading 20 books written by Rick Riorden at of Greek mythology. It was just, you know, it it brought this whole new interest and easy collaborate and easy way to learn. And that's what made me want to pursue the learning at a higher level of higher education.
….You know and you could do that but you only, when I read I like to read I like to read story and that's why I like the Rick Riorden series is the only series I read about mythology because it, you know, it give the story, it give it gives, it makes history fun, it makes learning fun. And you and you know, without, without playing, without even knowing the God of War came out way before he did so

> without even knowing what Greek Mythology I wouldn't even know to pick that books of the shelves to know what I know about the gods now to know about Roman mythology Greek mythology, I mean I wouldn't have been able to want to read those books without knowing without having a baseline which was given to me by the game.

On the surface level we can clearly see that this participant has **integrated and evaluated multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem (RH.11-12.7).**

This next? example clearly shows that the game play in combination with external reading allowed Blake to deepen knowledge and involvement in historical content. It becomes relatively clear that his acquisition of knowledge is vast as he describes the characters that he was introduced to in the game space of God of War.

> So uh.. as I, like I said, Zeus is the king of the gods and what he does is he is like the commanding factor in, you know, the titans and the gods. He is like the I dunno the great monarch of the world pretty much and what what you learn from him is that everybody kinda has. It's kinda like a Hitler situation where everyone is after each other's throats in command. Like who's actually in command? Cuz they know he is but who else is? Like you know is Poseiden ranked higher than Ares? Is is Ares higher ranked than Athena? You know. Who who has which power? So it's really and entire power struggle between all these guys.
>
> Deciding who is more important in their roles. So as you progress through the third game especially, you learn that uh… that that Zeus's own, or uh Poseidon's own wife is totally against him. That Hercules hates his own mother, because she's limiting him because he thinks that he should be king of the gods and he should take down Zeus. So as you go through you're pretty much putting everybody in their places and putting them in the ground. And you're showing that you are the strongest and the best. It really it really gives you a cool chain of command and shows you know the basis behind, not the real thing, behind Greek mythology on how you know Zeus but he left everything (PA interuption) As I was he ah Ze-, you know, Zeus is kinda the ultimate king everybody else want to is like the commander and they wants to climb the next round that's a nice twist they put on Greek Mythology.

This finding reveals the depth to which Blake understands the complex relationships within the Greek Mythology hierarchy. Further we see that Blake has the ability to meet the 11-12th grade standard of **presenting information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks (SL.11-12.4).** These speaking and listening standards show that Blake was synthesizing information in a way that allows him to go beyond basic understanding. Blake goes beyond than giving facts by speaking to his very own account of the relationships and the underlying intentions of the game, as he demonstrates his own clear and distinct perspective of Greek Mythology. Demonstrating his depth of knowledge, Blake distinguishes the game story line from the historical accounts of Greek Mythology through his description of the progression through the game.

Beyond the Common Core Standards

For games such as Call of Duty (CoD) and Madden, respondents described participation in affinity groups (Gee, 2007) and required collective problem solving efforts. This was a particularly strong finding as all players of games like CoD reported the importance of "team work" as a fundamental skill for success. Collaboration was referred to in terms of complementarity. The boys in this study accessed forums, coding books, instructional videos, among other resources to enhance their ability to succeed. What traditional educators might consider cheating, these gamers confirmed as necessary resources which helped users remain engaged as they also reinforced learning and served as emotional support. This interest-driven and exploration space allowed the boys to remain engaged and gave free reign to access and utilize all available resources (Steinkuehler, 2011). These gamer abilities are highly sought after in the business world among others (Beck & Wade, 2004).

Hunter describes his involvement in his affinity groups online with friends playing CoD. Affinity groups as Gee describes it consists of the gaming learners, " that is bonded primarily through shared endeavors, goals and practices and not shared race, gender, nation, ethnicity, or culture (2007). Hunter provides an account that shows the significance of teamwork and its ability to transfer to real world goals and objectives. In Call of Duty, many

participants used their headsets to communicate with friends over the online environments. These telecommunication tools were important instruments that were used to collaborate in complex missions.

> Interviewer: So you described a skill you gained in the gaming world that you can translate to the real world, which was teamwork. Can you describe that? Can you explain what you meant by that?
> Hunter: Uh I meant,… Cuz when you're when you're playing the game you're playing on a team-based game. Inside of the game you have to communicate and you have to be on the same page and I think even in real life if you're working on a team in a job, in school, or on the sports field, you gotta be able to communicate effectively and clearly and to the point. And I think a lot of video games you have to do that. You have to communicate clearly and effectively and quickly. and get your point across to achieve whatever you're trying to achieve.
> Interviewer: Did you do that a lot with friends?
> Hunter: Yea constantly, that was the thing always would communicate to get it done.
> Interviewer: Do you do you feel like you value their strategies, that they had?
> Hunter: Yea, I mean we all had our strengths we all had had our weaknesses and they complement each other very well and we were trying to play together. I think.
> Interviewer: Do you have an example?
> Hunter: Um,.. well you know Cody Rampart, I play with him most of the time. He was, he was always about, you know, the sniping in the game. He would always be the sniper and I was not so great at that. So he was much better at that than I was at that so we complimented each other very well in games when we played together.
> Interviewer: Do you think that that kind of collaboration has helped you in any other ways, in like the real world possibly?
> Hunter: I mean, yea when you're when you're working with someone else you have to gain an understanding of what their strengths and weaknesses are and what your strengths and weaknesses are. You have to learn how to collaborate and work together and find out what compliments each other

When gaming, players may use various tools to help in their problem solving tasks. Chase then speaks to his use of various materials towards information literacy practices including digital literacies.

> Interviewer: In the game, other than friends, is there any kind of help that you can get in the game?
> Chase: Um. Usually I just go on YouTube or something, like to find out a little hint like to get through it I don't look up cheats. I don't really like em.
> Interviewer: What do you consider as cheats?
> Chase: They're like something to get you through the whole entire mission without really doing anything. Like hints are like little tips that help you get through one stage
> Interviewer: and what else do you look up other than YouTube to get better?
> Chase: I would say Google, bing, .. a whole bunch of other things. I have apps on my iPhone that you can see. There's Skyrim tips, GTA tips and Call of Duty
> …
> Interviewer: And how does information you get help you play in game?
> Chase: um,… it helps you like get better strategies you're learning from what you did. And just about helps you in every area.

Chase describes a common theme amongst our gamers. They enjoy being challenged and despise tactics that interfere too heavily with the normal processes of in-game challenges. They consider cheating to be any aid that overly simplifies required tasks and they have a moral code that appears to shun this type of behavior. Instead his information literacy practice/digital literacy practice involves accessing specific types of data that will give players clues instead of solving the entire problem for them. Furthermore Chase seems to use various types of digital media to meet his needs as he uses search engines to access forums, YouTube videos and mobile applications that help with specific games such as Skyrim, Grand Theft Auto (GTA) and Call of Duty. This demonstrates his ability to locate and utilize specific sources for particular complex tasks.

We recognize that these are interpretations upon which we draw the connections between COTS experiences and CCSS transfer. Naturally, others might read something quite different in these quotes, and we encourage readers to further plumb the depths of these ideas shared with us by our respondents.

Discussion

This study provides evidence that a breadth of traditional learning outcomes can be obtained from COTS gaming. Our findings support theoretical work, which posits that gaming can lead to specific and significant learning gains (Gee, 2007, Prensky, 2006; Steinkuehler & King, 2009). The interviews conducted revealed that boy gaming experiences show deeper levels of understanding than originally expected as it relates to literacy. The boys showed that they had the ability to not only acquire vocabulary and use it efficiently but also to analyze structures of text towards understanding information data. Our findings have moved beyond 8th grade standards to more complex and demanding standards located in the 11-12th grade CCSS ("NGA & CCSSO", 2012). Normally these may be areas that are not visibly seen in classroom settings as reading materials are usually provided and chosen for students. Even more, respondents demonstrated the ability to synthesize information in the form of providing accurate summaries and making clear relationships between major themes in text. Boys suggested that the ability to engage directly with the material not only gave the material more meaning, but also allowed and encouraged them to seek out other sources of related information. Educators would benefit from these otherwise hidden skills in classroom settings as boys not only engage at deeper levels but also learn at deeper levels. Blake demonstrated a level of understanding Greek Mythology that went beyond regurgitation to synthesizing and analysis as he recounted and spoke to the relationships between the Greek characters.

Perhaps even more fascinating is where our findings stretch beyond CCSS. From collaboration to problem solving (Steinkuehler & Squire, 2012), through planned strategizing it's clear from this data that the students in this study believe they're learning important skills and knowledge from playing games. Gamers must often rely on other tools within the gaming community for support. They must become experts in what's commonly known as information literacy practices ("ACRL", 2014). Problems are so complex that they require the efforts of people as well as their tools to support them. Within these affinity groups (Gee, 2007) gamers must learn to navigate these tools efficiently and effectively toward problem solving goals. Beck and Wade would attest to the value of these skills in the 21st Century business workplace (2004). Beck and Wade, of the Harvard Business school, extol the talents of gamers and believe businesses would be wise to hire these quick learners. They claim that they have an ability to learn on the fly as well as view their work as important. These talents would be valuable in classroom settings and can be accessed as we grow respect for video gaming culture. Furthermore we must support boys in expressing themselves in normal and natural ways—and a healthy acceptance of video games can build that respect and support. Understanding the power of gaming can encourage teachers to consider including games in traditional classrooms, which we believe will send a clear message that boy culture is respected and accepted.

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Interpreting the Aesthetics of Games and Evaluating its Effect on Problem-Solving Using Visualization Theory

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Index indicators: Gaming & Problem Based Learning

Abstract

Digital game-based learning is often associated with problem based learning since games offer opportunities to take on new roles in the virtual worlds through problem solving. We believe that gaming environments can stimulate learners' critical thinking and problem solving skills. We propose that aesthetics sparks learners' interest in the content and draws them into an aesthetical experience of gameplay. An aesthetical experience emerges through the interaction of the players with all aspects of the games directly or indirectly which reflects upon the entire gaming experience. These interactions provide different meaning to learners and their sociocultural contexts and the associated emotions facilitate deeper engagement and meaningful learning. Utilizing the sociocultural paradigm that cultural understanding evolves through the identities and various modes of existence or practices of human beings, and using our own framework of visualization, we elaborate how learners interpret the aesthetics of games through a game, *Global Conflicts*. Our framework of visualization integrates the notion that in digital game-based environments, sense making and interactions within the environment, activate emotions that lead to cognitive processing of the information.

Introduction

"..I think the game [*Global Conflicts*] *made me feel a lot more sympathetic towards the people who are going through that* [Palestinian Israeli Conflict]."

"We think they are both right and both wrong [The Israel and Palestine issues over owning the Gaza strip and West Bank] *but in the end the Palestinians have the right to not be barged in…"*

The above excerpts are taken from interviews with students of Saltash.net Community school who as investigative journalists played the game *Global Conflicts* (Serious Games Interactive, 2008) depicting the Palestinian Israeli strife. The students were emotionally affected by the situations arising out of the Palestinian Israeli conflict and they tried to think of solutions. Such participatory experiences that involve unique encounters, and awaken interest in the unknown are often aesthetic in nature (Jardine, 2006). An aesthetic experience from this perspective can be understood as being pulled out of one's subjectivity and into a web of relations that demand one's attention (Gadamer, 2012). The aesthetic experience that also emerges out of a human computer interaction and interaction design, when conceptualized pragmatically, comes across as the interplay between the user, context, culture and history (Wright, Wallace & McCarthy, 2008). These aesthetic experiences bring about a lively integration of means and ends, meaning and movement, involving all the sensory and intellectual faculties and are thus emotionally satisfying, meaningful and fulfilling (Wright & McCarthy, 2004).

We propose that aesthetics of games as designed cultures establish and clarify the theme of learning which is essential for problem solving in games. Games are designed cultures because the social cultures and broader cultural notions of play mediate game play and hence learning (Squire, 2012). Aesthetics in game-based environments, is defined by the various facets of gaming experienced by the players (Egenfeldt-Nielsen, Tosca & Smith, 2013), and art or aspects of aesthetics can be utilized to communicate educational concepts (Squire, 2011). In fact, aesthetic qualities of a learning environment promote higher levels of comprehension when used to clarify the subject matter (Parrish, 2009). Based on the established body of research suggesting that game-based learning helps

learners develop problem solving skills (Barab, Gresalfi & Ingram-Noble, 2010; Barab, Gresalfi & Arici, 2009; Gee, 2008, 2003; McGonigal, 2011, 2008; Squire, 2005), we advocate for the deeper consideration of aesthetic qualities in designing games for learning.

In this paper we use the game *Global Conflict*s whose aesthetics represent the underlying themes of democracy, citizenship, human rights, terrorism and poverty, which are often difficult and abstract concepts to comprehend. We analyze the aesthetic qualities of the game, describe how learners interpret and interact with the aesthetics and explain how each interaction with the aesthetic qualities helps with critical thinking and problem solving using our own framework of visualization. Our framework of visualization is built upon the basic tenets of visualization in digital environments (Brodlie, Brook, Chen, Chisnall, Fewings, Hughes, John, Jones, Riding & Roard, 2005) and embeds sense making (Klein, Moon & Hoffman, 2006) and cognitive processing through interactions within game-based environments (Kim & Kim, 2010). In the following section we begin by briefly discussing how games are designed cultures from a number of perspectives highlighting the role of aesthetics.

Understanding the Cultural Framework of Games through the Aesthetics

Games are often understood as designed cultures from an educational perspective on account of their unique design features, the underlying learning principles and the socially situated nature of game play (Squire, 2013). Games are designed to make the learners central and important participants in worlds where their knowledge is directly related to what they can do and ultimately who they turn into (Gee & Levine, 2009) thus establishing a culture of understanding reality through a virtual world. In fact purposefully designed games can be a form of dramatic agency positioning the player with intentionality, legitimizing the content and adding consequentiality to the context (Barab, Pettyjohn, Gresalfi & Solomou, 2012). This transactive potential of games transforms education by making it personally meaningful to the learners and situationally consequential (Barab, Pettyjohn, Gresalfi & Solomou, 2012). Such form of play integrating the person, the content and the context as part of a transactive system, has moved the focus towards more interactive experiences in games. As designed cultures digital games are also based on the principle of collective intelligence where the collective is a " complex, flexible and dynamic knowledge base" (McGonigal, 2008, p. 199). In an age of powerful and networked collaboration games enable players to exercise their power both individually and collectively. In the following, we discuss the role of aesthetics in understanding games as designed cultures, games' underlying learning principles, and the visualization framework as a tool for understanding learners' gaming experience.

Games as designed cultures with aesthetic qualities

The unique design features of a game are normally defined by the mechanics, the dynamics and the aesthetics: the mechanics are the basic components, the dynamics results from applying the game mechanics to players' inputs, and the aesthetics is the subjective experience of the player from the game (Aleven, Myers, Easterday & Ogan, 2011). The aesthetical design of video games is often mentioned in connection with the aesthetics of human computer interaction and interaction design from a pragmatic account of human experience or culture (Wright, Wallace & McCarthy, 2008). In this pragmatist proposition, aesthetical experience emerges through the interplay of user, context, culture and history and the construction of relations between artifact and viewer, subject and object, user and tool. Such interactions mediated by personal or cultural reasons in game-based learning environments, is also an evidence of culture as learning through gaming is a form of participation in social practice (Squire, 2002). These aesthetic experiences are continuous integration of means and ends and meaning and movement involving the sensory and intellectual faculties establishing unity or wholeness that is fulfilling for the user (Wright & McCarthy, 2004).

From a cultural perspective aesthetics plays an important role in generating research discourses contributing to new ways of conceiving game design (Niendenthal, 2009). Aesthetics of games are conceived as (1) sensory knowledge, (2) art, and (3) play. From Niendenthal's definition (2009), an aesthetic perspective on games comprises of the visual, aural, haptic or embodied sensory phenomena that players encounter in the game. It includes the commonalities that emerge or are shared with various art forms and is the experience of the game as in pleasure, emotion, form giving, sociability etc. Drawing from this notion, aesthetics as sensory knowledge functions as a cultural construction of various relationships through history, place and time and hence provides a geographical and cultural understanding of the game.

The notion of aesthetics as art in games revolves around the creation and display of art as in music or painting through the game to playfully engage the intellect as well as the senses of the players. This aesthetic approach adds to the immersion, and flow of the gamers and can be compared with Huizinga's "magic circle"

because the players are able to focus on qualities of the fictional worlds, their roles, and the participation mechanisms (Niendenthal, 2009). In creating game art, a player is a co-creator of the piece not only by engaging intellectually but literally by making choices and modifications on such aesthetic design (Pearce, 2006). By allowing cultural construction of various relationships and participation in artistic endeavours, aesthetic experiences bring out the cultural aspect of the games.

The notion of aesthetics as play (Niendenthal, 2009) develops through the interaction of the players with the aesthetic qualities of the game such as rules, geography, representation, time and number of players (Egenfeldt-Nielsen, Smith & Tosca, 2013; 2008). From a different standpoint, play is an inherent part of aesthetics and is incidentally present in digital games and works through the imaginative and cognitive faculties of players to create the aesthetic experiences (Kirkland, 2007). An aesthetic experience as play is derived through participation in the moments of opening and venture, which are crucial for individuals to comprehend the ways of the world (Jardine, 2006). Since aesthetic experiences are similar to being pulled out of one's subjectivity and into a web of relations that demand his or her attention (Gadamer, 2012), they become meaningful (Dewey, 1980) through the act of playing and the aesthetic notion of play reflects the gaming culture.

Underlying principles of learning with games

One of the underlying principles of learning that establishes games as designed cultures is problem solving. It is a widely acknowledged fact that game-based learning goes beyond motivational factors since it advocates computer literacy, problem solving skills and real world scenarios. The specific mediated contexts of games are ideal for learning as they provide richly designed problem spaces with similar yet varying levels of challenges across the levels of the game (Gee, 2008). Games are thus "goal driven problem spaces" (Gee, 2008, p.26) and learning happens through the goal driven experience, which provides the purpose for learning and meaningful problem solving (Gee, 2008; Royle, 2008).

Contemporary games establish a functional or pragmatic model of knowing through the meaning making that occurs on account of the direct interactions and responses of the player(s) with the gaming world (Squire, 2011). These interactions are often motivated by the aesthetics of the games that enable players to see patterns in the gaming process or game states and thereby solve problems (Squire, 2011). Learning experiences involve transactions with the learning environment and these can be transformative with significant aesthetic qualities (Parrish, 2009). Such aesthetic experiences are crucial because they demonstrate the expressive power of life offering ways to discover and create meaning (Alexander, 1998). Since aesthetic experiences are efforts towards creating meaning aesthetic principles of learning have commonalities with information processing, constructivist and social learning theories (Parrish, 2009). The aesthetic principles incorporate learning experiences as narratives or plots within which the learner is a protagonist, the learning activity establishes the theme and the context contributes to the immersion (Parrish, 2009). The aesthetic of digital game play similarly includes learning through new ways of doing and being in a designed world and the aesthetic principles are entrenched in the deeply rhythmic experiences evident through authentic participation in complex activities that blurs the distinction between play and work (Squire, 2011).

Aesthetic qualities of a learning environment are also known to promote higher levels of comprehension by clarifying the problem. These clarifications are obtained through aesthetic qualities of the learning environments that incorporate patterns, routines and motifs as well as sources of aesthetic tension that enhance the complication and help sustain the engagement (Parrish, 2009). In digital game play, Squire (2012, 2011) defines this engagement as rhythmic immersion towards problem solving and attributes it to the design of the game.

As digital cultures games allow for social participation through various communities of practice and the social structures that govern game play (Squire, 2012, 2011). Games enable enculturation into communities of practice such as creating new game designs (Squire, 2011) and these communities are naturally occurring and self sustaining learning communities built on widely accepted sociocultural and cognitive theories of mind in psychology and education (Steinkuehler, 2013; 2006b). The social practices or interplay from the surrounding context, also known as *metagame* play a significant role in learning associated with games (Gee & Hayes, 2012). The *metagame* affords the interaction and the link between the organization of the space (the site or events including real world spaces and events) and the organization of the people. Gee & Hayes (2013) acknowledge these activities as nurturing affinity spaces in games that are supportive of learning. The interactional structures of social and material systems also afford cognition in game-based learning environments (Steinkuehler & Oh, 2012). From this perspective, it is through participation in a community of practice that an individual comes to understand the world and themselves from the perspective of that community and such activities have a direct import for the identity of the individual (Steinkuehler & Oh, 2012).

Culture is defined through the identities of individuals (Hollins, 2008), and communities of practices that afford learning (Packer & Goicoechea, 2000, Greeno, 1997) and can be understood through a system of learned behaviours, that individuals make use of to organize and make sense of the world (Wanda & Warms, 2011). The aesthetic mode of knowing also incorporates vicarious participation in situations that perform a referential function to some aspect of the world helping learners experience it (Eisner, 2005). The aesthetical principles of learning classify learning through a problem, tension or conflicting information (Parrish, 2009). The aesthetic is in fact secured within the process of coping with a problem, involving the exploration of the problem leading to the eventual resolution (Eisner, 2005). Hence we assume that the aesthetic interactions with the games allow the learners both individually and collectively, to engage in a cultural practice towards learning and problem solving. It is also pertinent to note in this context that the aesthetic components in games, such as rules, geography, representations and time, are all social constructs. The number of players in a game may depend on the design but collaboration or participation in a community of practice is a form of social activity that can occur depending on the intentions of the individuals playing the game.

Visualization framework for aesthetics and culture

Delving deeper into the process of learning, we propose that as the learners interact with the aesthetics of the digital games they visualize and start making sense of the information. This framework of visualization is based on three broad semantic contexts (Brodlie et al. 2005). The first semantic context deals with the data being displayed through a digital environment. We interpret this data as the aesthetical characteristics of the game, which the players interact with either directly or indirectly while playing. As previously discussed, the aesthetic interactions here refer to the learner interactions with the rules, the geography and representation, time and the number of players of the game.

The second sematic context includes the data specifying meaningful information to the viewers. We interpret this as meaning making that occurs through the interactions of the player with the aesthetics of the games as in the rules, geography and representation, time and number of players. We understand the meaning making through a data frame analysis (Klein, Moon & Hoffman, 2006), where an initial interaction helps the learners to create a frame for sense making and each interaction thereafter brings forth additional information or changes based on the initial context or frame of reference. Thus the player is able to build upon the frame by adding or removing information based on the continuous interactions with the aesthetical qualities of the game. For example, interactions with the aesthetical qualities of a game bring about a sensory understanding of the history, place and time thus providing a framework for a geographical and cultural construction. And this framework develops based on the more interactions of the players with the game aesthetics. To cite another example, player interactions with game art as in graphical style, content and music engages the player's senses and intellect as it emerges as data. Subsequent developments of patterns or routines start making sense to the player based on his initial frame of reference leading to a rhythmic immersion or acculturation, which helps to clarify and solve the problem. Such participatory experiences that evolve out of interactions mediated by personal or cultural understandings in game-based environments are reflective of culture.

The third sematic context deals with the cognitive processing of the information. We relate sense making with cognition using the notion that growth of emotion and cognition are tightly linked (Zembylas, 2005). As the player interacts with the aesthetics of the gaming environment, each interaction provides different meanings to learners and their sociocultural contexts and the associated emotions affect their thinking, learning and performance as a system (Kim & Kim, 2010). Hence the players are able to visualize the problem using their interactions as emotional anchors to solve the problem. In the following, we discuss how learners might interact with the aesthetics of games through an example, *Global Conflicts*, using this framework of visualization.

Visualizing Problem Solving Through the Aesthetics of *Global Conflicts*

The game *Global Conflicts* (globalconflicts.eu) is based on issues pertaining to democracy, human rights, and social inequities around the world. The learners experience and comprehend these issues as newspaper journalists who are attempting to report on the situation. As they navigate the regions marked by turmoil, such as Israel or Palestine, the learners understand the problem from various perspectives and are able to report with their own thoughts on the story. As stated earlier the aesthetics of a game are the elements that make up a game, including the rules, geography and representation, time and number of players of a game (Egenfeldt-Nielsen, Smith & Tosca). Here we analyze each interaction with the aesthetic element of the game as evidence of culture using our framework of visualization for problem solving.

As the learners start playing the game by assuming the role of a journalist, they learn the rules of the game indirectly through their visualization of the context and interactions with the characters and objects. Such interactions in a learning environment as in *Global Conflict – Military Operations*, hold different meanings for the learners and their sociocultural contexts and the associated emotions impact their thinking, learning performances and development as a system (Kim & Kim, 2010). As the learner converses with the editor of the newspapers outside a café in Israel or travels across Abu Dis with the Israeli Defense Force, he or she gets a fair idea about the purpose, the limitations and the affordances of the game (Figure 1). These limitations and affordances within the game are the rules (Egenfeldt-Nielsen, Smith & Tosca, 2013). The conversation with the editor makes the learner realize that as a foreign journalist securing local sources for credible information is crucial. Witnessing the arrival of an army truck with a squad of soldiers beside the café as in visualizing the same context through a change of situation clarifies the political situation of the country and the learner is able to comprehend why there is a need to wear a bullet-proof vest while on the job. As an American journalist the learner realizes that getting upset or showing arrogance while conversing is not going to garner the cooperation from the people.

Figure 1. Screen shot of the journalist in conversation with the editor

The learners are also able to see their own progress in the game through the emerging information as they start abiding by the rules for making the necessary moves. Thereby their actions become part of the narrative and this helps to sustain their engagement (Figure 2). Choices with responses and the options to work for different newspapers such as the Palestine Today, the Israeli Post or the Global News clarifies the rules even further and gives an insight into the theme of the game. When they are reporting for Global News for example they look at the conflicts up close by focusing on the events that take place, the military operations, the treatment of prisoners and the danger for the soldiers. For Palestine Today on the other hand the learners are focusing on the abuse of the Palestinian prisoners by the Israeli soldiers documenting the way the suspects are treated, the corruption and the brutal interrogation methods as well as the potential of innocent people being arrested. The learners are thus able to analyze the conflicts or problems through the interactions stemming from the rules of the games. These progressive interactions activate their emotions and hence their thinking and they are able to present their viewpoints from different perspectives. Therefore the rules as aesthetic characteristics define the game by elucidating the political and cultural aspects of the situation and the problem, which assists the learners to make sense of the Israel Palestinian issue.

Figure 2. Screen shot of the journalist in conversation with IDF Chief

The geography of the game represents the physical space that the learners encounter in the game (Egenfeldt-Nielsen, Smith & Tosca, 2013). The geography helps the learners to visualize not just the physical landscape as in Abu Dis or Jerusalem in Israel but various other landscapes binding with the geography such as the economic, social, cultural and political environment. The geography familiarizes the journalist(s) with Abu Dis and as the game progresses through various chapters the learners develop a deep awareness of the country from various perspectives and they are able to make meaning out of the physical, economic, social, cultural and political environments relating one to the other. This meaning making begins with the visualization of any landscape that the journalist chooses to use as the initial frame of reference (Figure 3). Based on the interactions with this initial frame of reference the journalist is able to figure out for example the areas frequently targeted for raids, the demographics involved and the reasons behind the frequent raids. The emotional experiences arising from such interactions activate and modify the cognitive processing of the learners. It also makes them aware of the economic situation within the country and familiarizes them with the social and cultural practices or norms by region providing an in-depth insight into the population of the country. The geography as represented in Figure 3 can also evoke emotions with the appearance of a sudden complication (Figure 4) that provides an aesthetically cultural understanding of the issue.


Figure 3. Screenshot of neighbourhood of Abu Dis

Representations as in the audiovisual characteristics (Egenfeldt-Nielsen, Smith & Tosca, 2013), also add towards creating the atmosphere that makes it meaningful for the learners to comprehend the theme of the game. *Global Conflicts (Military Operations*) is a photorealistic game, which makes it visually powerful for the learners. The accompanying realistic sounds and music add to the effect by evoking emotions and feelings that enable then to comprehend the game from various perspectives. When the journalist reaches the location (Figure 2) with the Israel Defense Force the visuals clarify that the area is quiet and deserted. As the prisoner is brought out into the open the mosque prayers are played in the background clarifying the neighbourhood as a Muslim area. The loud prayers also make the prisoner respond emotionally to the questions asked by the journalist elaborating on the religious issues in

the region. This in turn forces the journalist to deal with the issue delicately. Thus representations as aesthetic qualities present the theme and prepare the learner for a change in perspective. The problem as in the religious differences emerges through the representations of the game making it contextually meaningful and helping them with consequential decisions

Figure 4. Screen shot of IDF escorting prisoner out of the building

Global Conflicts (Military Operations) is played in real time and the temporal characteristics unfold through the participation of the learners in the narrative. A change of the scenery (Figure 1 & 2) depicted by the quiet surroundings of the cafeteria as against the sudden arrival of the Israel Defense Force or the deserted street of Abu Dis becoming the center of activity all of a sudden due to discovery of explosives in a house (Figure 3 & 4) sustains the suspense and builds up the complication immersing the player in the game. Such immersion also helps with the real time strategizing skills of the learners such as wearing a bullet-proof vest for safety reasons. Time is also used aesthetically when the learner as a journalist interviews the characters in the narrative. These aesthetic moments clarify the problem from various angles such as the treatment of potential prisoners, dangers faced by the Israeli defense, the validity of the statements from the people interviewed and the reliability of the information in these situations. The learners are then able to weigh the information by developing the frame from one reliable source of information, which then serves as the initial framework. The learners may have positive or negative emotions towards the content but they respond to the relational meanings brought about by their personal interactions with the characters or objects (Kim & Kim, 2010). This in turn helps the learners to understand the issue and make their own judgments towards what needs to be done (as in publishing an editorial in the newspaper).

Figure 5. Screen shot of IDF members surrounding the house of the potential terrorist in Abu Dis.

Like most single player games, *Global Conflicts (Military Operations)* is procedural and based on artificial intelligence (AI) (Egenfeldt-Nielsen, Smith & Tosca, 2013). Progression in such games, are typically player centered but that does not limit the social dynamics of the game (Egenfeldt-Nielsen, Smith & Tosca, 2013). The narrative builds up through the AI or the characters, who as virtual entities are intelligent enough to respond to

various game conditions. The IDF members for example elaborated the narrative on the raid in Abu Dis by blowing up the door and surrounding the house before capturing the potential terrorist. They also discovered explosives hidden in the house (Figure 5). Thus these AI or characters establish the problem on the theme even if they are not communicating with the journalist. The social context of the game from another perspective comes into play in the learning environments of classrooms, which allow for collaboration both towards game playing and solution seeking discussions.

Conclusion

The purpose of this article was to emphasize the importance of aesthetics in game-based learning environments towards problem solving. We used a game, *Global Conflicts,* as an example to explain the visualization of aesthetics by learners for meaning making and hence problem solving. We also clarified how games are designed cultures and how the aesthetics of the games contribute to a cultural understanding of the content or theme presented in the game. Aesthetics in games is an emerging subject of interest and further research in this area will contribute to new perspectives on aesthetics of games and its' effects on knowledge creation. We believe learners at all levels stand to gain from a better understanding of aesthetics in games. A holistic understanding of aesthetics pertaining to digital games will contribute further to new areas of research in game-based learning.

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Designing Feedback to Increase Interaction and Learning in an Online Self-Study Course

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Abstract

One of the challenges of online instruction, especially those courses that are primarily self-study, is to provide timely and effective feedback that is both constructive and additive to learning(Boling, Hough, Krinsky, Saleem, & Stevens, 2012; Gikandi, Morrow, & Davis, 2011). Self-assessments in the form of test items with corresponding developmental feedback were created to help learners validate and enhance their knowledge of computer tools and their instructional uses. In this paper, the challenges of developing such feedback and the design process will be discussed.

Introduction

For the past five years, a graduate course in advanced design has been undergoing design modifications to enhance the presentation of content, provide additional support materials, and increase the interactions that learners have with content. New components of the course included digital tutorials, virtual learning sessions, detailed project rubrics, and sample deliverables. The course, however, still lacked a feedback mechanism that would efficiently address learner needs in a timely manner, especially in a course that is greatly self-study and completed based on the pace of each individual learner. A major effort was taken in this design iteration to create interactive self-assessments with developmental feedback. This effort was a collaboration of graduate students with an instructional design expert in the form of a cognitive apprenticeship. As the instructional designer worked with the assessments, she externalized her thinking and would often contrast how novices and experts think about the problem. Through this process, the role of feedback and its benefits were researched, and principles of design were adhered to when integrating the self-assessments into the course. Principles of effective feedback(Evans, 2013; Kluger & DeNisi, 1996)generative learning theory(Wittrock, 1990), first principles of instruction(Merrill, 2002), critical thinking/deep learning with technology(Jonassen, 2005), authentic practices(Herrington, Reeves, Oliver, & Woo, 2004),distance education best practices, and adult learning(Knowles, 1984) guided the design of the course.

Benefits of Feedback

Feedback has been defined as the information provided about one's performance or understanding (Hattie & Timperley, 2007). To be effective, information (feedback) should communicate a goal, define where the learner is on their progress towards the goal, and provide guidance as to how to overcome any obstacles hindering the attainment of the goal (B. P. Black & Wiliam, 1998). Sadler (2010) adds that students need to be informed about their performance in regard to task compliance, quality, and criteria if the feedback interaction is to be successful. Benefits of feedback include reducing the gap between a learner's current level of performance/understanding and the desired goal. Feedback can help students identify misconceptions and give explicit directions on how to improve (Shute, 2008). Feedback may also motivate students to continue seeking a goal, increase their effort and engagement, or boost their confidence by confirming a correct response (Deci, Ryan, & Williams, 1996; Hattie &

Timperley, 2007). Although feedback has great potential for augmenting learning, systematic use of feedback has been identified as a weak element in current educational practice due to its underutilization and lack of clarity when implemented (Havnes, Smith, Dysthe, & Ludvigsen, 2012). A collaborative approach was taken in this project to use research on feedback, learning, and instructional design principles to incorporate a systematic approach to feedback in an online course.

Principles of Feedback Evident in Our Design

Throughout the process of designing the self-assessments and developmental feedback, we focused on several principles concerning the design and delivery of sound feedback. Through a meta-analysis of feedback literature, Evans (2013) provided a framework of feedback principles. Two principles relating to assessment feedback which directed our design were that "feedback is an ongoing and integral part of assessment (Evans, 2013, p. 80)", and "greater emphasis is placed on feed-forward compared to feedback activities (p. 81)". In order for feedback to be an integral part of the assessment process, it should be relevant and aligned with the learning objectives, designed to encourage efficient learning and self-regulation, part of an entire process, and developmental and timely(Evans, 2013). Additionally, emphasizing feed-forward activities necessitates feedback to be delivered while a task is still progressing and directed toward future learning. It should also be situated within the learning context and be directed at the learning gap(P. Black & Wiliam, 2009; P. Black, 2003). The self-assessments and corresponding feedback align with these principles and yet are only one component of the course(Souid, Koszalka, Wu, & Hall, in press-a, in press-b; Wu, Koszalka, Souid, & Hall, in press). Other aspects of the course focus more directly on feedback principles such as student engagement in the feedback process and training to utilize feedback, but this paper exclusively discusses the self-assessment feedback design.

As an integral part of the course, the self-assessments with developmental feedback were created as an instructional tool to make the course material more relevant to students. The feedback engages students in thinking about the fundamentals of a Mindtool and prompted students to contemplate how the Mindtool should be implemented in an instructional context and evaluate how the Mindtool was integrated in authentic scenarios. The students complete the self-assessments which are most relevant to the Mindtool they are focusing on and can complete the self-assessment when it fits their study plan. There was much discussion about ensuring the assessment and corresponding feedback was purposeful. In order to accomplish this goal, a table of specifications was created along with a template for the items and feedback. The question template ensured that all collaborators were structuring items similarly for each Mindtool, and the table of specifications bound our items and feedback to the learning outcomes. Since the feedback was aligned with assessments of the stated learning outcomes, it could more effectively guide students' path by either prompting deeper thinking or addressing a misconception about the Mindtool. A content expert and the instructor detailed what typical misconceptions were about each Mindtool and directed how the feedback should be written to reduce this gap.

Another goal of the feedback was to encourage efficiency in this self-directed online course. Students could select to complete the self-assessments as an advanced organizer or they could complete the assessment to measure their progress after studying the content or both. Since no limit was placed on the number of times students could access the assessments, students were able benefit from both strategies. The nature of this self-study course and the needs of the students necessitated immediate feedback. The professor had no foreknowledge of when a student would need feedback on an assessment or when the student was planning to complete the assessment, and the student needed the developmental feedback from the assessments to continue progressing in the course. Therefore, it was decided that feedback for each item would be delivered automatically to the student at the conclusion of the self-assessment. This ensured that all students received consistent feedback while reducing the time constraints on the instructor.

Feedback in this course was designed to inform the process of learning(Evans, 2013). Its intent was to challenge students to reflect on their knowledge of Mindtools. Did they understand the content well enough to design a lesson? Were they being hindered by misconceptions? It also informed the process of learning by promoting self-regulation. The feedback referred the students back to the study materials provided on the learning platform or bid the learner to think about a new idea for the course project. Encouraging reflection and self-regulation were both paramount goals of the entire course, and the feedback structure was meant to foster independent learning with scaffolding.

The self-assessment feedback is intended to send students forward toward their learning goals. At the end of the semester, students are expected to complete two lesson outlines with accompanying examples of how two selected Mindtools can facilitate critical thinking. As they work on this project, the self-assessment feedback can guide them to deeper thinking and possibly spark a new idea. Students are encouraged to reflect on how the assessed

features of each Mindtool can be leveraged within the context they are working. Finally, the self-assessments are designed to be responsive to the needs of the learner within the context of an online self-study course which is a capstone course in a graduate program. The developmental feedback facilitates self-regulation as it alerts the learner of misunderstandings and offers ideas for where to find clarification. Learners may also be informed of their mastery and be guided to even deeper scholarship. Indeed, the goal is not to keep learners focused on their past performance but to help them continue building toward future successes.

Design Process

The process of designing feedback was unique in how the team collaborated and worked to ensure the quality of the questions, answers, and feedback. Three graduate students worked with an instructional design expert (instructor of the course) to create a 250 item test bank intended to enhance students' learning and engagement in the content of an online course. Each team member selected a number of topics from the course that required an assessment. Team members were provided with the resources (e.g., readings, tutorials) for their topics and given instructions to create test items (see Figure 1) and feedback (see Figures 2&3)that tested either direct knowledge of concepts or the application of concepts for the topic.

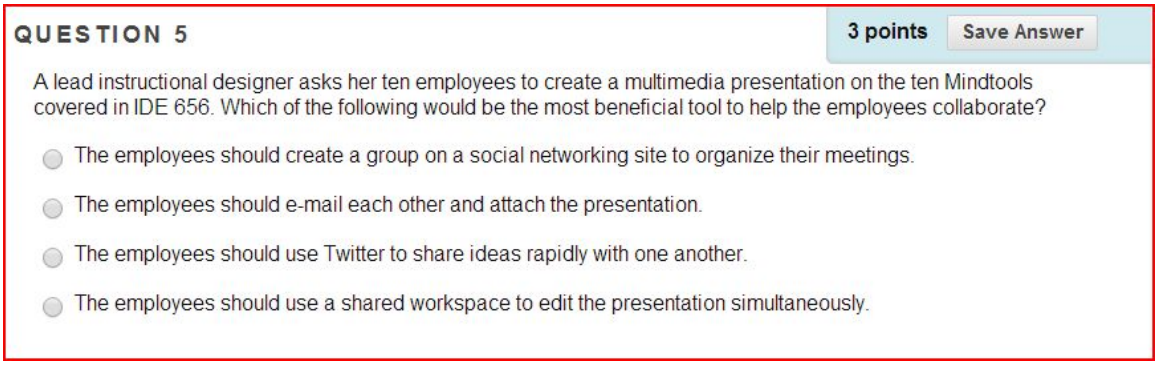

Figure 1. Example of an item in the test bank. This figure shows what a learner would see when completing a self-assessment.

Each question was required to be written as a 'selected response item' so that the online learning platform could automatically score the test. There was no need for learners to wait for an instructor to review and provide grading and feedback. Thus, after completing the questions and submitting responses, feedback was provided immediately to the learner. The feedback was written to specify the accuracy of the response and to validate or correct the learner's understanding. If the learner selects the correct alternative, the feedback informs them of the response success and prompts deeper learning with an explanation of why the response was the best choice. If a distractor is selected (incorrect response), the feedback provides an explanation of why the response is incorrect and attempts to correct misconceptions. In both cases, feedback also provides directions on where to get additional information from the course resources about the construct which the item was measuring.

Feedback is often found lacking in its implementation. Research has shown that while 97% of teachers perceived their feedback to be effective, only 50% of their students felt it was (Havnes et al., 2012). In order to guard against such a discrepancy, the team peer reviewed the test bank, made minor modifications, and submitted the test bank for review by the instructional design expert. A psychometrician also reviewed 75 of the items and provided guidelines for revisions. This process generated in-depth discussions about how the construct validity on the assessments would need to be high in order to maximize the potential benefits of the developmental feedback.

Additionally, Hattie & Timperley's feedback model was used in the review process to ensure feedback consistently provided answers to, "Where am I going? How am I going? Where to next?" (2007, p. 87). Since the purpose of the self-assessment was for learners to measure their own understanding of the content, (e.g., promote their self-regulation on course projects) the feedback had two goals, to ensure the learner's proper understanding of the content and to provide guidance for further learning. The learners could complete the self-assessments at any time in the courses (e.g., advanced organizers, post-test) however ultimately it was hoped that learners would develop confidence in and master the content of the instruction prior to beginning their performance-based activities.

The self-assessments provided the learners with measures of their readiness to perform. As the feedback was written, it was consistently reviewed and revised in order to provide consistent and clear guidance to the learners.

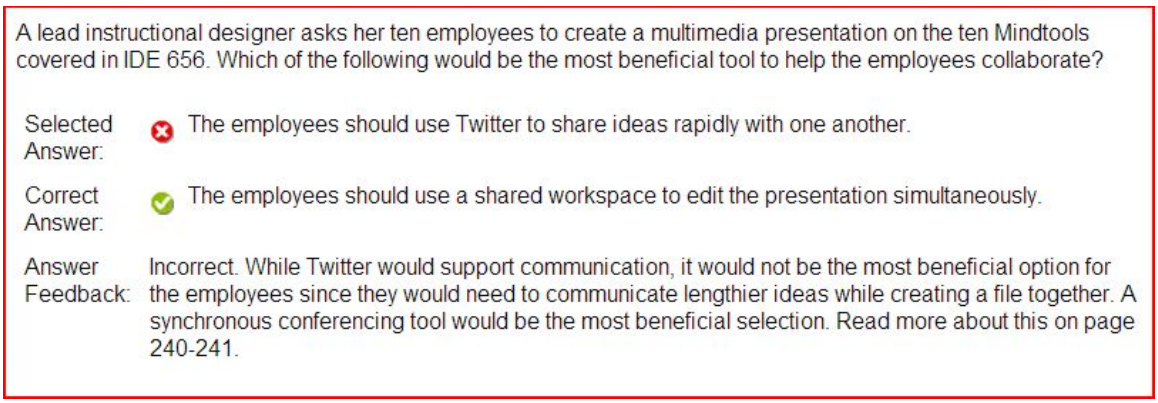

Figure 2. Example of an item answered incorrectly. This figure illustrates the feedback a learner receives when the answer is not correct.

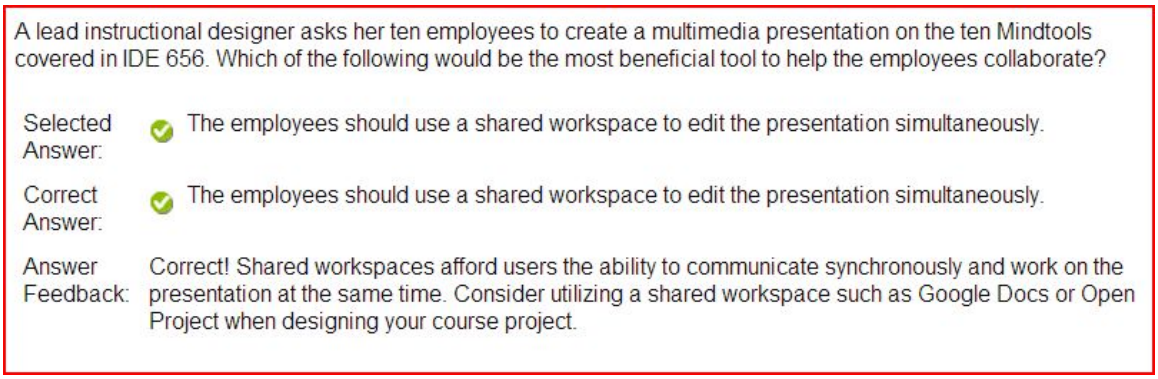

Figure 3. Example of an item answered correctly. This figure illustrates the feedback a learner receives when the right answer has been selected.

Implementation

During the 2014 summer semester, the self-assessments and feedback were integrated into the course for the first time. It was noted that many students did not take advantage of the self-assessments. This may have been due to the assessments being an optional component in the course or to students' misunderstanding of how to properly utilize the assessments as part of their learning plan. While the students' final projects would most likely have benefitted from interacting with the self-assessment, it was not clear why there was a lack of interest in this course component. Several misconceptions, which the feedback was written to address, were still evident in the student work. In future iterations of the course, it is being discussed how to best encourage students to gain from the self-assessments and learn from the available feedback.

Conclusion

Researching and designing powerful feedback was an intricate piece in the larger scope of this online self-study course. Through this process, a lot was learned through collaboration and cognitive apprenticeship with an instructional design expert. Although the students in the course did not engage the assessments to the extent hoped for, future research, revisions of the items and feedback, and a discussion of how to restructure the course to highlight the benefits of the self-assessments will expectantly lead to great outcomes. Additionally, research can be conducted regarding feedback in other portions of the course to expand upon what has been learned and design an increasingly effective course.

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How a Once-rejected Grant Proposal Was Later Funded by The State of Georgia

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Abstract: The article chronicles how a grant proposal rejected a year earlier turned into an approved proposal. This article discusses what the primary author learned through this grant-writing process and what major themes emerged as successful variables to achieve the state grant. In other words, we will examine how the accepted proposal was written differently from the rejected proposal.

The article will chronicle how a grant proposal rejected a year earlier turned into an approved proposal. This article will discuss what the primary author learned through this grant-writing process and what major themes emerged as successful variables to achieve the state grant. In other words, we will examine how the accepted proposal was written differently from the rejected proposal.

Autoethnography, a form of qualitative research, was used to collect the reflective thoughts and put them into meaningful personal empirical knowledge. *Clandinin* (2008) called it personal theorizing. By embracing my own personal reflective thoughts, feelings, and observations as a way of understanding the social context when writing the grant proposal, the presentation will illuminate my total interaction emerging the grant requirements with the social forces of a Southern university. With detailed artifacts and stories, this presentation will make the entire grant-writing process visible to audiences who are interested in writing successful proposals.

The reflective process was the basis of this presentation that involved journaling; reading and rereading exchanged emails and other documentations; conversing informally with colleagues; and sharing the grant-writing process in a faculty meeting. One of the major purposes of the presentation will be to show detailed steps of the grant-writing process so audiences will be able to nearly visualize what really happened in the process. Specifically, this article offers a number of grant-writing strategies that share the artifacts used in the grant-writing process, such as the originally rejected proposal, the accepted proposal, exchanged emails, and state reviewers' comments, internal university comments. This detail-oriented article offers significant insight on ways this grant writing progressed, including integrating assistive people from different units all involved in this single project. The grant project design will be explained during this article.

Starting with the Reviewers' Comments of the Rejected Proposal

Once you swallowed the pain of being rejected by the grant office, it is time to pull out the reviewer's comments and started with fixing problems the reviewers pointed out when writing a new proposal. When I first wrote the proposal, I strictly followed the sample proposal previously accepted and provided by my colleague. Then I learned that the reviewer strictly crisscrossed the Teacher Quality Grant Program Proposal Scoring Instrument, and he/she meticulously located the missing components of the rubric chart.

One comment the reviewer noted was:

> Sufficiently demonstrated, though some of the imported tables were not legible. An argument for using the Khan approach, which focuses on "flipping the classroom," needs to be more strongly supported. Documentation is presented concerning the lower than state average math scores for the targeted district. However, free and reduced lunch data are provided rather than the required poverty information. I had to do

my own checking to see that in fact, the partner LEA does meet the poverty requirement. Additionally, *no information* is provided concerning the highly qualified teacher requirement.

The proposal indicates that the Morgan County school system reports its students are performing below the national and state averages but the data that was included in the report indicates that 32% of Georgia's schools performed below the basic level in math. According to the 2010-2011 GADoE report card data for Morgan County Schools included in this proposal 22% of Morgan County 6th grade students performed below expectations which would be 10% higher than the state average (even though the district's 22% was higher than its 2 previous years). While minority students at this school may have had a higher failure rate, the proposal *did not include* the report card data for the school's sub groups but did cite the achievement gap as an issue "among some groups" in this school district. I would like to have seen more statistical data regarding the performance of the student groups in the Morgan County system. The proposal also cites the need for math instructors to have a more content rich knowledge but it *did not include* the percentage of math teachers in the Morgan School system who lack certification in math. This proposal also *does not include any data* that pertains to the success students have had with the Khan Academy program.

It is critical that you stick to the grading criteria established by the funding agency. I listed out the missing components of the rejected proposal and tried to strategize how I gather the required information. I will discuss this in detail while I followed the main structure of this article. The core elements of any grant writing can be summarized as following: Problem Statement, Objectives, Activities/Methods and Evaluation (POME). I learned this abbreviation at a grant-writing workshop offered by our university's Office of Sponsored Programs. The grant workshop had conducted by an invited guest speaker from Bank Street College in New York City. She had a long history of working with grant projects helping Bank Street College's faculty member to write the grant proposals. Four major elements of grant writing offered by the grant workshop became the backbone of this article.

This paper will chronicle my grant experiences following these aforementioned elements. Developing an initial outline around these elements will provide a logistics that will map the grant writing process from start to finish. However, additional street-smart ideas will support nuts and bolts of grant writing. And those clinical ideas of strengthening proposal helped me make the compelling proposal. This paper is centered on the Teacher Quality Grant writing experience, which will provide the baseline of any grant writing process.

Problem Statement (Need)

***Rejected Process*:** When I first wrote the proposal, I strictly followed the sample proposal previously accepted and provided by my colleague. I wrote the problem statement only based on information School District Superintendent provided in his support letter.

Accepted Process: Before writing problem statements, the first and foremost, grant writing need to start with conducting needs assessment to make the problem statement a compelling case, and to make it relevant to the project, and explains to the funder why the proposed program is significant to achieve the proposed goals. This bottom-up approach more makes sense to make the program/project successful and relevant to project participants since none of top-down approach of " sage on the stage" will work with practitioners. Needs assessment requires to start contacting the partners, and locating their problems by posing major questions like:

a demonstrated need for improvement in literacy/ math - recent math and literacy scores from the district (DIBELS, MClass, CRCT for 3-5), standardized test scores, teacher quality data,

b. information on your district's current technology resources/ goals,

c. information on the project participants and how the workshop would help your district's teachers meet their goals in literacy/ math/ technology improvement,

Especially, their school improvement plan will provide the grant writer the basis of the project. This process of gathering information, either from documents provided by the district/ school personnel or from the direct communication content, is the best source of the actual proposal writing because the Georgia's Improving Teacher Quality Grant Program Proposal Scoring Instrument demands evidence that proposed activities address documented, real needs of participants with an emphasis on participants from high-need Local Education Agencies (i.e., school systems). The grant writer proved the real needs of LEA by gathering information about their goals and strategic plans. This process enabled us to construct compelling reasons about why the proposed program is necessary, and to outline the specific needs that the program will address. The robust communication through video conferencing,

phone calls, and emails will further provide evidence of active involvement of all required partners in planning, governance, and implementation, which is another proposal requirement.

Needs assessment also has to be based student achievement data and/or teacher quality data that makes a compelling case for demonstrated need. Obtaining teacher quality data is not an easy task due to the most of schools currently hired all certified teachers. In particular, it is hard to find uncertified teachers in an elementary school level. The TQ grant writer has to rely on the student achievement data to demonstrate needs. There are two ways the grant writer can obtain student achievement data. There are achievement data available online including The Georgia Department of Education's AYP data, the Georgia Department of Education's free and reduced price meal eligibility, and the Georgia Department of Education's CRCT statewide scores. They have different sets of data that you cannot obtain through the public information online. One strategy we did to collect this non-public data was to use a draft of support letters as an apparatus to collect date you need. You also can collect this kind of data from asking school district personnel or school principals. When drafting the support letters for school administrators and principals, we required the data within the draft of support letters by embedding the following request: Please add any statistics or details here from your school's assessment data or curriculum goals to strengthen the case.

Another benefit of sending the draft of support letters is the fact that it increased the speed of receiving letters from the partnering school district. When crafting the draft of letter of supports, it is critical to include the section that states the partner's contributions and commitment to the project's partnership through involvement in project planning and implementation of project activities because this description of contributions and commitment to the project's partnership is the requirement of the grant-scoring rubric.

It is critical to make frequent contacts and utilizing a wide range of communication channels to communicate at the beginning, during, and at the end of the project process. When we solicited to find partners, School District in LEA, we found direct emailing to the superintendent of the school district will be the most effective way to reach and receive the responses from them. Phone calls took several more steps to reach the person who you want to reach, from the operator, to the secretary, and to the answering machine that led us to back to the secretary. Phone calls to superintendents resulted in leaving a message with the secretary not allowing us to reach the actual person. Usually, we sent out emails to superintendents of the entire LEA school districts, about 18-20 school districts. In general, one or two school districts responded to us in 2-3 days. We were not successful to obtain a partnership through Regional Education Service Agencies (RESA), which was a recommended approach to establish a partnership by the UG Grant Office. We received one RESA-related person's response after we already established a partnership with a specific school district. We learned that the direct contact to superintendents of school districts is the best approach to receive any attention.

Another critical part of the problem statement is to provide grant project activities that is solidly ground in the research-based framework and effectiveness of the project proved by the body of studies. If the grant writer failed to provide the research report of project effectiveness related to student achievement, you will receive feedback from the reviewers saying: "I've not seen the data that compares the performance of students who use the Khan Academy tutorials with the performance of public school students. If this information had been included in this proposal, I would have given it a higher rating. The report did state that teachers would have the opportunity to view the successes of this program, but I would have liked to review the evidence in this proposal." The grant writer needs to provide the demonstrated needs you located with citations from research and reliable sources. It will be desirable to use the most recent information available. You also need to always describe the problem in terms of the people you intend to serve. It is a better idea that the grant writer does not describe the need in terms of the financial needs of the organization requesting the funding.

You also need to start with the largest manifestation of the problem and work down to the population you will serve such an example as: Across America, because children watch too much TV, there is a growing (no pun intended) obesity problem.) This is no less a concern for the children in grade 5 at Atlantic Elementary School in the underserved neighborhood of someplace where 65% of kids are overweight. You also need to remember to describe the problem as a glass that is half full, not half empty. You do not want to paint a picture so bleak that it makes the funder think the situation is hopeless.

Objectives

You can describe what you want to accomplish: 75% of the participants will demonstrate increased content knowledge of math. What outcomes will we be able to say we've achieved at the end of the project? What will have changed? Objectives should be drawn directly out of the needs or issues identified (and are backed up by data analysis and research). Generally, each problem you describe needs to be closely associated with an objective. We do not want to overestimate what you can accomplish. Objectives describe who or what will change in terms of a

behavior, attitude, condition, knowledge, or status (BACKS). Outcomes can be expressed in terms of enhanced learning (knowledge, perceptions/attitudes or skills) or conditions, (increased literacy, self-efficacy, certifications) or behavior (write/share frequently, increase collaboration time by 20%). Objectives should be measurable; they are often framed using action verbs such as increase, decrease, improve, and expand. You need to think ahead to what types of data (lesson plans rubric, student CRCT scores, teaching demonstration rubric, content knowledge assessment sheet, and etc.) you can collect to evaluate whether or not you have achieved your objective. This is also a way of checking whether your objective is realistic. A well-constructed objective addresses the who, when, what, and how of measurement. For example: *By the end of the 2010-2011 academic year, 23% of the faculty will have improved their proposal writing ability as demonstrated by an analysis, using OSP proposal review criteria, of the changes between their draft proposal and the final proposal. AND/OR By the end of the 2010-2011 academic year, 10% of the faculty will have obtained new external funding*. An objective can be described as the "then" in an "if…then" statement. If we do this (methods/activities), then this will happen (objectives). For example, you need to write your objective is to increase the number of students who get an A. If students attend all the classes, do all the readings, and satisfactorily complete assignments then they will receive an A.

This article shared comments we received from the director of the Office of Sponsored Programs, who revised the draft of out proposal. The grant-writing expert had an ability to locate the weakness of the proposal draft. You can take advantage of their expertise.

Before Revision: Objective one- During the summer program, 75% of the participants will demonstrate increased content knowledge of math as measured by comparing outcomes on pre and post content knowledge assessment. (Outcome Evaluation)

Objective two- During the summer program, participants will create a minimum of 5 mini-lesson plans that allow students to consume learning content (i.e. 'the lecture') outside of the classroom, usually as homework. This will free up valuable face-to-face classroom time to reinforce materials, extend learning, and work on assigned work (work that may have been homework in the traditional classroom). (Process Evaluation)

Objective three- During the summer program, participants will create a minimum of 5 mini-lesson plans that allow students in expressing their mathematical reasoning through writing. (Process Evaluation)

Objective four- During and after the summer program, participants will share their lesson plans and reflect on their learning experiences collectively through their reflective postings on the Edmodo social Web site (www.edmodo.com). (Process Evaluation & Outcome Evaluation)

After our internal reviewer received the draft of the proposal, she sent us the following feedback:

- Query: You guys need to define the time frame in which you expect to accomplish this objective *do you anticipate that all of the content will be delivered in the summer or will some of it be part of sustained support?*
- Need: to deepen teachers content knowledge, in particular math content*, Make sure this is mentioned in need section.*
- Stella's Objective one- ~~During the summer program~~, *do you anticipate that all of the content will be delivered in the summer of will some of it be part of sustained support?* 75% of the participants will demonstrate increased content knowledge of math as measured by a comparison of outcomes on pre and post content knowledge assessment. (Outcome Evaluation)
- Activity**:** Bob, is this correct: Bob will use exercises like The Division Algorithm 10-Digit ISBN Remainders: The Pirate's Dilemma, The Division Algorithm: Clockwork to increase content knowledge of x, y and z. *BOB, need to be a little specific about the general concepts you are focusing on through these activities so TRISH* has something to measure. (*Make sure these activities are mentioned in the plan of operation?) What will little hands-on mini-components ask the participants write or do that shows that can actually use the information you present to craft part of a lesson. For instance you teach the math concept and they figure out how to make it appropriate to the particular grade they teach. Then, because the administrators wanted math knowledge to be scaffold between years the teachers could make sure that in fact all their pieces are connected.*

After Revision: Objective one- 75% of the participants will demonstrate increased content knowledge of math (set theory, division algorithm, Euclidean algorithm, the distributive property, etc) as measured by a comparison of outcomes on pre-and post-content knowledge assessment.

Objective two- At the conclusion of the summer program, participants will be able to create lesson components that enable students to express their mathematical reasoning through writing (as indicated by comparison to pre-workshop lesson plan rubric).

Objective three- At the conclusion of the summer program, participants will be able to develop lesson plans that show their increased understanding of flipped classroom paradigm as measured by a comparison of lesson plan rubric.
Objective four- During and after the summer program, participants will share their lesson plans and reflect on their learning experiences collectively through biweekly reflective postings on the Edmodo website (www.edmodo.com), a social learning platform for teachers.

Activities/Methods (Work Plan)

In this section of activities, we described the work we would undertake to achieve objectives. Among many different activities that we could conceivably undertake, we selected those that are most appropriate and can realistically solve the problem and/or achieve our objectives. Activities can include: mini-lesson creation, mini-lesson demonstration, classroom coaching, homework activity cration, in-class activity creation, project-based activity cration, etc. A well-described activities will provide funders a general idea of who the participants are, how often the activity will take place, and some idea about the content of the particular activity. For example: We will hold a graduate seminar to improve students' ability to develop proposals for education programs. 20 graduate students in education will attend the class, which will meet four times over the course of one semester. Class content will include: 1) An overview of proposal elements: Executive Summary, Problem Statement, Objectives, Methods, Evaluation, Personnel, Organizational Background, 2) An analysis of proposal style and criteria 3) an overview of budget preparation including hands-on exercises 4) Finding a funder for projects. Each student will complete a proposal and 80% of the students will improve their proposal writing skills. The budget will basically describe with numbers the methods and activities you describe here in words.

It is also a key element that the grant writer describes ways to support participants after the scheduled summer workshop. The grant writer needs to locate the means to continue the conversation. This project adopted a social network platform called "Edmodo." Edmodo enabled participants to submit their group assignments through this social network platform for the sharing and reflecting purposes. Edmodo site played a role as evidence of sustained contact involving multiple group meetings or project personnel visiting participants' classrooms following the initial workshop/course. This Web network also served as a reflection tool which is an additional requirement of the grant proposal.

Evaluation

What will you do to assess progress and determine if you your program is working well and you are successfully achieving your objectives? Evaluation activities should be both formative (assessing progress while project is still underway) and summative (assessing outcomes.) Formative evaluation helps you to determine if you are moving toward your objective or if you need to make adjustments to your methods or other program components. You can use it as a management tool to make modifications in service delivery or make decisions about priorities. It is critical to think about evaluation in terms of the data you will or can collect as a measure of progress toward (or success in) attaining an objective. The grant writer needs to describe the evaluation activities and plan. Link these back to specific objectives. Evaluation tools often include pre- and post-tests and surveys, specific "off the shelf" assessment tools, standardized tests, focus groups and interviews, participant reports, structured observations. Data analysis often includes studying results of tests and surveys (sometimes using rubrics for assessment), transcripts from interviews and focus groups, written logs and reports.

The section of evaluation in our proposal was modified significantly after receiving the internal reviewer's feedback.

> *Before Revision*: A 20-item online pretest-posttest of math content will be administered to measure to which extent the WISE workshop improves teachers' depth of math. A post-test (the same as the pre-test) will be given at the end of the workshop. The workshop personnel and external evaluator will construct the pre/post-test. The identifier (e.g., numbers), instead of participants' names, will be used to compare two test outcomes when participants take the online test as well as the purpose of verify the reliability of the instrument. The pretest data will be the baseline data to show an increase in the content knowledge in math. At the end of the workshop, one section of the participant survey questionnaire (attached as an Appendix) will determine the perceived learning outcomes in areas of literacy strategy knowledge and instructional technology content knowledge. Another section of the participant survey questionnaire will assess workshop experiences and participants' level of satisfaction.

The assessment rubric for mini-lessons will measure the effectiveness of learning modules that are designed to foster students' metacognitive strategies as well as to integrate technology tools into expressing their mathematical reasoning through writing. The specific components of the assessment rubric includes: use of Common Core Standards for Mathematics; systematic, effectiveness of homework instruction in the flipped classroom learning modules; effectiveness of in-class activities in the flipped classroom learning modules; student engagement level; and effectiveness of implementing the flipped classroom learning activities learned from the WISE workshop.

An open-ended questionnaire will ask participants about their learning experience in three areas: their most engaging experience(s) of the week and area(s) where workshop facilitators could improve. This open-ended questionnaire will be used as a mid-term survey instrument to improve the quality of the remainder of the workshop.

The classroom observation rubric will be used to measure the degree to which participants can apply content from the summer workshop in their classrooms.

The follow-up survey will be utilized to discuss how information from the workshop was applied in their classroom and the impact it had on their students toward the end of the academic year. All items included on the survey questionnaires and rubrics were created in consultant with the external evaluator to ensure that all suitable items measure the full scope of the project and outcome for each objective. During the classroom observation period, the grant team will collect participants' lesson plans and student work samples to show unyielding evidences of the impacts of the workshop. The grant team will pursue IRB approval for this project upon receipt of the grant.

The following is the feedback that we used a basis of revision of section of evaluation.

Evaluation**:** Stella, how will you measure whether or not this objective *(teachers increase content knowledge of x, y, and x as Bob has defined the concepts.)* has been successfully accomplished? Is the time frame just the summer or part of sustained support? For instance, pre and post content knowledge assessment, maybe self-report using journals and/or provide teachers with some kind of rubric against which they can measure their progress? Pre-test at beginning of the workshop ½ way through (time frame?) as part of a formative evaluation…post-test (at end of week or in May after on-going sustained support)

Need**:** Teacher's need to know how to better incorporate instruction technology [into their math and literacy lessons]. Need to expand teacher's technology skills *(This need is stated in the needs section: "The project is driven by the district's priorities: to expand teachers' technology skills in order to increase students' literacy skills and math content knowledge)*

- Susan's new Objective**:** 80% of Workshop participants will increase their knowledge of and ability to use instructional technology
- Activity: Teachers will do x,y,z activities. *Jackie, what specific things are you teaching? Jackie what are the technology skills you teaching that will impact teachers' ability to craft and deliver better literacy and math lessons and in particular math and literacy integrated learning instruction. What little hands on mini-components will ask the participants write or do that shows that can actually use the information you present to craft part of a lesson.*
- Evaluation**:** Trish how will you measure whether or not teachers have increased their technical expertise enough to use instructional technology (*Subsequent objective will focus on **incorporating** the new knowledge into lesson plans—this one is just about technical expertise)* 80% of the participants will **increase** their knowledge about and ability to use technology in the classroom [that expand their repertoire of instructional strategies for literacy and math content]
- Need teachers need to increase their knowledge about and ability to deliver enhanced reading and writing, lessons *[and develop math and literacy integrated learning experiences.*
- Objective Make sure to include in objective that teachers will be able to create lesson components that have students express their mathematical reasoning through writing
- Activities Stella, what activities will you have them do? What instruction will you deliver? How will you teach your content about reading and writing? Will you just focus on the literacy skills or will you integrate math and technology too or let the other guys cover that. What products will the teachers need to produce
- EVALUATION: Please give Trish some guidelines here. I will work with her to extend
- NEED: make sure you mention in the need section what problem a flipped paradigm will ameliorate
- Objective At the conclusion of the summer program, participants increase their understanding of flipped-classroom paradigm

- Activity; various exercises that combine the theory of flipped classroom with hands-on activities to apply components of the practice such as 1.construct preparatory assignments for student to complete online before the classroom article students to view and complete online preparatory materials before the classroom article. 2, Develop specific strategies to reinforce content and extend learning during face to face classroom time
- Objective: 85% of Participants will be able to develop lessons plans that incorporate strategies that encourage students to express their mathematical reasoning through writing, more technology enhanced instruction, and_____. (as indicated by comparison to pre-workshop lesson plan) (Process Evaluation)
- Activities: mini lessons and capstone
- Evaluate: as indicated by a comparison of a lesson plan composed on the first day of the workshop and one composed in May at the end of the sustained ongoing involvement. Rubric developed to measure increase will be shared with teachers as part of the first week workshop. I suggest this (or something like it) because the rubric will closely reflect the learning objectives]
- Objective During and after the summer program, participants will share their lesson plans and reflect on their learning experiences collectively through biweekly reflective postings on the Edmodo website (www.edmodo.com), a social learning platform for teachers. *Stella you will have to give reviewers a real sense of what is happening from September to May." a structural framework doesn't cut it.s~~. This structural framework will ensure that the workshop facilitators and teachers have sustained interaction before the December 2014 follow-up visit~~. (Process Evaluation & Outcome Evaluation)*

After Revision: Means of evaluating the WISE project model's objectives are detailed below:

- Objective one- 75% of the participants will demonstrate increased content knowledge of math (set theory, division algorithm, Euclidean algorithm, the distributive property, etc.) as measured by a comparison of outcomes on pre-and post-content knowledge assessment. To measure increase of content knowledge of math, a pre-and post-test of math content will be administered. The workshop personnel and external evaluator will construct the pre- and post-test. The pre-test data will be the baseline data to show an increase in the content knowledge in math. In addition, teachers will self-report gains in knowledge through journals and Edmodo postings (during workshop) as well as during the ongoing support period (June 2015-May 2016).
- Objective two- At the conclusion of the summer program, participants will be able to create lessons that have students express their mathematical reasoning through writing. (as indicated by comparison to pre-workshop lesson plan) (process and outcome evaluation). Comparison of participants' pre-and post-lesson plans will indicate if there was increased use of mathematical reasoning through writing. A rubric will be used to evaluate this construct.
- Objective three- At the conclusion of the summer program, participants will be able to develop lesson plans that show their increased understanding of flipped classroom paradigm (as indicated by a pre and post lesson reflection rubric) (outcome evaluation). A teacher rubric will be shared with teachers as a component of the workshop to discuss how the learning objectives will be achieved throughout the workshop. The classroom observation rubric will be used to measure the degree to which participants can apply FCM from the summer workshop in their classrooms. The components of the rubric will include: 1) effectiveness of preparatory assignments for students to complete online assignments before the classroom article; 2) effectiveness of in-class activities in the flipped classroom learning modules; and 3) effectiveness of implementing the flipped classroom learning activities (that expand their repertoire of instructional strategies for literacy and math content). In addition, anecdotal notes from the Edmodo discussions (June 2015-May 2016) will be utilized to assess this objective.
- Objective four- During and after the summer program, participants will share their lesson plans and reflect on their learning experiences collectively through biweekly reflective postings on the Edmodo website (www.edmodo.com), a social learning platform for teachers. (Process and Outcome Evaluation). To measure the improvement of their lesson plans, the project team has developed a rubric that will compare the lesson plan composed on the first day of the workshop and one composed in May at the end of the sustained ongoing involvement. The rubric closely reflects the learning objectives. The level of participation in the social networks will be measure by the social network log created by the external evaluator.

The Grant Project Designing Process

This article discusses an initiative designed to equip primary and elementary grade educators with information and research-based practices to facilitate the development of a teacher's repertoire of writing instructional strategies and deepen their math content knowledge through a flipped classroom model. The primary goal of this project is to train teachers from one of Georgia's Public School Systems to more effectively engage primary (Kindergarten-Grade 2) and elementary (Grades 3-5) students in the flipped classroom model through Common Core Georgia Performance Standards (CCGPS) in math, writing, reading, and metacognitive learning strategy instruction.

The flipped classroom is a learning model that encourages scaffolding by reversing the typical lecture-then-homework paradigm. Rather, students do homework in preparation for a lesson. A key feature of the Flipped Learning Model (FCM) is the opportunity to maximize student-learning opportunities in the classroom by deliberately shifting direct instruction to outside of the group learning space. The emphasis on maximizing one-on-one interactions turns the focus to student-centered instruction that more actively involves students in the learning process. These approaches are commonly said to involve "active learning," defined as "the process of having students engage in some activity that forces them to reflect upon ideas and how they are using those ideas." (Michael, 2006)

The *WISE workshop p*rofessional development strategy was developed through the close collaboration of Armstrong faculty and County School administrators. Thus, the project is based squarely on the teaching and learning needs and objectives articulated by the administrators. Teleconferences, phone conversations and email dialogues involved the team from the involved university and County School personnel. The main consideration of the university grant team was to develop a professional development initiative based upon school system's stated needs, with a focus on foundational skills for primary and elementary educators. Communicating with the school district administrators was paramount to the planning of this project. Collaborative phone discussions with the school district administrators indicated to grant writers that the district was in need of professional development to enable teachers to improve students' achievement in literacy and mathematics while meeting the digital learning trends of the 21st century learner in a time of budget cuts. School administrators explained to the grant writers, both through phone conversations and multiple e-mail dialogues, that their teachers need assistance with more practical teaching models, particularly in regards to educators utilizing technology to self-direct their students' learning and flip classroom instruction.

Conclusion

The article concludes with summarized guidelines that will help audiences be better grant writers and, consequently, be more successful in obtaining grants. We learned that the grant writing process requires the power of collaboration. The successful grant writing requires different sets of eyes to look over and the tenacity to crisscross the trivial details and requirements until it is complete. We need to take advantage of expertise sitting on the Office of Sponsored Program. They are more ready to help you than you expected. The experience of being rejected further added value on your prospective proposals. You need to keep submitting to receive the invaluable rejection reviews which seems painful on the first sight.

Based on the success of the project, the following guidelines are offered:

1) Use Reviewer's Feedback and the rejected proposal as a baseline for the grant proposal.
2) Collaborate with the right colleagues. If you have a colleague who has worked with writing grants, she/he will be the best candidate for your partner in crime in writing the grant proposal.
3) Identify the needs of the school district by simply asking to the school district. (Dig the topic in the field: Bottom-up approach.) Employ all communication channels to gather information and describe the process of gathering information.
4) Be clear about the benefits of participating in the grant project (PLU credits, stipend, the program, and etc.)
5) Stick to the grading criteria established by the funding agency.
6) Find and analyze the data that support your problem statement.
7) Locate the research to support the argument that activities embedded in the project will improve the targeted problem. (Convince reviewers that the methods chosen are appropriate to the specific aims.)

8) Make sure your assessment will measure project objectives. "If then" storyline will streamline the problem statement, project objectives, instructional strategies, and assessment tools in the goals of the project.
9) Be certain you have concrete and structured workshop activities that show the clear activity plan.
10) Find the grant expert in your campus and seek for help for proofreading/suggestions. We asked our director of the Office of Sponsored Program. She offered invaluable suggestions and we strictly followed her suggestions in revision process.

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iBooks Author: Potential, Pedagogical Meanings, and Implementation Challenges

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Abstract

This article discusses Apple's iBooks Author, an application intended for textbook writers and publishers to create e-textbooks. This article provides insight on why IBA will change how we teach and learn as well as IBA's potential, controversial issues, pedagogical meanings, and implementation challenges of using it as a classroom textbook. The article includes lessons learned from the leading countries in implementing e-textbooks in the classroom, such as South Korea and Malaysia.

Introduction

This article discusses Apple's iBooks Author, an application intended for textbook writers and publishers to create e-textbooks. This article provides insight on why IBA will change how we teach and learn as well as IBA's potential, controversial issues, pedagogical meanings, and implementation challenges of using it as a classroom textbook. The article includes lessons learned from the leading countries in implementing e-textbooks in the classroom, such as South Korea and Malaysia.

The IBA publishing application extends the capacity of what eBooks can do. It offers various interactive functions, multimedia content such as video clips, animations, and virtual reality as well as reference books, Web resources, dictionaries. In other words, IBA literally creates globally connected and animated textbooks that not only construct the knowledge of individual learners, but also manage students' performance from remote places through the Internet. IBA allows learners to create personalized textbooks while using the digital textbook - underlining important parts, taking notes, and adding more helpful resources as they became known. Through an analytic data set, teachers can monitor where students are in terms of their performance. IBA features four key educationally meaningful functions: (1) Authoring Tool; (2) Interactive Interface; (3) Analytic Tool; (4) Multimedia Integration. These four key functions will address many of the contemporary issues in education, such as data-driven instructional planning and implementation, differentiated instruction, problem-based instruction, self-directed learning, project-based learning, collaborative learning and discovery learning.

IBA can bring various arrays of educational e-technology tools to teach, to assess students, and to collect student performance data in and through an e-textbook. This article will highlight the following topics:

- Pedagogical meaning of IBA in the classroom
- Educational issues and IBA: Differentiated instruction; self-directed learning; self-paced learning; assessment-based (data-driven) teaching

The targeted audiences of this article are largely educators who will develop e-textbooks with students, instructional designers, educational technology practitioners and researcher communities, and stakeholders of education.

Pedagogical Meanings of IBA in the Classroom

Multimedia Integration

One of the significant features of IBA, which differentiates IBA from other e-publication applications, is its capability to incorporate a variety of multimedia technology into eBooks. Multimedia elements of IBA include an eclectic blend of multiple modes such as text, graphics, animations, audio, etc. E-books created with IBA can take advantage of multimedia. For example, eBooks with IBA makes presentation materials more understandable and facilitates long-term memory by using multiple sensory channels to put forward information. As incoming information is presented through multiple sensory channels, the learner's ability to generate mental representation of external information is enhanced (Mayer, 2001).

This assumption aligns well with Paivio's (1986) dual coding theory. Multimedia uses two different modes to represent content knowledge: verbal and non-verbal (Paivio, 1986). Dual coding theorists (Large, Beheshti, Breuleux, & Renaud, 1994) argued that pictures are more likely than words to be dual-coded (verbal and visual) in the human cognitive system; thus, when one memory is lost, the other remains available. In addition, two separate codes of pictures have additive effects so that the likelihood of information being remembered is increased. IBA has an extensive capacity to integrate various multimedia productions such as interactive games, videos, audios, animations, 3D, etc. Multimedia can foster cognitive change (Mariano, Doolittle, & Hicks, 2009; Mautone & Mayer, 2001) and facilitate information processing in learning (Mayer & Moreno, 2003; Rieber & Kini, 1991).

The most effective learning environments are those that combine verbal and nonverbal representations of knowledge using mixed-modality presentations (Low & Sweller, 2005; Mayer, 2001, 2005; Moreno, 2006; Moreno & Mayer, 1999, 2002a, 2002b).

Affective Effect of Multimedia

Creating a book with multimedia can tap into a student's hot cognition (emotion) as well as cold cognition (reasoning and problem solving). It is important to consider hot cognition because learning and information processing are influenced by both hot and cold cognition (Miller, 2002; Pintrich, 2003). It is pivotal to recognize the close relationship between emotion and cognition in the learning process. Although these two terms seems to have a distant relationship, they are closely related to each other. Interest in learning has been recognized as a critical emotion for successful learning since the beginning of the 20th century (Dewey, 1933). Provoked emotional responses more likely increase students' attention (Alexander & Murphy, 1998; Reisberg & Heuer, 1992), memory and interest (Renninger, Hidi, & Krapp, 1992).

IBA multimedia has the potential to increase a student's situational interest; there are two kinds of interests—personal (individual) and situational interest. Researchers have focused more on how to improve situational interest, rather than individual interest, in a learning environment because students' individual interest is the individual's disposition developed over a period of time by the process of internalization of situational interest. Therefore, it is easier to improve situational interest. Situational interest is triggered by certain conditions or concrete objects embedded in a learning environment or in instructional material for the purpose of promoting interest from a specific situation (Renninger, Hidi, & Krapp, 1992). Multimedia in eBooks has a higher probability of triggering situational interest because of its inherent variables such as personal relevance, novelty, and activity level.

Another important topic of hot cognition related to multimedia is emotion. Multimedia tool in IBA has a significant potential to improve learners' positive emotion by promoting their enjoyment of the topic, causing learners to pay more attention and encode more of the information presented (Izard & Ackerman, 2000; Kintsch, 1980). Many design features of multimedia materials in IBA, such as colors, shapes, and sounds, are likely to have an impact on a learner's affect. Several scholars recognized that multimedia can be used as "seductive augmentation" devices that attract students, make them pay more attention to learning materials, and promote interest (Schraw & Lehman, 2001). Therefore, it is predictable to see that, in many studies, positive emotions (pleasant states of emotion) have a critical effect on diverse cognitive processes such as information processing, the communication process, the negotiation process, the decision-making process, and even the creative problem-solving process (Isen, Daubman, & Nowicki, 1987; Isen, Johnson, Mertz, & Robinson, 1985; Picard, 1997).

Multimedia elements of IBA can trigger the motivation to learn, which is another topic of hot cognition. Park and Lim's study (2007) demonstrated that the illustration effects of multimedia materials generated a significant effect on learners' motivation and found that learners pay more attention to learning materials when emotional interest illustrations are presented than when text-only information is presented. Additionally, their study also showed that the emotional interest group had a significantly higher relevance score than did the text-only group. Um and others (2011) indicated that applying emotional design principles to learning materials can induce positive emotions and that positive emotions in multimedia-based learning can facilitate cognitive processes and learning—thus suggesting that emotions should be considered as an important factor in the design of multimedia learning materials. One of the key roles of IBA multimedia materials is to gain students' attention, which Gagné and Merrill (1992) identified as a crucial event of the learning process.

Interactive Interface

One of the significant features that IBA offers education is its ability to create interactive educational materials. The interactive feature embedded in digital textbooks has opened many possibilities in learning. It is believed that providing interactive, manipulative functionality in multimedia can improve learners' problem-solving skills by (a) promoting their self-efficacy and (b) reducing the cognitive load involved in the problem-solving

process (Zheng & Zhou, 2006; Zheng, Miller, Snelbecker & Cohen, 2006). Multimedia with carefully designed interactive components offer visibility in learning so (a) users are able to see the actions that are open to them at every choice point, (b) they are able to receive immediate feedback about the actions they have just taken—since few things upset computer users more than not knowing what a computer is doing when it seems to be churning unexpectedly, and (c) they are able to get timely and insightful information about the consequences of their actions (Norman, 1988; Hutchins, Hollan, & Norman, 1986).

Learning Analytics

The significant feature of IBA is its capability as an analytic for learning - with the potential to be an assessment tool for individual learning as well as a tool for institutional decision-making. Accordingly, it can select, capture and interpret data on teaching and learning activities, with the goal of improving teaching and learning outcomes. Building on the demonstrated strategic advantages of "business analytics" in the corporate world, learning analytics also draws on the related fields of Web analytics, academic analytics (Goldstein & Katz, 2005), educational data mining (see Romero & Ventura, 2010) and action analytics (Norris, Baer, Leonard, Pugliese, & Lefrere, 2008) to support decision-making and strategic planning in academic settings. Learning analytics installed in IBA will be able to bring this tool to the individual learning level. Review widget (analytic tool) affords many different possibilities in the process of teaching - including enabling teachers to conduct diagnostic, formative, and summative assessments without taking any of their time grading. IBA allows users to create a form of an assessment tool within the digital textbook system as well as supplementary and in-depth learning materials for each level. Digital textbooks allow teachers to use evaluation data to assess whether study goals are achieved.

Educational Issues and iBooks Author

Differentiated Instruction

IBA will be an effective tool for differentiating instruction that seeks to maximize each student's growth by recognizing that students have different ways of learning, different interests, and different ways of responding to instruction. The aim of differentiating instruction is to provide a variety of choices in teaching and learning. This includes various tasks and materials to meet the each student's level, needs, interests, ways of learning and so on. That makes differentiated instruction ideal; unfortunately, it is unrealistic to ask and to expect success for classes that hold too many students under one teacher. IBA can assist teachers with providing pre-assessment with Review widget so instruction can be planned based on evidence and be focused on specific areas of instructional needs. The result of formative assessment executed by Review widget allows teachers to adjust instruction according to students' specific needs rather than following a predetermined skill sequence that may not match a student's development. IBA offers hope to differentiate instruction for the current classroom where whole group instruction without differentiation remains the dominant choice of teachers regardless of the profiles of students enrolled in the class.

Self-Directed Learning

It is significantly meaningful in education that IBA enables learners to create their own projects with a professional style because successful learning occurs when students are engaged in creating their own products A growing body of theoretical and empirical literature supports the view that when students' perceptions of personal control in the learning situation increases, so does their motivation to learn (Alderman, 1990; Ames, 1990; Deci & Ryan, 1991). In designing pedagogically sound multimedia systems, a high premium needs to be placed on leveraging a judicious mix of various presentation modes to cater to users' differing learning styles and needs. This will ensure that learning is optimized, which is essentially learner-centered in nature in multimedia-rich learning environments - learner-centric in the sense that learners have control over the pace of their own learning and are empowered to take charge of their learning trajectories.

Researchers have recently attempted to have e-learning technologies applied to processes of self-directed learning. The researchers who studied self-directed learning commonly found the effectiveness of e-learning technologies to present course contents (e.g., audio files, video files, and text files) in self-directed learning (Idros et al., 2010; Liu, 2009). E-learning technologies, which hold the capability to present course contents with different multimedia, reignite enthusiasm in students to enhance self-directed learning skills. In self-directed learning environments, students tend to learn more effectively than those who wait passively to be taught (Knowles, 1975). The 3D Alice Programming workshop offers students increased control of their project by letting them create their own games. Students appreciated the fact that they have control over what to accomplish, as opposed to completing particular assignments that were thrown to them - which would more likely happen in other classes. They worked on

what they wanted to accomplish. In addition, they can make a choice about their projects (Kim, 2012). IBA has an inherent capacity to create students' own projects with diverse technology aspects, which makes IBA a strong technology tool for self-directed learning.

Self-Paced Learning

Another great merit of IBA is its controllability. eBooks made by IBA allows students to control the learning materials with good user-interface functionality. With e-books created with IBA, students also could take advantage of self-testing. In particular, if they desired, the participants had the opportunity to use self-testing to focus restudy on what still demands close attention.

For self-paced e-learning tools, a good user-interface which IBA offers, can increase learners' motivation to learn by providing them with controls, displays and information elements that keep them interested, help them find out where they are, and ultimately aid them in the complex process of extracting information and integrating it into their own conceptual knowledge-base (Jones, 1994; Mendez, Lorendzo, Acosta, Torres, & Gonzalez, 2006).

Project-Based Learning

It is critical to see how the feature of multimedia in IBA is particularly well suited to project-based learning, which offers an intrinsically interesting and pedagogically promising alternative to an exclusive reliance on textbooks. According to extensive research in multimedia and project-based learning, a successful relationship among tools and teaching methods is required to allow learners to construct their own knowledge by associating relevant and meaningful information through multimedia projects (Mendrinos, 1997) and by arranging and rearranging chunks or nodes of information based on a learner's needs and background knowledge (Borsook & Higginbothan-Wheat, 1992). When asked to create projects by using movies, Web sites, and animation, students have the opportunity to organize and make public (visualize) their understandings, allowing for more meaningful assessments of their learning, among other benefits anticipated by constructivist theory (Drake & McBride, 1997). IBA incorporated in project-based learning affords opportunities for students to develop habits of mind that characterize independent learners (Dewey, 1933).

Evidence-Based (Data-Driven) Teaching

For teachers, the assessment tool (Review widget) in IBA offers more access to instant assessment data than ever before. IBA strengthens the capacity to access data to improve developmentally appropriate decision-making in instruction that leads to adaptive learning and personalized learning opportunities. Formative assessment on student learning through IBA will allow teachers to see students' progression and completion without grabbing the grading pen for exam papers. Review widget in IBA will save teachers' time that can be used for grading, monitoring, and interpreting students' status for learning.

Potential Controversies in the Adaptation of IBA in the Classroom

Technology and Pedagogy

The history of technology in learning tells us that the integration of newly announced devices in education does not automatically translate into successful student learning. While IBA is an innovative, cutting-edge tool, some longtime educators are warning that technology has enjoyed an uncertain path with numerous short-lived efforts.

Michael Spector (2004)'s summary of the history of technology to support learning documents the short-lived efforts of technology integration. His explanation presents the way educators can learn and prevent educational failure in technology integration. He summarized the history of technology to support learning and teaching as three distinguishable periods: 1) the replacement era; 2) the empirical era; 3) the transformative era. Technology integration has missed the link with learning by focusing on using a new technology (the replacement era) and locating specific technologies to support particular types of learning requirements (the empirical era). This current generation of educational technology might then be called ***the transformative era*** because emphasis is being placed on the ways in which technology changes and transforms what people do (Ganesan, Edmonds, & Spector, 2001; Spector, 2004). The emphasis of integrating technology in education should be placed on learning how to use technology in support of higher-order learning involving complex and ill-structured problems (Naidu, 2002).

Based on this brief review of recent trends in educational technology, it is possible to identify likely directions and the reasons for the failure of technology integration. The focus within the educational technology practitioner and researcher communities should not be to replace aspects of traditional classroom teaching with technology - because this could result in the lack of a link between technology and learning. When pedagogy,

content, and capacity of technology tools meet under the same education goals, technology integration will have a more promising path. IBA can be an effective learning tool for active learning only if it is used in ways which maximize its capacity and minimize the large inventory of learning failure. This can be accomplished by understanding IBA's pitfalls as well as its benefits. Successful IBA learning results also require effective methods by the teachers.

Cognitive Load

Under the premise that multimedia presentations do not overload students' cognitive capacity during learning, multimedia benefits may accrue not just from explicit cues, but also from the nature of human information processing such as visual and spatial subsystems in working memory (Baddeley, 1992). There are, as well, limitations to multimedia's effectiveness, therefore emphasizing the importance of careful design and implementation of format and modality combinations (Novick & Morse, 2000; also see Mayer & Moreno, 2003).

The e-books produced with IBA might face sharp critiques from different theories such as cognitive load theories. The benefits of embedding multimedia in eBooks of IBA will overload with multiple sensory uses in limited human working memory. The body of multimedia research found that multimedia presentations demand to work multi-sensory systems simultaneously, which results in overloading students' working memory. The negative effects of cognitive overload has been apparent on low-level student learning (Moreno, 2006; Plass, Chun, Mayer, and Leutner, 2003). Mayer (2001) put forward a cognitive theory of multimedia learning, which focuses on cognitive processing of verbal and visual material. His theory thus incorporates the cognitive load theory (Sweller, 1999), which postulates that multimedia learning processes are carried out under the constraints of limited working memory. Plass, Chun, Mayer, and Leutner (2003) point out that this limited capacity of human working memory might produce a negative impact in multimedia learning under some conditions. For instance, some authors have pointed out that constructing a coherent mental representation of the subject matter presented in a multimedia learning environment constitutes a complex cognitive task, which turns out to be highly demanding especially for learners with lower levels of prior knowledge (Seufert, 2003). This cognitive theory of multimedia learning (Mayer, 1997) asserts that learners have dual information processing channels (visual and verbal) that distribute the processing work. The auditory narration of the information flows into the verbal conduit whereas text- and graphics-based animation is directed into the visual conduit. This means that humans possess separate channels of communication; therefore, different information must be coded and presented in appropriate media types to maximize learning.

Modality Principle

The modality principle specifies that students learn better when verbal information is presented as auditory speech rather than visually as on-screen text for both concurrent and sequential presentations. Because our working memory consists of at least two information processing channels (visual and auditory), using only visual text and pictures could overburden the cognitive capacities of the visual channel since both the screen text and graphics would be competing for the scarce resources of the visual channel (Clark & Mayer, 2003; Sweller, 1999). Harnessing a dual mode in design instead of a single mode for information processing enhances the performance of working memory as the processing workload is now diffused across both channels (Penney, 1989).

These findings are in line with the cognitive theory of multimedia learning (Mayer, 2001), which postulates that adding interesting but extraneous material (i.e., material that may be related to the topic but does not directly support the educational goal of the task in question) may cause the learner to use limited cognitive resources on incidental processing, leaving less cognitive capacity for essential processing. Garner, Brown, Sanders, and Menke (1992) discuss extraneous cognitive load in relation to unwanted effects of features, calling them "seductive details" - referring to interesting but peripherally relevant facts that are added to a passage to make it more interesting. These seductive details are related to the instructional objectives but may inhibit the learning of main points in the text. Basically, these features seduce the readers away from the main idea in the text. It is apparent that teachers should use interesting segments that contain highly interesting as well as important objective-related information to promote or help understanding of the main topic.

Another important assumption of the cognitive theory of multimedia learning proposed by Mayer (2001) is that presenting information in multiple modalities is only seen as advantageous to learners who actively process such information. These authors point out that, when learning with multimedia, students need to integrate multiple representations of information (e.g., text, diagrams, animations and digitized video clips) to attain a fundamental conceptual understanding and use them to make inferences, solve problems, grasp meanings and so on. In other words, in order to benefit from multiple representations, students must interact with these representations in meaningful ways, i.e., at the level of cognitive interactivity (Aldrich, Rogers, & Scaife, 1998), by engaging with

these multimedia resources and using them to understand concepts and to reflect and integrate different kinds of knowledge. In summary, research has shown that, although multimedia instructional materials can result in improved learning outcomes, the effectiveness of integrating multimedia into learning will greatly depend on ensuring the multimedia design is based on empirically proven theories and practice.

Additionally, cognitive load theory leads designers to minimize and control the conditions that create unwanted cognitive loading in multimedia materials. This theory is based on a cognitive architecture consisting of a limited working memory with partly independent processing units for visual and auditory information, which interact with unlimited long-term memory (Paas, Renkl, & Sweller, 2003). Cognitive load is composed of intrinsic cognitive load and extraneous cognitive load (Sweller, Van Merrienboer, & Paas, 1998). Intrinsic cognitive load is solely from the intrinsic characteristics of learning materials such as content that is difficult to learn. Extraneous cognitive load is generated by poor learning materials, curricula design, or learning activities; however, it can be reduced by modifying the design of learning material. Because the cognitive resources of each learner's information processing system are limited, Mayer and Moreno (2003) argued that the primary challenge for designers of multimedia materials is the potential for cognitive overload, which occurs when the intended cognitive processing exceeds a learner's available cognitive capacity. Therefore, multimedia design with IBA should be designed to minimize unnecessary cognitive loading (Mayer & Moreno, 2003).

Split-Attention Principle

The split-attention principle or contiguity principle argues that when a combination of text and graphics is used to present instructional material, corresponding words and pictures should be presented with contiguously rather than separately (Mayer & Moreno, 1997). Students learn better when the instructional material does not require them to split their attention between multiple sources of mutually referring information. Attention is diffused when text and pictures are placed one after the other rather than contiguously (Sweller, 1999; Chandler & Sweller, 1994). Split-attention principle could be enforced by placing printed words next to the corresponding pictures to convey relevant meanings or through the activation of pop-up message boxes to enable users to roll over the mouse on the graphics and read further explanations and descriptions (Clark & Mayer, 2003). This is consistent with the understanding that working memory is limited in its cognitive resources and should not be overtaxed in learners having to view separated mutually referring text and pictures to make referential connections between them.

Redundancy Principle

Many multimedia learning scenarios include the presentation of visual materials (such as animations, video, or graphics) with simultaneous text and audio (Moreno & Mayer, 2000). However, the redundancy principle states that students learn better from animation and narration than from animation, narration, and text if the visual information is presented simultaneously to the verbal information (Mayer & Moreno, 1997). Simultaneous presentations of textual explanations and auditory narrations of the same information would be extraneous, taxing limited cognitive abilities of the working memory and hurting learning (Clark & Mayer, 2003). The textual representation of the information unnecessarily burdens the visual channel, which now needs to process both textual and pictorial information - when, in fact, the text is redundant and duplicates the auditory narrations (Sweller, 1999).

Multimedia materials should energize readers so they pay more attention to learning materials, learn more overall and improve their positive emotion by promoting an enjoyment of the topic. The effective use of multimedia in designing instruction material should be considered when working with IBA. When developing certain instructional materials with IBA, it is critical to consider the students' level of prior knowledge and information processing ability.

Conclusion

This article mixes IBA's promising potential with possible controversial issues involving its use as a technology tool. As we have much experience with adopting technology tools to education, we know that a revolutionary technology tool cannot create magical environments for learning. Central to the creation of effective learning environments is the capability of the people who will adopt the tool. Armed with technology and pedagogical knowledge, educators will be able to be successful after their dedicated trial-and-error efforts to make the best out of IBA. In doing so, we can transform our learning environments - especially where the diversity of education consumer is a big challenge to meet. IBA is in a better position than any other previously introduced technology tool in the field of education because it can create the major tool for learning: textbooks. That is the major reason that IBA has drawn full attention from different stakeholders and interest groups. Researchers also

have a responsibility to provide empirically and theoretically grounded knowledge so educators do not experience cognitive overload or attention-split or other negative educational results.

Other countries that have adopted e-books in their education system have support at a federal level because the adoption of e-books in the classroom requires a tremendous amount of financial resources, training, and collaboration with many related organizations. We need organized and systematic enterprise planning and execution in a longitudinal fashion. We do not want anyone left out due to the high price of an iPad. Hopefully, the adoption of best practices with IBA can create an excitement so we can prove our willingness and flexibility to transform education with any medium we can find.

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Creating participatory online learning environments: A social learning approach revisited

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Abstract: Online learning has never been more popular than it is today. Due to the rapid growth of online instruction at colleges and universities, many questions about the effectiveness of online courses have been raised. In this paper, we suggest guidelines for the selection and application of social media tools. In addition to describing the potential implications of social media integrated into online learning environments (OLEs), this paper also presents new and established best practices to stimulate meaningful social interactions in OLEs. We propose five essential instructional strategies used in combination with social media tools for creating participatory OLEs. Drawing from the relevant literature in this area, we suggest a new framework that includes planned social interactions, collaborative activities, real-life context, learner reflection, and assessment of participation to create a successful online learning experience for students.

Introduction

Online learning has never been more popular than it is today. With the surge of new educational platforms such as massive (and little) open online courses (MOOCs and LOOCs) and online degree offerings, online learning environments are a booming frontier in education. Online learning environments, sometimes called OLEs, consist of an instructional delivery system that allows students to participate in an educational opportunity without being physically present in the same location as the instructor (Johnson & Aragon, 2003; Richardson & Swan, 2003). More and more academic institutions today are considering online learning as the preferred learning medium to be able to reach more learners (Yu, Tian, Vogel, & Chi-Wai Kwok, 2010). In higher education, it is a growing trend to offer courses that were previously only available as in-person online, and to offer completely online degree programs where a student does not have to step foot on the campus once to participate. One of the drivers behind this movement is to expand access to education for new learners, and in part to increase revenue for higher education institutions (Richardson & Swan, 2003). Also, there is thought to be value in the convenience of offering learning online where students can participant anytime, anywhere (Ginns & Ellis, 2007; Johnson, Aragon, & Shaik, 2000; Neuhauser, 2002; Richardson & Swan, 2003; Summers, Waigandt, & Whittaker, 2005). Although much of the research in this area is inconclusive, it is thought that there is little to no difference between the two types of learning environments—face-to-face versus online (Moore & Kearsley, 2011; Swan, 2003). Therefore, those responsible for designing instruction at universities such as instructors, instructional designers, and teaching assistants, have been responding to this shift to online classrooms by attempting to integrate more innovative technology into their curriculum. As a result, practitioners and researchers are continuously exploring ways to create thriving online learning environments with participative social interaction that contributes to acculturation and positive learning outcomes (Yu et al., 2010).

The Problem: Learning in Isolation

Due to the rapid growth of Web-based instruction, many questions about the quality of the learning experience in online courses have been raised. Often, when instructors are tasked with creating OLEs, the focus is mainly on the technology (Brown, 2000; Johnson & Aragon, 2003) and not the pedagogy of fostering sound instruction (Alonso, López, Manrique, & Viñes, 2005). Despite the notion that tools currently used to host and facilitate learning activities in an online environment are more advanced than they have ever been before, it isn't enough to rely on the technology to create meaningful, deep learning experiences that positively impact learning outcomes (Garrison & Cleveland-Innes, 2010). Additionally, instructional design models commonly used to create online learning content, albeit flexible, i.e., Gagné's Nine Events (1985), Merrill's First Principles (2002), and Keller's ARCS Model (1987), are not contemporary enough to account for the recent innovations of the technology. Furthermore, there is a body of literature that indicates that potentially one of the most important aspects that naturally occurs in face-to-face classes but is often missing from OLEs is the social context of learning (Garrison & Cleveland-Innes, 2010). Today's learners are able to participate in classes from anywhere in the world. There is a growing student population that will participate in enough classes to earn a degree, yet never meet their classmates or instructors in person. With this developing trend, instructors need to be concerned about learner isolation, which can lead to bored, frustrated, or disengaged learners. To prevent or reduce feelings of isolation, OLEs should be designed to promote social interaction, which happens naturally in face-to-face classrooms. In either learning environment, it's critical that students have an active social presence and engage in prescribed interactions directly tied to the course's learning goals.

There is a sizeable collection of literature that suggests that social presence and interaction is the most vital component of a successful online learning experience for students (Garrison & Cleveland-Innes, 2010; Hrastinski, 2009; Huang, 2002; Martin, Parker, & Deale, 2012; Tu, 2002; Wegerif, 1998). Recent research has demonstrated that the lack of social connections not only affects student learning outcomes, but also their relationship with the instructor (Richardson & Swan, 2003). In a study conducted by Garrison and Cleveland-Innes (2010), social interaction and a sense of belonging were reported as the most important factors according to students. Accordingly, Huang (2002) discusses the negative consequences of students not having adequate connection with the instructor in an online course can lead to feelings of isolation. Hrastinski (2009) concludes that social interaction through active participation and learning are inter-related; without one, the other factor doesn't exist in OLEs.

According to Bandara (1977), learning by nature is a social activity where learners are able to interact in ways that stimulate the learning process. During the learning process, students use informative feedback from social interactions to "develop thoughts or hypotheses about the types of behavior most likely to succeed" which in turn guides their future behavior (Bandura, 1977, p. 3). In a social learning system, people learn more quickly and without unnecessary negative consequence through observation and modeling (Bandura, 1977). According to Vygotsky (1978), learners can accomplish more through collaborative activity with other learners. Additionally, the social nature of learning pushes learners beyond their existing developmental level, beyond the levels of development they could achieve independently (Vygotsky, 1978). In social cognitive theory, an extension of social learning theory, observation, modeling, and proximity to other learners are important instructional elements (Bandura, 1986). Of equal importance are social interactions in instructional settings that establish clear benefits of learning, promote learner self-efficacy and self-regulation, and support learners in setting realistic learning goals (Bandura, 1977, 1986; Zimmerman, 1989). As such, we believe that these constructs of social learning theory and social cognitive theory are especially relevant in online classrooms and can be achieved through strategic curriculum design and the social collaborative features of social media technologies.

The Solution: Part A - Technology & Tools

In pop-culture, social media refers to the advancement of Internet technology and applications including blogs, wikis, RSS and social bookmarking (O'Reilly, 2007). Social media, also known as Web 2.0 tools, when used effectively in designing online classroom experiences, could drive participatory learning by facilitating student interaction in a social way. Social media technologies provide numerous social features that can enable interactive social experiences that mimic traditional face-to-face experiences such as student-led discussions, collaborative group work and resource-sharing (Wang, 2011). Social media has shown the ability to facilitate observation, modeling, and proximity to other learners, something that is naturally present in face-to-face classrooms. Through text, pictures, and videos, learners can connect with others in a way that is authentic despite not physically being in the same location. Through social media it is practical for peers and instructors to interact regularly, just as they would in a traditional classroom, only through technology. As such, it is foreseeable for social media to enable all

aspects of social learning, such as engaging in constructive dialogue, modeling new behaviors, demonstrating new skills, collaborating on assignments, and providing supportive coaching and feedback. How different social media tools can be used in an online environment to promote participatory learning is described in Table 1.

Table 1. Social Media Tools in OLEs

Social Media Tools	Recommended Use
Discussion Boards	• Class discussions designed to apply or and/or synthesize course content • Posting assignments and learning resources for students
Wikis	• Repository for course content and learning resources • Used to create and host study groups • Student project activity and file sharing
Blogs and Vlogs	• Instructor blog used to share information, tips, course updates • Student blogs used to post reflections or short, topic-based assignments • Video lectures prepared by instructors
Instant Messaging	• Chat areas used for announcements, information-sharing, networking, or getting help
Video Conferencing	• Instructor-led seminars and lectures • Student-led presentations • Student project activities; planning, brainstorming, collaboration

Social media can positively enable learning when used to support well-constructed, meaningful, and relevant learning activities designed to meet a specific set of learning outcomes. Selecting the appropriate social media tool depends on the nature of the instructional activity. Factors to consider are the time required to complete the activity, the need for synchronous verse asynchronous, and the type of interactions desired (i.e., student-student, student-instructor, or student-content). There are a variety of social media tools available to facilitate participatory learning in OLEs. However, use of social media technology alone will not guarantee participatory learning. Therefore, instructional techniques must be deployed along with social media tools in order to create an online learning experience that helps students have social interactions similar to face-to-face experiences.

The Solution: Part B - Instructional Strategies

The design of the instruction will determine the social media tool used, yet instructors still need to plan for meaningful learner interactions. In addition to the technology, we suggest the inclusion of five essential instructional strategies for creating participatory OLEs. Drawing from social learning theory and social cognitive learning theory, it is important to include planned social interactions, collaborative activities, real-life context, learner reflection, and assessment of participation and interactions. These instructional techniques can be brought to life in an online classroom through social media tools. All of the strategies proposed, when used along with social media, could help create an effective, engaging online learning experience. Table 2 describes common applications of social media and how they can be used to facilitate participatory interactions in OLEs.

Table 2. Social Media Tools that Support Participatory Interactions

Type of Interactions	Suggested Social Media Tool
• Asynchronous group discussions (e.g. special topic or problem set)	Discussion Board
• Asynchronous collaborative group work (e.g. small project or problem solving)	Discussion Board and Wiki
• Individual or group assignment submission for peer/instructor review	Blogs and Vlogs
• Synchronous discussion, debate, brainstorming, and solution generation	Video Conferencing and Instant Messaging

To construct a participatory online learning environment, educators should implement instructional strategies that are conducive to interactive discussions, collaborative group work, authentic applications, with reflection opportunities and feedback loops in order to engage learners in a social learning process that starts in the classroom and continues forward through personal discovery, negotiation and collaboration with peers. Online learning that is truly social can be a catalyst for deep learning opportunities that are expected in traditional classroom settings (Zimmerman, 1989). Even though learners come together initially to achieve a specific learning objective, through social interactions students also form networks of information, resources, and relationships that enable them to continue learning even after formal instruction ends (Dabbagh & Kitsantas, 2012).

Conclusion

Although there still exists a strong need for more empirical evidence, the implications of the online learning revolution are somewhat obvious. Online learning is different from the conventional classroom; therefore, online instructors need to apply instructional techniques that facilitate participation and interaction, and promote students' learning success. The key challenge instructors face is the absence of 'natural' social interaction and learner proximity that promotes the learning process—a circumstance that is automatically present in face-to-face environments (Bandura, 1977; Vygotsky, 1978). Other challenges include curriculum design and structure that is not conductive to social learning. In other words, the curriculum does not stimulate or incentivize interactive participation, contribution, or collaboration—the necessary fuel in the social learning gas tank. Figure 1 encapsulates the 'recipe' for successfully creating a participatory online learning environment. The key ingredients include aligning instructional design choices with one or more social media tools to achieve the desired level of student-student, student-content, and instructor-student interaction.

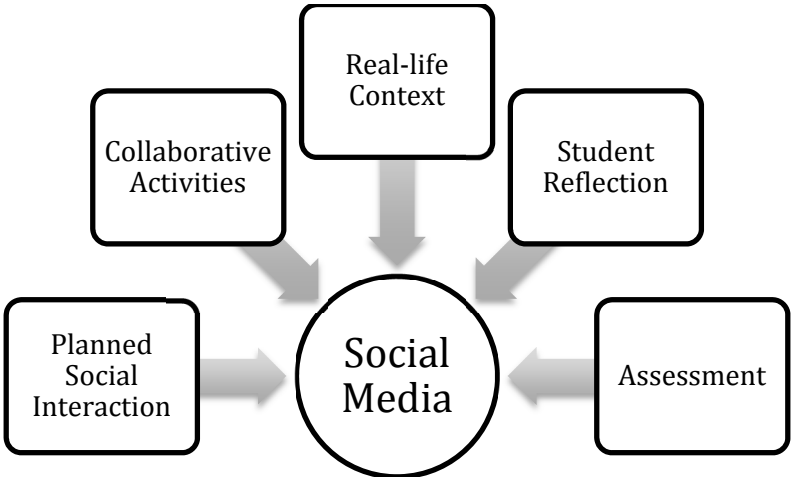

Figure 1: Ingredients for a Participatory Online Learning Environment

In conclusion, there are still obstacles that instructors have to overcome to create meaningful online learning experiences. Leveraging social media tools is a step in the right direction. However, we also suggest that it is not enough to simply add in social media and expect results. Instructors need to also apply instructional design techniques originating from social learning and social cognitive learning theories; planned social interactions, collaboration with other students, real-world problem-solving, reflection to synthesize and apply new knowledge, and meaningful feedback.

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Faculty Training on eLearning: An International Performance Improvement Case Study

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Abstract

With $332.9m in revenue in 2013 and a projection of $512.7m by 2016 (Docebo, 2014), Africa's eLearning market is experiencing tremendous growth. This case study details a training intervention for faculty and staff on eLearning at an East African university with 31,723 students in 297 programs. The project was based on the International Society for Improvement's ten standards and code of ethics. This paper describes how faculty were trained and how each of the standards was met while focusing on tools, techniques, systematic methods, best practices, and challenges encountered. Recommendations are also provided.

Introduction

Africa's eLearning landscape has changed. Research shows that there is limited access to higher education in Africa, with less than 5% of students in higher education institutions compared to 16%, the world average (Prakash, 2003). However, the demand for higher education exists. For example, in 2003, Kenya sent 12,000 students to foreign universities. 7,000 of them went to India and 5,000 to Europe and the United States (Mutula, 2003). Increased higher education demand and reduced public funding has forced higher education institutions to find innovative ways to ensure more access to their programs. One practical option has been the adaption of eLearning. With that comes the challenge of using the limited resources to develop effective eLearning programs (Sawyerr, 2004). Carroll (2006) notes that African students now expect education that emphasizes learning than mere transmission of information. The students also expect technology to be integrated into their learning (Juma, 2003, Docebo, 2013). Thus, the purpose of this project was to improve the quality of teaching and learning at a Kenyan university through a pedagogical and integrated instructional technologies initiative, as the university strives to improve teaching and learning through the application of Information Communication Technology (ICT).

Performance improvement is the science and art of improving people, process, performance, organizations, and ultimately society. One factor that drives performance is employee skills and knowledge; employees should have the necessary knowledge, experience, and skills to do the desired behaviors (Tiem, Moseley, & Dessinger, 2012). Performance practitioners apply principles of performance improvement and the practices, processes, and methods of performance technology. They base their work on ten standards and the Performance Improvement code of ethics (Tiem, Moseley, & Dessinger, 2012).

Taking a performance improvement approach, this project systematically linked university goals and strategies with the faculty responsible for achieving the goals, with an ultimate goal of improving their knowledge and skills in eLearning. The performance need was for faculty to make their face-to-face courses available online. The desired result was online courses and programs. The impact to the university was the increased access to academic programs and a consequent increase in enrolment.

The Standards and Process

The standards of performance technology are specified on the ISPI website (2012).

Standard 1: Focus on Results or Outcomes

The intended result of this project was for faculty to re-design their face-to-face courses to the online format. The solution and its effectiveness were agreed upon by the team working on the project. The effectiveness would be demonstrated by newly and effectively designed online courses and programs. The effectiveness of the solution would be measured by:

- Return on investment: the solution had to be cost-effective. The value may be intangible, but valuable nonetheless.
- Sustainability: Once the solution has been implemented, it should be easily maintained.
- Accountability: the solution should have a sponsor to champion the project and have a long-term commitment to it.
- Newly developed online courses and programs.
- Participant satisfaction with the training.

Standard 2: Take a Systemic View

This standard emphasizes the factors that had a significant impact on society or market, individual, group, department, or organizational performance before deciding on a solution. These are the factors that were considered:

- Management: This project would not be a success without management support. We needed the management to endorse the project and its efforts.
- Resources: Since there were additional resources, we would be able to implement the intervention multiple times at multiple locations.
- Time: We explored the timeframe of this project to determine what intervention would be feasible.
- Skills and knowledge: We questioned if this was a critical piece of this project.
- Infrastructure: Is a challenge in this environment for both students and faculty. Whatever the intervention, infrastructure limitations had to be factored into it.
- Location: The institution had four campuses. We questioned how the intervention would be implemented on more than one campus.
- Culture: The culture was that of passive goal orientation and power respect. This was a positive aspect for the overall intervention effort, but could be a challenge.

Standard 3: Add Value

The optimal solution emerged from our needs and cause analyses. The solution was decided upon by the team. The solution had to affect the root cause of the problem. It had to be effective, efficient, and invaluable to the participants and to the institution. It had to be feasible and acceptable, especially by management. It also had to be timely, and of course, of value. The worth and value of the project would be determined by:

- Return on investment: The course of action had to be of value to the institution. It had to be cost-effective.
- Development of online programs: The ultimate goal of the intervention was to have faculty and staff develop online courses and programs.
- Satisfaction with the training and demonstration of mastery of workshop content would show that the intervention was worthwhile.
- Sustainability: The intervention had to be easily maintained beyond the project closure.

Standard 4: Work in Partnership with Clients and Stakeholders

This project was a team effort consisting of:

- Faculty and staff: We had a total of 120 participants.
- The University Institute (UI) staff: The UI was the center that coordinated training. It has approximately 9 staff members who were involved at some level on this project. The UI had a Director who championed the project. There also was the Coordinator who coordinated the workshops, the IT personnel, and others who played minor roles on the project, for example time keeping, catering, etc.
- Management was instrumental in implementing other performance interventions and supporting this eLearning project. This included deans, department chairs, and other university administrative staff.

Standard 5: Determine the Need or Opportunity

I conducted a needs assessment to determine the opportunity for this project. I collected data and analyzed it. I started with a set of questions. I worded the questions so that they could be easily understood. For example: how is the gap affecting the university – I asked: how is not having online learning affecting the university? I then had interviews and conversations with the Director of the UI, the Coordinator of Continuing Education (CE), faculty, general university staff, the UI staff, and even students. I also reviewed university bulletins and directives, technology infrastructure, and the university website.

These questions guided the analysis:

- Who is affected by the performance gap?

- What is the desired situation?
- What is the actual situation?
- How is the gap affecting the organization?
- How does the gap affect the university goals?
- Do the faculty and staff support closing the gap?
- Does the gap require immediate action?
- Why do you want to move forward with this now?
- How does the management feel about this?
- Are they ready to move forward?

These questions with the conversations that emerged touched on the worker, workplace, work, organizational levels. I gathered information on actual and desired organizational and individual performances, systems improvements to be made by management, and worker expertise that needed to be developed. I also identified the knowledge, skills, and attitudes required by employees to perform at the required level i.e. to develop eLearning.

With data from above, I used the *Performance Analysis Worksheet* (Chevalier, 2009) to analyze the data. The analysis uncovered that:

- *Overview of the situation:* To stay current and competitive, the university had to establish eLearning. That was the overarching opportunity. The university had the technological capacity to support eLearning. Faculty had the equipment (LMS, computers, etc.) to develop online courses. The UI would provide support for faculty in online course development. The workload would still be manageable. Faculty and staff did not have the knowledge and skills to make this happen. They did not have the confidence that eLearning could work. Current management and leadership were for the change but did not advocate for it.
- *Current and desired performance:* The University offered face to face courses only. The desired performance was for the university to offer online courses. Faculty had been asked to develop online courses and programs, but that was not being done.

Standard 6: Determine the Cause and Performance Requirements

I used the *Performance Analysis Worksheet* (Chevalier, 2009) to display information and make conclusions, as shown in Table 1. This worked well because I could systematically identify, describe, weight, and display the data.

Table 1: Performance Analysis

Factors	**Driving Forces**				**Restraining Forces**				
	+4	+3	+2	+1	0	-1	-2	-3	-4
Information Roles and performance are clearly defined and faculty get feedback about their performance.		→	→	→					
There are excellent guides to everyday work that describe the work process. There is little guidance on developing online learning.					←	←	←	←	
Individual performance is routinely observed and feedback documented and given to employees – by department chairs.		→	→	→					
Resources There is time for faculty to develop online learning, there are tools (LMS) available.		→	→	→					
There are clear processes and procedures on developing online learning. These have been put together by the IODL. Faculty just not aware.			→	→					
Safe and organized work environment.									
Incentives There are no financial and non-financial incentives for group or individual performance – in terms of developing online courses.	→	→	→	→	←	←	←	←	←
Faculty require a variety of skills to do their work and have autonomy.		→	→	→					

Factors	Driving Forces				Restraining Forces				
	+4	+3	+2	+1	0	-1	-2	-3	-4
Incentives - *continued* Overall, the work environment is positive. Employees believe they have a chance to succeed. Career development opportunities are available.		→	→	→					
Knowledge and Skills Faculty do not have the necessary skills and knowledge to develop online learning.					←	←	←	←	←
Faculty with necessary knowledge and skills share what they know, but in this case, they all did not have the skills to do the job.					←	←			
Not really a factor.									
Capacity Faculty have the capacity to learn how to create online courses.									
With proper direction and a clearly defined process faculty should be able to do develop online learning	→	→	→	→					
There are no obvious emotional limitations		→	→	→					
Motives Faculty motives are clearly aligned with work and work environment.	→	→	→	→					
Faculty have the desire to create online learning.		→	→	→					
Faculty are recruited and selected to match the realities of the work situation. However, the realities of the workplace have changed.	→	→	→	→					
			→	→					

The analysis uncovered that:

- Faculty and staff lacked the essential knowledge and skills to develop online courses and programs. They needed training.
- Faculty did were not aware of the support at their disposal – the UI staff - to develop online courses and programs. A strategy had to be established to communicate and create awareness of the existence of the Institute.
- There were no rewards for performance or consequences for lack of performance. A compensation system (in addition to any other appropriate non-monetary system, e.g. earning CEUs) should be put in place for faculty who developed online learning.

Standard 7: Design the Solution including Implementation and Evaluation

We decided on the following solutions:

- Knowledge and skills: Faculty should be trained via workshops on different aspects of online learning and how to create online courses. I would develop and conduct the training workshops.
- Communication: Awareness should be created around campus on the existence of the UI. This should be through email, flyers, and word of mouth. The UI would handle that.
- Incentives: To motivate them to develop online courses, faculty should receive a certification of completion of the training workshops. They would also earn CEUs after completing the workshops; a career enhancement opportunity.
  Faculty should receive some sort of compensation for every online course developed, for the extra effort and time.
- Management should determine the extent of ownership of courses and communicate with faculty. This issue came up in the conversations.
- Hold employee accountable: Management should hold faculty accountable for developing online courses. Consequences should be put in place.

Standard 8: Develop the Solution and Test its Feasibility

I did a needs analysis for training topics and discussed these with the Director of the UI and the Coordinator of CE. We reviewed and revised the topics and made sure they all focused on critical aspects of online learning. I used instructional design methodologies to develop the workshops.

Standard 9: Implement the Solution

- Faculty and staff attended training workshops where they learned new skills. I prepared handouts and reference materials to help support and reinforce new behaviors. These resources would help them learn more about the topics post-workshops.
- I conducted training for the UI staff because they would be the ones supporting faculty in developing their online courses. I also gave participants my contact information in case they wanted to contact me in future with questions. They indeed contacted beyond the workshops.
- Feedback was solicited during and after the workshops. The information was used to plan for future faculty support and training, for example, participants were asked what other aspects of online learning they would like training in or support for.
- The UI Director communicated with management about the training. Both the UI Director and the Coordinator of CE communicated information about the training to faculty by email, flyers, and word of mouth.

New behaviors were monitored by the number of new online courses that were being developed, and if they demonstrated the skills and knowledge from the workshops. Reinforcement of new behaviors was done by the UI staff providing support to faculty in developing online courses. Other interventions (CEU credit, compensation, consequences) were put in place to reinforce adoption of new behaviors.

Standard 10: Evaluate the Results and Impact

I adapted Kirkpatrick's four-level model (1996) in the evaluation of effectiveness of the training intervention. Immediate verbal feedback about the value of training was very positive. Participants said that they truly enjoyed the training (reaction). There was an immediate change in attitude among the attendees about online learning. Participants demonstrated mastery of skills and knowledge covered through activities and exercises (learning). Faculty and staff began developing eLearning courses right away (transfer). The impact on the organization should be significant (results) from the increase in enrolment that would come from making programs accessible online. As of March 2014, 11 schools (equivalent of colleges) have courses online.

Success criteria included overall satisfaction of training by faculty and staff, demonstration of mastery of skills and knowledge, and development of online courses. At the individual level, faculty and staff gained new skills and knowledge in online learning, which enabled them to develop online learning and even blend their face to face courses. At the organizational level, new online learning would attract more students and make learning flexible for current face to face students. The additional revenue would be significant.

Challenges and Recommendations

The challenges encountered during this project include lack of proper ICT infrastructure especially for students and for example, limited internet connectivity. However, the university was planning on making Wi-Fi available freely on campus. There was lack of expertise in development of eLearning and a low awareness of eLearning. The curriculum required transformation and some faculty were reluctant to adapt eLearning.

eLearning, if appropriately implemented in Africa, could be of great benefit to universities and students alike. Nafukho and Muyia (2013) caution that "people in low income and middle income countries may be poor in this century, but it does not mean that they are unintelligent; neither will they remain poor forever" (p.658).

Based on this project, the following are guidelines for successful implementation of eLearning in Africa, specifically Kenya:

- Develop institutional policies and guidelines for eLearning and have a plan for development and implementation. Then follow through with the plan.
- Improve the availability of hardware and software to faculty and students.
- Improve internet connectivity. It should be reliable and fast so that can access it at least on the entire campus.
- Provide technical and pedagogical support for eLearning.
- Provide training and professional development opportunities for faculty and staff on eLearning.

Conclusion

The opportunity to determine a performance improvement intervention and implement it was an invaluable experience for everyone involved. Using a collaborative approach to the design, development, and delivery enabled students, faculty, staff, and the university as a whole to benefit from the experience.

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Using the Community of Inquiry Framework for Library Science Course Design: An Eastern Caribbean Example

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The University of the West Indies (UWI) the English speaking Caribbean's lone indigenous public institution of higher learning now offers online courses to students scattered across the Caribbean islands. UWI's goal is to offer a three-tiered registration structure (certificate, diploma, and degree) that considers students' needs and educational backgrounds and facilitates their transition into and through the university system (UWI Open Campus, 2013), with the certificate program being the bridge to participation in the bachelor's degree program for those prospective students without entry level requirements. As a result, UWI now offers a range of certificate programs online. However, library and information science (LIS) is not among them, so the needs of unqualified prospective LIS students are not being met.

The Organization of Eastern Caribbean States (OECS) is a nine island sub-group of islands within the Caribbean with a combined population of over 600,000 (World Bank, 2010). Each indigenous institution of learning within the OECS only offers courses to the island population it serves and none offers LIS training neither do they offer any of their programs online. So here too, library support staff have no opportunity to bridge the gap between entry level and librarian positions which requires at least a first degree. An online program designed to meet the academic needs of library paraprofessionals within the sub-region would be uniquely positioned not only to offer LIS training but also to overcome the geographical distance thus connecting students scattered throughout these islands.

This paper proposes that LIS courses be designed for paraprofessional library staff within the OECS and offered using online modalities. To assist in the achievement of this goal, the paper explores how the Community of Inquiry, a process model developed specifically to inform the design and research of online teaching and learning, can inform the design process using a Collection Development course as an example. It is intended to explore the literature relating to the CoI theoretical framework. Relevant literature regarding the significance of such a program to the OECS and the wider Anglophone Caribbean will be explored. Thus this paper builds on literature related to library development and training in the Caribbean. The information in this paper will be especially useful to information professionals and other stakeholders in developing countries.

Significance of the Course

An objective of the OECS development strategy (2000) is to empower the peoples of the OECS through providing opportunities for advancement by ensuring high quality, relevant, affordable education. Libraries are an integral part of the education system and if library staff are to effectively function within that system they should be properly trained. Greene and Robb, (1989), recognizing the Caribbean milieu in which complex social and economic factors increase the demand for library and information services, asked some challenging questions that are still salient today. They queried how the workforce needs for LIS related to the role of information in the countries' development process, whether the demand for workers matched the supply, and the effectiveness and relevance of training programs in meeting our human resource problems. Even at that time they saw information systems as critical components of the development process.

The Caribbean student has to overcome several hurdles to access higher education. Ogundipe (1994) noted several problems encountered by the Caribbean student that still exist today. Primary among them is cost. He notes that the cost of studying at a UWI campus is so prohibitive that Caribbean students opt to study abroad and due to their low return rate contribute to the Caribbean brain drain. The cost of air travel too is prohibitive especially so for a paraprofessional who might be very low on the salary scale. He proposed that the library school in Jamaica should seek to shorten the expensive period that non-Jamaican students stayed in Jamaica through offering programs through distance education or independent studies using modalities available at the time such as, correspondence courses, radio and TV instruction, and videocassette and CD-ROM courses. To date this has not been done for LIS although UWI now offers many of its programs online. He further opined that there was nothing to prevent UWI's

library school from offering locally oriented sub-professional certificate and diploma courses and thus demonstrate its willingness to accept its responsibilities as a regional institution.

Kapur and Crowley (2008) discuss the value of higher education and training in developing countries, and the importance of not just credentialing the few who can afford access but rather providing access to quality education for all. They point to the necessity of building human capital within these countries as they strive to develop knowledge based societies. This is especially significant for library staff since they play an integral role in the formation and preservation of a knowledge based society. What can developing countries do to level the playing field and provide access to higher education to all? Online learning is a means of meeting the increasing demands for education in developing countries and especially for small states since it can be developed collaboratively and provide a scalable, economical education responsive to Caribbean needs. This new medium however needs a framework, and new pedagogical approaches specifically designed to meet the needs of the virtual academic community (Woodall, (n.d.), Mohamedali, 2004, Kapur & Crowley, 2008). The Community of Inquiry might offer just such a model and approach to effectively teach LIS.

Ogundipe (1994) highlighted three concerns in relation to a curriculum that are relevant to the online context: "First, there is a desire to provide a basic general core education training in its subject field, as obtains everywhere. Next, there is a necessity to be directly relevant to its immediate environment and circumstances by including materials with a local content, that is, by seeming to indigenise its curriculum. Third, there is the intent of pitching the programme at a high level that would be accreditable and meets international standards" (Curriculum section, para 1). He connected training and its impact in local communities where libraries are staffed and efficiently run to international respect and acceptance of an institution's programs.

Any course developed should address the three curricular needs highlighted by Ogundipe (1994), but the need to indigenize the curriculum cannot be overemphasized. While we embrace Western beliefs and practices we should also seek to preserve our unique culture that contributes to it. Language is used to transmit culture. Libraries are in the business of information disbursement and play a central role in this process. They are also directly mandated to preserve our culture. It is therefore important that courses while striving for curricular that meet international standards and providing a general core education should also speak directly to the needs of library staff and their various communities within the OECS. Barnes (2010) when reporting on the results of a survey conducted with staff and administrators of small international libraries noted the critical need for training of paraprofessional staff since the limited number of professional staff depend on paraprofessionals to perform specialized tasks (See Figure 1 below) including administration and other key aspects of library development such as collection development, cataloging and technical services. She highlighted specific areas for training such as administrative, computer and technology, and library fundamental competencies, circulation including familiarity with library automation systems, acquisition and collection development, and planning and service competencies. Her pedagogical and design recommendations included: 1) Design programs that respond to local needs and local job requirements, 2) Utilize primarily free and easily accessible training methods, 3) Focus on practical skills that are immediately applicable, and 4) Evaluate training for its effectiveness. Much of library work occurs in an online environment. An online course will provide the opportunity for students and practitioners to not only hone their skills in that context but also to explore and practice with the tools freely available on the web.

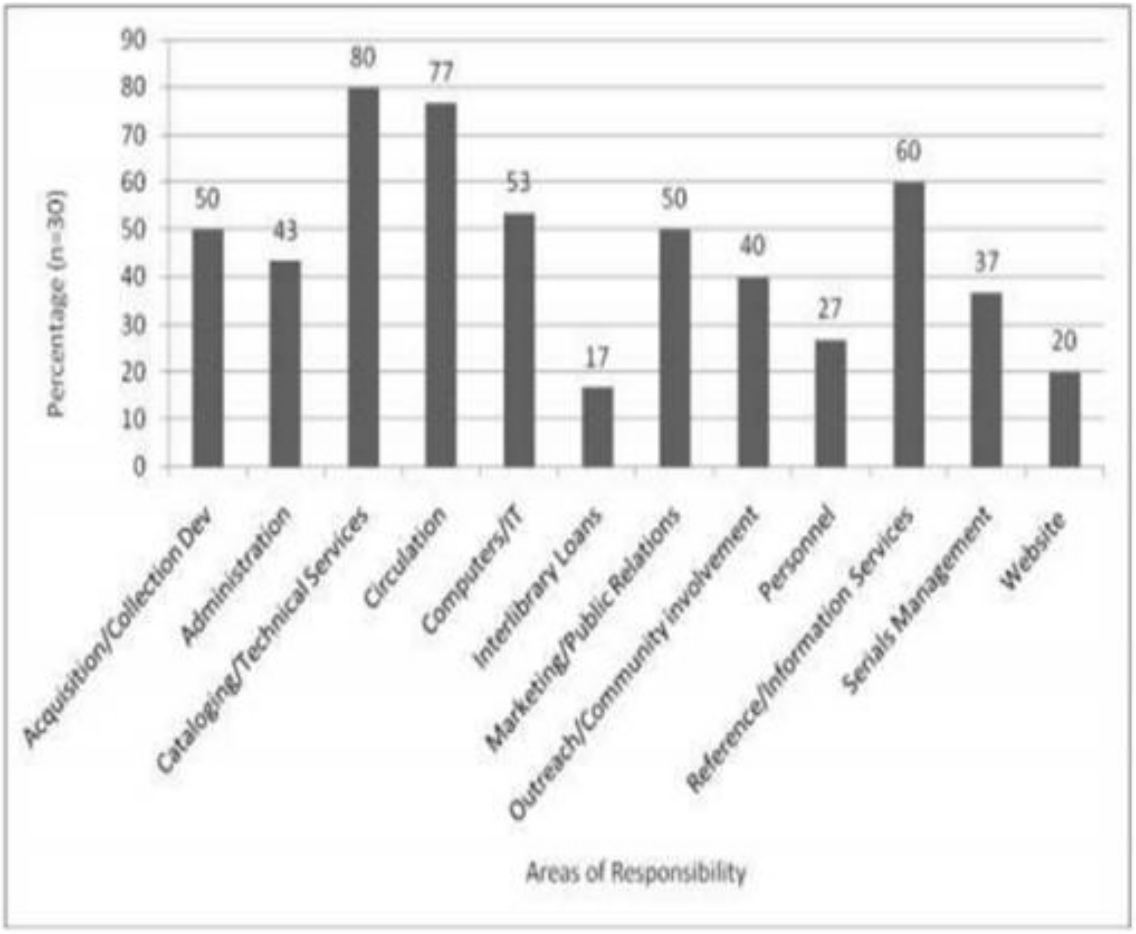

Figure 1. Work responsibilities of paraprofessionals from Barnes (2010)
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Online education offers another advantage as noted by Booth (1993) when he points to the difficulty of locating sufficient qualified staff on each island to teach each course and suggests distance learning as the solution. Qualified professionals can be sourced within the region to teach online. We share a common cultural heritage and these professionals can serve not only as instructors but also as mentors providing libraries with well trained staff. Thus effectively bridging any digital divide and also bridging the physical geographical distance and sense of isolation and insularity of library staff. It will build collaborative relationships with the possibilities of building trust and of sharing resources (Francis, 2008).

Community of Inquiry

The origins of the term "community of Inquiry" has been traced to C. S. Pierce scientist and philosopher (Dumitru, 2012, Kennedy, N. S. & Kennedy, D., 2010; Pardales & Girod, 2006). Pierce focused on bringing the scientific method to philosophical practice, positing that reliable knowledge could be derived through agreement reached among a community of inquiry through the use of the scientific method. Through a community of inquiry education can realize its goals to help individuals clarify what they know, make better distinctions, recognize underlying assumptions, distinguish between better or worse reasons, think consistently and comprehensively, be able to critique their own thinking and their decision-making processes, and become more objective in their inquiry (Sharp, 1987).

The above ideas are compatible with the CoI as introduced by Garrison, Anderson and Archer in the late 1990s (McKerlich, Riis, Anderson, & Eastman, 2011). Unlike traditional learning with its individualistic focus, the pedagogy behind online learning assumes collaborative learning. The CoI framework evolved out of the need for a new theoretical model to explain and explore the online learning experience (Swan & Ice, 2010). Shea and

Bidjerano (2009) suggest that with the increase in online courses, and media's constant evolution a theoretical framework is required to inform the integration of pedagogy and technology in ways that will positively impact learning. They point to the CoI framework as one such promising theoretical model. CoI is a cohesive, holistic, theoretical framework that facilitates the exploration of online learning and pedagogy (Shea & Bidjerano, 2009).

Library staff are required to be critical thinkers as they interact and collaborate with each other and with members of the community, and function within a technology rich and fluid environment. The CoI was developed to inform teaching within that environment. The goal of education is to develop self-directed high level critical thinkers and to achieve this, models must be developed that facilitate "student metacognition, self-actualization, and meaning making" (Boris & Hall, 2004, p. 2). CoI is just such a model. A premise of CoI is that higher-order learning, that is, high levels of critical thinking are best supported "within a community of learners engaged in critical reflection and discourse" (Garrison, Cleveland-Innes & Fung, 2010, p. 32). This meshes with one of the goals of the library science course which is to develop a community of learners within the OECS.

The CoI framework is constituted of three core elements: social presence, cognitive presence and teaching presence. These are considered critical to the success of the higher education experience (Garrison, Anderson & Archer, 2000). Figure two below shows the inter-relatedness of CoI's core elements.

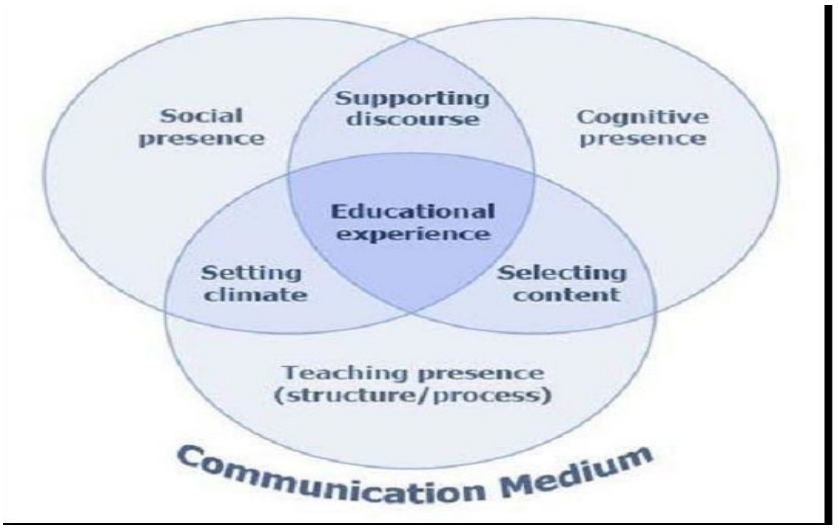

Figure 2. The Community of Inquiry from Garrison, Anderson & Archer (2000)
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Social Presence

Initially Garrison (2007) delineated the aspects of social presence as effective communication, open communication and group cohesion. This list has been extended by Whiteside and Dickers (2008) to include: 1) affective investment –the emotional connections made during a course; (2) cohesiveness –the extent to which participants experience a sense of community; (3) interaction level –"operationalizes the level of interaction among participants" (p. 3); (4) knowledge and experience, and (5) instructor involvement (See Figure 3 below). Social Presence is individuals' ability to project themselves within the community as real people; they see themselves as real and have others perceive them as real. Social presence is the perception that no matter where in the world we are located we are a part of a social group even though our communication is digitally mediated. The levels of social presence impact our sense of connectedness as a group and our motivation to participate in group activities (Wheeler, 2005). But the CoI is not merely a social community; the primary importance of this element is its function as a support for cognitive presence as it indirectly facilitates the critical thinking process within the community of learners (Garrison, Anderson & Archer, 2000). Social presence is integral to a collaborative constructivist learning approach (Garrison, 2012).

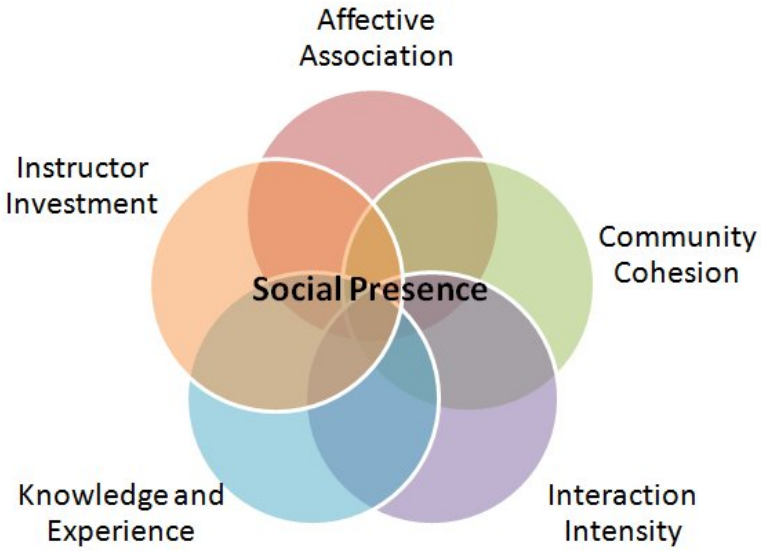

Figure 2. The Social Presence Model, (Whiteside & Dikkers 2008)
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Cognitive Presence

Cognitive presence is "the extent to which the student is able to construct and confirm meaning related to the course content based on sustained reflection and discourse within a community of inquiry" (Carlon et al, 2012, p. 215). Cognitive presence is operationalized by the practical inquiry model (see figure 3 below) which is buttressed by Dewey's work on reflective thinking (Garrison, 2007). The phases within the practical inquiry model are:

1. The triggering event where a problem or issue is introduced for participants to explore
2. Exploration in which the problem is explored through individual and collective critical reflection and discourse.
3. Integration: Here participants construct meaning using the ideas developed during the exploration phase.
4. Resolution: In this phase the students apply the new knowledge in an institutional or organizational context (Alavi & Taghizadeh, 2013).

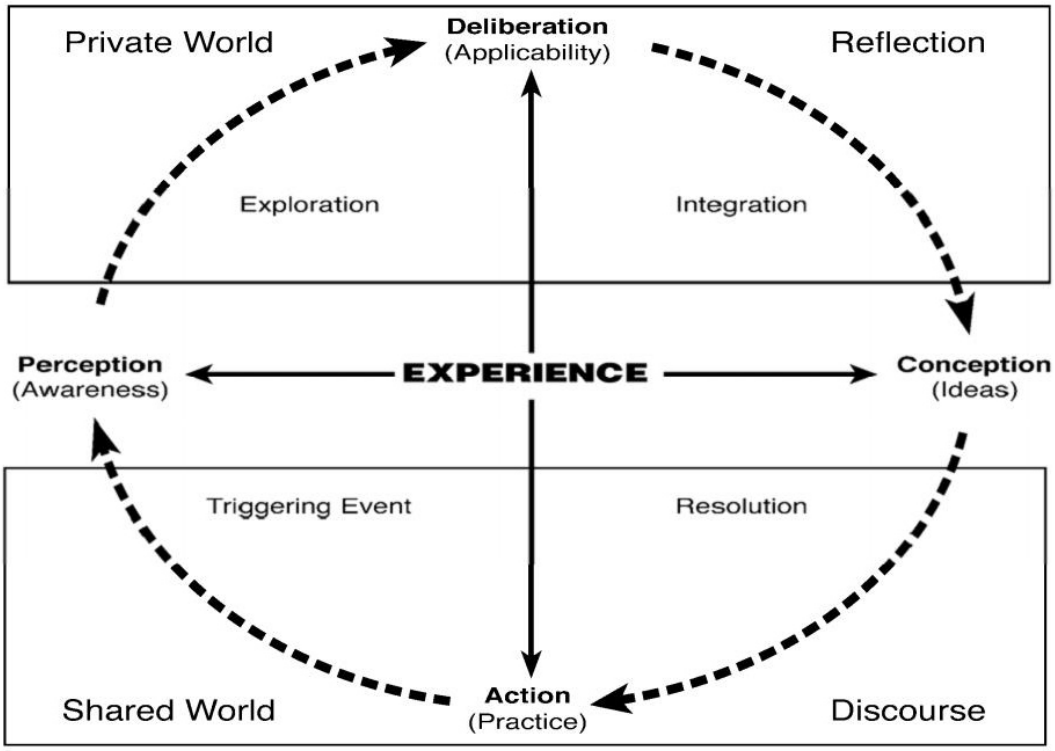

Figure 3. The Practical Inquiry Model (Garrison, 2007)
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This process exemplifies the concept of knowledge building as idea improvement as espoused by Scardamalia and Bereiter (2006). It is not enough to generate ideas; students should be encouraged to accept, challenge and critique their ideas and the ideas of others and in that way advance knowledge. Participants are expected to problematize, deconstruct and reconstruct their assumptions and beliefs not through knowledge transmitted by a teacher, or simply through individual reflection and debate, but through knowledge building processes in which individuals use dialogue to build on each other's ideas (Kennedy & Kennedy, 2010).

Although the practical inquiry model provides a process for envisioning cognitive presence and the development of critical thinking, researchers (Alavi & Taghizadeh, 2013) have noted low levels of the triggering event, exploration, integration and resolution, categories critical to the functioning of cognitive presence as indicated by the practical inquiry model. Research has pointed to difficulty for critical thinking to move beyond the exploration stage (Garison, 2007, p. 65). Garrison proffered several possible reasons why this problem occurs; these include: teaching presence with its focus on design facilitation and direction; the nature of the tasks; not enough time allowed for reflection, and the quality of questions asked. There are also organizational issues (Garrison & Cleveland-Innes, 2005) that might impact the level of learning in an online environment. These include clear expectations, manageable content, appropriate activities, and activity and goal congruence. Garrison and Cleveland-Innes suggest that there needs to be a shift in the quality of the interaction whether learner-teacher, learner-content, or learner-learner, from being merely a social community to one in which deep purposeful learning, through critical thinking and reflection occurs. They point out that interaction does not necessarily indicate cognitive engagement "in an educationally meaningful manner" (p. 135) and meaningful cognitive engagement is one of the main purposes of the learning experience. These ideas are strongly related to course design and a course designed and implemented informed by the CoI would help to shed light on some of these issues.

Teaching Presence

Teaching presence has been defined as '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 and Archer, 2001, p. 5). Precedence is given to "teaching" over "teacher" implying the shared roles and responsibilities of "teaching" presence in a purposeful collaborative learning environment. This idea of shared roles indicates a shift from the teacher centered learning environment to a more collaborative environment in which all participants' ideas have value. Kennedy and Kennedy (2010) views it as a social,

communicative, argumentation discourse model that is different from the traditional teacher centered model; a social system in which students and teachers are immersed in "epistemological curiosity, critical consciousness, non-authoritarian power relations and authentic democratic practices" (p. 3). While social presence is an intervening variable between cognitive and teaching presence and very necessary in the initial stages of a course, teaching presence facilitates the transition from social to cognitive presence (Garrison & Cleveland-Innes, 2010). Teaching presence determines students' satisfaction with a course, their perception of the learning experience, their perception of the quality of what they have learned, and their sense of community (Garrison, Anderson & Archer, 2010).

Facilitators become both model and coach (Kennedy & Kennedy, 2010). They model dialogue participation, that is, how to follow an argument to its satisfactory conclusion, while at the same time have a metacognitive awareness of how the conversation is proceeding and what can be done to move the process along. Further, the facilitator should aim to distribute both epistemological and procedural authority to participants such that participants acquire the dialogic and metacognitive skills modelled by the facilitator. Although all participants may perform the functions of teaching presence, the teacher is primarily responsible to select, organize and present course content, design and develop learning activities and assess the entire process (Garrison, Anderson & Archer, 2010).

Another appeal of the CoI is its constructivist foundations (Swan, Garrison & Richardson, 2009) and attraction for culturally sensitive design. McLoughlin and Oliver (2000) suggest that instructional designers should begin with an "epistemology of constructivist theories of learning" acknowledging "that knowledge is socially-grounded and located within communities with particular cultures, values and expectations" (Conclusion and implications for practice section, para 1). They further recommend that designers "plan activities where learning is a process of participation, communication and co-construction of knowledge….cultures have identifiable dimensions, goals, expectations,…variations in learning styles, modes of communication and participation" (McLoughlin & Oliver, 2000, Conclusion and implications for practice section, para 1) that affect learning. They list ten design principles for culturally sensitive design that echo the ideas that buttress the CoI: 1. Adopt an epistemology that is consistent with, and supportive of constructivist learning and multiple perspectives. 2. Design authentic learning activities. 3. Create flexible tasks and tools for knowledge sharing. 4. Ensure different forms of support, within and outside the community. 5. Establish flexible and responsive student roles and responsibilities. 6. Provide communication tools and social interaction for learners to co-construct knowledge. 7. Create tasks for self-direction, ownership and collaboration. 8. Ensure flexible tutoring and mentoring roles that are responsive to learner needs. 9. Create access to varied resources to ensure multiple perspectives. 10. Provide flexibility in learning goals, outcomes and modes of assessment (McLoughlin & Oliver, 2000, Ten design principles for culturally inclusive instructional design section). The CoI therefore seems to offer to course design the opportunity for cultural inclusivity.

Since the intent is to design a course to be implemented within a purposefully established collaborative community of inquiry, this next section of the paper extracts elements from CoI research that can be used to inform LIS course design, their implications for course design, their application in the actual course design and technology that facilitates the various aspects of course design highlighted.

Designing for Social Presence

Social presence, the social and emotional connection shared in an online community, is critical to the advancement of cognitive presence or collaborative inquiry and is greatly influenced by interactions within the online environment (garrison, Cleveland-Innes, & Fung, 2009, Shea et al., 2010, Rubin, Fernandes, & Avgerinou, 2013). Particular emphasis has been placed in the research on the importance of student instructor interaction to building and maintaining social presence. The level of student social presence is impacted by instructor levels of social presence. As pointed out by Shea et al. (2010), teaching presence is a type of instructional orchestration in which the instructor must play a leading role. There are certain elements that affect social presence and the individual's ability to collaborate; these include interest, motivation –students might only be doing a course because they are required and so lack motivation, and personality traits –whether the person is an introvert or an extrovert (Lambert & Fisher, 2013). These should be considered in course design.

Other considerations include the changing nature of social presence over the life of a course from social and affective processes to cohesive processes (Garrison, 2007). One of the reasons suggested for this is that as the community coalesces and becomes focused on successful academic outcomes the affective connections are deemphasized while the cohesive connections are emphasized (Garison, 2007). In response to this, it is recommended that open communication should be established from the onset of a course to ensure a sense of community (Garrison, 2007). As this sense of community is established and the focus of the group shifts to purposefully designed academic activities, the desire for social reinforcement declines. Students' familiarity with each other also enhances their social presence. In a study conducted by Shea and Bidjerano (2009) it was found that students felt getting to know their classmates gave them a sense of belonging and higher levels of cognitive

presence. While students like the sense of community not all students are comfortable communicating in this collaborative online environment nor feel free to disagree with others, and this may affect their performance (Lambert & Fisher, 2013). However, as the researchers note, the focus of an educational online community is on learning through reflection and discourse, not on socializing. Therefore there should be built into the course opportunities for the community to focus on inquiry and for students to be intellectually challenged and engaged. Elements necessary for the creation of the type of community in which there is a strong sense of social presence include honesty, responsiveness, relevance, respect, openness, empowerment, interaction, collaboration, and support from peers (Tolu, 2013)

In light of the above Lambert and Fisher (2013) suggest that "course structure, leadership, and learner connectedness must be designed into a course for a sense of community to develop in learning communities" (p. 1). Tolu (2013) suggests that to ensure social presence the three categories of social presence –open communication, group cohesion and affective expression, should be addressed. To facilitate open communication ensure an environment in which individuals feel secure and comfortable enough to express their opinions and participate in learning activities. Encourage interaction to develop a sense of trust. Group cohesion occurs when learners can identify themselves as part of the group and are willing to work together toward common goals. Learners take time to develop the bond that encourages the expression of emotions. Hence, effort should be made to create a welcoming and stress free environment. Provide opportunities for them to know one another, to collaborate and support each other, work on knowledge building activities that require objective feedback, develop trust, a sense of responsibility to contribute to group activities, and to value each other's opinion. (Lambert & Fisher, 2013, Tolu, 2013)

Designing for Cognitive presence

The development of cognitive presence is predicated upon strong social and teaching presence (Tolu, 2013). While in this environment teacher presence is distinguished from teaching presence in that teacher presence indicates teacher dominance while the teaching presence role is a shared by students and teacher, the instructor is expected to facilitate discourse by asking probing questions that require reflection, and to model appropriate responses that exemplify complex cognitive processing. They should also develop tasks that require approaches from differing perspectives (Bangert, 2009). This is useful not only to support cognitive presence but also an appreciation and respect for diversity. Students should transit through the various levels of the practical inquiry model to achieve deep and meaningful learning. This should be done in a learning environment that encourages high levels of critical thinking through providing opportunities for reflection and discourse, and analysis and synthesis (Garrison, Cleveland-Innes, & Fung 2010). Students should be encouraged to share, test and confirm their ideas. Garrison (2006) notes that "greater emphasis is placed on the facilitator to thread discussion, sustain commitment, encourage conversational approach, provide relevant information links, and resolve issues" (p. 30). The flexibility of an asynchronous online learning environment provides the opportunity for students to reflect on tasks, on inputs to the discussion from others, and on materials obtained elsewhere. This flexibility offers students greater independence and more control and responsibility for their learning. However, this does not negate the instructor's responsibility to ensure that the discussion does not falter or stray from the topic, to monitor the discussion board, to be cognizant and ready to clarify issues as they arise, and to ensure that the discussion progresses in a timely manner (Garrison, 2006).

Designers should be cognizant of the phases of the practical inquiry model and develop tasks relevant to each phase. To assist in moving the discussion to high levels of critical thinking designers should clarify the goals of the course and of the discussion so that students get a sense of how activities fit into the overall structure of the course. Students should be aware of various problem solving strategies and develop a metacognitive awareness of the level of their response. From the onset of the course they should be aware of the level of critical thinking expected. Designers should clarify course goals. Encourage students to identify and clarify individual and group goals for projects. The course should be designed in such a way that a learner centered environment is maintained.

Designing for Teaching Presence

A causal relationship has been established between teaching, social and cognitive presences with teaching presence playing a central role in developing and maintaining the other presences (Shea & Bidjerano, 2008, Garrison, Cleveland-Innes, & Fung, 2009). Direction and facilitation are critical functions of teaching presence that contribute to group cohesion particularly in an environment where high level critical thinking is required to resolve complex issues (garrison, 2007). Lambert and Fisher (2013) in their review of CoI research point out significant findings about teaching presence relevant to this discussion: 1) In addition to course design, teacher-led facilitation of discourse is influential in the formation of a CoI. 2) Instructors felt it was important that they purposefully

design, organize, facilitate, and direct the inquiry process within the online learning community, and 3) they also felt the need to provide more active and collaborative strategies in their courses. Teaching presence and students' satisfactory experience of a course are dependent on the instructor's design, support and direction of student activities (Arbaugh, Bangert, & Cleveland-Innes, 2010). Teaching and social presence facilitate reflection and dialogue and "represent the processes needed to create paths to epistemic engagement and cognitive presence for online learners" (Shea, Bidjerano, 2010, p. 351)

Since teaching presence is a shared role designers should provide opportunities within the course for students to contribute to the teaching process. To facilitate discourse when planning the process designers should incorporate materials and methods that will motivate students and encourage them to participate in class and group activities. Thy should model appropriate responses, ensure students feel a part of the group, guide students to high levels of critical thinking, constantly monitor the course assessing students participation and responses to ensure its effectiveness, be willing to change direction if necessary to ensure achievement of agreed upon goals. Another responsibility of teaching presence is to provide direct instruction. This involves providing materials that cover the foundations of the course, clarifying course expectations, providing access to supplementary materials, developing aspects of the course that encourage students' independent study, summarizing discussion, providing timely feedback, developing assessment methods that will confirm students understanding of content and processes, and clarify any misunderstandings (Garrison, 2006; Tolu, 2013).

Application to Collection Development Course Design

In this section samples of the actual Collection Development course design that demonstrate one of the implications from each CoI presence discussed above will be provided.

Sample A: Clarify Goals and Expectations

This collection development course is concerned with building library collections. The focus will be on the principles, procedures, attitudes and skills required by library paraprofessionals when they evaluate, select, acquire and weed/remove materials and other resources in the collection building process. This course will cover collection development policies; community needs assessment, selection of library materials, acquisitions, weeding, intellectual freedom, collection assessment and preservation. Students will also gain familiarity with the selection and use of the tools that facilitate and expedite the process.

Course Learning Outcomes

By the end of this course students will be able to

1. Assess user needs for library materials.
2. Justify the necessity of evaluating and maintaining library collections and describe various evaluation methods.
3. Be sensitive to the ethical, moral, social, legal and personal consequences of collection building decisions.
4. Select, verify, order, and receive various types of library materials including books, serials, electronic and other non-book formats, and justify their choices.
5. Develop and implement a library materials budget
6. Define the characteristics of a written Collection Development Policy, assess its value to the library collection, and discuss the challenges to its implementation.
7. Describe the main components of a preservation policy and a disaster plan and justify their use within a library or information organization.
8. List the main benefits of promoting the collection, discuss the principal methods of promotion, and identify the potential problems.

Sample B: Provide opportunity for critical reflection and discourse

Brainstorming exercise: The first anniversary is approaching for a recently established village branch library. The librarian wants to use this opportunity to sensitize the community to the library's presence, and the services it offers. However, the library has a limited budget. How can the library achieve its goal?

Discussion of Course readings:

Discussion and participation are important areas of assessment in this course. B prepared to participate in lively collegial discussion on designated topics related to assigned readings and coursework.

There will be a discussion thread for each chapter of your text. Students are expected to read the assigned material each week and post a response to the question provided. Students are also expected to respond to at least two posts. At the end of each week students should write a reflection on the week's discussion.
Provide opportunity for multi-perspective viewpoints.

Each group should select one of the following scenarios to discuss. You are encouraged to share your individual perspective considering your particular culture. Discuss not from a perspective of right or wrong or to discredit another person's point of view, but with an aim to merge what might be your disparate ideas. At the end of the week work together to present a summary of your group discussion in the class discussion area that will be provided. To avoid duplication, please indicate your group selection.

1. Should this book be made available in the Youth Services Department? "Are You a Teen Who Wants to Die? Here's How"
2. Should a library use filtering software?
3. The Library should not provide just any kind of information. What about books with "bad words" in them? Even some of the romance books they write nowadays barely border on pornography. Should we expose our people to these things? Discuss

Sample C: Establish a climate supportive of a CoI

Students will be expected to post an introduction on the LMS. They will be encouraged to share information about themselves, their island and their library and to upload a picture of themselves/family/country/library.

Conclusion

Part of the teaching presence responsibility lies with the instructor who should ensure that the course is designed in alignment with the academic standards of the discipline. The process of a purposeful collaborative course design implies an awareness and sensitivity to local needs that will encourage the inclusion of relevant local material. The practical inquiry model embedded in cognitive presence offers a process for students' transition to high level critical thinking.

This concept paper responds to the need to explore the community of inquiry framework in new areas of study since the framework is explored in the library science content area. Library science is not offered online by any institution of learning within the OECS. The community of inquiry framework is appropriate since it offers a process for course development and online learning facilitation. The social, cognitive and teaching presence focuses the paper on the specific elements to target. Participants in a purposeful online environment should participate in knowledge building. This is a collaborative knowledge building process that encourages high level critical thinking. This cannot be achieved without both the teaching presence of participants and teachers cognizant of their responsibility to design and facilitate learning. The influence of the presences on course design has been explored and examples of their use to inform a collection development course have been provided. The community of inquiry therefore provides the appropriate theoretical lens through which to focus the course design.

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Technology Enhanced Learning Strategies in K-12 Classrooms

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Abstract

This brief paper reports on the study conducted to determine how the current K-12 teachers integrate technology into teaching and learning processes. The findings indicated a general lack of effective strategies essential for meaningful integration into the curriculum. Based on extensive review of research-based literature, this paper offers strategies that current K-12 teachers need in order to integrate 21st century technology effectively. In addition, the paper offers suggestions for teacher preparation and professional development programs to ensure effective technology training for in-service and pre-service teachers.

Introduction

The last decade has seen an increase in pre-service teacher technology courses, in-service teacher technology professional development (Blocher, et.al, 2011; Hughes, 2004, Ntuli, 2010), and technology funding for school infrastructure that support STEM education such as; Promethean boards, ipads, etc., (Amiel & Reeves, 2008; Bohlin, 2002; Chen, 2004). Research in the last few decades documented how difficult it has been for teachers to integrate technology as an instructional tool into the curriculum (Bauer & Kenton, 2005; National Center for Education Statistics, 2000). Previous studies revealed that teachers lacked technology pedagogical strategies (Doering, Hughes & Huffman, 2003; Hew & Brush, 2007; Hughes, 2004; Mishra & Kohler, 2006; Schrum, 1999; Struddler & Wetzel, 1999) necessary to support effective teaching and learning activities in various disciplines. With the increase in pre-service technology courses at teacher preparation programs and in-service teacher professional development in the last decade, the researcher wanted to find out the progress in technology integration in the curriculum brought by the current technology courses and professional development.

Methodology

The purpose of the study was to determine how current K-12 in-service teachers integrate technology into teaching and learning processes. It is important to note that permission was sought before recruiting participants. An explanatory mixed method approach was employed to gather and analyze data for this study. An explanatory mixed method research design is a procedure that employs both quantitative and qualitative research methods in collecting and analyzing data (Cresswell, 2011). The first phase of the data involved the collection of survey data from a purposeful sample (Patton, 1990) of 46 K-12 teachers from school districts in Idaho. The survey consisted of both open and closed-ended questions which yielded both quantitative and qualitative data. In the second phase, ten teachers were selected using "typical sampling" and asked to participate in a semi- structured interview which lasted approximately one hour. "A *typical* sample would be one that is selected because it reflects the average person, situation, or instance of the phenomenon of interest" (Merriam, 1998, p. 62). The interview data provided complementary findings that supported the information gathered from the surveys (Gall, Borg, & Gall, 2006; Creswell, 2011).

Research questions which guided the study included the following: In what ways do K-12 teachers integrate technology in the classroom? What are the current challenges and barriers to technology integration? What recommendations do teachers have to minimize the barriers to technology integration?

Findings and Discussions

Due to limited space, this brief paper focuses on the findings from research questions two and three. Holding other things such as inadequate computer resources in the classrooms, limited time to prepare for technology integrated activities, etc., constant, the findings of this study reveal that one of the greatest barriers to technology integration today is a lack of knowledge of active learning strategies that could be utilized in technology integrated classrooms (and curriculum). More than eighty percent of the teachers who participated indicated that they need new skills and strategies to cope with new technologies and how to implement such technologies into the pedagogy. The findings also revealed that though the technology courses have increased at pre-service teacher

preparation level and in-service teacher professional development, there is still inadequate infusion of technology pedagogical knowledge (TPK); the courses do not offer in depth technology strategies necessary for effective technology integration in the classroom.

Teacher recommendations call for pre-service technology courses and in-service teacher professional development curriculum to infuse active learning strategies aligned with instructional technology tools. Based on extensive literature review (Brush & Saye; 2009; Faust & Paulson, 1998; Marzano, Pickering & Pollock, 2001; Smith & Throne, 2007), pre-service teacher technology courses and in-service professional development curriculum need to include the following teaching strategies aligned with the technologies (see Table 1).

Table 1. Active Learning Strategies Aligned with Technologies

Instructional Strategies	**Sample Technologies**	**Classroom Application**
1. Identifying similarities and differences	Tables (Microsoft Word Software) Lucid charts www.lucidcharts.com Inspiration www.inspiration.com Kidspiration- www.inspiration.com/Kidspiration	Students can use graphic organizers to represent similarities and differences in graphic and symbolic form. Sorting, classifying, and using metaphors and analogies.
2. Identifying relationships or connections among concepts	Mind42 www.mind42.com Lucid charts www.lucidcharts.com Inspiration www.inspiration.com Kidspiration	Concept maps to identify or show relationships among concepts related to a particular topic or idea.
3. Electronic Brainstorming	Scribblar- http://www.scribblar.com/dmucs16 Padlet -http://padlet.com/ Mind42- http://mind42.com/ *Lucidcharts* https-://www.lucidchart.com/	Generate ideas at the beginning, middle, or end of the class.
Summarizing and note taking	<u>Take pictures using:</u> smartphones, digital cameras, and tablets <u>Create slide show using:</u> Slideshare www.slideshare.com Prezi www.prezi.com Lucidpress www.lucidpress.com Powerpoint (Microsoft Office)	Take pictures as a way to document evidence or take notes. A slide show may be created as a way to summarize what has been learned, or clarify information at the beginning, middle, or end of class.
Authentic learning experiences	<u>Virtual Field Trips/ Webquests</u> <u>Google Earth:</u> http://www.google.com/earth/ http://www.tramline.com/trips.htm <u>Webcams:</u> http://mrssmoke.onsugar.com/Visual-Field-Trips---Webcam-Feeds-Classroom-Viewing-2959452 http://www.educationworld.com/a_tech/sites/sites081.shtml <u>Global Trek:</u> http://teacher.scholastic.com/activities/globaltrek/	Use of virtual field trips or webquests for authentic learning experiences.

Homework and practice	<u>Create Podcasts/ instructional videos using:</u> VoiceThread www.voicethread.com Yodio http://www.yodio.com Windows Movie Maker <u>Create electronic portfolios using:</u> Edmodo https://www.edmodo.com/ PbWorks www.pbworks.com Wikispaces http://www.wikispaces.com/ Google sites www.googlesite.com	Homework and practice to extend learning beyond the classroom.
Nonlinguistic representations	<u>Graphing:</u> mathcats.com http://www.mathcats.com <u>3D Graphics:</u> Google sketch http://google-sketchup.en.softonic.com/ <u>Graphic organizers:</u> Mypaint: http://mypaint.intilinux.com/ Classtools.net: www.classtools.net *Lucidcharts* https-://www.lucidchart.com/ Inspiration www.inspiration.com	Graphing provides another way for students to understand relationships in numbers. Young children can express their understanding of curricular targets through pictures and drawings. Before they can read and write drawings and pictures play an important role.
Cooperative learning	<u>Interactive Documents</u> Zoho docs https://docs.zoho.com google docs https://drive.google.com <u>Discussion Boards</u> Edmodo https://www.edmodo.com/ PbWorks www.pbworks.com Wikispaces http://wikispaces.com Google groups www.google.com	Interactive electronic documents allow for cooperative/collaborative learning beyond the classroom. Using discussion boards to generate ideas on a topic or concept at the beginning, middle, or end of the class. Discussions could be extended beyond the classroom. Home-bound students may participate in the discussions. Electronic discussion board allow for think-pair-share strategy with students in other classes or within the same class.
Setting objectives and providing feedback, questions, and cues	Socrative www.socrative.com Testmoz www.testmoz.com QuizStar www.quizstar.com Poll Everywhere www.polleverywhere.com Quia www.quia.com Kubbu www.kubbu.com Rubrics http://rubistar.4teachers.org/ Engrade https://engrade.com/	The technologies in this section could be used for ongoing assessment aligned with objectives such as; multiple choice, true/false, flash cards, short essays, exit tickets, rubrics, self-assessment, peer-review or student-led feedback, teacher feedback, etc.

Generating and testing hypotheses	Webquests: Museum Scavenger Hunt http://zunal.com/webquest.php?w=39835 Use Simulations: http://phet.colorado.edu/en/simulations/category/new National Library of Virtual Manipulatives -http://nlvm.usu.edu/	Research projects which use webquests; students may investigate and generate more knowledge through searching for more information online. Predictions or assumptions leading to problem solving or decision making may be tested using web-based simulations. Investigation and experimental inquiry using simulations.

Conclusion and Recommendations

Based on the findings, current teachers still lack technology pedagogical strategies meaningful in authentic learning experiences. Though this paper offers research-based active technology pedagogical strategies that could be integrated in K-12 classrooms, the researcher advocates for teacher preparation programs to infuse technology field experience in their curriculum. The technology field experience should require pre-service teachers to be paired with a cooperating teacher of their choice for the whole semester. The pre-service teacher should help with designing and planning for technology integrated lessons and activities in the in-service teacher's classroom. This type of field experience provides the teacher candidates with an opportunity to apply new technologies learned in the instructional technology course into a real-life classroom as well as to observe and learn how in-service teachers integrate technology tools into the curriculum. Pre-service teachers should be required to bring back from the field experience technology integration issues for discussion, and new ideas into for the technology course. This helps with authentic classroom experience and "self-identified technology connections" (Hughes, 2004) which have been lacking in technology courses. Technology field experience is different from structured clinical experiences in that it is more relaxed and cooperating teachers do not have to be stressed by evaluations required at the end of an 'organized' or structured clinical experience or practicum.

Besides technology field experience, instructional technology courses and professional development should be organized into three groups; beginning, intermediate, and advanced courses. The findings of the study indicate that teachers have a problem with courses that do not meet their needs. Either courses are beyond what they can comprehend because of limited background knowledge or they offer what they already know.

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The Role of Digital Game-Based Learning in Enhancing Social Presence

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Descriptors: DGBL, Social Presence

Abstract

The advances in Computer Information Technologies (CIT), have caused a paradigm shift especially in education. Also, learners have changed drastically over the last two decades. This has necessitated a new approach to learning and teaching as well as a new medium to educate the new learners in order to meet their needs and make learning more intrinsically motivating for them. Digital Game Based Learning is now considered to be an effective approach in teaching the learners of today. There has been research in the development of DGBL; however, the majority of this research focused primarily on the design and efficacy of DGBL and the relationship between DGBL and social presence has been targeted in the research in this field rudimentarily. As a result, the purpose of the present study is to analyze DGBL and social presence separately and find out the shared interests of both fields. The results of the study indicate that there might be a close relationship between the two and social presence may impact DGBL positively, and at the same time DGBL can be used to develop higher social presence in online learning.

1. Introduction

With the advances in the information communication technologies (ICT), there has been a move from industrial age to information age which has caused a paradigm shift in the way people communicate, live and learn (Galarneau & Zibit, 2007, p. 62; Kearney, 2006, p. 39). One of the basic changes is about the type of learners of the 21st century. Learners today, especially the children born after 1990 are said to have grown up in a digital world where there is intensive use of digital games and mobile technologies (Johnson, Smith, Levine & Haywood, 2010, p. 17; Kaplan-Akıllı, 2007, p. 3; Prensky, 2003). Wilen-Daugenti (2009) reports that "According to a 2003 Pew Internet and American Life Project Survey of College Students and Gaming, 70% of college students reported playing video, computer or online games 'at least once in a while' and 65% reported being regular or occasional game players" (p. 35) and the percent of gamers seem to be on the increase as well (p. 37). Considering the eleven years that has passed since, the impressive growth of gaming industry and the widespread use of games thanks to mobile technologies, it is possible to anticipate that the number of gamers are rocketing today. As the learners have changed with their experiences with online technologies, online environments became a widely accepted media for education. Nevertheless, Johnson and Aragon (2003) argue that "Instructional designers need to look for innovative ways to support quality teaching and learning without succumbing to the temptation to have online instruction become direct instantiations of traditional forms of instruction." (p. 33).

Papert and Caperton believe that this change in the structure of the society both necessitates and allows for a new form of education (as cited in Galarneau & Zibit, 2007; p. 60). Prensky (2001a) also argues that new learners have different educational needs (p.5). It is, therefore, believed that the new educational system should prepare students for the requirements of the new century (Dede, 2000; Galarneau & Zibit, 2007,) and help them develop the following skills (Dede, 2000):

- collaborate with diverse teams of people—face-to-face or at a distance—to accomplish a task
- create, share, and master knowledge by assessing and filtering quasi-accurate information
- thrive on chaos, that is, to make rapid decisions based on incomplete information to resolve novel dilemmas.

With this in mind, some experts like Sir Ken Robinson (2010) advocate a revolution in education emphasizing that learning for its own sake does not attract students anymore. In accordance with this, Prensky (2001a) proposes edutainment- a situation where learning is the outcome but the means is entertainment- and Digital Game-Based Learning (DGBL). Games are considered to be an integral part of learning and in the new millennium these games

are transferred to digital platforms. “Many researches show that computer games are widely accepted as an alternative to traditional ways of teaching and learning” (Shen and O’Neil, 2006, p. 2), and advocates of such games believe especially serious games will bring forth the revolution that is called for by Sir Ken Robinson (Mayer and Bekebrede, 2006, p. 141). However, until recent times there was “Only one researcher [who] mentions specific strategies such as moving away from recorded lectures, readings, homework and tests toward more interactive and active learning environments like virtual teams, games, case studies etc.” (Johnson and Aragon, 2003 as cited in Dixson, 2010, p. 2).

Wilen-Daugenty (2009) also indicates that digital games can be considered as “valuable learning mechanisms” (p. 38). In addition, it is believed that digital games can furnish learners with the necessary skills that are required in the new world order. As an example, Pivec and Dziabenko (2004) report that DGBL is intended to prepare individuals for the business world by enabling them to acquire the new skills that are necessitated by the developments in Information Communication Technologies. They give Minerva Project UniGame: Game-Based Learning in Universities and Lifelong learning as an example to this end (p. 1). One game within this project is UniGame: Social Skills and Knowledge Training. In this game, the students play a game involving in teamwork and a series of discussions in order to finish the game. They can use emoticons during their conversations (p. 5). This type of games are considered to be invaluable in developing 21st century skills.

Although games have been an integral part of education for centuries, digital games are now widely used for educational purposes attracting not only children but also adults (Pivec, Dziabenko & Shinnerl, 2003, pp. 222-223). One reason why digital games are becoming so popular is not only entertaining the students as they learn but also to foster collaboration among students who are playing the same game.

Reeves, Herrington and Oliver believe that interaction is a key factor in online learning environments and only better programming does not ensure interaction, therefore understanding the new phenomenon that is closely linked to collaborative learning is essential (as cited in Bowers, Smith & Canon-Bowers, 2009, p. 703). These are also the expectations of the students as especially distance learners do not simply expect more availability but they now want “multiple forms of interaction and individualization” (Chen, Chen & Liu, 2010, p. 76). Rieber (1996) believes technological advances can create new interactive environments which are designed and substantiated by learning theories (as cited in Kaplan-Akıllı, 2007, p. 7). Chen, Chen and Liu (2010) also claim DGBL just offers this with its emphasis on multiple forms of interaction (p. 76).

One of the reasons why DGBL is considered to be a significant trend in learning is its contribution to socialization of learners. Gibson, Aldrich and and Prensky (2007) predict that digital “games and simulations are central to the future of education” (p. iX) Despite this prediction, there is limited research on how digital games for learning can be used for enhancing social presence in online learning environments. In a meta-analysis of eighty nine research articles which were selected from 256 documents on the design, use and evaluation of computer-based games for education, Ke (2009) found that the central issues in DGBL research were about motivation and engagement, student retention, knowledge gain, cognitive development and feedback (pp. 8-20) and he also classifies these 89 empirical studies on DGBL into five categories according to their research purposes (p. 20):

- evaluating the effects of computer based game on learning (65/89),
- exploring effective instructional game design (17/89)
- exploring game-based learning activity or pedagogy (9/89)
- evaluating the learner characteristics (10/89)
- investigating cognitive or motivational processes during game playing (4/89)

The results indicate that the researched factors that contribute to learning with digital games are usually limited to motivation, feedback, and learning itself. Wu, Richards and Saw (2014) argue that although DGBL has motivational contribution to learning, the specific aspects of gaming that lead to motivation have not been targeted in many research in the field. For instance, the factors that lead to and foster socialization and its effect on learning is not researched deeply, and there is a need for research in the relationship between social presence and DGBL.

As a result, the purpose of this study is to provide a review of digital game based learning and social presence; and suggest the use of DGBL to enhance interaction and social presence in education. In accordance with this, the following research questions are considered:

1. To what extent do digital games foster collaboration?
2. How does social presence impact DGBL?

2. Literature Review

2.1. Digital Game-Based Learning

Although games have been used in education widely, the type of games and the medium that the game is played has differed significantly in the last 20 years. DGBL which "involves highly engaging hypermedia often including player-defined nonlinear texts with audio and video" (Gibson, Aldrich & Prensky, 2007, p. ix) is getting popular in education, however "research and development of digital games and simulations in online learning is in its infancy" (Gibson, Aldrich & Prensky, 2007, p. ix). According to Prensky (2001a). digital games not only meet the demands of the new type of learners, but "Digital Game-Based Learning is precisely about fun and engagement, and the coming together of and serious learning and interactive entertainment into a newly emerging and highly exciting medium — Digital Learning Games" (p.5)

A model for game-based learning is provided by Garris et al. (as cited in Pivec, Dziabenko & Shinnerl, 2003):

Figure 1. Model of game-based learning modeled by Garris et al. (2000) (As cited in Pivec, 217)

The model for DGBL would be no different, with an exception about instructional content. As many commercial digital games can also be used for education, there may not be real instructional content such as in War of Warcraft, but the instructional design can be made in such a way that though there is no instructional content, the game can be used for instruction.

Several characteristics of DGBL are identified by researchers. One of the characteristics that is identified by researchers is that DGBL is motivating and engaging for the learners. (Ke, 2009; Kasvi as cited in Kearney, 2006; Mayer, 2005; Skyes, 2006; Tüzün, 2006; Van Eck, 2006; Woo, 2014; Wu, Richards & Saw 2014). This is especially important because many teachers are seeking ways to motivate the new type of learners and engage them in the learning task. There are reasons that make DGBL motivating. First, there is a vast use of dynamic visuals (Pivec, Dziabenko & Shinnerl, 2003). Moreover, it provides interaction with the game and other players instead of being passive recipient of information. (Chen, Chen & Liu, 2010, p.76; Kasvi as cited in Kearney, 2006; Pivec, Dziabenko & Shinnerl, 2003; Prensky, 2001b; Skyes, 2006) Therefore, digital games provide a community of learning where learners interact with eachother as well as with the instructors. As a result of multiple interactions, DGBL fosters collaboration among players (Kasvi as cited in Kearney, 2006; Mayer, 2005, p. 37; Oksanen, 2014; Pivec, Dziabenko & Shinnerl, 2003; Wilen-Daugenti, 2009). Kasvi believes multiplayer games have most of these characteristics and bring the best results.

The other characteristics of digital games are also found relevant to learning. Primarily, in digital games there are rules (Pivec, Dziabenko & Shinnerl, 2003; Prensky, 2001b) and there is a specific goal to be achieved (Kasvi as cited in Kearney, 2006; Pivec, Dziabenko & Shinnerl, 2003; Prensky, 2001b). While trying to reach the goal, the players are challenged and challenge and risk are an integral part of most digital games (Prensky, 2001b; Pivec, Dziabenko & Shinnerl, 2003; Kasvi as cited in Kearney, 2006). Thanks to these challenges it is believed that DGBL helps problem-solving skills (Prensky, 2001b). DGBL helps problem solving also partly due to the fact that that the digital games provide immediate feedback. (Prensky, 2001b; Skyes, 2006; Kasvi as cited in Kearney, 2006; Qian, 2009). The learners get the results of their actions, learn by trial and error and find working solutions. Erhel & Jamet (2013) found that especially in serious game environments the feedback results in motivation which also leads to deep learning. The result is that digital games cause a flow state (Cowley, Charles, Black & Hickey, 2008; Prensky, 2001b).

Most of the characteristics summarized above are related to the learners. However, Skyes (2006) believes that there are also benefits for the teachers such as DGBL allows the teacher to be supportive rather than judging especially in assessment and in the highly populated higher education where one teacher has to deal with hundreds

of students. It can also reduce the workload of the instructors by changing their role from teacher to guider, facilitator.

Based on these characteristics, Prensky postulates that "practice and feedback, learning by doing, learning from mistakes, goal oriented learning, discovery learning, task-based learning, question-based learning, situated learning, role playing, coaching, constructivist learning, multisensory learning" are the techniques that can be used in DGBL (as cited in Kaplan-Akıllı, 2007, p. 6).

Kretschmann (2010) identifies two types of digital games "depending on the type of software" that are used in educational settings: One is specifically designed for education by educators or professional game designers and the other is the game software that is not designed for education but used by educators such as "commercial off-the-shelf games" that is COTS (p. 67). Van Eck (2006) believes COTS are more effective in DGBL as the games are designed by game designers, which is better, and the design of learning is made by teachers (p. 7). Galarneau and Zibit (2007) argue that especially Multiplayer Online Games (MOG) develop collaborative skills such as "critical thinking, teamwork, problem-solving, collaboration, facility with technology, information literacy" thanks to their inherent collaboration and they claim that unlike "an educational or serious game, where learning objectives are designed into the game" online games develop such skills "organically" and "quite unintentionally" (p. 61)

2.1.1.DGBL Research

Tüzün (2006) reports that educational computer games are motivating because of challenge, curiosity, control, context and fantasy, but upon the analysis of the data he gathered for the evaluation of Quest Atlantis "an educational computer game that immerses children in a 3-D virtual environment for completing educational activities", there were other categories that fostered motivation in educational computer games such as uniqueness, creativity, ownership, context an support (p. 76).

Some commercial games are used for education at educational institutions to furnish students with specific skills. For instance, it is reported that The World of Warcraft in School Project is used to teach skills like "communication, digital literacy, online safety, mathematics, and leadership through the game play" in Suffern Middle School in New York and Cape Fear Middle School (Johnson et al., 2010, p. 19).

In a study by Lin, Tsai and Chien (2011) it was found that in teaching English communication abilities, students playing three online games provided by Facebook such as Guessing Song King, Farm Ville and City Ville with an international population of players were able to develop abilities of social interaction, communication and the students indicated that they were more motivated to learn English in the long term as they were able to find real people to interact with in the online game, thus felt more sociable, satisfied and internationalized (p. 153).

A similar study was conducted by Wu, Richards and Saw (2014). The researchers investigated the role of massive multiplayer online role-playing game (MMORPG) in communicative competence of English learners in a mixed-design research. Based on the quantitative data they collected, the researchers highlight the importance of relatedness in playing the MMORPG which was observed to have a positive impact on the communicative abilities of the English learners.

Yien, Hung, Hwang and Lin (2011) also conducted a study by using quasi-experimental nonequivalent-control group design while analyzing the achievements of students in nutrition education by using computer games, and the researchers found that the learning achievement of the students who learned with digital games was higher and those students also reported more positive attitudes towards learning.

In yet another study by 42 students, Martinson and Chu (2009) researched student attitudes towards using digital games for learning. The results were promising. A high majority of students (95%) believed that computer games could be used as learning tools.

Sung and Hwang (2013) developed a collaborative game-based learning environment by integrating a grid-based Mindtool. In their experimental study, the experimental group was taught with collaborative educational computer game with repertory grid, control group A was taught with collaborative educational computer game without repertory grid, and control group B was taught with educational computer game with repertory grid where the students learned individually. The result of the study revealed that the grid-based collaborative game resulted in higher learning achievement, motivation and a better attitude.

All these findings, however, do not ensure that DGBL is what exactly students are looking for as there are some research findings which indicate that some students do not prefer games for learning. For instance, in their study Chen, Chen and Liu (2010) found that most of the students (56.6% of students in their study) were "philosophically opposed to online gaming" as they believed it could distract them in the learning process (p. 82). Whitton (2007) also found that although students primarily believed that they could use computer games to learn if the games would be the best medium to learn, they are not necessarily motivating; therefore the researcher concluded that the design of the game played a significant role in the motivation of students for learning.

Van Eck (2006) argues that most of the research "has focused on efficacy (the message that games can be effective) rather than on explanation (why and how they are effective) and prescription (how to actually implement DGBL) (p. 2). Therefore further research is needed to improve DGBL in favor of learning.

2.2. Social Presence

The original social presence theory was developed by John Short, Ederyn Williams and Bruce Christie in 1976 who define social presence as "the degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships" (Krejins, Kirschner, Jochems and Buuren, 2007, p. 180). While the early research on social presence in 1990s tried to prove the sociability of Computer Mediated Communication (CMC), later in 2000s the theory of social presence is evaluated in terms of "how people use communication media rather than any supposed inherent qualities of them" (Lowenthal & Dunlap, 2010, p. 70). As such, Gunawardena and Zittle (1997) define social presence as "the degree to which a person is perceived as real in mediated communication" (p. 8). Moreover, another definition came from Garrison, Anderson and Archer (2000) who defined social presence as "the ability of participants in a community of inquiry to project themselves socially and emotionally, as 'real' people (i.e., their full personality), through the medium of communication being used" (as cited in Garrison and Anderson, 2003, p. 49). Most of these definitions were general definitions of presence in any mediated communication.

Along with the emphasis in collaborative learning and the possibility of supporting collaboration through e-learning mechanisms, the definition of social presence began to be used also for online learning environments. It was argued that especially Computer Supported Collaborative Learning (CSCL) would promote the construction of knowledge (Vinagre, 2008, p. 1022) and "Collaborative learning engages students in knowledge sharing, inspiring one another, depending upon one another, and applying active social interaction." (Tu & Corry, 2003, p. 52), but this is only possible with appropriate levels social presence. One frequently quoted definition in this context is that "Social presence is a measure of the feeling of community that a learner experiences in an online environment" (Tu and McIsaac, 2002, p. 131). Gunawardena (1995) believes that a sense of online community promotes collaborative learning (Krejins et al., 2007, p. 178). This feeling of community is of utmost importance because as Garrison and Anderson (2003) argue "Education and learning, in its best sense is a collaboration, which includes a sense of belonging and acceptance in a group with common interests" (p. 49). Being a part of an online community is, as a result, closely linked to social presence. Tu (2000) predicts that the interaction in online environments cannot be attained in the absence of or with low levels of social presence (p. 30). This also complies with Fu, Wu and Ho's (2009) definition of social presence "as the sense of awareness of an interaction partner" (p. 553) To illustrate, So and Brush examined the relationships between perception of collaborative learning, perception of social presence and satisfaction, and they found that there is a positive correlation between these factors (as cited in Biasutti, 2011, p. 1866).

Wiener and Mehrabian identified two concepts of social presence: intimacy which refers to "the physical representation of closeness, and immediacy which refers to the psychological distance between the communication subjects" (as cited in Rau, Gao & Wu, 2008, p. 3).

In addition to the two concepts of social presence, Tu (2000) proposes three dimensions of social presence: social context referring to "task orientation, privacy, topics, recipients/social relationships, and social processes" (p. 29); online communication referring to "the attributes of the language used on-line and the application of on-line language" (p.29) and interactivity referring to "the activities in which CMC users engage and "the communication styles they use" (p. 30).

There are also many empirical research that relates social presence to satisfaction with the course (e.g. Gunawardena & Zittle, 1997, p. 19; Johnson, Hornik and Salas as cited in Biasutti, 2011, p. 1866; So and Brush , 2008, p. 321; Rau, Gao & Wu, 2008, p. 3). It has also been found that social presence contributes to cognitive presence (Garrison & Anderson, 2003; Archibald, 2010). Moreover, social presence was found as a significant factor that affects student participation and motivation (Vrasidas and McIsaac, 1999, cited in So and Brush, 2008, p. 330). Similar results were also found by Fu, Wu and Ho (2009) whose study yielded that different degrees of social presence led to different levels of enjoyment and performance (p. 559).

With its impact on interactions, collaboration, motivation, satisfaction and engagement, social presence has become one of the basic concerns in online learning.

3. Social Presence and DGBL

It has been noted by several researchers that collaboration and social presence are closely linked to each other as people tend to communicate and collaborate more effectively when they feel the presence of others in a mediated environment (Garrison & Anderson, 2003). Moreover, social presence has been identified as a significant

factor affecting student satisfaction and learning outcomes (Johnson, Hornik and Salas as cited in Biasutti, 2011, p. 1866; So and Brush as cited in Biasutti, 2011, p. 1866). "It is hypothesized that using strategies to improve social context, online communication, and interactivity will increase interaction of online students and instructors in online classes." (Tu & McIsaac, 2002, p. 132). De Kort, IJsselsteijn and Poels (2007) define digital gaming technology as "social presence technology as it provides a setting and medium for interacting with others at a distance (e.g., in online gaming) and augments and enlivens communication in co-located settings. "(p. 2). Therefore, digital games for learning and DGBL which have a high potential for collaboration among learners should be evaluated in order to understand to what extent digital games can be used to foster social presence in online environments.

Tu and McIsaac (2003) propose five items that may have positive effect on social presence:

- familiarity with recipients,
- informal relationships,
- better trust relationships,
- personally informative relationships,
- positive psychological attitude toward to technology, and
- more-private locations. (p. 140)

Most of these items can be found in DGBL. For instance, as most digital games focus on collaboration to solve problems and to achieve the learning outcome, trust relationships are required in DGBL, which may have an effect on social presence. Moreover, in DGBL, learners need to work towards the learning task by sharing information, and it is possible that the gamer learners may meet in settings other than the game itself which may lead to informal relationships. Examples can be seen in several forums about how to accomplish tasks in World of Warcraft. More importantly, as the new generation of learners is born with this technology, they already have positive psychological attitudes towards gaming technology and they may develop higher levels of social presence thanks to DGBL.

One concept of social presence is considered to be immediacy which is "the psychological distance between a communicator and the recipient of the communication" (Tu, 2001, p. 47) As Prensky (2001b) points out "Games have interaction. That gives us social groups. Games have representation and story. That gives us emotion." In online educational games immediacy can be attained through the game personas that can be in the game environment with their emotions which would reduce the psychological distance between learners.

Bannert, Piehler and Pietschmann (2008) argue that aspects of social presence on learning can be transferred to game environments as players seek emotional relationship while trying to attain the learning goal (p.2-3) This emotional relationship can be fostered by interaction. Mitchell maintains that "games are complex learning systems that involve virtual worlds, communities of practice (social learning that occurs when participating in social learning practices), trade, blogs, and developer communities" (as cited in Wilen-Daugenti, 2009, p. 39). Kelly also asserts that players in games are "judged by their characters actions", experience "spontaneous kindness" and make "genuine friendships" (as cited in Galarneau & Zibit, 2007, p. 81) which can be related to the social presence of learners. According to the results of an online survey with 346 usable responses, "the majority of respondents reported they felt that multiplayer games encouraged communication through interaction and allowed communication with diverse individuals" (Barton & Maharg, 2007, p. 160).

Chou and Min (2009) argue that "person-oriented activities such as a judgment task are likely to require media high in social presence" (p. 418). Considering the fact that most practices of DGBL are person oriented due to their collaborative nature, social presence within such environments need to be investigated.

Another characteristic of DGBL is its being challenging and competitive (Prensky, 2001b; Pivec, Dziabenko & Shinnerl, 2003; Kasvi as cited in Kearney, 2006). One of the task types that has an effect on the degree of social presence is identified as "competitive performances with opponents or external standards" (Tu, 2001, p. 48). As such, DGBL can be considered as means to provide the competitive atmosphere with the other players and impact social presence.

Perhaps one of the most important factors that contribute to social presence is paralinguistic information. By nature, "Online gaming is a social learning tool and it provides multiple forms of interaction." (Chen, Chen & Liu, 2010, p.83). Moreover, it is stated that games have paralinguistic information (Skyes, 2006). Specifically, the Massively Multiplayer Online Games (MMOG) which are considered to be a Multiuser Virtual Environment (MUVE) as well, allow players to adopt avatars that can act like real humans and therefore provide interaction and communication similar to face to face communication. As a result, "Social presence can be increased by providing non-verbal cues such as eye gaze, dress and posture" (Bowers, Smith & Cannon-Bowers, 2009) in MMOGs. Factors that contribute to social presence in a face to face encounter are identified as facial expression, direction of gaze, posture, dress, non-verbal, and vocal cues (Tu, 2000, p. 28; Tu, 2001, p. 47) and these can be replicated in MMOGs through avatars which can contribute to social presence of learners when applied as DGBL practices.

Edirisinga, Nie, Pluciennik and Young (2009) argue that MUVEs that are designed primarily for gaming but initially are used for learning can be used to develop social presence, however, they claim there is little research on the socialization of learners in such environments through the creation of avatars (p. 459).One identifying characteristic of MMOG is the physical presence of the players. This type of presence Debbabi and Baile (2008) purport, "seems to be 'real', 'direct' and 'immediate'" (p. 1575). One example of such environments is Second Life (SL) developed by Linden Labs in 2003 (Wilen-Daugenti, 2009, p. 44). Although Second Life is not considered by some as a game (Pursel, 2009, p. 29), some regard it as a game environment (Jin, 2011, p. 468, Oliverio & Beck, 2009; Pereira, 2009; Wilen-Daugenti, 2009, p. 44). Oliverio and Beck (2009) argue that SL embodies all factors such as "a sense of social interaction, a visual indication of level of participation, and 3-D models for instruction or simulation" that enhance the learning environment (p. 146). Second Life is an environment where "Physical presence (as avatars) in MUVEs also gives students and teachers a feeling of physically (albeit virtually) being there, otherwise known as telepresence" (Burgess, Slate, LeBouef & LaPrairie, 2010, p. 84) and the results of Burgess et al.'s study indicated that "affective expression, open communication, group cohesion, emotive expression, real life references, and initiation of after-class activities" were proved to be contributing to social presence. Pereira (2009) who combined SL as a virtual world and digital gaming in and English language teaching project argues that "with their immersive 3D environments, avatars, and communication tools, are able to provide the highest level of social presence in an online environment, which may lead to more realistic embodied experiences and authentic social interaction" (p. 24). Therefore, environments like Second Life can be used to foster social presence of learners.

It was argued by Short, Williams and Christie that "absence of visual channel reduces the possibilities for expression of socio-emotional material and decreases the information available about the other's self-image, attitudes, moods, and reactions" (as cited in Garrison and Anderson, 2003, p. 49). It is therefore, within the inherent characteristics of digital games to provide a wide spectrum of visual channel.

Despite the promise of using MMOGs for education and fostering collaboration in such environments, Bowers,Smith and Canon-Bowers (2009) contend that such technologies can validate better learning only if they are planned based on sound theoretical foundations and they believe psychological theory is the most important one. Social presence serves here as a foundation for DGBL research. Both DGBL and social presence have shared interests which are presented in Table 1:

Table 1. Shared interests of DGBL and social presence

DGBL	**Social presence**
Provides a community of learning	Is necessary to build a learning community
Fosters collaboration among learners	Promotes collaboration
Necessitates interaction	Affects interactions among learners
Helps learners to see representations of peers through avatars and other virtual representations	Visual cues enhance higher social presence
Includes paralinguistic information	Is enhanced with paralinguistic information
Game personas provide immediacy	Reduces psychological distance between learners
Challenging and competitive	Is affected by competition
Engages learners	Provides engagement when the learners perceive others

As Table 1 demonstrates, the relationship between DGBL and social presence is built upon the nature of the task in DGBL and social presence's effect on this new form of learning is especially on building communities of learning with high motivation through highly collaborative learning experiences that requires and promotes interaction.

Though the number of studies that focus on the relationship between DGBL and social presence is limited there are some studies that try to explain the relationship between the two. Lee et al. (2011) compared three groups in terms of the effects of networked interactivity on the learning outcomes and the role of social presence. One of the groups studied the topic with an online educational quiz game where they could monitor the performance of three other players, the second group played an offline educational quiz game and the last group was given a traditional classroom lecture on the same topic. The results of the study yielded that networked interactivity in the former contributed positively on learning, test performance and social presence while social presence in turn was related to several learning outcomes such as sense of competition, satisfaction and perceived efficiency.

In yet another study, Marklund et al. (2014) designed a MUVE for project-based learning with a game-based approach in a project-based learning (PBL). The purpose of the project was to provide a social channel that

would strengthen the informal bonds of the learners, which presumably would contribute to the outcomes. The results of their study revealed that the acceptance of such a design was high, but there was also the challenge of designing an effective environment that ensures both learning and social bonding. , but there was also the challenge of designing an effective environment that ensures both learning and social bonding.

Conclusion

Being a new field of research, DGBL has a potential to be uncovered. Although there has been few research into DGBL's relation with social presence, the shared interests between both topics of study such as collaboration, interaction, building a community of learning, immediacy and the effect of visual cues, implies that there is a relationship between social presence and DGBL. Because DGBL is seen as the future of education (Prensky, 2001a; Mayer & Bekebrede, 2006; Shen and O'Neil, 2006), research should not only concentrate on "motivation and engagement, student retention, knowledge gain, cognitive development and feedback" (Ke, 2009) in DGBL. Within socio-psychological perspective, and being one of the most important topics of research, social presence should also be investigated as a construct affecting and affected by DGBL. Therefore, further research is needed to uncover the potential of DGBL to enhance social presence.

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Digital Science Notebooks to Support Elementary Students' Scientific Practices

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Abstract

This study investigates the potential of a tablet-based note-taking application as a digital notebook to support students' science practices in the classroom. A teacher and 20 students in Grades 4-5, from a public charter school in Hawaii, participated in this study. During the Spring semester of 2014, the participating teacher integrated a tablet-based note taking application (TNA) into her science class. Participating students used the TNA instead of their paper-based notebooks for a semester. For research purposes, data was collected by interviewing the teacher, conducting focus group interviews with students, administering student-oriented surveys, and conducting classroom observations. In addition, the notes students generated using the TNA were collected and analyzed. This paper presents findings related to how students used the TNA in the context of their science lessons. Special attention is given to the role of specific features of the TNA, including handwriting recognition, drawing tools, audio recording, and file sharing.

Introduction

While it is a common notion that science and literacy are two separate school subjects, writing has been deemed an essential component to many scientific practices. Recent studies argue that educators should consider language and writing as an integral part of doing and learning inquiry-based science (Baker et al., 2008; Yore, Florence, Pearson, & Weaver, 2006). For example, *A Framework for K–12 Science Education* (NRC, 2012) asserts that:

> From the very start of their education, students should be asked to engage in the communication of science [and] should write accounts of their work, using journals to record observations, thoughts, ideas, and models. They should be encouraged to create diagrams and to represent data and observations with plots and tables, as well as with written text. (pp. 76–77)

As a way to encourage students at the elementary level to write within science, many teachers utilize science notebooks (Baxter, Bass, & Glaser, 2001; Campbell & Fulton, 2003; Fulwiler, 2007; Rivard, 1994). However, writing related to scientific practices such as constructing explanations and obtaining, evaluating, and communicating information, is not easy for students to learn. This is especially true for primary-aged students and those who may struggle with language, such as English Language Learners (ELLs). For these populations, writing in science is a challenging and complex task, since many of them are in the early stages of literacy development and are learning how to write in general. Consequently, it is essential that the teacher scaffold instruction (Ruiz-Primo, Li, Tsai, & Schneider, 2010) by supporting student development of scientific language with appropriate writing frames (Choi, Notebaert, Diaz, & Hand, 2010; Ruiz-Primo et al., 2010; Warwick, Stephenson, Webster, & Bourne, 2003) and by delivering explicit instruction (Baxter, Bass, & Glaser, 2001; Ruiz-Primo et al., 2010; Tucknott &

Yore, 1999). Furthermore, support in the form of meaningful formative feedback from the teacher is important to student development of scientific writing (Black & Wiliam, 1998).

In addition to teachers' explicit instruction and support mechanisms, we believe technology can be used to facilitate student writing in science. When used appropriately, technology can provide a number of scaffolding tools that can assist students in a variety of science-related tasks including observation, note-taking, and data recording and organization. Technology can also facilitate communication between instructors and learners, making it easier for teachers to provide timely formative feedback. For example, some of the technical functionality available in today's tablet-based note taking applications, such as handwriting, voice recording, instant picture taking, and note sharing, can be leveraged to engage and support students in their scientific writing. In particular, the capability of sharing files and notes with peers or instructors using free "cloud" storage services such as Google Drive is an important development in assisting teachers in their effort to provide formative feedback to students.

In an effort to better understand the potential of technology to facilitate and support student growth in science writing, this study examines elementary students' use of a tablet-based note taking application in the science classroom. A special emphasis is placed on ways in which digital notebooks might be leveraged to support students' scientific practices.

Conceptual Framework

Digital Science Notebooks

The rationale for leveraging digital science notebooks in in science education is based on the argument that educational technology is a powerful tool when it is well designed, carefully validated, and properly implemented (Abrami, 2011). That is to say, if digital science notebooks are integrated into a science classroom in a meaningful fashion, it is reasonable to suspect that they can support students' writing in science. Furthermore, they may be able to do so in ways that are beyond the affordances of traditional paper-based notebooks.

Although commercial electronic laboratory notebooks exist for career scientists (see Rubacha, Rattna, & Hosselet, 2011), the field of science education does not have access to digital notebooks that meet the developmental needs of young children. This is important because elementary-aged children have unique needs when it comes to using software, regardless of its genre (i.e., productivity, entertainment). In fact, research has shown that a child's age is correlated with her ability to use and understand software (Egloff, 2004). Additional research has emphasized the importance of software usability, even for young children (see Sim et al., 2006). Unfortunately, even as technology takes a more prominent role in the lives of children, developmentally-appropriate design "has not been leveraged to make the child-computer interaction optimal" (Hanna, Risden, Czerwinski, and Alexander, 1998, as cited in Inkpen, 2001, p.2).

Regarding usability, educators cannot assume that children are just like adults (Inkpen, 2001). As Druin (2002) observed, children are not "just short adults" (p. 1) but an entirely different user population with their own culture, norms, and complexities (Berman, 1977). In particular, children have a more difficult time verbalizing their thoughts (Piaget, 1978), and they tend to draw on direct physical and social experiences to construct their understandings of the world around them (Bee, 2000; Meadows, 1993). In fact, younger children are sensory dependent making abstract thought and intangibles beyond their immediate world vague and unreal (Santrock, 2002). Along with cognitive differences, young software users have also been shown to have unique physical needs. For example, Hourcade, Bederson, Druin, and GuimbretiËre (2004) found performance differences between children and adults that were large enough to "warrant interface interactions designed specifically for children" (p.357). In related work, Donker and Reitsma (2007) studied kindergarten and first grade students and found that drag-and-drop interactions were a more appropriate and faster movement procedure compared to click-move-click interactions.

Taken together, the physical, social, and cognitive needs of children must be taken into consideration when choosing software that might be integrated into classrooms. For the current study, the researchers identified a number of technical features that might be beneficial in assisting elementary students with their science-related practices.

Handwriting & Drawing

Handwriting is a "natural" and fluid mode of text entry. Longcamp, Zerbato-Poudou and Velay (2005), working with elementary-aged children, found that writing on a tablet was as efficient as, and produced comparable writing to, pencil and paper. They also found that keyboard-facilitated text entry was the least efficient input method

for children. Considering the age of the target audience, handwriting with fingers or a stylus should support students' engagement with the writing process. In addition, having a drawing feature could be critical for encouraging young children's writing. This notion is supported by the work of Shepardson and Britsch (2001) who have shown that drawing can be a helpful communication strategy as children learn to become writers. Thus, we believe it is beneficial to use note-taking applications that allow students to use "natural" handwriting and to draw as a means for data collection (e.g., a leaf observation) and organization (e.g., a table). Being able to do this by using a finger on a touchscreen surface is likely to be critical for student success.

Audio Recording

Articulating ideas, arguments, and claims is not an easy task, even for adults. Students often express their ideas and talk about them verbally with ease, while having a hard time transferring them into a written context. Educators know that students are able to describe things verbally before they can capture the same idea in writing. Aware of this reality, Fulton (2012) found that when students used iPods to record their thinking prior to writing, they used the devices as a means to rehearse what they wanted to say. That is, they would listen back to their statement, modify their thinking, and repeat the process until they were satisfied with their answer. As a result, the act of recording their answers allowed students to self-assess their understandings and pushed their thinking further. Accordingly, a developmentally appropriate note taking application should allow students to take audio notes that can later be played back and transcribed.

Tables for Data Organization

An important aspect of science notebooks is using the data within it to make sense of a scientific concept, to interpret data, and to draw conclusions. Just like recording data, being able to organize them are important skills for developing scientists. For example, being able to create a table and enter values is a common scientific practice; one that is often used by students working with science notebooks. However, students often struggle with organizing their data in a way that will help them make sense of it and they tend to use rudimentary forms of organization (Ruiz-Primo et al., 2002). Although teachers will scaffold student learning at times by providing them with ready-made graphic organizers, students also need opportunities to organize their information and observations in a way that makes sense to them (Rider-Bertrand, 2012). While students can do this in a traditional science notebook, it can be difficult to create a table when one is not sure of how many columns to create or the best way to organize the information. Therefore, a developmentally appropriate note taking application should allow students to add graphic organizers, such as tables and charts, and provide them with a variety of tools from which to choose to modify the organizer as needed.

Cloud-based File sharing for Formative Assessment

Formative assessment is a process that provides feedback and support during instruction. The purpose of formative assessment is to help teachers and students adjust ongoing instruction and learning to improve students' achievement of planned instructional outcomes (Black & William, 1998). Researchers and educators have emphasized the importance of formative assessment for guiding students toward learning and academic achievement (Hwang & Chang, 2011). Given the importance of formative assessment, having cloud-based features that facilitate the communication between teacher and learners, and amongst learners, is deemed an essential feature of a developmentally appropriate note taking application. Such a feature can provide teachers access to students' notebooks from any networked device, making the process of examining student notebooks more efficient for teachers, as they do not have to physically collect their students' notebooks.

Method

This research was conducted at a public charter school in Hawaii. In this study, an elementary class consisting of ten students in the fourth grade and ten students in the fifth grade participated. The participating teacher had three years of classroom experience. For the study, the classroom teacher integrated a tablet-based note taking application (TNA) recommended by the researchers, based on the criteria reviewed above, into her science lessons in the spring semester of 2014. The TNA was a commercially available note-taking application on the iOS platform, called *Notability*. The TNA was carefully selected based on an analysis of similar tools and was chosen for its feature set and low cost.

After a semester-long implementation of using TNAs as digital science notebooks, data was collected. Data included students' notes on the TNA, an interview with the teacher, a focus group interview with students, and student self-report surveys. Additional data were collected through classroom visits at the end of the semester. The purpose of these visits was for the researchers to observe how students used the TNA for their inquiry-based science lessons. This paper presents the findings from the classroom observation, focusing on whether and how students used the particular tools that were pre-identified by researchers, to examine the potential of a TNA for supporting students' writing in science.

Results

The day of the researchers' classroom visit, students were busy investigating corn chips. For their investigation, students were asked to observe various attributes of the chips such as their shape, size, and color. Importantly, they were asked to record their observations using the TNA. Twenty students were in attendance. Eighteen students had their own tablets, and two students shared one tablet. Students were given approximately 45 minutes to work on this task.

At the beginning of the class, the teacher gave students brief instructions on what the task was about, and then allowed students to work freely on the task. Occasionally, during the class period, students asked clarifying questions and the teacher responded to them. Other than the few times the teacher answered the questions, there was little teacher involvement as the students proceeded with their investigation. Importantly, the teacher did not provide students with explicit directions on how to use the TNA.

Handwriting & Drawing vs. Typing & Taking Pictures

The researchers believed that having a virtual pen, a technical peripheral for handwriting, would be useful for students' writing. However, based on our observations, none of the students used the pen tool for handwriting. Rather, all twenty students used on-screen keyboards (so called "soft" keyboards) instead for their text entry. We noticed that one student used the virtual pen for his/her writing, but that student only wrote a few words using the pen and then switched back to the on-screen keyboard. In other words, we did not see any students use the virtual pen tool as their main writing tool. Interestingly, when students used the on-screen keyboards, most students used one or two fingers, mostly their index fingers, which did not seem to be too convenient or efficient for writing. In addition, we observed that students did not use the virtual pen for drawing. Rather, most students used their tablet's built-in camera to take pictures of what they were observing. Interestingly, the virtual pen tool was used the most for drawing lines to create tables. This was a somewhat surprising finding since it was expected that the pen tool could provide a more natural way for students to enter text.

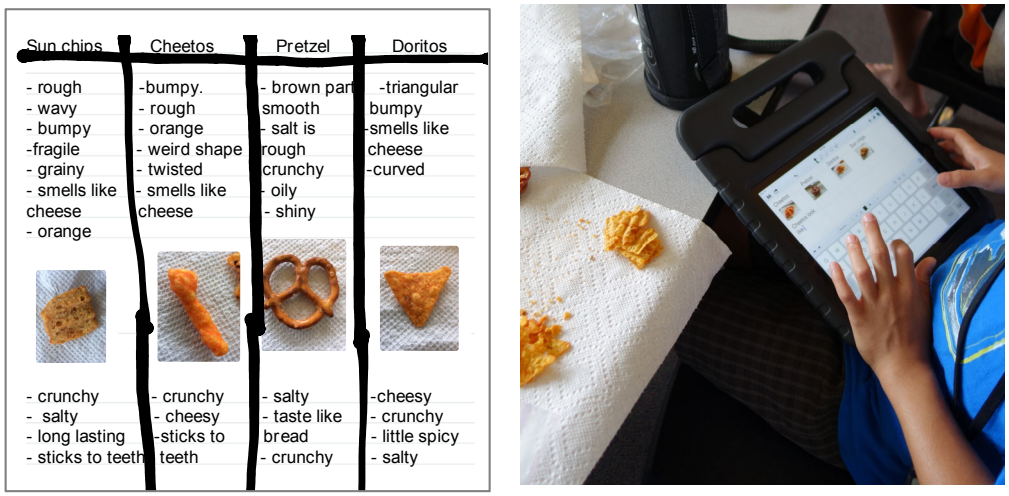

Figure 1. Students' tables were made using the pen tool, text entered via the on-screen keyboard, and photos taken using the tablet's onboard camera.

Audio Recording vs. Video Recording

The researchers carefully observed whether any students used audio recording while they were recording data. We did not, however, find a student using audio recording. We found one student using video recoding instead of audio recording, so we observed how the student used the video recording. This student narrated while he recorded a video of a piece of corn chip. Interestingly, his description was focused on what he was doing rather than on his observation of the object. That is, he stated, "Today is (Date and Time), and I'm recording (the name of the chip)." This was unexpected, but interesting. The object that the student was observing was static. Therefore, using video to document the corn chip was probably unnecessary as a picture could capture most of the same information. This is not to say, of course, that video is not useful in a TNA. In fact, video recordings can be very useful for capturing any moving object such as clouds, animals, or a falling parachute. In hindsight, the student's use of the video to record the corn chip made an excellent teachable moment for the teacher to discuss with the class the difference between observing static and dynamic objects. Therefore, having access to video recording can be beneficial, if the video recording is properly used. Of course, students may need some instruction on when to use such a tool available in the TNA.

Tables for data observation

As expected, most students used tables to organize their data. Since the selected TNA did not provide a specific tool for creating tables, students used the pen tool to draw tables instead of inserting pre-made tables as seen in most word processing software (i.e., Microsoft Word). However, it seemed to be easy for students to draw tables using the TNA, drawing vertical and horizontal lines to add columns and rows. Another observation related to creating tables was that many students had a hard time drawing straight lines. Interestingly, students tried very hard to draw the straight lines and it was noticed that several students drew a line, erased the line, drew another line, and erased it again. This made us wonder whether those students would do the same thing when creating tables in a traditional paper notebook.

Formative Assessment

One of our main interests was how TNAs might facilitate the teacher's formative assessment efforts. However, this was not something we were able to observe during our classroom observation. It was noted that students did not save their notes in Google Drive, which we thought would be an efficient way for students to share their notebooks with the teacher. Of course, this does not mean that the teacher did not look at students' notebooks or did not provide feedback. The teacher might have taken each tablet individually to access students' notes just like teachers do for assessing students' work in traditional paper-based notebooks. Furthermore, she may have provided her feedback to individual students verbally rather than writing her comments in student notebooks, or she may have kept her comments separate. All we could conclude from our classroom observation was that students did not share their notes using Google Drive. Further investigation is needed in order to understand how the teacher provided feedback on students' work and writing in the TNA. It would be worthwhile to find out the teacher's perspective on how TNAs might enhance or hinder formative assessment initiatives.

Discussion/Implication

The aim of this study was to examine the potential of a TNA to act as a digital science notebook. To this end, the researchers identified four technical features of TNAs that might potentially support elementary students' efforts to practice writing in science. Those features include 1) handwriting and drawing, 2) audio recording, 3) table creation, and 4) file sharing. Using these features as a guide, a low cost TNA was selected and implemented in a science class for students in Grades 4-5. After a semester long implementation, researchers observed one class period to better understand how students used TNAs in their scientific investigations. Findings from the observation show that the four features were not used as anticipated. Why did students not use those tools? Did they not know how to use them? Or were they too difficult to use? The researchers' interpretations of the findings are discussed below.

First, students typed using an on-screen keyboard rather than using handwriting recognition available through a virtual pen. Why did students not use the virtual pen? Since researchers did not want to interrupt students' during the observation, we could not ask this specific question to students. However, responses from the follow-up survey suggest that handwriting on the screen was not as "natural" as it was predicted to be. One student who chose "typing" as his or her favorite tool in the TNA explained that she liked that tool the most "because when I wright

[*sic*] on the iPad it is hard to wright [*sic*] and when I do not it doesend [*sic*] go sloppy." In addition, assuming the students in Grades 4-5 had enough experience with typing, they might have decided that the virtual keyboard was easier than using their fingers to "handwrite." However, students in younger grades may have less experience with keyboard typing and therefore prefer the virtual pen. Further research is needed to see if having a stylus might make a difference and also whether or not this finding will hold for younger students.

Second, students did not use audio recording during their data collection. Based on our observation, it was not clear whether students even knew that the tool was available for them. It might have been the case that they just did not need it for the particular task they were working on that day. The nature of the task, which was the beginning phase of observation and data collection, had students focused on listing the features of the chips rather than making any claims based on their collected data. Accordingly, students might not have needed to verbalize any sentences or paragraphs prior to their writing. To examine whether and how the audio recording can support students' writing for scientific inquiry and reasoning, different tasks are needed where audio recording might make more sense.

Third, most students created tables to organize their data by drawing lines using the virtual pen. It was encouraging to find that students did not struggle to create and use tables to organize their data. The only difficulty that some students had was drawing straight lines, which the researchers did not realize would be a concern for the students. Although creating tidy tables should not be the focus of creating tables, if students spent too much time attempting to draw straight lines or adjusting the cells of their table, the technical features of auto-generated tables might be valuable to avoid the distraction of creating and perfecting their tables.

Fourth, within the 45 minute class, we did not see any indication of students sharing files with their teacher. As stated earlier, this does not mean that the teacher did not conduct formative assessments during the integration of the TNA into her science lessons; however, a follow-up interview will be necessary to find out more about how the teacher assessed students' note and what forms of formative assessments might have been conducted. Further investigation is needed to determine why the teacher and students did not use the file sharing tools available in the TNA. In addition, it would be important to determine whether there were any challenges or difficulties using those sharing tools.

Overall, our classroom observation suggests that students were comfortable using the TNA. Some differences we noted with the TNA included the fact that students typed rather than handwrote their notes and took pictures rather than drawing their observations. While it might be argued that having typing tools and cameras in TNAs makes student writing tasks a bit easier, at this point, it is not clear whether TNAs can support students' scientific practices *better* than paper-based notebooks. Nevertheless, it was encouraging that students were comfortable using the TNA and seemed to enjoy using it for typing their notes and taking pictures for data collection. Even though it was only one student, it was promising to find a student exploring some of the features (e.g., video capture) of the TNA.

Lastly, while further investigations on the uses and impacts of TNAs in the science classroom are needed, our observations show some of the possibilities of drawing on TNAs as digital science notebooks that support students in the development in the scientific writing.

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ESL's and PARCC Online Testing

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Introduction

Starting in 2014, students across the country will begin to take their assessments online with the implementation of the Partnership for Assessment of Readiness for College and Career (PARCC) test. Teachers and administrators are currently preparing to implement this newly mandated testing approach in their schools which will continue to bring students even closer to 21st century technology goals; however, the implementation of this new assessment program raises questions about whether or not students will be prepared to take these online tests and what type skills will be needed in order to complete these tests which are replacing old-fashioned pencil-and-paper tests. One group at the center of these questions is the English as a Second Language (ESL) student population.

The ESL student population in the United States has grown quickly over the last ten years. In Tennessee, for example, the ESL population increased almost 370% between the years 1994 and 2004. Many of these ESL students arrived in the United States with little or no knowledge of English and many more came with very few, if any, experiences using a computer for an online exam. Sadly, with the addition of online exams and where high stakes testing has become the norm, teachers are faced with increasing pressure not only provide to students with the necessary content knowledge that will be assessed on state tests but to also teach students the necessary computer skills to maneuver through the test. Petterway (2006) noted schools which are working to produce successful students but have a disproportionate percentage of ESL students can receive less than stellar scores and be at risk for acquiring an "underperforming" label because of the test's inability to recognize and account for the performance of English language learners (ELLs). With the addition of online testing, teachers will now be required to educate ESL students on how to successfully use educational technologies (computers, keyboards and variable software environments) to complete computer-delivered tests. Gándara and Baca (2008) found that "research has demonstrated that ESL students can reach or exceed performance of English-only peers given adequate time for growth. However, these students are not initially able to compete with English-speaking peers on English assessments and given the sanctions in place for performance deficits, this issue could be devastating for schools (p. 207).

Studies have been performed to ascertain the amount of Internet access students have in the home. Not surprisingly, Fox and Livingston (2007) stated "recent data suggest that non-English-speaking Latinos remain a group with alarmingly low rates of Internet access and use (p. 12) and "many low-income or immigrant youth will have few friends or relatives who are sophisticated users of digital media" (Warschauer & Matuchniak, 2010, p. 188).

Not only will ELLs be forced to overcome the hurdles in place regarding their knowledge of English, they will now have to overcome the technology skills gap that exists for students who have virtually no experience with technology. With these two challenges, learning English, as well as gaining technology skills (specifically, computer, keyboard and computer-testing software skills) ESL students likely have an uphill battle with upcoming online assessments.

Literature Review

The Partnership for Assessment of Readiness for College and Careers (PARCC) is set to begin in thirteen states during the 2014-2015 school year. PARCC, in a departure from historical paper and pencil tests, will embark on a fully online, computer-based assessment system. As with all state assessments, all students will participate in the state PARCC assessment. This includes special education students as well and English as a Second Language (ESL) students. Current laws (No Child Left Behind), a growing digital divide and technology challenges are major obstacles ESL students will need to overcome in order to be successful with this academic and technological challenge.

No Child Left Behind (NCLB)

When considering their language acquisition, ESL students can take one to three years to become proficient in social language and five to seven years to become proficient in academic language. Li and Suen (2012) stated concern for ELL's and the impact their test performance had on individual students and schools. Students, including ESL students, are required to make adequate yearly progress (AYP). However, they are faced with taking an assessment that is geared toward English speakers, thereby further challenging the students not only to become proficient in the language of the test but also to become proficient in the academic content contained within the assessment. Heubert and Hauser (1999) stated, "If a student is not proficient in the language of the test, her performance is likely to be affected by construct-irrelevant variances—that is, her test score is likely to underestimate her knowledge of the subject matter being tested" (p. 225). The lack of proficiency in English creates an even more stressful testing situation for students as well as teachers who know test performance will affect students' academic progress in school as well as a teacher's evaluation scores. Even though students have not been in school long enough to become proficient with academic language, they are still, after a year of attending an American school, expected to measure up to their English speaking peers. However, Deiner's (2010) research showed that immigrant children are not likely to score at the state proficient level (as cited in Ntuli, Nyarambi & Traore, 2012). Amazingly,

> "Given that the tests being used nationally are linguistically complex and administered in a language they [ELLs] are learning, it is then not surprising that ELLs typically do not perform well on the tests used to comply with the mandates of NCLB. Nationally, ELLs score an average of 20-50 percentage points below native English speakers on state assessments of English language arts and other content-area subjects, and thus the majority of ELLs fail to achieve a score of proficient or meet adequate yearly progress goals" (Beckman, et al, 2012, p. 42).

Critics of the required state assessments are hoping for a change in testing when it comes to measuring the progress of ESL students. Instead of using measurements that push ESL students to measure up to their English speaking peers and do not fully represent the diversity of ESL populations, critics would like to see assessments that are sensitive to cultures, language, socio-economic levels and are based on an equal representation of students who fall into these categories. Ntuli et al., (2012) hope assessments will respond to the many diverse populations and their needs through the use of more authentic types of assessment.

Digital Divide

Success on the PARCC assessment is confounded by the fact that many ESL students do not have access to technology to provide the experiences necessary to adequately prepare them to be assessed with a fully computer-based online system. Recent research has described a distinctive phenomenon surrounding technology. It is referred to as the digital divide: the inequality of use, access and knowledge of technology. In 2009, the United States took steps to shrink this divide by investing in technology access in schools, libraries, and other public facilities.

Researchers Warschauer and Matuchniak (2010) took a look at the equity of technology, its use, and access. They saw in the late 1990's what could be described as a shrinking digital divide. This shrinkage may have been due to the lowering cost of computers and the increase in availability of Internet access. However, they found a lot of the techniques used to measure technology usage and access was fairly narrow in focus. A lot of data was gathered by phone surveys. Unfortunately, this type of investigation does not account for those who do not have a phone and those who do not speak the language. Because of this, their estimations of a shrinking digital divide may well be incorrect.

This disparity has made technology and access to the Internet a priority for groups in the United States. Data from the Computer and Internet Usage Supplement to the October 2003 Current Population Survey (CPS), a survey conducted by the U.S. Census Bureau and the Bureau of Labor Statistics, shows technology access is very

low for Hispanics and Native Americans. Both groups have low computer ownership and very little access at home which can provide the most use and greatest amount of benefits for these particular groups (Fairlie, 2007). Also, Warschauer and Matuchniak (2010) remarked a larger number of individuals would be sharing a computer in large Latino families compared to the availability of an individual computer in a family where the race is white. Fairlie (2007) also noted that Latino groups were by far the group in greatest need of technology and access at home. He found "only slightly more than 40 percent of Mexican-Americans have access to a home computer, and less than one third has Internet access at home. Clearly, the digital divide is a reality for Mexican-Americans" (p. 272). Lastly, Howard, Busch and Sheets (2010) noted that due to the lack of education and higher incomes, certain groups will continue to lack computers thereby continuing to create a gap between those who have computers and those who do not and are thus unable to keep up with the development of much needed technical skills. The lack of computers and lack of access at home create a situation where these subgroups may slip even further behind in their technology skills.

Technology Challenges

As noted earlier, there is a definite division of technology where some groups have technology, access and skills and some groups do not. This creates a situation where there are limited opportunities for students to participate and interact with technology on a daily basis that will provide them with the skills and confidence to use technology.

Since PARCC will be coming online in the 2014-15 school year, work continues to be completed in schools in order to provide schools with the equipment, infrastructure and training to prepare students to complete and succeed in taking the state assessments online; however, more issues are at play with the introduction of online assessments.

Language

As noted earlier, ESL students are tested using assessments written in a language they are learning. During an exam, students translate from one language to another, which takes time and is not something that is faced by native English speakers. Smith (2011) noted that ESL students are at a serious disadvantage when these tests are timed. Most notably Smith (2011) saw that timed writing exams for ESL students added immense pressure to translate their work, edit and provide a response that will adequately relay their knowledge and won't be mistaken for lack of knowledge due to challenges with the language and grammar. Noting when college students were in the timed exam mode, ESL students' work quality was diminished due to their inability to express ideas under pressure. This was also shown in the slower writing pace of ESL students who were not able to keep pace with their English-speaking peers.

Besides becoming anxious about writing to convey knowledge accurately, ESL students are faced with assessments are not sensitive to the small "cultural nuances" that are contained within some questions. ESL students must take additional time to determine the meaning of idioms and phrases and interpreting information, that in many cases, comes more quickly and easily to native English speakers (Petterway, 2006).

Anxiety

Aside from the obvious challenges with language contained in an assessment, ESL students who may lack experience with technology may find they are nervous just at the thought of taking a test online compared to a traditional paper and pencil test (Young, Shermis, Brutten, & Perkins, 1996). This obviously may cause the student to perform poorly on the assessment. Additionally, Ricketts and Wilks (2002) found students were more anxious and put at a disadvantage simply from their dislike of computers.

Inexperience

The digital divide illustrated certain population subgroups lacked technology and Internet access at home. This creates a situation where students are not exposed to technology on a regular basis and do not have the skills needed to keep up with the demands of technology in the 21st century classroom.

Researchers are seeing many instances where this lack of experience is affecting student's performance. Lee (2002) saw students who lacked experience were slower to generate text on a keyboard than when writing for a traditional paper and pencil test. Lee also noted some students who did have experience with computers at home were still at a disadvantage when pushed to use unfamiliar equipment in a timed situation, i.e., Windows vs. Mac.

Taking tests online requires a whole new skill set for students. The yearly writing assessments will require students to be able to type their responses. However, Lee (2002) again observed that just exposure to some

keyboarding skills is not enough to provide an atmosphere of success when students are in a timed situation. Students need to be provided with word processing skills that will which require some time and practice to become proficient, effective writers on the computer.

Smith (2011) studied inexperience with technology and its effect on assessment. He notes, "While a lack of English skills rather than a lack of familiarity with assessment practices has been previously identified as a major cause of under-performance, it is feasible that the problem lies not with unequal language facility but with unequal examination ability" (p. 21). This problem can be avoided by using alternative assessments, which are sensitive to such challenges. Possibilities should exist for students to take writing exams on something other than a computer to make the assessment fair and equitable.

Off-task

Social media and technology are infused in almost every aspect of our lives. Few individuals are without access at their fingertips to their email, texts and Internet. This makes for an environment where individuals continuously feel a need to be logged in and know the latest information. This can cause distractions in an environment where it is easy to be off-task when technology is open to exploration its use is encouraged in the classroom.

Junco and Cotton's (2012) research has shown when students are engaging in more than one technology activity, also known as multi-tasking, a student's performance can suffer (Wood, Zivcakova, Gentile, Archer, De Pasquale, & Nosko, 2012). This can be seen in ESL students' activity. For example, searching the Internet for content relevant information, translating information and attending to the classroom teacher, can lead to student overload. When faced with a timed, high-stakes assessment setting, the situation can be even more detrimental. ESL students, already pressured to understand a test in a language they are learning, also have to select an answer on the computer screen. Wood et al., (2012) observed that confusion could occur when trying to perform these unrelated tasks. To compensate for these additional mental tasks, ESL students would need additional time to process the content and then manipulate the technology to select the answer. Without this additional time, test performance for these students would decrease. When students, especially ESL students, are placed in a situation where they must process content and process technology skills in a timed situation, the student can be overtaxed and a poor performance can be the result.

Conclusion

ESL students are faced with and multiple challenges: learning a second language, learning academic content, learning exam language, and learning typing/computer skills. Online assessments like PARCC will undoubtedly exacerbate the situation by requiring ESL students to learn more than their English-speaking counterparts in the limited academic school year. Yet, ELLs, especially Hispanics, have less experience with technology at home and therefore lack adequate frame of reference to accomplish this.

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Teaching Soft Skills with Games and Simulations

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Index Descriptors: Soft Skills, Games and Simulations

The Disappearance of Soft Skills

Recently, the exponential increase in technology has led to large-scale training opportunities for building technical hard skills; however, soft skills, including effective communication, time management, critical and creative thinking, and problem-solving, seem to be diminishing. Although students and employees acquire hard skills through education and training, they rarely possess the soft skills to effectively communicate both their abilities and potential. Additionally, the influence of social media and mobile devices has exacerbated the loss of human interaction. Booth states, "there has been a shift in the way we communicate; rather than face-to-face interaction, we're tending to prefer mediated communication…we'd rather e-mail than meet; we'd rather text than talk on the phone," (Keller, 2013). Ironically, the increase in technology, which has created an increase in hard/technical skills, has decreased personal and soft skills.

Why Soft Skills Training?

Employers are demanding soft skills of applicants and employees. Currently, the labor pool is a majority of low skilled applicants who are not qualified for the high level of skills needed in today's demanding job market. Over half of employers indicate challenges in hiring due to a lack of hard and soft skills training and education (Indiana Youth Institute, 2012). Teaching hard skills or technical skills needed for a position is typically addressed in education and employers are willing to train these skills to meet their company needs. However, employers do not have time, personnel, or financial resources to train individuals how to communicate and cooperate with others, work in a team environment, make sound decisions, think critically to solve problems, or show up for work and interact in a professional manner. These skills need to be developed before the individual applies for his or her first job.

A multitude of employer surveys, conducted over the past two decades, suggests that soft skills are as important to the success of our youth as the more traditional academic skills (U.S. Department of Labor, 2010). It makes sense that in a globalized society that one must have the soft skills required to not only effectively communicate across cultures, but to accurately communicate one's potential to benefit an organization. A polished resume highlighting experience and technical abilities does not encompass the complete person, which could explain why so many employers interview potential candidates. At this point, it makes sense for an employer to look for someone who can communicate effectively and efficiently, promote the organization through critical and creative thinking and problem solving skills, and reflect positively on both the organization and within the community. Therefore, individuals, who possess soft skills, would have the advantage. With the advancements and increasing dependency on technology, integrating technology in the form of games and simulations in career curriculum in P-12 schools to teach soft skills makes sense.

Why Games and Simulations?

Many researchers have identified games and simulations as potential learning tools (Aldrich, 2005; Annetta et al., 2009; Cameron & Dwyer, 2005; Coller & Scott, 2009; Gee, 2003; Halverson, 2005; Hamlen, 2010; Prensky, 2001; Reiber, 1996; Shaffer, 2006; Shaffer et al., 2005; Squire, 2006). One of the reasons often cited is engagement since the interactive nature of games and simulations causes intense immersion, which in turn, can cause deep, meaningful learning (Aldrich, 2005; Annetta, 2008; Cameron & Dwyer, 2005; Coller & Scott, 2009; Gee, 2003;

Prensky, 2001; Rieber, 1996; Shaffer, 2006). Other cited benefits include: increased motivation, enhancing problem-solving skills, peer-learning/collaboration opportunities, differentiation/individualized learning, contextualized learning, facilitation of language acquisition, stimulating information assimilation and retention, improving integration of concepts, increasing cross-functional thinking, and failsafe learning environments (Ferdig & Boyer, 2007; Gee 2003; Koh et al., 2011; McManus et al., 2014; Reese, 2007; Rosas et al., 2003; Royle & Colfer, 2010; Torrente et al., 2010; Vos & Brennan, 2010). Additionally, research suggests that games and simulations serve groups (i.e., genders, low socio-economic, behavioral problems) that can be under-served or even left behind (Angelone, 2010; Chen et al., 2010; Hamlen, 2010; Robertson, 2012). Furthermore, given their ubiquitous nature, games and simulations are a potential teaching tool that has the potential to reach all ages, ethnicities, genders, and learning levels.

Developing Gaming and Simulation Curriculum

Morgan and Adams (2009) suggest a recent pedagogy shift where learners are given more control over the learning process as they are encouraged to bring specific contexts of application to learning by using web technology to pose questions. The utilization of off-the-shelf or customized games and simulations would follow this shift in pedagogy since it enables a learner to experience first-person interactions based on consequences realized in educational or business environments. The development of a training module must provide decision making opportunities based on changing variables and alternative scenarios through feedback based on end-user decisions and actions. These processes are inherent in cognitive and social learning theories, which aligns with some of the unique interaction, strategy, engagement, decision-making, and problem-solving requirements (Balasubramanian & Wilson, 2005).

The U.S. Department of Labor, Office of Disability Employment Policy (2010), recognizes that integrating technology into soft skills training can provide students with the hands-on experiences they need while effectively supporting, reinforcing, and augmenting classroom instruction. Advances in technology provide designers, instructors, and end-users with a variety of media formats lending various levels of engagement through auditory and visual elements; therefore, investigation and caution must be taken to choose an effective format for this type of lesson. For example, determining which training format to develop or pursue could be based on product competitiveness, end-user needs and/or available resources (i.e., technical, financial, personnel).

Integration in Education and Business

While the training aspects required for education and business may be different, the basics of effective communication, time management, critical and creative thinking, and problem-solving are not. The educational arena has the opportunity to incorporate soft skills training as early as elementary school. While education generally provides the technical hard skills for a position, soft skills tend to be overlooked. These skills could be developed throughout the student's educational career which would enable him or her to better compete in the job market.

Business and industry are accustomed to providing face-to-face soft skills training during hiring procedures and when company polices change; however, games and simulations can reduce the costs of training and the amount of time employees are out of the office. The military, police, and medical institutions already rely on soft skills training based on simulations (Hubal & Frank, 2001). This provides an opportunity for the employee to make decisions, act upon them, and witness the outcomes in a virtual environment rather than in real life where a wrong decision or miscommunication can have an adverse effect. For example, The University of Southern California Institute for Creative Technologies use virtual characters that look, think, and behave humanly to improve skills in decision making, diversity, negotiation, and leadership for the military.

Teaching Soft Skills with Games and Simulations

The generation entering high school and college today grew up with technology, games and simulations, animation, and social media (Barjis et al., 2012). Games and simulations provide an effective and engaging method for teaching through interactive virtual environments. Therefore, it makes sense to develop and implement soft skills training through games and simulations. Future research and development of teaching soft skills with games and simulations should consider the following points: the need for soft skills training (i.e., the types and levels of skills), methods to teach soft skills (i.e., types of games/simulations, appropriate pedagogy), pros and cons of using games/simulations for soft skills training, and the future of technology in soft skills training.

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Online Learning: Genie in a Bottle or Pandora's Box?

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Online course offerings in higher education have grown significantly in the past decade, and 6.7 million students are enrolled in at least one online course (Allen & Seamans, 2013). Even with the rapid and expansive adoption of online learning, there has been some criticism of its value and efficacy (Baggaley, 2014). The argument for and against the state of online learning often focuses on comparisons of learning outcomes between online and traditional learning environments. For instance, Means, Toyama, Murphy, Bakia, and Jones (2010) reported that students enrolled in online courses performed at least as well and those in traditional courses. Interestingly, they also reported higher learning outcomes in blended courses than in only online or only face-to-face courses. On the surface, it would appear that online learning is beneficial, and even better in some cases, than traditional learning environments. However, Means et al. (2010) warn against attributing these successes to an online delivery method. It seems administrators do not yet have rigorous research upon which to make good decisions about online learning (Bakia, Shear, Toyama, & Lasseter, 2012). We may ask then, what are the benefits for adopting online learning in higher education?

In this paper, we introduce factors that drove higher education to adopt online learning, as well as the benefits to institutions, students, and teachers. Additionally, we expand upon Means et al.'s (2010) warning regarding mistaking a delivery system for pedagogy, by exploring some of the negative effects of adopting online learning.

Online learning has been defined as a technologically-mediated environment that supports interactions between students and teachers with course content (Bollinger & Wasilik, 2009). Geographic and temporal distances contribute to the complexity of communication with peers, with the teacher, and with course content. A significant characteristic of online learning includes a virtual dimension, which can be described as a learning environment in which students and teachers can interact with one another, without regard to time and place (Heirdsfield et al, 2011). In online courses, technology plays a large role in bridging the time and distance gap between students, instructors, and course content.

The Promise of Online Learning

Higher education institutions believe technology can do 3 things: 1) increase access to a broader audience, 2) support student retention, and 3) improve teaching and learning while reducing costs (Ehrenberg, 2012). Technological innovations and its availability to an increasingly wider audience have encouraged the adoption of online learning (Bach, 2006; Rubin, 2013). Online courses can be offered where the technological infrastructure supports Internet connections, and when students can get access to computers (Song, Singleton, Hill, & Koh, 2004). Many higher education administrators believe that online learning is cost effective (Arbaugh, 2014). Online learning is considered to be cost effective when course content can be delivered via computer-mediated technology to many students in a variety of geographic locations (Chau, 2010). In such cases, faculty can teach more students than were previously taught in classrooms (Njenga & Fourie, 2010). Online learning is considered to be cost effective when courses can be delivered to locations where it was previously not possible to have faculty on site (Chau, 2010). In such cases, students gain access to a greater number of programs at more locations.

Technology allows faculty to create, deploy, and archive reusable content that meets individual student needs, and students can achieve mastery of content through reusable content and intelligent tutoring systems (Sturgis, 2012). This scenario suggests that instructors conserve time and intellectual energy when they create instructional strategies once, and deploy them on the Internet multiple times, to a multitude of students. A hallmark characteristic of online learning is, students can access the instruction at their convenience, and as often as they like.

Benefits

Assumptions about the ubiquity of access to computers and the Internet brought attention to the Digital Divide that exists in developed and undeveloped countries, and the attention helped close the gap between the haves and the have-nots (Bach, 2006; Chau, 2010). Online learning cannot proliferate without the necessary technological infrastructure, and government agencies responded by funding programs to remedy the Digital Divide (Sturgis, 2012).

Online learning offers nontraditional and previously underserved students an opportunity to acquire a higher education degree (Geith & Vignare, 2008). More educational opportunities available to a larger population can translate to higher enrollments and thus income for institutions. Open enrollment policies and scholarship initiatives have enabled broader access to higher education for underrepresented minorities and veterans (Sturgis, 2012). The promise of individualized instruction also presents academic opportunity for students with disabilities (Bakia et al, 2012). Students who were previously unable to attend on-campus, now have access to instruction, anytime and anywhere, through online courses. When coupled with reusable instructional modules, they can work at their own pace to achieve mastery over content (Bakia et al, 2012). Additionally, the creation of reusable instructional strategies that can automate some routine instructional activities translates to cost savings because teachers can focus energy on instruction that provides a rich learning experience (Power & Gould-Morven, 2011).

On the surface, online learning provides benefits to institutions, students, and faculty. Institutions have increased tuition revenue, students have expanded availability to programs and courses, and faculty can reach a larger number of students. In the next section, we explore some barriers to adopting online learning for institutions, students, and faculty.

Barriers

Despite the promises of online learning some disturbing findings have begun to emerge in the published literature. Song et al, (2004) observed that there was no evidence that learning is supported or effective in online environments, and adoption of online learning was based on anecdotal reports of success. Some early online courses were openly viewable on the web and students reported concerns about privacy issues. The introduction of learning management systems (LMS) quelled some of the concern for privacy, but introduced issues of technical expertise. For instance, some students were uncomfortable with using an LMS and lacked familiarity with navigating websites. Additionally, in asynchronous environments, delayed feedback and interaction contributed to a lack of immediacy, and some students were wary about the level of expertise in peers, and lacked confidence in the value to be gained from interactions with them. A persistent concern voiced by students was the lack of community and subsequent feelings of isolation and alienation. Students who lack the technical skills needed to navigate LMSs may fail to participate fully in online courses, and thereby compromise the development of a learning community.

Online learning is often characterized as portable and mobile, which are two aspects valued by students seeking the convenience of anytime and anywhere learning. Ross et al (2013) insisted that such a view undermines the complexity of learning online. Their findings serve as reminders that students enrolled in online courses are not magically released from the pressures of work, family, and finances that may have kept they from the on-campus classroom. Students in online classes may yet be exposed to the same pressures, and furthermore, because they often have failed to develop meaningful connections with students and instructors, and are at a greater risk to drop out. For all the promise of convenience that online learning offers, there are also difficulties to be overcome.

Higher education administrators predicted cost savings for institutions by yoking technology and learning to produce online learning environments. However, Arbaugh (2014) pointed out budget cuts that impacted plans for physical locations were at least equaled by cuts to technological upgrades and maintenance. In addition to the hidden cost of upgrades, technology can also take a different kind of toll on the learner who must learn to use the technology. Designing good online instruction is time consuming, and faculty reported that it takes more time to design online instruction than traditional instruction (Power & Gould-Morven, 2011). Despite the focus on technologies that support online learning, Arbaugh (2014) reported that technology was least predictive of learning outcomes, and that student characteristics have a greater impact on learning.

One message that is clearly transmitted by all of the previous studies is that the adoption of online learning does not automatically lead to successful learning outcomes. High dropout rates may be a signal that higher education institutions should attend to hidden costs in material assets, and also to students and faculty who are deemed major stakeholders in online learning.

Recommendations for the Future

Song et al. (2004) recommended that instructional designers be consulted during the design and development of online learning. They proposed that instructional designers be considered e-leaders in the future of online learning. Online courses should include training in how to use the LMS, and time management techniques, such as calendars and timelines, should also be included in the course design. According to Song et al. (2004), these course design elements can impact learner motivation and increase learner satisfaction levels. They argue that convenience remains a strong contender that drives the preference for online learning, so asynchronous meetings should comprise the majority of course interactions.

Njenga and Fourie (2010) advised higher education institutions to take time to develop appropriate theories and pedagogy to guide online learning. Such advice depends upon good research, and the appropriate assessment of technology for learning. Instructors need to match tech use with learning outcomes. The authors recommended more research on the limitations of multitasking, and the power of student characteristics that predict learning success. Importantly, they remind administrators that top universities remain focused on learning, not elearning.

The concept of online learning as a place was taken up by Ross et al (2013) who recommend the use of reflective practice within digital spaces to create artifacts that leave traces of learning development. They suggested a research focus that considers online learning as "absent from the institutional space" (p. 52). Ross et al (2013) see future research focused on the unseen online campus that is inhabited by students who must make a renewed effort each semester to establish presence and identity. They ask how unseen students may be viewed when they become unseen alumnus.

One way to improve online learning in the future is to invest in instructors who are innovative (Arbaugh, 2014). Institutions should put more money into helping students become better online learners, and course design should cultivate social presence and online identity at the beginning of the course.

Conclusion

Online learning in higher education holds an audience enthralled by the promise of convenient, cost-effective learning. High dropout rates and hidden costs to institutions, students, and faculty are real problems. They call for research investigations that develop theory and promote pedagogy that remediates these problems. This article is a first step toward improved learning by acknowledging what has been previously unseen.

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Promoting Student-Centered Learning: Team-based Learning in a Technology-rich Classroom

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Introduction

For years, universities have undergone major revisions in General Education (GenEd) curriculum to include "emerging" or "essential" curriculum such as communication, technology literacy, critical thinking, writing for the digital age, reasoning, global awareness, and so on, with the goal of preparing students with the knowledge and skills necessary to succeed in the 21st century job market. With the changes in GenEd curriculum, educators realize that they still need to provide an integrative learning experience for students to make meaningful connections between the GenEd learning and their majors. Students need multiple opportunities to draw on their previous learning, apply past and new knowledge and skills to increasingly complex problems, and to reflect upon how the various components of their education can help shape their future engagement in professional, civic, interpersonal, and intellectual activities. But how does higher education prepare students with the skills and depth of knowledge they need to apply in their future career and professional world and infuse their college education into "a source of self-understanding and an identity to the world in which one lives" (Palmer, 2007)?

Since 2012, the University of Massachusetts (UMass) Amherst, a research intense public university, has instituted an Integrative Experience (IE) GenEd curriculum to provide a structured context for *upper* division students to reflect on their own learning and explore the connections between the broad exposure provided by GenEd and the more focused exposure of their own majors. These Integrated Experience GenEd courses at UMass Amherst aim to blend and apply content from more than one discipline to examine a central issue, topic or theme. In addition, the integrated experience courses also emphasize active engagement of concepts and connection between ideas, self and society. Teaching IE GenEd courses may take different forms and approaches, one of which is to take a multidisciplinary content and offer it in a collaborative (teamwork) learning setting. The Team-based learning (TBL) approach, as suggested by Michaelsen (2004), provides plenty of opportunities for students' peer learning, collaboration among team members and assurance of individual accountability in group settings. It uses the classroom as "a meeting place for constant interplay between the knower and the known – between interiority and community (O'Reilly, 1984)." The TBL approach can promote active learning and self-reflection which helps students develop an ownership of their own learning and achievement.

The IE and TBL course: *A real course*

In the fall of 2011, the Team-Based Learning Fellowship Program was funded and implemented at the UMass Amherst campus to support faculty in redesigning their existing courses. The program focused on helping faculty to design their courses based on four key TBL features, which are as follows: forming/designing diverse teams, managing team performance, implementing meaningful team assignments, designing team projects and evaluating team/individual performance.

During the 2012 Fellowship Program year, a faculty member of the Department of Plant, Soil and Insect Sciences used the TBL approach to design a new GedEd IE course: "Global Issues in Applied Biology." The course learning outcomes included:

- Solving real-world problems
- Developing critical thinking skills
- Building leadership skills
- Learning to work as an effective team member

The course had 73 students from 9 different majors. Prior to the start of the semester, a brief article was sent to the enrolled students to introduce them to the concept of Team-Based Learning. For the majority of the students, TBL was a different learning experience from what they had encountered before. The instructor also assigned students to teams of 6 or 7 based on their majors, genders, and academic standing at the start of the semester. Throughout the semester, before each new unit or class, students would read assigned articles related to the class work. Then each class started with an individual readiness assurance test (iRAT) to ensure that every student had come prepared for the course work for that day. Following the iRAT, the same test was given to teams (tRAT); when taking the tRAT, students were actively engaged with their team members to resolve any discrepancy in their iRAT answers. Following the tRAT, the instructor led the class discussions to demystify misconceptions revealed in the tRAT results, and clarify any confusion students may still have had in the course materials. There was an assigned team project every week where each team had to apply knowledge from the reading assignments to resolve a new or more challenging scenario. Right after the team projects, students would evaluate their team members' contributions through a peer evaluation system. The individual team contribution (peer evaluation) scores became a multiplier for calculating each team member's team project scores. The peer evaluation score would also be used as a multiplier for the tRAT score so that each member is accountable for his/her effort in the team's overall performance. The integration of peer evaluation is critical in a team-based learning course as it eliminates the possibility of all team members receiving the same team grade regardless of an individual's true contribution to the group work. The grades were posted online weekly to give students timely feedback of their individual/team progress and to help teams maximize their performance.

The unconventional team-based learning design requires instructors to devote class time to familiarizing students with unique TBL structures. It is essential that some team building exercises are introduced at the beginning of the semester to give students an opportunity to work out any potential incongruity among team members and to maximize the learning experience for the entire team. Setting the tone correctly at the start of the semester is the key to a successful implementation of this new teaching and learning approach. In the "Global Issues in Applied Biology" course, a mocked up TBL class was conducted on the first day; students were asked to complete an iRAT and a tRAT as soon as the class began to familiarize them with the TBL format, and prepare them for the structure and course expectations for the rest of semester. Students were also given a series of technological exercises to get them acquainted with various gadgets in the TBL classroom. It was expected that by the end of the first week, every team would have developed the team contracts and every team member had to agree and sign the contracts.

To understand how students perceived their TBL experience and the effectiveness of implementation, the instructor conducted an end-of-semester survey. In addition, she collected students' feedback on their IE GenEd learning experience in the TBL classroom. Many students reported that this new learning approach helped them learn the subject matter in greater depth (71%). They also commented that the course had taught them how to integrate multiple resources through team projects (52%). Other comments were that it had helped them apply learned materials to real life situations (87%), improved their problem solving and critical thinking skills (74%) and that they had become more appreciative of the power of diversity (74%). Fifty eight percent of enrolled students also reported that this course helped them to develop stronger team skills, such as compromising, negotiation, listening, respect, trust, etc., all of which are crucial skills for successful integration into the work force. As one student commented on her learning in this course: "I have been so used to doing work on my own throughout my college career, yet, this course made me realize that, in the real world, I will never be doing work in this way. All in all, I

now recognize the true power and importance of collaboration and how a combined effort is much more effective than an individual one."

Incorporating TBL strategy in the GenEd IE course can motivate students to go beyond rote learning of subject maters. The well-crafted in-class application exercises in a TBL course allows students to apply knowledge to realistic situations and to see the value of the prior knowledge and skills that they have acquired in the GenEd, as well as in their major courses. As students attach relevance and value to a problem, it becomes significant and meaningful to them, and when they are working in teams, they are developing important team and problem solving skills. Using the TBL approach in this upper level undergraduate course underlined the GenEd IE core values of active engagement of concepts and connection between knowledge, self and society. The GenEd IE curricula helps to deepen college students' knowledge and prepare them for their future careers in the professional world.

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Computers as Critical Thinking Tools: Primarily Self-Directed, Online Capstone Course

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Abstract

This paper reports on the design of a primarily self-directed, online capstone course that challenges popular designs of online instruction, while still being informed by instructional theories and best practices. In this course, learners create instruction that engages their students in critical thinking with technology. This course is *different*; it includes synchronous virtual sessions yet has no ongoing discussions or fixed deadlines. It is *flexible*; learners choose projects, Mindtools, learning experiences, and determine their own schedule. It is *rich,* incorporating resources designed to facilitate learning, confidence building, and project completion. An overview of the purpose of the course and design project, summary of the iterative and collaborative design-based research approach used in this project, list of course features informed by theoretical foundations, and discussion of preliminary results from the implementation, including suggestions for directions for future design revisions and research are included.

Purpose

Project Problem

Computer-lab classroom space and scheduling problems led to transforming 'Computers as Critical Thinking Tools' from a classroom to an online course. The transition was informed by distance education principles and a desire to enhance the course's capstone nature, without prescribing to popular designs that include ongoing social interactions (e.g., discussion boards). It was critical that students demonstrate abilities to self-critique projects and show confidence in their work without constant guidance. Thus, transitioning to an online environment provided opportunities to create a course that facilitates great latitude in self-directed instruction.

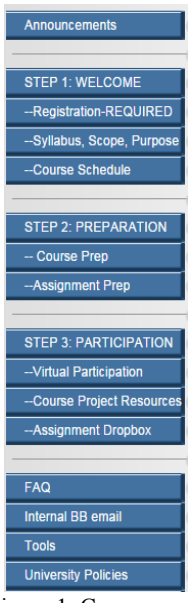

Figure 1. Course menu divides required work into three sequential steps.

Target Learner Population

This course is open to undergraduate and graduate students who have prerequisite courses, knowledge, or experience in learning theory and instructional design. Undergraduates and graduates without prerequisites are provided with tutorials to cover prerequisite concepts. The course is a required capstone for teaching certification as an Educational Technology Specialist and an elective course for a general Instructional Design degree.

Course Goals

The course goal is to engage learners in creating instruction for their students that prompts critical thinking about subject matter through the use of technology resources, referred to as Mindtools. Learners gain authentic experience as *designer-teacher* (creating

lessons and instructions), *student* (creating prototype deliverables based on lessons), *implementer* (administrating lesson activities), and *evaluator* (critiquing deliverables/implementation). Through these activities, students are required to wear different "hats," providing them with a holistic view of instructional design and critical thinking with technology.

The course, as a capstone experience, also intends to build learner confidence and independence by providing a rich online environment containing multiple and varied resources and scaffolds, with limited instructor guidance and social interaction. The course is 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).

Course Structure

The course structure and resources were informed by goals to prompt learners to demonstrate competencies and confidence. Adult learning theory and instructional design and technology theories informed the design. Since adults tend to look for learning experiences that provide easily accessible resources *(What I need)*, relate to their workplace *(relevant)*, and are minimally disruptive of their time *(flexible/doable),* the course structure, as reflected in the course menus (as shown in Figure 1), guides learners through three major steps:

STEP 1: Welcome - Set-up instructions; Introduction tutorial; Schedule
STEP 2: Preparation - Course Prep, Assignment Prep
STEP 3: Participation - Virtual Participation, Project Resources, Assignments

Rationale for design

More courses are being translated into online offerings yet much of the literature suggests that online courses require more faculty time than their classroom counterparts (Tomei, 2006). Little is known about how much time faculty are required to be present in online courses or how much engagement they must have with students. While there is evidence that instructor presence is related to learner satisfaction, perceived learning, and metacognitive understanding (Garrison & Akyol, 2013), online courses can be created to reduce faculty engagement and teaching time to avoid burnout and still maintain quality of instruction (Dunlap, 2007).

This course provides learners with support to work *independently* with little input from the instructor. Media design principles, adult learning characteristics, pedagogical and learning scaffolding, and project management tools were used to move instruction from the instructor's control to the learner's control. For example, short tutorials replace lectures; frequently-asked-questions (FAQ) reduce learners' need to wait for instructor responses; automated self-assessments provide immediate feedback and correction; and menu structures guide learners through recommended steps. These features place responsibility on learners, build confidence, and mimic authentic practices outside of school learning (Dunlap, 2007). Thus, the design supports independent and flexible work practices and engages learners in authentic and meaningful experiences resulting in products that can be used in their workplace, all while providing digital scaffolds to support learner independence.

This course was designed using a minimalist approach, removing distracting materials and only including required ones. Some attractive and popular course management system features (ex. blogs, groups, discussion boards) were not used because they did not match well with the instructional strategies and learning expectations (Koszalka & Ganesan, 2004). The first iteration of the course design included few resources, such as readings and examples. Based on student performance, feedback, and instructor reflections, more resources, such as narrated tutorials and self-assessments, were designed and developed to meet learner needs. Thus, the course is progressing towards providing *just enough* resources to support and facilitate learning.

Design and Development Process

Design-based Research Approach

A design-based research approach was used in this project. The course was designed through iterative and collaborative efforts between the course instructor (an ID professor) and teams of Instructional Design and Technology students. In yearly iterations, evidence-based decisions were made to enhance or add new components to the course. These evidence-based design and development processes included reviewing literature, course materials, learner deliverables, formative evaluations, course statistics, instructor journals, and course evaluations to

make design decisions. Student-designers took the lead to conduct reviews, organize and summarize data, brainstorm design solutions, and develop resources. One student designer served as an assistant during the current implementation of the course. The instructor provided design input, met with teams to discuss decisions, and informed and challenged student thinking.

Cognitive Apprenticeship

As described in Souid, Koszalka, Wu, & Hall (in press), in this case, the professor, informed by a cognitive apprenticeship approach, made her thinking visible to the student designers. In cognitive apprenticeships, apprentices eventually behave like practitioners through collaboration with an expert, coaching, and practice (Brown, Collins, & Duguid, 1989). Throughout this project, the professor explained how she made design decisions, answered theoretical and practical questions, and modeled scholarship. These activities supported learning and professional development by allowing student designers to acquire and use cognitive tools in an authentic setting (Brown et al., 1989) and apply what they had learned in their coursework in all aspects of the design of a real course, thereby bridging the gap between theoretical learning and real-life application (Resnick, 1987).

Theoretical and Empirical Foundations

The design of this course was guided by generative learning theory (hands on, minds on) (Wittrock, 1990), first principles of instruction (Merrill, 2011), critical thinking/deep learning with technology (Jonassen, 2005), authentic practices (Herrington, Reeves, Oliver, & Woo, 2004), adult learning (Knowles, 1984), and distance education best practices. The design challenges notions of typical distance education recommendations for extensive use of social interactions.

Course Features

There are five key design components of this course. These aspects represent the uniqueness and purpose of the design. In table 1, design components that supported learning (tutorials, virtual sessions, and digital scaffolds) are described in relationship to their theoretical foundation. In table 2, two student activities (projects and self-assessments) are described in relationship to their theoretical foundation. See Tables 1 and 2.

The course features were purposefully designed and implemented to support the course goals (e.g. learners create instruction for their students that prompts critical thinking about subject matter with technology resources and build confidence and independence). The course provides learners with *authentic* experiences working as an instructional designer by supporting independence and confidence building and limiting inauthentic behaviors. For example, students were provided with rich and varied resources (ex. learning contracts, self-assessments, rubrics, FAQs) to scaffold their independence. However, accessing these resources was not required. Contrary to popular designs, short quizzes were not required or graded, were rather available for self-assessment or as advanced organizers for project work. Further, authentic and purposeful synchronous communication replaced popular online discussion boards in which peers respond to questions and reply to one another. Learners were encouraged to interact with relevant individuals outside of the course, (e.g., in their workplace) and were not required to engage in ongoing social interaction within the course, except through three planned synchronous sessions.

The projects in the course were designed to be *authentic, relevant, generative, and require deep learning with technology.* Projects represented work that the learners are, or will be, doing in their jobs (e.g. teachers). Thus, they were encouraged to create deliverables for their workplace. Authentic workplace examples were provided to model expected performance and possible applications for the projects.

Finally, learners were prompted to reflect on their completed work using a project rubric before receiving instructor feedback. See Figure 2. These rubrics served to communicate project requirements and prompt learners to think about their competencies, designing instruction using a particular Mindtool, and their application of the Mindtool in prompting critical thinking, as reflected in Mindtool project deliverables. Thus the rubrics were tools to support self-awareness, confidence building, and continued growth.

Concepts are descriptive of content domain (breadth of net)	
4 points	Map includes all important concepts; describes domain on multiple levels
3 points	Map includes most important concepts; describes domain on limited number of levels
2 points	Map includes numerous concepts; important concepts missing; describes domain only 1 level
1 point	Map includes minimum concepts with many important concepts missing
0 points	Failure to complete the assignment
___ Self-assessment	___ Instructor's assessment

Embeddedness and interconnectedness	
4 points	All concepts interlinked with several other concepts
3 points	Most concepts interlinked with 3 or more other concepts
2 points	Several concepts linked to only one or two other concepts
1 point	Most concepts linked to only one or two other concepts
0 points	Failure to complete the assignment
___ Self-assessment	___ Instructor's assessment

Figure 2. Portion of a project rubric for concept map prototypes. Rubric allows for self-assessment and instructor assessment.

Table 1: Design Components to Support Learning in Relationship to Theoretical Foundations

Course Component	***Description***	**Theoretical Support**			
		Adult Learning Theory	***Scaffolding***	***Authentic Practice***	***Rich Resources***
Tutorials	Narrated and animated summaries replacing traditional lectures	Course *flexibility*, learners could access the tutorials anytime, re-watch as needed.	Provided guidance on how to use project rubric. ***See Figure 3.***	Included authentic examples of Mindtools in use.	Narrated, animated, graphic intense, presented expectations aligned with rubrics, readings, and examples.
Virtual sessions (VS)	Three required synchronous video and audio sessions	No required on-going peer consults, no discussion boards, flexible nature of course, course can be completed any time prior to course end date.	Scaffold learning process & project development. VS 1: Introduce content and projects. VS 2 & 3: Project sharing, receive feedback.	Demonstrate project, initial practice with resources, report status, and defend design decisions	Video and audio conferencing, project and screen sharing, on- and off-line interactions during VSs
Digital Scaffolds	Course menu, prerequisite & content reviews, learning contracts, FAQ, project templates	All items (except learning contract) optional, learners can access resources as they require.	Supported time-management, learning, and project development.		Digital readings, interactive question/answer resources, templates in multiple formats

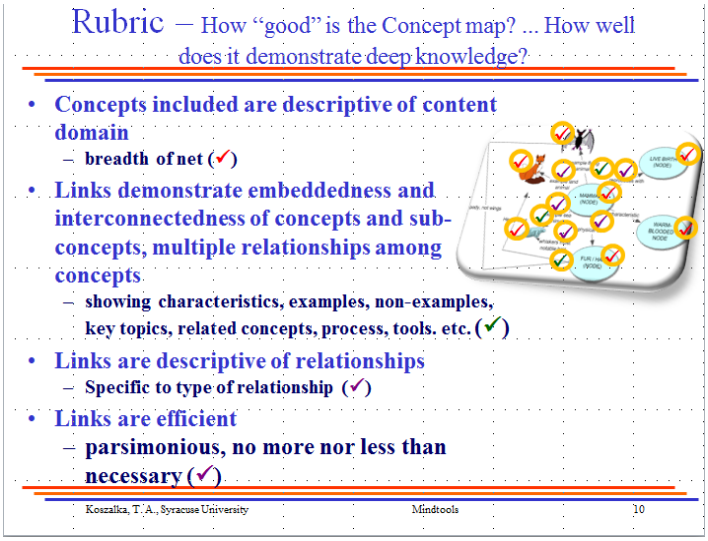

Figure 3. Screenshot of an animated, narrated tutorial on concept maps, showing discussion of how to use the project rubric.

Table 2: Student Activities in Relationship to Theoretical Foundations

Course Component	*Description*	Theoretical Support			
		Adult Learning Theory	***Scaffolding***	***Authentic Practice***	***Rich Resources***
Projects	Lesson plan, three prototypes using Mindtools, rubric-based critique of prototypes	Learning activities *relevant to job,* learners chose meaningful projects, relevant Mindtools, flexible work schedule	Project work scaffolded by tutorials, readings, rubrics (including self and instructor assessment), and authentic examples.	Projects related to work environment Encouraged to create projects for their workplace. Multiple workplace examples provided. Rubric-based self-reflection and self-critique	Multiple examples using different subject matter, animated sample projects
Self-assessments	Self-assessments of Mindtools in the course, randomly generated questions allow for multiple attempts	Self-assessment as advanced organizers (to activate existing knowledge) or as self-checks of learning; Scores on self-assessments not included in grades, optional activity.	Formative and developmental feedback provided for correct and incorrect responses, included explanations and references (e.g., page number, tutorial) for further study.	Items involved mini-case scenarios of tool use, common uses and misuses of Mindtools, misconceptions.	Rich feedback to question responses, references to more information on content ***See Figure 4.***

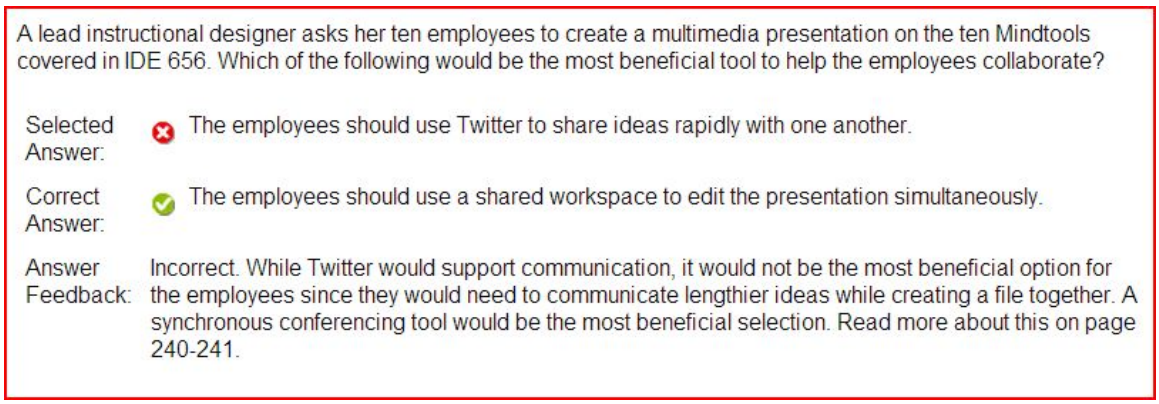

Figure 4. Example of a self-assessment item answered incorrectly with developmental feedback (Hall, Koszalka, Souid, & Wu, in press)

Results

Based on preliminary data and reflection, five themes emerged. First, the learners did not seem to use the available resources effectively. Course statistics showed that few students accessed a majority of the resources including Mindtool tutorials, readings, and self-checks. Second, the virtual sessions did not seem to fully support course exploration or fully engage learners in understanding the value of course resources. Upon investigation of the virtual session agendas, instructor reflections, and student evaluation responses it was found that little emphasis was placed on helping students explore resources. Third, submitted projects were of good quality based on the criteria outlined in the rubrics. Fourth, learner course behaviors seemed to contradict the principles of adult learning theory. Contrary to the principles of adult learning, learners tended to ignore scaffolds and course resources that could support their work and the flexible nature of the course, often seeming to proceed with projects without due diligence to reviewing project requirements, checking their understanding of key concepts, and using course flexibility to their advantage to learn more deeply and make progress. Finally, learners did not appear to develop confidence. Evaluations and comments during the virtual sessions suggested that even though this was a capstone experience, students wanted more feedback as they were proceeding. They appeared not to use the scaffolds (e.g., tutorials, self-checks, samples, rubrics, FAQs) to check their work, thus were not taking advantage of the tools designed to help build independence and confidence.

Discussion

Learners did not use the available resources effectively.

Preliminary data and reflection suggest that students avoided using the digital scaffolds. These scaffolds were designed to help the learners create projects that reflected an understanding of the course content. For example, it was observed that only a few learners accessed the self-assessments which check fact-level knowledge and provided developmental feedback to address misconceptions of the Mindtools (Hall et al., in press). Learners also regularly contacted the instructor with questions through email, without first consulting project instructions or the frequently-asked-questions (FAQs). This was puzzling as the FAQ section was clearly visible as an item in the main menu and provided just-in-time information without waiting for the instructor to respond. This type of reluctance might be attributed to media stickiness, or the "tendency for a group of users to collectively stick to one type or style of media use and not switching to another" (Huysman et al., 2003, p. 431). This reluctance to switch technologies (e.g., from asking questions through email to self-seeking answers through a FAQ database) may be explained conceptually through a "cost-benefit analysis; learners will only change their way of working if the perceived benefits exceed the anticipated overhead costs" (associated with learning to use the new technologies/resources) (Huysman et al., 2003, p. 433). To address underuse of digital scaffolds, in the next design iteration, benefits will be explained and learners will be prompted to actively explore the course site and all the available scaffolds during the first virtual session. This will help to ensure that learners are both aware of the resources and understand their value.

Virtual sessions did not support course exploration or fully engage learners in course resources.

The instructor and teaching assistant observed that the virtual sessions were not successful in making learners aware of the available course resources. The focus was on reviewing typical course information, e.g., syllabus, procedures to complete and submit projects, rather than guiding learners through a review of the available resources and into the start of their learning and project development activities. This prompted the decision to provide longer virtual sessions (virtual residency) in the next design iteration to allow for time for learners to interact with resources in a combination of synchronous on-line and individual off-line activities to explore the course site, find and access digital resources, and return to the virtual session for debriefs and continued instruction.

Furthermore, the quality of the virtual sessions was affected by technical issues likely due to participant connections, thus thought will be put into ways to plan for ways to mitigate such events in the future.

Projects were of good quality, based on the criteria outlined in the rubrics.

Learners were able to produce projects that were of good quality, meeting most of the criteria outlined in the project rubrics. Some learners however relied heavily on the provided examples, which seemed to replicate and modify example projects and meet quality standards, however, called into question whether learners met the goals of the capstone: becoming independent and confident designers. In the next iteration of the course, additional requirements may be added to project rubric prompting learners to explain *how* their projects are relevant to their practice environment and *how* they will promote critical thinking with Mindtools in their students. This may provide additional evidence suggesting that learners are thinking about the course content and the practice of designing instruction and help them develop more confidence in being able to rationalize their choices.

Learner behaviors contradicted the principles of adult learning theory.

As discussed, this capstone course was specifically designed to prompt 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). Yet, the preliminary data seems to suggest that students did not take this initiative. Learners had difficulty managing their learning, rarely accessed resources to support their work, and were reluctant to follow the learning contracts they created to scaffold their work (Wu, Koszalka, Souid, & Hall, in press).

Over multiple iterations of the course, learners also continually requested peer communication through discussion boards, but when the discussion boards were included in different iterations of the course, they went unused. Upon review of the final projects, this absence of asynchronous discussions in the various iterations of the course did not seem to affect the quality of learner projects. Thus, it seemed that learners were looking for peer support but did not take advantage of the communication tools when they were available. It is unclear if learners were requesting discussion boards because they felt the need for direction and support, or that they were accustomed to having asynchronous discussions in other online courses and were looking for it here as well. Adult learning theory suggests that learners will consult with peers only when they feel they must (Knowles, 1984). Thus, their request for the discussion boards might have been an indication they were looking for external reasons to explain the challenges they had in directing their own learning, critiquing their own work, and demonstrating confidence in their choices. Interpreting these findings is challenging. It may be that in this project we: a) incorrectly applied adult learning theory to the design of the instruction, b) interpreted the application of adult learning theory incorrectly when explaining learner behavior and feedback, and/or c) incorrectly classified our learners, who are mostly graduate students, as adults. Further analysis is required to unpack these findings and further research is needed to possibly development new principles, theories, and models to inform the design of online instruction for adults.

Learners did not appear to develop confidence.

One of the course goals was to build confidence and independence in this capstone experience. Learners were to demonstrate how they can apply the competencies they have been developing through this program in a culminating set of projects. Preliminary data and reflections suggested that this goal was not met by every learner. Specific responses, indicating lack of confidence in being able to successfully complete projects and meet standards, were provided from learners who suggested the course be lengthened and that more communication with peers and instructors was needed. Those indicating a need for more time and support were generally those who posted projects on the last day of the course and did not access resources during the first weeks of the course, outside of the required virtual sessions. These data suggest that the course should be enhanced to be more explicit in encouraging learners to take control of their own learning. This adjustment may be challenging or frustrating at times since students may be used to instructor-led online instruction where they have multiple pre-assigned checkpoints, regular required

social interactions, and a variety of other time-intensive and peer intensive activities. Given the nature and goals of this course as a primarily self-directed capstone experience designed to help learners build confidence before they enter their practice or academe careers, some additional short interval scheduling and scaffolding may need to be added to support successful completion of activities. These types of activities may be helpful to further engaging students in developing better self-assessment practices and building their confidence in designing instruction.

Conclusion

Initial analysis suggested that learners were able to create acceptable products with a minimum of scheduled activities and without ongoing social interactions. While digital scaffolds were provided, evidence suggested that learners did not access them or greatly underused them. Design modification (e.g., motivational prompts, value-propositions) may be able to resolve several of the resource use challenges. However, assumptions about projects demonstrating deep understanding of course concepts are being challenged by the near replication of example projects. Further investigation is needed to identify how well projects indicated deep understanding, if the multitude of project examples and resources add value or simply provide a project to replicate, and to look at other digital scaffolds to see if they indeed can reduce instructor time and still provide self-directed, flexible, a-la-carte instruction that adequately supports learners. There is a continued need for stronger theoretical models for the design of online capstone-level instruction, as preliminary results contradict some principles of adult learning theory.

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Collaborative Design of an Online Self-Directed Course: An Example of a Cognitive Apprenticeship

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Abstract

The process of developing knowledge in any field can be enhanced through project-based collaborations while apprenticing with an expert who engages novices in cognitive activities and makes his/her own thinking visible. Graduate students in an instructional design (ID) program collaborated on an authentic project that engaged them in a variety of instructional design activities through cognitive apprenticeship. The students worked with an experienced ID professor to enhance an online, primarily self-directed graduate-level capstone course. Each student had interests in ID and different aspects of the project's design: tutorials, learning contracts, and self-assessments. The professor's interests were learner interactivity with content and minimizing social interactions. The professor and three members of the team share their perspectives and reflections on the collaboration, topics of disagreement among themselves and the team leader, evidence-based design decision approaches, and how these experiences affected their views of instructional design.

Introduction

As students work to become members of the instructional design community of practice they generally experience similar courses. However, they often have diverse interests, make distinct design decisions when given complex learning problems, and ultimately view the instructional design processes differently. Experiencing design problems and working collaboratively while solving them provides a variety of opportunities that will support movement toward becoming a member of the community of practice (Lave &Wenger, 1991). An important aspect to this collaborative learning process is having an expert shepherd novices through the process. The expert can provide feedback, prompt additional reflection, and share his or her own reflections of the problems addressed and potential solutions. The collaborative problem-solving process thus can be enhanced with the addition of a cognitive apprenticeship, making novice thinking visible and expert thinking visible to novices (Salomon, 1993).

Hearing about how team members approach design problems, focus their attention, come to consensus when they have disagreements, use different types of evidence to make design decisions, and rationalize their decisions can provide a rich foundation on which novices can test their own knowledge, build deeper understanding, and develop sound practices in design (Boling, 2010). These experiences also affected novices' views of ID.

Purpose

Collaborating on instructional projects can bring about experiences prompting those involved to pause and wonder about design decision-making, the value and truth behind supportive literature, the meaning of available data, and opinions and appropriateness of selected instructional techniques. The purpose of this paper is to share experiences from team members who collaborated on an authentic design project and prompt thinking about how students can be engaged in different ways that challenge and enhance their design thinking.

The project was complex with many components. Each team member was involved in exploring the course data and making major design decisions, however each also gravitated toward a specific area of interest. The

professor prompted the students to take charge of the re-design, however shared personal goals, insights into how the course was facilitated and how learners participated, thoughts on design, and reservations about guiding theories.

Context

Team members on a collaborative re-design project were tasked with exploring course features, interactions, projects, feedback, current literature in online instruction, the professor's reflections and vision for the course, and their own knowledge of the instructional sciences to help re-create an advanced online course. The course being redesigned was a capstone for an Instructional Technology program. It had been converted into an online course years ago, however was very time consuming for the instructor and as a capstone, learners had difficulty applying new information with their previous knowledge from courses, into the capstone project. Learners also seemed to lack a sense of confidence in IT/ID practices as they attempted to complete their capstone.

The professor set a context that the new design would have to provide resources to better scaffold learners in developing projects that showcased their program knowledge, helped learners develop confidence in their competencies to practice, and reduced instructor time. The course also needed to align with adult learning and autonomy theories to support learner needs for flexibility in work pace, independence, and self-assessment. Finally the professor suggested that the course activities remain generative (active learning), developmental (support new learning and verify previous learning), and independent (not dependent on other students to complete work).

Some of the challenges in re-designing the course were prompted by testing controversial ideas in the literature that were strongly advocated, yet not fully supported by evidence in all studies. For example, social interaction in online courses is almost always advocated, yet in some research adult learners perceive social interactions with instructors and with peers as lower in value as compared to other aspects of the course (Craig, Goold, Coldwell & Mustard, 2008).

As the student team pondered ideas and developed approaches to enhance the course, the professor made her thoughts visible to the team during regular meetings and team and individual progress reviews. Through a series of discussions several design decisions were made based on literature, challenges to best practices in distance education, experiences of team members and professor, and data from previous versions of the course.

Cognitive Apprenticeship

Novice designers often apply what they learn in their coursework to aspects of course design projects both in their courses and independent projects. The novices are generally guided by intermittent feedback from an instructor or someone who has 'hired' them to do the work. However, deep learning is more likely to occur when novices work with an expert in an apprenticeship-type relationship and can get direct and timely feedback based on the expert's thinking while engaged in project work. This sharing and prompting of additional thoughts during work activities supports the notion of guiding thinking as found in cognitive apprenticeship. Cognitive apprenticeships support learning by allowing novices to acquire and use cognitive tools and methods in an authentic setting (Brown, Collins, & Dugid, 1989). Apprenticeships help bridge the gap between theoretical learning and real-life application (Resnick, 1987). Eventually apprentices behave more like practitioners after periods of coaching, practicing, reflecting, and collaborating with an expert (Brown et al., 1989). Enhanced reflective practices support these transitions, helping novices focus their observations of the expert and become conscious and in control of their own problem-solving strategies (Collins, Brown & Holum, 1991). The professor in this case, thus was facilitating the process of design learning by modeling her own inquiry and making her thinking and reflections visible to the novice designers when explaining how she made design decisions, pondering (out loud) theoretical and practical implications, modeling scholarship, and prompting the novice's thinking through her questioning.

Design Team Structure and Process

The re-design project made fertile ground for engaging groups of ID students in a collaborative design process, providing them with authentic design experiences in which they applied theoretical and practical knowledge they have been learning in their coursework. Through active engagement and cognitive apprenticeship student designers were often prompted to unpack complex sets of data (what evidence exists?), think more deeply about the context of the re-design (why re-design?), explore factors affecting success of the learners (what were they?), identify characteristics of online instruction (which could be most effective?), determine the value of evidence in making decisions (how could these data help?), and manipulate features of the technologies being used to develop scaffolds in support of deep learning of the subject matter (which features were best for learning?).

A student team leader was assigned to manage the logistics of the team. Each member agreed to work individually or with others to analyze data and propose and develop enhanced design features for the course. The team met regularly to share progress and drafts, review work alignment (for consistency), and plan future revisions. During meetings team members summarized their work and showcased their ideas. All, including the professor, commented, raised questions, defended ideas, and worked to reach a consensus on how to proceed.

Student designers contributed to the project by sharing their new knowledge, providing a learner perspective to design decisions, and drafting new materials. The team created standards, project templates, and peer-reviewing procedures to support their design work. The professor provided constructive feedback throughout the design process, shared stories and anecdotal instances related to new designs, interpreted theoretical and conceptual ideas and data, and challenged students' thoughts. Although seemingly harsh at times, the professor was prompting the students to rationalize and defend their ideas and describe how design features fit, or did not fit, within the context of established guidelines. At times, by consensus, some guidelines were modified (e.g., self-assessments format) while others were not (e.g., use of social media). Team members reflected on their work throughout the process, and shared their reflections during team meetings.

Perspective of the professor (Instructional Design Expert)

The cognitive apprenticeship model was used to make thinking more visible during decision making and problem-solving sessions. It was particularly relevant in facing the tantalizing challenges addressed in designing an online course that is primarily self-directed and uses a minimal approach to social interaction. Much of the literature suggests that the best cases of online instruction are highly interactive and engage learners in a variety of social networking activities among instructor and peers. However, there is literature that disputes social interaction findings to some degree (Craig, Goold, Coldwell, & Mustard, 2008; Kaur & Sidhu, 2010). Adult learning theory and descriptions of non-traditional adult learners in higher education suggest that such learners will take the lead, with or without the help of others, to identify their learning needs and plan appropriately to meet learning requirements (Knowles, 1975). Multiple studies suggest that adult learners value interactions with the content in online courses *more than* interactions with instructors (e.g., feedback on projects, emails, blogs) and the variety of social interactions with peers (e.g., discussion boards, emails, project feedback, blogs) (Croxton, 2014; McGlone, 2011; Rhode, 2008). Thus, the challenge was raised to reduce non-essential social interactions and increase scaffolding to support content learning, reflection, and project completion.

The capstone experience was designed to assess learners' abilities to synthesize their master's degree experiences in solving an instructional design problem focused on their K-12 context. As a capstone it was expected learners would take responsibility in developing instructionally sound project deliverables, access provided resources as necessary, and proceed at their own pace with little need for social interactions. As in any learning and assessment situation however, scaffolding was designed for easy access to help learners get started, interpret project expectations, and successfully complete requirements. Thus, a minimal amount of social interactions, in the form of synchronous sessions, were included in the course. Email access was provided to interact with the instructor however, students were encouraged to use the many different types of scaffolds to answer their questions immediately, move forward in creating their projects, assess their understanding of content along the way, check their work to make sure it met project metrics, manage their time with self-generated learning contracts, and demonstrate confidence in their work. Effectively enhancing these scaffolds in the course design and presenting rationale for design choices were the challenges for the ID team, thus the focus of their ongoing education as advanced practitioners and scholars in instructional design.

Perspectives of Student Designers

Each of three team members (student designers) had goals to enhance their general design competencies and pursue different research interests related to the project. Below each briefly describes his or her thoughts about project work and how the cognitive apprenticeship experienced informed personal views of ID processes.

Narrated Tutorials – Lina Souid

The Problem. Based on a brief instructor-led introduction to critical thinking with computer tools (Mindtools), learners had to choose three of ten Mindtools to integrate into a lesson activity to prompt critical thinking in their K-12 students. Learners did not follow project guidelines and often had difficulty using a self-assessment rubric. Through course discussions, analytics, and evaluations, it was found that learners rarely reviewed

resources on 'familiar' Mindtools (e.g., concept maps, internet searches) they had previously used, thus did not take advantage of their features in new ways that could enhanced critical thinking (Souid, Wu , Hall, & Koszalka, in press).

The Work. Given that Mindtool use was new content and learners had to use only three Mindtools, a variety of narrated tutorials were developed to scaffold learning and project development. The series of short tutorials (8-10 minutes each) supplemented textbook chapters and given sample projects, to provide an overview of each Mindtool and its uses to prompt critical thinking. The tutorials also included an overview of how to use project rubrics to guide project development and to self-evaluate projects before submission. The tutorial also prompted (modeled) learners to think about how to design critical-thinking rich instruction and prompting strategies.

Best practices principles in message design and prompting interactions were used in the tutorial design. Relevant and meaningful images were used to illustrate textual content, provide visual interest, and focus attention on key points. There was an effort to reduce distractors by excluding irrelevant images that did not add value. The tutorials were narrated to engage auditory learners and provide additional detail to support design decisions. The tutorials were designed to be short based on evidence that short videos are preferred by learners in online courses. Course announcements and activity instructions were augmented with additional prompts to encourage learners to visit, and revisit, the tutorials as they started and completed their capstone assignments.

My Thoughts. The development of narrated tutorials was a collaborative effort primarily between the professor and me. The professor provided an example of a couple of tutorials previously created as a sample. She explained how the tutorial was designed and the guidelines used to ensure consistency. Based on these samples I created narrated tutorials for each additional Mindtool in the course, making modifications based on the Mindtool. Having a sample (template) improved the consistency of content and format across all the tutorials. The consistency allowed learners to focus on tutorial content rather than get distracted by different formats in each.

Along the way professor provided feedback on the design of each Mindtool's tutorial. I believe this feedback served to improve the flow and information presented in each tutorial. This also provided me with insights on the use of each Mindtool and on how each individual learner consumes content differently. It re-emphasized to me the importance of creating clear and concise content and instruction for online environments.

Scaffolding Time Management - Yufei Wu

The Problem. This self-directed online capstone course is designed based on Adult Learning Theory that suggests adult learners are capable of identifying what work they need to do and managing their learning process to achieve expected learning outcomes (Knowles, 1986). A flexible time line was built into the course that allowed learners to complete projects up to 4-5 weeks prior to the end of the course. However, procrastination issues existed in the previous versions of the course. Evidence from course statistics and evaluations suggested that many students waited until the last few days of the course to access and quickly complete the entire capstone, indicating they did not necessarily take time to review learning resources or reflect carefully on their projects.

The Work. Two major scaffolds were provided in earlier versions of the course to engage learners in time management, learning contracts, and virtual sessions. The question now became one of determining if the learning contract and virtual session scaffolds actually helped learners engage effectively in learning and managing project work thus, helping them to learn deeply and to avoid procrastination. Learning contracts and social prompts are suggested as tools to help learners organize and take charge of their own learning process (Knowles, 1986).

A new approach to learning contracts was required at the beginning of the course to support learners. A template was created to help learners identify key activities to complete projects. Even with the template learners had difficulty creating the learning contract, and more importantly following their plan. The template was revised to show two examples, one where the learner completed the course 2 weeks early and one where the learner completed the course by the end date. Both included sample dates for completing and submitting capstone project components, as well as for preparing and participating in course activities (e.g., virtual sessions). It was thought that this detail would scaffold students to participate in learning activities, create reasonable time lines, and following their plans.

In addition, the virtual residency sessions were modified to better scaffold learner progress in the course. Three virtual residency sessions (only one had required attendance in the previous version of the course) were designed to help learners engage in the course resources early in the course, plan their projects, share projects and receive feedback, and ask questions before embarking in their capstone projects over the last 4-5 weeks of the course. Learners were required to complete project component drafts in preparation for the virtual session; attend and participate in the sessions, and complete activities after each session. Learners were prompted to reflect on their learning throughout the sessions. The virtual sessions ended by the middle of the third week (of eight) of the course at which time learners began to work independently, guided by their learning contract. Reigeluth (2012) suggested

that attainment-based progress could help with maximizing learning since students tend to move forward after they achieve instead of when certain amount of time passed. The learning contract templates and virtual residency sessions engaged learners in acknowledging their learning about Mindtools and critical thinking and helped them resolve procedural problems so that they could move forward in capstone project work.

My Thoughts. I learned that a majority of the learners did not follow their own learning contracts. After submitting their contracts only one learner followed the learning contract, one learner partially followed the learning contract, and none of the other learners followed their contracts (Wu, Koszalka, Souid, & Hall, in press). My thoughts were that since no feedback was given to learners about following (or not following) learning contracts, it is possible that learners did not value the learning contract as a useful time management tool, nor did they value time management as a factor to succeed in a self-directed online course. I also noted that learners who did not follow their learning contracts had acceptable, but lower levels of quality (grades based on rubrics) on their capstone projects. Overall, I believe that the use of learning contracts did provide learners with flexibility to create their own time lines, however they did not appear to support effective learning management in this self-directed learning environment.

Self-assessments - Jacob A. Hall

The Problem. It was unclear if the learners in the course were developing deep knowledge of the Mindtools and their uses as critical thinking tools. There was no specific assessment associated with the Mindtools, thus no specific feedback provided as to whether the learners understood the facts about Mindtools or their applications to instruction that prompts critical thinking.

Although the capstone projects generally met grading guidelines, some aspects of the projects appeared as though they were modeling the samples provided without demonstrating unique prompting strategies to the subject matter of the context chosen by the learners for their capstone, thus we questioned whether learners were showcasing deep knowledge (Hall, Koszalka, Souid, & Wu, in press).

The Work. The team decided to add self-assessments to the resources for each Mindtool. The self-assessments consisted of multiple choice questions that would provide immediate developmental feedback to learners for both correct and incorrect responses. Principles of design were followed when creating feedback for the course self-assessments. Two principles relating to assessment feedback which directed our design were that "feedback is an ongoing and integral part of assessment" (Evans, 2013, p. 80), and "greater emphasis is placed on feed-forward compared to feedback activities" (p. 81). For feedback to be an integral part of the assessment process, it should be relevant and aligned with the learning objectives, designed to encourage efficient learning and self-regulation, part of an entire process, and developmental and timely (Evans, 2013).

Learners were provided flexibility regarding how the assessment would fit into their learning contract and complement their learning style. Since learners were given this flexibility, features such as immediate knowledge of results were added, no due dates were attached to the assessment, multiple attempts were permitted, and students could select which Mindtool self-assessments they would complete.

Designing the assessments with developmental feedback was an iterative process. It began by developing a table of specifications detailing what would be assessed and the complexity expected for each item. Both simple facts about the Mindtool and Mindtool application questions were included. Following development of specifications, a spreadsheet was created to track each item and corresponding alternatives. Each item was peer reviewed multiple times, and a selection of items was sent to a content expert and psychometric expert for review.

The goal of the feedback was based upon prior research. Feedback has been defined as the information provided about one's performance or understanding (Hattie & Timperley, 2007). To be effective, information (feedback) should communicate a goal, define where the learner is on their progress towards the goal, and provide guidance as to how to overcome any obstacles hindering the attainment of the goal (Black & Wiliam, 1998; Sadler, 1989). The team met frequently to discuss how the feedback was meeting these goals.

My Thoughts. I learned a great deal about assessment and feedback during the process of designing and developing self-assessments for this projects. It is a very complex process to create sound questions with effective developmental (learning) feedback based on theoretical constructs and practical circumstances.

At times throughout the self-assessment process, however, the professor did not agree with ways in which some of the questions were formed or how some of the feedback was written. Although the psychometric expert provided feedback based on guiding principles of testing and assessment, the professors' ID experiences and developmental goals sometimes seemed contrary to the theories. This led to some interesting conversations and reflection on the tension between theory and practice. In the end we agreed to disagree in some matters, either

keeping, or making minor edits to, some of the questions and feedback, and agreeing to examine the questions in the next course offering.

Benefits of Collaborative Design and Cognitive Apprenticeship

For years, the design and revision of this course has been a collaborative effort between the professor and teams of ID students. This collaborative approach benefited these novice designers because they were able to gain hands-on practical experiences in design, development, and assessment. They also experienced design-based research and mentorship in scholarly activities (e.g., publications, conference presentations). The ID students worked to design materials while receiving frequent intense feedback and guidance from an ID expert and were able to observe first-hand how an expert makes design decisions based on ID theories, principles, experience, and evidence. Each was able to gain additional design, development, and research experiences as well as develop new, deeper perspectives as novice members of the ID community of practice.

Such experiences are helpful in forming insights and strong foundations for practical and scholarly practices. Questions asked during these experiences, and perhaps important to prompt others in similar collaborative situations in their reflections, include:

- What types of experiences have you had working in collaborative design team? What has (has not) worked for you?
- How have you managed conflicting opinions within the team, especially when team members are at different levels (expert vs. student) or have different interests (practice vs. research)?
- What other types of techniques, in addition to cognitive apprenticeships, do you think can help provide students with experience in practice and scholarship?

Learning to be a member of a community goes beyond course work and seminars. Engaging novices in collaborative projects and cognitive apprenticeship activities can enhance design-thinking and perspectives in a field of practice. This project engaged a group of ID students in practicing what they have learned in course work in an authentic project, prompted them to explore areas of interest more deeply, share and defend their developing knowledge with colleagues, and move closer to fully participating in the ID community of practice.

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Mobile Technology and Applications for Enhancing Achievement In K-12 Science Classrooms: A Literature Review

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Abstract

Recent research in mobile learning started to tap into the potential of mobile technology in supporting learning, teaching and transforming the educational environment. Empirical studies have targeted learning science using mobile devices that can facilitate learning in the K-12 classroom through applications that have been developed to help teach a variety of subjects. This literature review attempted to find out the effectiveness of these mobile technology applications in enhancing achievement in K-12 science classrooms. The results indicate that learning science with mobile technology in K-12 education led to enhanced student engagement, collaboration, communication and improved learning performance but enhancing achievement was inconclusive. Based on these results, the potential of mobile learning in science classrooms and the future challenges are discussed.
Keywords: mobile learning, science, technology, achievement, K-12

Introduction

Many research studies have focused attention on determining the potential of mobile technology in supporting learning, teaching and transforming the educational environment. Mobile applications used by commercial services have also been developed for mobile devices including applications that can facilitate learning a variety of subjects (Scanlon, Jones and Waycott, 2005). Past research in science education and technology has fundamentally centered on curriculum development and implementation (Forbes & Davis, 2007). The advent of mobile technologies demands a re-investigation of how students could better learn science through these mobile devices since traditional teaching materials like the chalkboard may no longer prepare them to learn the inquiry way which will make them self-directed and social learners.

Mobile learning has been defined differently by researchers based on the context in which it has been used. The Mobile Learning Network (MoLeNET) initiative project based in the United Kingdom, defined mobile learning as "the exploitation of ubiquitous handheld hardware, wireless networking and mobile telephony to enhance and extend the reach of teaching and learning" (p.1). Traxler (2009) on the other hand, defined mobile learning as learning which requires the use mobile devices which are personal, easy to use and which people can carry everywhere with them. For the purpose of this study, mobile learning will be defined as "any sort of learning that happens when the learner is not at a fixed predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies" (O'Malley et al., 2003, p. 6). This literature review attempts to find out the effectiveness of these mobile technology applications for enhancing achievement in K-12 science classrooms. Research studies which have evaluated mobile learning's effectiveness in enhancing achievement in K-12 science classrooms will be analyzed.

Purpose of the Study

Previous research has addressed the question; "if using mobile technologies really lead to learning?" (Vogel, Kennedy, and Kwok, 2009). The findings have been variable with some suggesting that providing technology and mobile devices in the learning environment did not necessarily ensure effective learning while others suggests that it improved engagement and ensured effective learning. From the review of literature, research on the use of mobile devices in formal science classroom settings has slightly increased from 2005 with the influx of different types of mobile devices. However, research in this area has been done more in higher education settings than in K-12 learning environments. As a result, the literature selected for use in this review includes some work done in college settings which could be applied in K-12 classrooms.

In this review of literature, the researcher seeks to find recent empirical research in science and mobile learning in the K-12 classroom to answer four questions of primary concern: 1. What mobile technologies are in-

services teachers and students using for teaching and learning science in K-12 classrooms? 2. How are in-service teachers and students using mobile technology applications for teaching and learning in K-12 science classrooms? 3. Is the use of mobile technology effective in improving achievement in K-12 science classrooms? 4. What are some of the concerns in-service teachers and students are facing with mobile technology use for teaching and learning science in k-12 classrooms?

Methodology

Thirty five articles which talk about mobile learning in K-12 learning environments specifically in science classrooms were included in this literature review. The articles were primarily found through the data based search engine on the website of a university library. Search terms included "mobile technology", "mobile learning", "mobile computers", "K-12 learning", "mobile applications", "science learning" and "mobile learning achievement". Using filters provided within the search engine, the results were cut back to only include articles from peer-reviewed journals that were published in 2004 or later, where the full-text of the article was available. An initial search of mobile technology applications in K-12 returned well over 39,500 articles. In order to further reduce the number of articles to those directly focused on mobile technology application use in K-12 learning environments, the search words were change to include specific mobile devices and subjects. Some of the search word combinations were also suggested by the search engine and they included "mobile learning", "mobile technology", "mobile apps in science", "iPads and learning", "mobile phones and learning", "educational technology" and "science learning". This reduced the number of articles that came up in each search.

Based on the titles of the articles, the abstract details, focus on empirical research, and their focus on K-12 learning environment, 35 articles were selected to be included in the literature review. Some of the articles in mobile technology and learning were based on personal opinions but the rest of them were empirical studies done in a K-12 learning environment. In addition, some of the empirical studies found were done in higher education settings. Consequently, more research needs to be done in the area of mobile learning and how it applies to the K-12 learning environment specifically the sciences. In order for an article to be selected for inclusion in the literature review, the article needed to be a primary source meaning that it contained the results of the original research study on mobile learning. Some literature reviews done in mobile learning from 2001 were also included in the study. In addition, the reference list of the articles yielded some articles that were included in the literature review. When all irrelevant articles were eliminated from the bulk, the researcher decided on 35 articles for inclusion in this meta-analysis.

As the articles were read, the researcher took notes based on the research questions, the results of the study and suggestions for future research. The notes were then carefully inspected and analyzed and based on this information four main themes arose; (1) Smartphones, iPads and their applications are the most used mobile Devices in K-12 science classrooms, (2) Mobile technology promoted learner engagement in collaborative, communicative, and informal learning, (3) There is a need for effective integration of mobile technology and applications, and (4) Challenges of mobile learning in k-12 science classrooms. This review of literature will be synthesized under these themes.

Results

Most of the studies had very positive things to say about the use of mobile technology in science classrooms. Some studies suggested that mobile technology could increase academic performance, task accomplishment rates, learning goals and achievement rates (Chen, Chang & Wang, 2008; Chou, Block, & Jesness, 2012; Looi, C.E., 2011) among others. Deaton et al. (2013) found that mobile learning devices, such as iPads, are being used to "enhance the science classroom experiences and promote collaborative learning and content research" (p.71). Furthermore studies showed that using effective mobile learning approaches in science learning can encourage students to become creative, critical thinkers, problem solvers, and effective users of technology (Keengwe, Pearson, & Smart, 2009). To best understand the results of the literature review, questions that arose from the themes will be reviewed as a way of answering the questions of concern listed above.

Smartphones, IPads, and their Applications are the Most Used Mobile Devices in K-12 Science Classrooms.

Naismith, Sharples and Lonsdale (2004), reviewed that "personal digital assistants (PDA's) and mobile phones were the most commonly used technologies for mobile learning" (p.2). Today, there is an increase in the use of advanced digital devices in learning like smartphones, a large collection of tablets, iPads and iPods (Ainsa,2013; Banister, 2010; Chen, Chang & Wang, 2008; Chou, Block, & Jesness, 2012; Corbeil & Valdes-Corbeil, 2007, Cortez

et al., 2004; Deaton et al., 2013; Franklin & Peng, 2008; Hwang et al., 2012; Lewis, Zhao & Moonteclare, 2012; Looi, 2011). Chen & Denoyelles (2013) also found out that tablets were the most popular devices used for academic purposes indicating that the use mobile technology in learning is variable as different academic tasks may require different mobile devices. Although the studies were not specific to science classrooms, the results can be applied to answer one question of concern; what mobile technology are in-services teachers and students using for teaching and learning science in K-12 classrooms? Appendix A below includes a summary of the mobile devices and applications used in the different studies.

Mobile Technology Promoted Learner Engagement in Collaborative, Communicative, and Informal Learning.

Students' engagement in learning was promoted when mobile technology was used in teaching science in the following ways:

In finding information. Traxler (2009) reviewed that mobile learning was beneficial to learning when finding information was "just in time, just enough, and just for me" (p. 14). The review of literature suggested that iPads were the most popular devices currently integrated in K-12 science classrooms for use in hands on exercises and simulations in the laboratory. The use of these devices in during in-class activities made the students very engaged. In the study by Deaton et al. (2013) students used iPad applications to access, seek, and share information related to cell processes in an introductory biology class. The findings of the study indicated that once students became comfortable with using iPads for learning and their experiences were enriched. In addition, iPads made it possible for teachers to present content in more creative ways making class sessions engaging.

As quick response tools (QR codes). Quick Response (QR) codes are bar-like codes that link to specific information on the Internet. Web-enabled mobile devices like smartphones and ipads (tablets) are equipped with cameras which can be used to snap the barcode to link to information online. The QR code generator app is free and available the app store for iPads, tablets and smartphones (http://www.qrstuff.com/). In a study by Hwang et. al. (2012) smartphones and QR codes provided a learning system for elementary students to explore life science topics such as trees. The finding showed that students became very engaged and motivated in their learning.

For providing feedback and for assessments. Mobile technology can assist teachers in getting immediate feedback from their students during a lesson to find out if they are following. The review of literature suggested that specific smartphone technology like student response systems (clickers) can enhance student performance on exam questions covering material taught with clickers (Crossgrove & Curan, 2008). Crossgrove and Curan (2008) reported higher retention of information levels in courses taught using clickers. However, proof that clickers actually enhance student learning is inconsistent. For example, research studies in the sciences that analyzed the effects of clicker use on student learning between different groups of students in different semesters, reported no effect in some studies (Paschal, 2002), whereas other studies reported positive effects on student learning (Freeman et al., 2007: Penuel et al. 2007). Backer (2010) used Facebook and Smartphones for assessment. The study revealed that smartphones and Facebook increased students' motivation, independent learning and sense of responsibility when used for assessment. Burden et al. (2012) used iPads to encourage in-service teachers to explore alternative activities and forms of assessment for learning.

Learn new things. To keep up with the constant changes in the educational, research, and technology world, the use of mobile technology applications gives learners the opportunity to learn new things. Zurita and Nussbaum (2004) found out that the introduction of mobile computer devices allow a learning environment where technology manages the necessary data and collaborative learning among students with less teacher support. Students become very engaged and inquisitive when using a mobile device to find information they did not know before. Chou, Block, & Jesness (2012) noted that the use of iPads in the classroom encouraged active engagement, increased time on projects and improved digital literacy. Corbeil & Valdes-Corbeil (2007) reported that students can use their smartphones to receive notices and new information within minutes of it being posted in a course, group, or organization through a text message.

Podcasting. The review of literature suggests that a small number of K-12 learning environments are using mobile learning applications as educational podcasts, to engage students'. Podcasts are digital media files that can be stored as audio or video and retrieved when the user wants to. Podcasting using smartphones have the potential to improve student's understanding of difficult concepts and ready access to information on devices like iPods (Banister, 2010). Not very much research has been done in the K-12 classroom on the use of podcasting for teaching and learning. Research in podcasting and mobile learning was mostly done in higher education settings like Keengwe, Pearson, & Smart (2009); using iPods and podcasts as effective tools for differentiated instruction. However, it is important to note that podcasting can allow students to go over information repeatedly as, they can

pause, skip, etc., depending on their understanding. Franklin and Peng (2008) had middle school students use iPods to create daily journals about their experiences with using the iPod for learning and to watch math movies. The participants in this study reported that they loved watching the movies on their iPods and they were able to present difficult math concepts in a visual format to their own understanding. Unfortunately, the study did not test the achievement of students in math but other math educators and university faculty recommended that a clearer understanding of some of the math concepts had been attained and could be identified in the building of math videos.

Communication, Collaboration, and Content Delivery. Other important ways mobile devices are used in learning in the K-12 setting include; for communication and collaboration (Ainsa, 2013; Deaton et al., 2013, & Fritschi et al. 2013). Mobile devices can facilitate teachers' communication with their students, with parents, and with other teachers (Fritschi et al. 2013). Likewise, Ainsa (2013) noted that pre-service teachers were eager to use mobile devices to plan instruction in their classroom because it facilitated communication towards intellectual capabilities and decisions. The study noted that mobile technology should be a part of every pre-service teachers' learning experience. On the other hand, Deaton et al. (2013) concluded that iPads helped students collaborate with peers through research using many other mobile technology applications tools. They used Safari or the Facebook app on iPads to access, develop, and communicate through social media and e-mail. Chou et al. (2012) reviewed that mobile devices fostered student-centered activities and enhanced teaching practices that could improve better content delivery in different subject areas. Lai et al. (2007) established a "mobile-learning passport" (MLP) system to motivate and guide students' learning in school gardens as part of their science projects.

There is Need for Effective Integration of Mobile Technology and Applications in the K-12 Science Classroom.

From the review of literature above, mobile technology and its applications are being used in K-12 teaching and learning science in finding information, podcasting, communication, collaboration, content delivery, motivation and in learning new things. Furthermore, the results show that there is a gap between students and teachers having mobile devices and actually using them for academic purposes. The literature did not specify if mobile technology and its applications were effectively integrated in the science classrooms, if it enhanced the teaching process, or if and how it actually improved achievement, and if it improved collaboration (both in class and field work). There is therefore a need for effective integration of mobile technology and applications in the k-12 science classroom.

Discussion

In spite of growing research in the area of mobile technology and its use in teaching and learning, mobile learning is still young in terms of its technical limitations and pedagogical concerns (Traxler, 2007). Most researchers reported that student' generally had a positive attitude towards mobile technology for learning but most teachers' felt that they are on their own, when it comes to identifying new resources that fit the curriculum (Drayton et al., 2010, Chou, Block & Jesness, 2012; Fristchi & Wolf, 2012; Franklin & Peng, 2008). The review of literature also pointed to several challenges that affect the effective integration and use of mobile technology for K-12 science classrooms, like continued technical problems, the time needed to find and evaluate resources, learning to use the new application and distraction by the multitude of irrelevant apps and Websites (Deaton et al., 2013, Chou, Block, & Jesness, 2012; Fritschi et al. 2013). Most of the articles reviewed seemed to suggest that teachers did not know the appropriate teaching model to use when teaching with mobile technology but showed interest in collaborating with other teachers to find opportunities for learning. This also points to the need for professional development like (Gundy and Berger, 2013; Penuel, Boscardin, Masyn, & Crawford, 2007).

Conclusion

In conclusion, a majority of the studies agreed that effective mobile technology use enhanced achievement and that mobile learning was not yet a common place in the k-12 learning environment. Some of the studies reviewed current pilot studies of mobile technology integration in schools in the United States and they reported success stories of improve learning achievement meaning that mobile learning could someday soon become a prominent part of the k-12 learning environment. In addition, the results of the literature review suggests that teachers should be encouraged to learn instructional design strategies for mobile learning in order to be equipped to teach k-12 science students of nowadays. There were some mobile learning trends and issues that this review of literature did not help explain. Some of these limitations include: research focusing on student and teacher perceptions and not on actual teacher applications of mobile technology, more empirical studies in mobile learning specific to mobile technology applications in science subjects like biology and chemistry, and research involving

more quantitative data and not just case studies to make the findings generalizable. Research in mobile learning in the K-12 science classroom is limited as compared to research done in mobile language learning and other fields.

Suggestions for Future Research

Although mobile technologies and their applications provide great potential for learning in the K-12 classroom, empirical evidence with quality research to support its use is lacking. This implies that future research needs to focus on grounded empirical research in formal classroom settings using mobile technologies at different grade levels. Corbeil & Valdes-Corbeil (2007) supported this statement by noting that though mobile technologies can afford students and teachers more flexibility and independence, new instructional strategies and approaches to delivering and facilitating teaching need to result from the prove of their effective implementation. In addition future research needs to focus on designing a mobile learning classroom for collaborative learning since students achievement seemed to improve when they studied in such environment.

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Appendix A

Table 1
35 research articles included in the study

Researcher(s) and year	Methodology and/or subjects	Technology or Applications used in the study	Grade or school level	Summary of Findings
Ainsa (2013)	Descriptive	iPads Marie Antoinetter, class Copilot, Dropbox, Edmodo	Kindergarten pre-service teachers	Mobile devices facilitates communication towards intellectual capabilities as such it should be a part of a pre-service teachers learning experiences.
Backer (2010)	Experimental approach	Smartphones and Facebook	Undergraduate	Smartphones and Facebook increased students' motivation, independent learning and sense of responsibility when used for assessment.
Banister (2010)	Review of literature	iPod Touch, iPhone, and iPad	k-12	Several applications are available on the iPod touch that assist in the teaching and learning of science like Earth 3D, molecules, MIM Epocrates and have improve student learning and achievement.
Chen, Kao, & Sheu (2003)	Experimental with pre and post tests	PDA and BWL system	4th, 5th and 6th graders (elementary school	The findings revealed that students who used the bird watching system improved their learning, above and beyond what would normally be expected they would learn.
Chen, Chang, & Wang (2008)	An experiment was conducted with 54 college students	Laptop, PDA or Cell Phone	College	Mobile learning websites that can be accessed anywhere can enhance three learning performance indicators; academic performance, task accomplishment rates, and learning goals achievement rates.

Chou, Block, & Jesness (2012)	Case Study	iPads	9th grade geography class	Results showed an encouraging impact of iPad integration on student learning with active engagement, increased time for projects, improved digital literacy, and digital citizenship.
Corbeil & Valdes-Corbeil (2007)	Survey	Smartphone, tablets, mp3 players, laptops	College	Mobile learning has a profound influence in education and students and faculty are ready for mobile learning.
Cortez et al. (2004)	Experimental	Smartphones	High school physics	Students and teachers responded very favorably to the MCSCL (Mobile Computer Supported Collaborative Learning) system and the experience also had a strong social impact outside the classroom.
Crossgrove & Curran (2008)	Experimental	Smartphones	College	Reported higher retention of information levels in courses taught using clickers
Deaton, Deaton, Ivankovic, & Norris (2013)	Qualitative Case Study	IPads, Safari and Facebook app	k-12	IPads helped students collaborate with peers and carry out content area research with their peers through many tools.
Drayton Falk, Stroud, Hobbs, & Hammerman (2010)	Mixed-methods study reports on quantitative and qualitative data.	Smartboards	High School	Mobile device are being used in science classrooms to deliver content, for data analysis, labs, for visualizations, and classroom interaction.
Franklin & Peng (2008)	Qualitative case study	iPod , iPod touch, iMovie, PowerPoint, and iTunes	Middle school	The study reports the experiences of two math educators who implemented iPod Touch technology and math videos in their eighth grade math classroom to support the learning of mathematical concepts.
Freeman et al. (2007)	Experimental	Clickers	College	Student's achievement in biology increased when they used clicker's active-learning exercises. Attendance also increased in classes that used clickers.
Gundy, & Berger (2013)	Qualitative descriptive case study	Laptops	High School	There is a need for professional development in the use of laptops to teach biology.
Hwang, Wu, & Ke, (2011)	Experiment	Smartphones and concept map tool	Elementary	The experimental results show that the concept maps and smartphones not only enhanced learning attitudes, but also improved the learning achievements of the students.
Huang, H. M., Chen, Y. L., & Chen, K. Y. (2010)	Experimental Design	Smartphones	28 College students	Using a smartphone application to study human anatomy resulted in increased interest and motivation for learning.

Hwang, Chen, Chu, & Cheng (2012)	Experimental	Smartphones and QR code reader app	Elementary	Students were able to learn in real world environments and could easily reference their plant library through the names and QR code.
Jahnke, Norqvist, & Olsson (2013)	explorative approach with mixed methods	iPads	K-9	The findings suggested that there was very low use of iPads in the natural science in K-3 classrooms but high iPad use in Mathematics in K-12.
Ju-Ling, S., Chien-Wen, C., & Gwo-Jen, H. (2010).		Mobile Devices/ Wireless communications	33 fifth grade elementary students	Most of the students were very enthusiastic about the task, and felt a sense of achievement and made significant improvement in their learning based on improved test scores.
Keengwe, Pearson & Smart (2009)	Qualitative study with pre-service teachers at a Midwestern College of Education	iPods, Podcasting	College	Pre-service teachers recognized using iPods and podcasts as an effective tool for differentiated instruction. Further, a majority of the pre-service teachers saw podcasting as a teaching strategy for presenting content to students
Lewis, Zhao, & Montclare (2012)	Experimental	chemistry-based iPad app	High School	Teachers received assistance in the classroom while students received reinforcement in their chemistry curriculum. IPad motivated and captivated students as they learned while their in-class education was enriched.
Liang, Yu & Long (2011)	Survey of K-12 students and teachers	Tablet computers	K-12	The findings of the study indicated that both teachers and students need deeper understanding of the new technology's application in K-12 education.
Lai et al. (2007)	Experimental	PDAs	Fifth-grade classes at an elementary school	Mobile technologies are effective in improving knowledge creation during experiential learning
Liu, Peng, Wu, & Lin (2009)	Case Study	TabletPCs	Fourth grade students	Students' perception of learning activities was positive due to engaging in "mobile-technology supported" observation during their scientific inquiry; and engaging in mobile technology supported" manipulation during their scientific inquiry.

Looi (2011)	Design research approach	smartphones	Third grade	The findings showed that the experimental class performed better than other classes as measured by traditional assessments in the science subject. With mobilized lessons, students were found to learn science in personal, deep and engaging ways as well as developed positive attitudes towards mobile learning.
Paschal (2002)	Experimental	wireless classroom communication system	College	The study reported no effect on student learning.
Penuel, Boscardin, Masyn, & Crawford, (2007)	Survey	Clickers	Elementary and Secondary	Professional development helped teachers with using and staying positive about using technology in their classroom.
Rau, Gao, & Wu (2008)	Experimental	Smartphones	High School	The results show that the use of instant messaging (SMS) helps in bonding the student and instructor in the instructional process.
Roschelle, J., Penuel, R., Yarnall, L., Shechtman, N., & Tatar, D. (2005).	Qualitative Case Study	Handheld computers	K-12 school District students and teachers	
Scanlon, Jones, & Waycott (2005)	Descriptive study	PDAs, WebCt	College students	Different case studies suggest that mobile devices are very beneficial in learning science mostly in informal settings.
Sha (2012)	Experimental	HTC smartphone	Elementary Science grade 3 and 4	Proposed the Self-Regulated Learning model of mobile learning as a conceptual framework for understanding mobile learning,
Shohel & Power (2010)	Qualitative	iPods/podcasting	Teacher perspective/ Secondary Education	Mobile technology has the potential to change the very nature and processes of Pedagogy.
Siegle & Foster (2001)	Quasi-experiment/ sample of convenience	Laptops and multimedia software	High School	Laptop computers and multimedia software provide a strong learning tool for teachers and students
Song (2012)	Design Based Experiment	Smartphone	Primary	Findings suggested that student's personalized learning was raised by experiential learning.
Swan et al. (2005)	Mixed methods	Mobile computing devices	Elementary	The personalization of learning afforded by mobile devices both in terms of individuals and individual classroom cultures, as well as their usefulness in extending learning beyond the classroom increases motivation and the quality and quantity of student work.

Zhang et al. (2010)	Experimental	Smartphones	Elementary	Students showed significant improvement in their year-end science exam, were more engaged and motivated, self-directed. It encouraged collaborative learning with the teacher as facilitator
Zurita and Nussbaum (2004)	Experimental	Wireless Handheld network	Low-income public school of Santiago de Chile	The study shows the advantages of a technology-based activity over a paper-based activity in learning.

Note. The articles were retrieved for EBSCOhost and Google Scholar. The articles were selected based their relation to the topic of study.

Evaluation of Web-Based English Reading Activities for Adolescent English Language Learners: A Pilot Study

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Keywords: evaluation, web-based learning, English reading, EFL, ELL

Abstract

The field of instructional design and technology (IDT) encompasses knowledge and skills of integrating technology into teaching and learning. Despite the prevalence of research in e-learning, computer-based learning has not become a common practice in P-12 schools (Reiser & Dempsey, 2012). The purpose of the study is to assess how e-learning can be adjusted and applied to English as foreign language (EFL) learners in Taiwan. The theoretical framework of IDT in this study aims to allow the EFL students to read extensively using a self-monitoring strategy and to increase interactional opportunities in English outside of the classroom. This is an empirical and survey research. The participants' involvement in a web-based reading project was observed. A survey was conducted to investigate the participants' attitudes toward the project after it was finished. The results showed that the participants were not used to learning English through web technology. In addition, the participants' low self-discipline led to their low participation in the project while it was not a high-stakes learning activity. The suggestion of implications includes making such project a long-term and high-stakes activity which is aligned with students' other core subjects. Moreover, game assessment should replace common quizzes for reading comprehension.

Web-based learning and instruction have been popular and common in many American universities. The idea of integrating web technology and learning is spreading to P-12 levels in schools. Online learning, hybrid learning, flipped learning, and mobile learning are all branches of e-learning, which offer learners multi-faceted learning resources and environments related to the knowledge and skills that they are trying to master. In terms of language learning, web-based tools can be ideal aids. They make a good setting for learners to be immersed in the whole target language environment and to practice expressing themselves in the target language.

Language learners are often afraid of making mistakes. With the web-based tools, they can drill and practice as many times as they want before really communicating with others face to face. Despite the prevalence of research in e-learning in many countries like the United States, computer-based learning has not become a common practice in P-12 schools (Reiser & Dempsey, 2012, p 214). The environments for e-learning practices in other less advanced countries also do not seem mature yet. How e-learning can be adjusted and applied to language learners in the countries where their target language is not the official language still needs to be assessed. Learners' learning styles and attitudes toward e-learning should be taken into consideration. The current proposed project focuses on web-based English learning in secondary education in Taiwan.

Lectures and activities in an on-site classroom are still the mainstays of secondary education in Taiwan. For English as foreign language (EFL) learners in Taiwan, the time spent in class on the target language is often limited. For one thing, there are usually more than 35 students in a class, which makes it difficult for each student to practice using the target language. For another, teachers of the same grade have a common teaching schedule to follow in order to prepare students for exams throughout a semester. This leaves teachers little time to organize more creative and interactive learning activities for students. Therefore, it is important to offer students another space to practice using English and to facilitate their development of English abilities outside of the classroom, especially when there are no instrumental needs of learning English in most of their daily life.

The purpose of the current study is to evaluate web-based English reading activities for high school students in Taiwan. The reading activities are centered on fiction reading. A fiction with enjoyable text helps language learners with incidental vocabulary acquisition and is beneficial for students' learning despite the difficulty (Reynolds, 2014). Students will participate in this project for four weeks. The first three weeks are during their summer vacation, and the fourth week is at the beginning of their school summer courses. The invited participants

are all incoming 12th graders who have the greatest need to increase their vocabulary and to improve their reading and writing skills, since they have to prepare themselves for the upcoming high-stakes exams in six months. The following are the two research questions that will be addressed in this study:

1. How much are English language learners in Taiwan involved in the web-based English reading activities?
2. How do English language learners in Taiwan feel about the web-based English reading activities after they participate in the activities?

Method

Because online learning activities embedded in school education were not prevalent in Taiwan, the current study started the trial from a smaller number of participants. In other words, this was a pilot study to test the reactions of EFL students in Taiwan to using online tools for language learning.

Participants

A total of 38 senior high school students in Taiwan between the ages of 17 and 18 were invited to participate in this study. All of them were English as foreign language (EFL) learners and attended a public senior high school located in southern Taiwan. Senior high school students in Taiwan were usually separated into the humanity group and science group in their sophomore year based on their preference for the curricula. The participants in this study were in the humanity group. Among these participants, there were students with higher and lower English proficiencies according to their regular school examinations. Due to the difficulty accessing a large number of participants, participant selection was through convenience sampling.

Procedure

An online learning management system (LMS), Schoology, served as the platform of the summer reading project. The LMS was designed to suit the needs of K-12 educators and learners. A youth reading was carefully selected by an English native speaker who had taught EFL students for 12 years and now was a doctoral student in language and literacy education. The selected fiction offered the participants opportunities to improve their reading comprehension. The reading was a fiction novel aimed at readers of 5th to 6th grades in the United States. The ELLs participating in this project were 12th graders in Taiwan. They were preparing themselves with the vocabulary size of 7000 English words in order to handle the high-stakes exam. Before the project began, the participants' teacher introduced the whole English website to them, guiding them to operate and get familiar with the website. The participants signed in the website and joined the course at the beginning of their summer vacation. They had to follow the English instructions on the course website to do the following: download the PDF file of the English novel, check on the schedule, read and submit short reading feedback, join the discussions, take the quizzes, and finally complete the online questionnaire. The discussion board allowed them to organize their ideas from reading and to express themselves in the target language. The online quizzes helped to examine their reading comprehension. The activities lasted for 4 weeks. The students' participation in the activities was observed. At the end of the online reading activities, questionnaires were distributed to the participants for their feedback.

This was an empirical and survey research. The questionnaire was designed to investigate how much the participants were involved in the activities and how the participants felt about the web-based reading activities after their participation. These activities offered the students a different opportunity to experience a different way of language learning. Therefore, it was essential to understand students' attitudes, interests, and values toward the new experience after their participation. The results derived from the self-report instrument in this survey research would be able to serve as good reference information for teachers who also wanted to combine web-based activities into their language teaching.

Data Collection and Analysis

The main instruments used to collect primary data were the LMS and a post-activity survey including student reflections for the reading project. The web-based reading activities were set up as a course on the website of Schoology with functions of file downloading and uploading, a discussion board, quizzes, email, and feedback mechanism. The reading project lasted for four weeks. The post-activity survey was developed through the website Qualtrics. Approximately one week after the project was completed, all the participants were requested to help with a post-activity survey which would be used as a proxy for understanding how exposure to and use of web technology by high school English language learners could impact their language learning.

The observation of the participants' activities during the four weeks long project recorded the participants' involvement in the web-based learning experience. The survey instrument was comprised of open-ended questions and five-point scale items. The items in the survey were used to probe the participants' attitudes toward the online English learning. The experience of the web-based activities focused on the uses of digital reading material, feedback submission, online discussions, online quizzes, and the overall web-based English learning management system. The items regarding the students' English learning targeted the preference of various learning activities, and the overall impression of web-based English learning. The questionnaire was in Mandarin so that the participants could totally understand the questions. The participants answered the open-ended questions in Mandarin too. The quotes from the participants were translated into English and presented in the section of results. To ensure the content validity and reliability of the questionnaire, the items were selected from the studies of web-based learning (Tagoe, 2012) and English learning (Al Noursi, 2013), and were modified to meet the needs of the current study. The data from the five-point scale items was analyzed using Qualtrics for descriptive statistics.

Results

The Participants' Involvement in the Project

In order to investigate the extent to which students were involved in this reading project, their interactions and activities on the LMS were observed. They were also asked to answer open-ended questions after this project was over. At the beginning of this project, most participants showed their interest and expected themselves to make progress in their English ability through this project. A couple of them signed in late and expressed that they did so because their teacher told them to. Their interest seemed to only last for a week. On the index page, the researcher, who also served as the manager, gave announcements of what needed to be done, held polls to get to know how the participants' were doing, and offered links of learning resources such as online dictionaries and grammar exercise websites. However, there were very few interactions and responses from the participants. Only a couple of them responded to the polls. No one clicked the links of external learning resources.

Figure 1 shows the participants' views of the reading assignments and Figure 2 presents the participants' posts on the Discussion Board. In the views of reading assignments, there is a sharp drop from Chapter 1 to Chapter 2. Their reading assignments include reading the story during weekdays and giving very short feedback by chapter. Although there was the record of views from Chapter 1 to Chapter 16, only three of the participants submitted the short feedback by chapter as required throughout the four weeks.

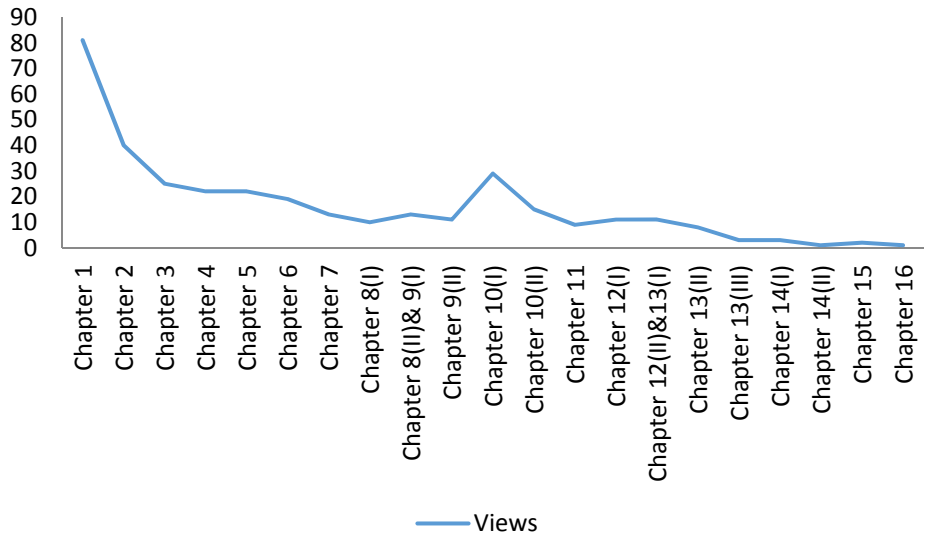

Figure 1. The participants' views of reading assignments.

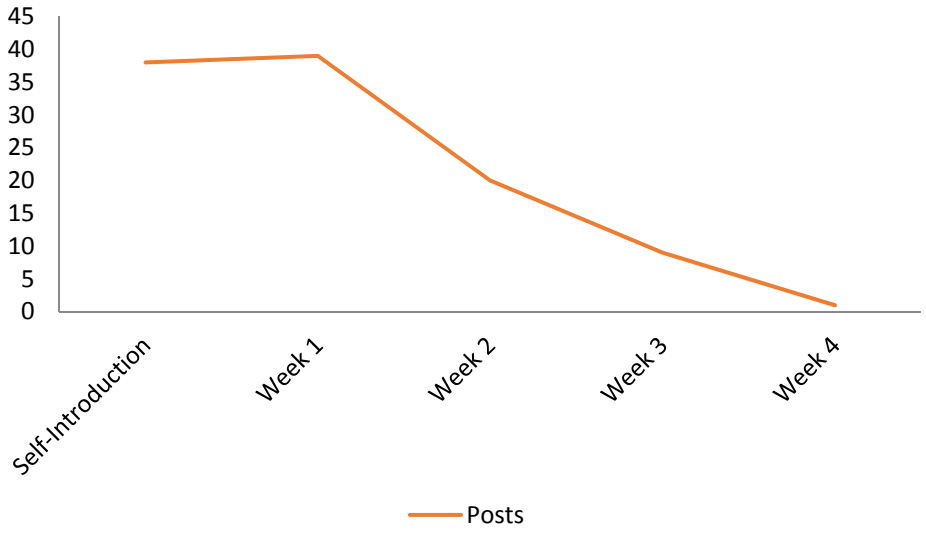

Figure 2. The participants' posts on the Discussion Board.

In terms of the Discussion Board, there was also an apparent drop after week 1. The discussion topics were closely related to the reading assignments and were designed to improve the participants' critical thinking. Almost each participant posted to introduce themselves, but many of their self-introductions were quite short. During week 1, eight out of all the participants offered more explanations to support their ideas. During week 2, only three out of all the participants gave more reasons to illustrate their statements. The other posts contained short messages which presented the participants' opinions without any reasoned arguments. Table 1 shows an example of a post with reason argument and a post without reason argument. Apart from the manager and assistant instructor, only two of the participants replied to their peers' posts as required. In the discussion space for the participants to ask questions about the reading, no one posted any messages.

Table 1. An example of the discussion posts

Discussion topic	Jake accepts a lottery ticket from a woman that he does not know as a reward for helping her. Do you think that he was right to accept this gift? Jake's father is against the lottery. Should Jake accept a gift that he knows his father would not approve of? Would you trust someone you do not know enough to accept a gift from them? What kind of obligations might go along with accepting a gift from a stranger?
A post with reason argument	*I think Jack was right to accept this gift, because he help this woman with kindness rather than intention. I also think Jack's behavior deserved to be praised .By the way ,if i were Jack ,i would also accept the lottery ticket .Even thought his father is against the lottery ,i still think that he had to receive it ,or the atmosphere between the woman and Jack would be quite embarrassed. What's more, thought someone give you gift is a stranger, if you refuse to receive it, the person would feel you are very impolite or even think that you despise him. Finally, I feel i would trust someone i don't really know, but i could also consider many situations, because i had ever been cheated by fraud group ~.*
A post without reason argument	*I think it is OK for Jake to accept the lottery.*

The Participants' Attitudes toward the Project

The open-ended questions were used to examine the participants' subjective views. There were 33 entries in the survey among 38 participants. The participants' major tasks in this project were reading, giving short feedback by chapter, weekly discussion, and weekly reading comprehension. Part of the survey was designed to investigate which activities the participants favored and which they disliked. The participants were also asked to state the reasons why the participation of the project went lower and lower, and to offer suggestions for improvement.

Favorite Activities

Figure 3 shows the participants favorite activities. The percentage of the participants who liked reading and the percentage of those who did not have any favorite activity are the same. If those who did not have any favorite activity are excluded, reading the story is the most favored activity, weekly discussion next, and then giving short feedback by chapter. No one favored the reading comprehension. Those who favored reading considered the story interesting. They tended to love novels originally and would want to keep reading in order to know what happened in the next chapter. Some said that reading was more relaxing. Those who favored weekly discussion liked to know what different opinions the other peers had toward the same topic. They stated that the discussion could help them elevate the ability to think from all aspects. Those who did not have favorite activities consider the project boring.

Figure 3. The participant' favorite activities

Disliked Activities

Figure 4 shows the activities that the participants disliked. Excluding the participants who did not have disliked activities, the percentages of those who disliked reading and the percentage of those who disliked weekly discussion are the same, ranked the top place, giving short feedback by chapter next, and then reading comprehension. Those who disliked reading considered that the assigned amount was a bit large. Those who disliked giving short feedback did not feel confident and were afraid to make stupid mistakes. Those who disliked weekly discussion considered it troublesome. Some stated that they did not have much thought to share and that not many of them joined in the discussion. Those who disliked reading comprehension complained that they did not want to have anything like tests during their leisure vacation.

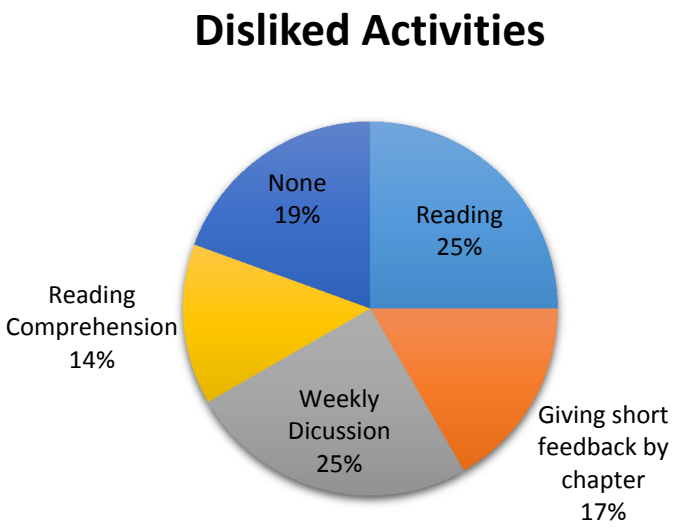

Figure 4. Activities that the participants disliked.

Difficulty following the schedule

The reason that the most participants pointed out led to the lower and lower participation in the project was the required reading amount every day. In order to make the participants read extensively, the participants were asked to read a chapter every day, about 5 pages long, during weekdays. There was no reading assigned on the weekends, which was meant for the participants to catch up the schedule. Since the EFL students' lacked interaction and communication using the target language, to have them receive information in the target language daily was the least level of practice that was beneficial to their language learning. The following are some quotes from the participants

- *I lost my patience because there was too much to do every day. The reading was difficult and it was so troublesome that I had to keep looking up words in the dictionary. I could not gain any sense of achievement.*
- *The reading schedule was too tight. There was not enough time for both this summer project and school studies. I could not finish the reading amount of a week because it was too much.*
- *The required reading amount per day was too large. I think it should be decreased to acceptable amount. This way, it would be easier for us to persist in reading.*
- *I am a slow English reader, so I lost my patience very soon.*
- *As 12th graders, we would choose to focus on school studies more, so the participation of extracurricular activities was comparatively low. Also, the reading amount every day became a burden, which was why we did not get involved in the project much.*
- *Don't make it too complicated.*
- *Less and simpler.*
- *Add some Chinese so that I could understand better.*
- *Offer some translation.*

Many participants viewed the reading amount a burden, which drove them impatient and giving up. About 33% of the participants considered the selected novel difficult to read. The other 67% of the participants thought that their English level could handle the selected novel quite well. So, the problem could be that they were not used to reading in English for long. According to the survey, about 21% of the participants did not often read in English. Excluding the school required readings for exams, 44% of the participants did not often read in English, and 1% of them never read in English out of their own will. In this project, students were actually exposed to a lot more reading besides the novel. Since the Schoology was a whole English website, the participants had to read each piece of information in English and found out what they had to do. The survey showed that 29% of the participants did not have much patience to read the directions and announcements in English on the leaning website, and 9% of them were not patient to do that at all.

Motivation

The second main reason that were pointed out caused the low participation of this project was whether the activities were related to the term grades, and less interest in English reading. Without the pressure of academic grades, the students felt it unnecessary to persist in this project. Therefore, they preferred to be engaged in what they felt fun. The following are some quotes from the participants:

- *Education in Taiwan tends to be standardized and one size fits all. The cramming type of teaching leads to students' lack of good reading habits and ability, so the participation of this activity is low.*
- *There was no concrete way of execution. Students would not consider the project important if it was not part of their term grades.*
- *There were the problem of students' self-discipline and whether the activity was involved with the term grades.*
- *Some stimulating ways were needed to promote students' interest and motivation.*
- *I would forget about it.*
- *Most of us would want to do something more fun so felt less interested in this English reading activity.*
- *Social network should be used for leisure activities and to increase interpersonal relationship. This website is not set up for leisure and interest. Also, I did not really want to meet English and my classmates when I surfed online at home.*

The survey showed that 35 % of the participants thought it would somewhat influence their participation whether the project was part of the term grades, and 29% thought it would make a huge difference. Only 9% of the participants did not think that it would influence their participation much. When there was no threat of the grades and when it was during their summer vacation, the participants would not have self-discipline to spend time on this kind of learning project. The survey showed that 35% of the participants had difficulty persisting in this project with their self-discipline, and 12% of them considered it extremely difficult to spend time on this project due to their low self-discipline. In terms of interest, 29% of the participants did not have much interest in the selected reading, and 18% of them were not interested in it at all. When asked whether being able to select their own favored reading would influence their participation, 41% of the participants thought it would influence a little bit and 35% of them considered that it would have a great impact.

Trouble of learning through computer and whole-English LMS

Students' major studying materials in Taiwan are paper books and the main tools in their bubble tests are paper and pencils. Although social networks and online games are quite popular among teenaged students, it seems that they are not used to learning through computer and web-based LMS. The following are some quotes from the participants:

- *It was not convenient for me to look up vocabulary when I read on the computer.*
- *It was troublesome to have to turn on the computer every day.*
- *I need a paper book.*
- *It was not convenient without a paper book. My eyes got very sore after staring at the computer for too long.*
- *Too troublesome. I did not know how to use it. I lost my patience on seeing the whole English website.*
- *The sequence was difficult to understand and extremely troublesome. It was all in English. Students could not understand at all and did not know what to do. So I did not log in the website frequently.*

According to the survey, 12% of the participants were not quite used to digital forms of reading, and 3% of them felt totally unused to the digital form. When it comes to digital forms of English reading, 29% of the participants were not very used to them, and 9% felt completely unused to them. About 35% of the participants considered it a bit difficult to be engaged in this project through computer and web technology, and 9% of them thought it extremely difficult.

Timing

On the whole, the participants' involvement in the project descended fast. Only 15% of the participants viewed this web-based learning experience positively. Some participants indicated that the timing of the project was not appropriate. They would either go for other activities that attracted them better or work on the preparation of coming exams. Although there were English learning activities in this project, the participants did not regard them as related to school studies. The following are some quotes from the participants:

- *This was my first time to learn in this way. There were so many things to study during the summer vacation, so it was difficult to spare time on this activity.*

- *There were many activities during the summer vacation, so I did not have time to take care of this online routine project.*
- *The content was too complicated. In addition, there were lots of school studies to handle in the 12th grade life. I could not sit at the computer for long.*
- *Because there would be mock tests after our summer vacation, I concentrated on the preparation for the tests in the last week of the project. The reading content was actually interesting. I will participate in this kind of activity again.*
- *The timing of an activity is very important, and participants' interest, ability, perseverance as well.*

Discussion

The results in this study infer that adolescent English language learners in Taiwan are not yet accustomed to web-based English reading activities. The e-book caused them inconvenience and discomfort. Turing on the computer for learning was not part of their life style yet. There are also other aspects for discussion over the IDT for the adolescent English language learners.

Among all the assignments, reading the novel was placed at the top both in the participants' favorite activities and in the activities they disliked, but more participants enjoyed reading than those who disliked it. Students with different reading habits have different level of prefernece for the activity of reading. The types of reading that attract them are also different. To take learners' interest into consideratoin is important. However, their learning should not narrow down to only what they like. All kinds of topics can occur in the high-stakes exams. A novel helps learners to read extensively because under one big topic it covers many subordinate themes. Although the participants thought it would make a difference in their pariticipation if they could choose their own readings, they might not realize the time it would take to find one good reading material that also interests them. It is better for students to save the time spent on search and try to immerse themselves in the story, since the project is more like a reading club. In addition, if the participants were allowed to choose their own readings, it would have been difficult for the manager to facilitate the weekly discussions of thematic topics based on the reading assignments.

One task the participants had to do after reading a chapter was to submit at least one sentence of feedback, and then they could get the one point for that reading assignment. It was a self graded task. Their feedback submission meant that they earned themselves the score. This practice was designed based on the self-monitoring strategy. Only three out of thirty eight participants did so throughtout the four weeks. One reason could be that the other participants did not know about this task although the survey shows that only 21% of them did not understand what tasks they should finish in this project. The other reason would be that most of them did not care about the scores on the LMS, since this project had nothing to do with the participants' term grades. According to the participants' descriptions, most of them would either focus on the preparation for school exams or be engaged in the activities they loved during the summer vacation. It is apparently a challenge for school English teachers to organize such web-based projects just based on students' interests without including them in the term grades. Once the project is related to the students' term grades, it will be considered part of school studies. In so doing, learners will be more willing to spend time on it. Otherwise, students would rather avoid any kind of assessment during their leisure time. Perhaps that is why no participants chose the reading comprehension as their favorite activity.

In terms of the discussion board, it is one of the activities that the participants disliked the most. The English native speaker, who served as the assistant instructor, did not attract the participants to join the discussion persistently. They did not appreciate this interactional opportunities in English outside of the classroom. They were not aware that it was a good platform for them to practice academic writing in English and to learn from the peers' perspectives. Some stated that they did not have thoughts to share. It might be because they did not do much reading. Some said it was troublesome to do weekly discussion. Adolescent English language learners in Taiwan are used to receiving what is given in class. They are also used to studying what is required to memorize for exams. On the LMS, the manager, also the researcher, provided links of learning resources based on the mistakes the participants made in their expressions. It is surprising that no one clicked any of the links. The links of three online dictionaries are wonderful resources for the participants to refer to word usages. The links of grammar exercise were offered because many of them made the same grammar errors in the discussion. However, it turned out that the participants felt no needs to consult these learning resources. All this shows that adolescent English language learners in Taiwan are quite passive in both formal and informal learning.

After the participants' opinions were gathered, it became clearer how to integrate web-technology into school English curriculum in Taiwan. To make use of the supplemental learning tool to assist students' English academic performance, first, such reading projects had to be made high-stakes. Since adolescent English language learners' low self-discipline hinders learning, to include such reading projects in the term grades becomes necessary.

This is the best way for passive learners. Second, such reading projects should occur throughout the school year so that learners can cultivate better reading habits. Third, selected readings have to be aligned with other core subjects like history, geography, biology and so on. The reading project manager should examine what students' are learning in other core subjects, according to which the manager selects appropriate English readings helpful to review the contents of the other subjects. Fourth, reading comprehension can be turned into game assessment instead of tests. This may need some technical supports and skills. Although it is suggested that such projects should be made high-stakes, fun elements can be added to reading comprehension as an alternative assessment to increase students' interest.

The limitations of this study include the instruction the participants received in the classroom and their major. The participants shared the same English teacher. The participants' involvement and attitudes toward this project could be influenced by the way their teacher taught at school. In addition, the participants' academic focus was on humanity studies. It is possible that they had lower interest in technology. English language learners in Taiwan who are taught by different English teachers and whose academic focus is on science studies may produce different results.

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Training Instructional Designers as Edupreneurs

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Abstract

This paper offers a novel approach to training instructional designers within the context of a student-led service center, Learning Design Solutions (LearnDS). It describes a unique milieu for graduate students to practice and sharpen their instructional design, leadership, and entrepreneurial skills. Through LearnDS, members and collaborators engage in contracted projects that provide them with opportunities to solve educational problems and become instructional designers, leaders, and edupreneurs (educators + entrepreneurs).
Descriptors: Instructional Design, Edupreneurism

Background

Learning Design Solutions (LearnDS), a self-supported, student-led, service center at Iowa State University, grew out of an advanced instructional design course in which students worked on real-world projects with clients from organizations in the community. The focal learning activity of the course was to be part of a multi-team instructional consulting company designed to simulate a small firm that provided professional-level services free of charge. Students, taking on the roles of technology consultants, worked with both university clients and organizations within the community (e.g., government agencies, schools, and healthcare providers). However, the demand for instructional design work was greater (dozens per year) than could be accommodated by the single advanced instructional design course offered only during the spring semester. In order to meet the needs of the community, the course instructor and a group of graduate students envisioned a center that could provide instructional design services year round. This led to the creation of LearnDS, which is located within the Center for Technology in Learning and Teaching, in the School of Education at Iowa State University.

As a service center LearnDS is able to offer educational technology consulting services to internal Iowa State University clients as well as external clients from business and industry, both within and outside of the local community. LearnDS, as a service center at a non-profit institution of higher education, operates on a break-even basis. The per hour rate for LearnDS services is calculated each year based on the anticipated number of projects that will be contracted and the anticipated costs to both keep LearnDS running and to complete the number of contracted projects anticipated. The organization is self-sustaining, where the revenue that is generated through contracted projects covers both the organizational expenses and the expenses that are incurred to complete the contracted projects.

The contracts for each project are drafted after an initial meeting with the prospective client. The draft contract, which contains an outline of the phases of the project, the deliverables, the number of hours that will be needed per phase, and the per hour rate for services, is given to the prospective client. Once the draft contract has been signed by both the prospective client and the LearnDS representative it is a completed contract and the instructional design and development work begins. At this point students are hired, on an hourly basis, to work on the contracted project. LearnDS members and collaborators are selected first based on their skills and availability. Additional students with specific skills are also hired on an hourly basis to complete components of projects.

This combination of education and entrepreneurship allows collaborators and members of LearnDS to develop into instructional designers and edupreneurs. Within this context students approach educational problems from an entrepreneurial perspective. This paper presents a reflective case of this novel approach to instructional design training.

Theoretical Framework

In order to address the increasing need for instructional design services, and to train instructional designers capable of identifying, addressing, and solving ill-structured educational problems, LearnDS embraces an enterprise-based curriculum (Correia, 2013) that is learner-centered and stands on the pillars of experiential learning, leadership and entrepreneurship. Utilizing the Experiential Learning Framework (Kolb, 1984), LearnDS provides authentic experiences through which graduate students learn about and develop instructional design, entrepreneurship, and leadership skills. Transforming their traditional graduate student experiences with real-world projects allows students to build their knowledge of instructional design, entrepreneurship, and leadership, internalize what they've learned, and to serve as experts in instructional design. LearnDS provides a non-hierarchical working environment in which students are encouraged to take on leadership roles and serve as experts in instructional design --crucial experiences necessary to prepare students for success in their professional careers. Recognizing the importance of integrating entrepreneurial activities into the curriculum, LearnDS also strives to engage students in learning experiences that help them develop an entrepreneurial mindset and capabilities (Morris, 1998). With an entrepreneurial mindset, graduate students become better prepared to identify educational opportunities and challenges, and to tackle instructional design challenges in an innovative way. LearnDS encourages students to become not only instructional designers, but also edupreneurs who are passionate solving about educational problems, equipped with the skills necessary to face the challenges of the continuously evolving field of education, and who can easily adapt to new landscapes of learning and teaching. LearnDS has become the venue for connecting real life experiences and the academic knowledge gained about instructional design.

Within this framework, edupreneurs are "self-motivated learners/members of an enterprise who can recognize opportunities and take action on complex educational problems while aiming to create social value, financial value, and/or social benefits" (Correia, 2014, p. 115). They are eager to identify educational problems, approach them as challenges to overcome, and address those challenges in a way that is innovative and unexpected. In the case of instructional design, edupreneurism involves recognizing and evaluating complex educational problems, taking risks to propose alternative but creative solutions, assess the needs and costs associated with an educational design problem, and leverage the available resources and capabilities to maximize the impact of instructional design. In this sense, instructional design is one of the most apt venues through which an entrepreneurial mindset can be brought into education.

Reflections of Edupreneurs

The members and collaborators of LearnDS continuously reflect on their work and experience within the organization. This part of the daily practice. Following are excerpts of their reflections on their involvement with the organization. Pseudonyms are used throughout this proposal.

John joined LearnDS as the Research and Development Manager. Reflecting on his experience with LearnDS, John states:

> I joined LearnDS to work in a vivid, collaborative environment where I can sharpen my leadership and entrepreneurial skills. As a social entrepreneur, I was impressed by LearnDS' commitment to contribute to the community by addressing and solving instructional issues. Within my capacity as the R&D Manager of LearnDS, I have taken on leadership responsibilities to keep the organization running, overseeing projects, writing contracts, meeting and contracting with clients, which I think will be beneficial for my future career as a faculty member. My association with LearnDS has given me the chance to interact closely with potential clients, listen to their needs and address their questions. In that sense, I strongly believe that LearnDS has greatly helped me practice and enhance my interpersonal skills. Moreover, my involvement with LearnDS has provided me with valuable insight into how to manage and run an organization within the context of a non-profit university in the U.S., thereby enabling me to have a better understanding of how business works in the U.S. In the near future, I expect to actively engage in overseeing projects and thus improve my project and crisis management skills.

Mark, a PhD student in Applied Linguistics & Technology, reported the real-world experiences a benefit of joining LearnDS:

> As a language teacher and researcher of applied linguistics, I always have a strong passion to adopt and apply instructional technology into my teaching and research. When it comes to making it in the real world, knowledge and experience should go hand-in-hand. In this sense, LearnDS is a perfect arena for me to gain valuable hands-on experiences of instructional design and their implementation in the real world. Another intriguing characteristics of LearnDS is the fact that this organization has been led by graduate students and also guided by faculty members. This unique feature of the organization expects active participation and contribution to the community and promotes peer learning for instructional design and its practice among the members and collaborators. After I earn my PhD, I intend to become a faculty member with research interests of task-based language teaching and testing; language program development; and language program evaluation. As my research interests are closely related to the use of technology, I hope to gain more from theory to practice experiences of instructional design from LearnDS. Besides, grant writing experience and leadership skills are also important and necessary assets for me to become a well-prepared faculty member.

Mariana, a recent collaborator of LearnDS, articulates why she joined LearnDS:

> My work as a language teacher embraces a wide range of activities, including course and class material design. I have always been fascinated with the incorporation of technology in the classroom as way to bring more interaction and context to the topics studied. The synergy that exists between theory and practice has intrigued me a lot and that it led me to pursue a PhD in Curriculum and Instructional Technology at Iowa State University. My personal approach in my studies is to try to find connections between the scholarly work and the practice world. I learned about LearnDS in my first semester and I found it the perfect match for my interests. I am eager to get involved in real-life tasks where I can experience first-hand how this synergy of knowledge intersects in all the phases of the instructional design. Being a collaborator in this organization will provide me with instructional design knowledge and experience, with improvement and refinement of my communication skills, and with development of entrepreneur and leadership skills, which are paramount in working with instructional design projects. Last but not least, my involvement in LearnDS will definitely give me the opportunity to work collaboratively with other members and nurture this organization with our experiences, suggestions and initiatives. Besides the professional experience that I can get through this organization, what appealed to me was also the fact that this is an organization with clear open minds, creativity and strong commitment for seeking the best of everything. Being part of LearnDS will be a rich and solid ground to trigger my professional career into a faculty position in which I can apply what I have learned.

Emaa, a Master's student in the School of Education specializing in Curriculum and Instructional Technology (CIT), explains her reasons for joining LearnDS:

> Entrepreneurship has always intrigued me and is an aspect which I think highly of simply because the lessons learned in an entrepreneurial venture by far exceeds the four walls of a classroom. This, coupled with instructional design, made LearnDS the most promising and enriching hands-on educational experiences that I could get. I wanted to gain valuable expertise in real-life instructional design projects, from its conception to completion, which would definitely give me an edge over others as I work towards my career goal of working as an instructional designer. The various aspects of running an entrepreneurial venture starting from creating various operational documents and artifacts, promotion, contract negotiation to project acquisition and then finally development is a learning experience all the way. These initial phases keep the members of LearnDS on their toes, which in a traditional classroom environment would have meant long periods of waiting before the actual design and development work is undertaken.
>
> I hope to continue to be a part of this innovative endeavor and contribute to the successful completion of projects, provide constructive criticism and input, to make LearnDS an exemplary initiative in teaching and learning.

Allison, a PhD student in the School of Education with a specialization in CIT, describes her experience with LearnDS as follows:

> As a PhD student, I see myself as a researcher and faculty member in the near future. I know that how to write a grant proposal is going to be an important part of my job. Although a PhD education teaches me the theory and application in the field, I believe there is a huge gap between the education that we receive in

the graduate school and the real world. Thus, the main driving force for me to join Learn DS was to gain experience by implementing my knowledge base to the real life projects and work with professionals in the organization a mentor and mentee relationship. Furthermore, as a future faculty, I am also eager to learn about the initial contact with the client, contract writing, and budgeting processes. The time I spent in past two years as a member of LearnDS group gave me several chances to observe the grant writing process.

Conclusions

LearnDS offers a novel approach to training graduate students to be not only instructional designers, but edupreneurs. Through LearnDS students accumulate real-world experiences designing effective learning environments, leading others, and running a business-like organization.

As edupreneurs LearnDS members and collaborators strive to address educational problems through an entrepreneurial perspective. They serve as leaders within their community to promote the impact of instructional design while sharpening their entrepreneurial skills and grow as professionals. Instructional design is the applied field that allows to put into action ways to bring leadership and entrepreneurship to the foreground.

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Engaging the Online Language Learner

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Abstract

As research and practice in online learning and teaching has advanced, scholars and practitioners have identified elements that facilitate successful completion of courses delivered online. In this paper the authors identify factors that are specific to second language (L2) acquisition in the online environment. The authors examine theoretical constructs and practical applications for online language learning that promote engagement and facilitate language fluency, with emphasis on motivational design theory, emotions and the importance of self-regulation. The authors also propose directions for additional research specific to US high school learners.

Introduction

As research and practice in online learning and teaching has advanced, scholars and practitioners have identified elements that facilitate successful completion of courses delivered online. These elements include course design that promotes student-teacher interaction, student-content interaction and student-student interaction (Anderson, 2003) and the incorporation of strategies that promote motivation, such as Keller's ARCS-V model of motivational design (Keller, 2010) and principles of motivation to learn and e^3-learning (Keller, 2008). However, additional factors should be considered to facilitate engagement of the online language learner. Language acquisition is unique because:

- In all language acquisition, mediation occurs. Mediation is the act of modifying the stimulus situation in the process of responding to it (Driscoll, 2005; Swain & Lapkin, 2013).
- The goals of foreign language (L2) acquisition are not limited to knowledge and performance, but also include competency and fluency (Swain & Lapkin, 2013).

In this paper the authors examine theoretical constructs and practical applications for online language learning that promote engagement and facilitate language fluency, with emphasis on emotions and the importance of self-regulation.

L2 acquisition

L2 language curricula follow objectives and proficiency or fluency targets based on standards. These are prescribed by governmental organizations or by national organizations, such as the American Council on Teaching of Foreign Languages (ACTFL). A whole body of work is devoted to the process of second language acquisition. For our purposes it is important to recognize that language is tied to both the affective and cognitive domains, is

mediated, and is transformational.

Firstly, language cannot be separated from emotion. According to Vygotsky's sociocultural theory, language is tied to both the cognitive and affective domains (Swain & Lapkin, 2013) as shown in Figure 1 (Bloom, 1998).

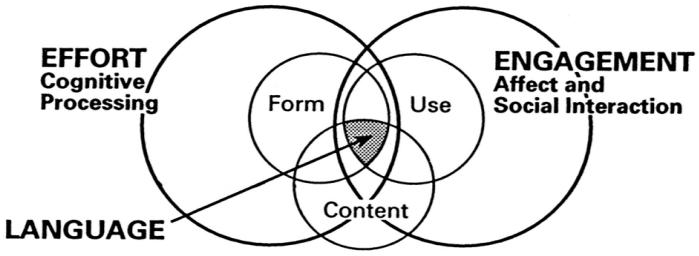

Figure 1. Model of the interaction between engagement and effort for language development (in Bloom, 1998).

According to Gardner's (1985) socio-educational model of L2 acquisition, various variables associated with the affective domain also influence language learners. These include motivation, anxiety, attitudes, and orientations (Aubrey, 2013).

Secondly, language is mediated. In L2 acquisition, L1 is internalized and used to mediate L2 (Driscoll, 2005;Swain & Lapkin, 2013). This occurs as language develops first as an egocentric tool and then emerges through imitation (Swain & Lapkin, 2013; Lantolf, 2003) and social speech (Driscoll, 2005). Swain & Lapkin (2013) have further defined this process as *languaging:*

> *Languaging* is the use of language to mediate cognition and affect. When one languages, one uses language, among other purposes, to focus attention, solve problems and create affect. What is crucial to understand here is that language is not merely a means of communicating what is in one person's head to another person. Rather, language serves to construct the very idea that one is hoping to convey. It is a means by which one comes to know what one does not know. (Swain & Lapkin, 2013).

As students learn language, they are able to externalize internal language (Driscoll, 2005), and, as they practice imitation and engage in social speech, they mediate the immediate stimulus situation (Swain & Lapkin, 2013).

Thirdly, L2 acquisition is transformational. In learning a second language, one learns about the culture of the second language users, and thus gains an opportunity to reframe one's own ethnocentricities. According to Mezirow's (1997) transformative learning theory, there are four processes of learning. These include elaborating an existing point of view, establishing a new point of view, transforming one's point of view, and transforming one's habitual ways of thinking, feeling and acting, which one has assimilated through a set of codes.

Transformative learning posits that, following a "disorienting event" early in the learning process, the learner goes through the four processes, ideally arriving at a point of reframed assumptions and empathy—if not necessarily approval—with the disorienting proposition (Mezirow, 1997, p. 11). While Mezirow's theory is predominantly applied to adult learning, and to our knowledge has not been previously related to L2 acquisition, the transformative structure provides a framework for culturally authentic learning, both through the disorienting events inherent to the target language's structure as compared with L1, and to additional disorienting events presented by the embedded target culture. The intentional use of disorienting rather than comforting elements of L2 is highly beneficial to generating debate, especially in the online environment where genuine debate is valuable and can be rare (Eliot, 2012/2014). Discourse—the use of language—is necessary to evaluate and explore these frames of reference (Mezirow, 1997).

Therefore, L2 involves change in the cognitive and affective domains, the stimulus situation, and the learner's frame of reference.

Influencing emotion, motivation and engagement

Transforming frames of reference involves the cognitive, affective and conative domains (Mezirow, 1997). Motivation is a conative process that can be influenced by strategies directed toward engaging the learner and which promote self-regulation (Keller, 2010). Since language acquisition involves discourse and meaning negotiation, (Swain & Lapkin, 2013; Lantolff, 2003) students in online courses must be engaged in opportunities that allow for language negotiation through discourse, imitation, and transformation. Furthermore, since language is affective as well as cognitive, emotions must be considered as part of learner analysis for the instructional and motivational design of L2 curricula. Thus, as course designers and instructors use strategies to influence emotion and motivation, they move the student toward engagement and L2 proficiency.

No learning can take place in the absence of motivation; L2 acquisition is no exception. Keller's (2008) principles of motivation to learn should be considered as instructional designers and instructors seek to engage students in online language learning. These principles are based upon and incorporate elements of Keller's ARCS-V model, which evolved from Keller's (1987) ARCS model. The ARCS model is grounded in expectancy-value theory (Keller, 1987), which posits that "individuals' expectancies for success and the value they have for succeeding are important determinants for their motivation to perform different achievement tasks" (Wigfield, 1994, p. 50). The principles of motivation to learn and of e^3-learning—which includes online learning, e-learning, hybrid learning, mobile learning, etc.—can be applied systematically to define interventions that allow for problems primarily found in the e-learning environment (Keller, 2008). We examine these principles in conjunction with problems characteristic of e^3-learning and language acquisition and with consideration of the role emotion plays in L2. According to Keller (2008), motivation to learn is promoted when:

1) A learner's curiosity is aroused to a perceived gap in prior knowledge (Attention),
2) The knowledge to be learned is perceived to meaningfully related to the learner's goals (Relevance),
3) Learners believe they can succeed in mastering the learning task (Confidence);
4) Learners anticipate and experience satisfying outcomes of a learning task (Satisfaction); and
5) When learners employ volitional (self-regulatory) strategies to protect their intentions. (Volition).

The first four principles can scaffold the development of the fifth principle, and need not be applied in the above numerical order. They can also be effective applied in a non-linear fashion, as they have a curvilinear relationship as shown in Figure 2 (Keller, 2010), to address particular learner needs. The curvilinear model better represents potential unintended effects of very high motivation, such as perfectionism and learner paralysis, than a purely linear relationship might.

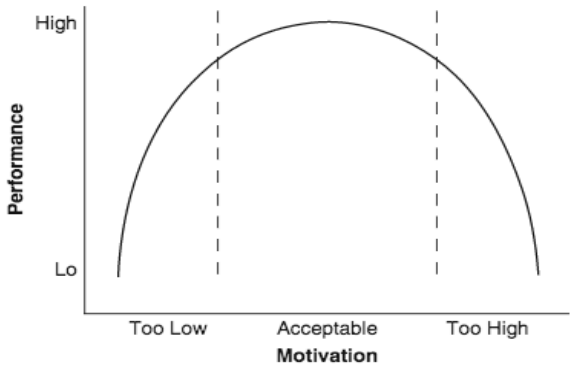

Figure 2. Curvilinear relationship between arousal/motivation and performance (in Keller, 2010, p. 36).

Research-based strategies, general guidelines to achieving a goal and tactics, or specific activities used to implement strategies (Keller, 2010) can be employed to facilitate motivation and to help learners overcome obstacles and to maintain goal-oriented behavior (Keller, 1987). Discouragement and attrition can thus be reduced. These strategies can be implemented based on the current engagement of the learner. For example, teachers at Middlebury Interactive Languages (MIL) use a job aid that helps them discern the current motivational state of the learners and to take appropriate action to influence that motivational state (Peak, nd). Examples of such strategies and tactics designed to influence attention, relevance, confidence, satisfaction, and volition are described in the following sections.

Attention. Perceptual arousal, an attitude of inquiry, and variability all contribute to motivation (Keller, 2010). Although transitory, perceptual arousal is easily obtained, "almost any sudden or unexpected change in the environment will activate a person's perceptual level of curiosity," (Keller, 2010, p. 47). It is at this point that the authors conclude that Mezirow's Transformational Learning Theory is potentially applicable to L2 learning in particular, as the emotion inherent to the disorienting event will in most cases initiate a state of arousal. The disorienting event is perhaps most powerful in connection with the Perspectives, Practices and Products (PPP) standards for L2 curriculum promulgated by the ACTFL (Cutshall, 2012), as these authentic objects, whether embedded in L2 text or presented alongside it in alternative media such as material culture artifacts, can be chosen in such a way as to induce a productive state of disorientation and shock, rather than domestication of L2 and its native culture, which can eventually lead to greater states of both engagement and empathy in learners (Eliot, 2012 & 2014).

On the practical level, this activation can be accomplished through a myriad of tactics. For example, the Pericles Group has incorporated an attitude of inquiry throughout its game-based Operation Lapis e-learning course to gain and sustain attention by involving the player in a narrative game with an objective of solving a quest (Slota, Ballestrini, & Pearsall, 2013). Announcement pages may also facilitate perceptual arousal, though further data confirming this finding for ages 9-12 rather than post-secondary is needed given the frequency of this model in practice (Ryle & Cumming, 2007).

Variability can also be included by diverse announcement creation methods and tools. For example, teachers at MIL use a variety of images and video announcements in their courses (pd.middleburyinteractive.com). Glogster, Voki, and GoAnimate are some of the varied announcement tools used by Florida Virtual School (FLVS) L2 teachers (Taylor, Bebergal, & Shelton, 2008). Furthermore, in addition to focusing attention, announcement pages and discussion questions can be used to scaffold goal-oriented behavior. As one respondent reported: "Regular announcements from facilitators of where students should be and what to expect were valuable in keeping us on track" (Ryle & Cummings, 2007, p. 40). Attention-getting strategies and techniques are useful in motivating online learners and can facilitate volitional behaviors.

Relevance. Learners have various motives for enrolling in a course, and these may be different from the motives of the instructional desinger or the instructor. For example, in a nationwide survey, Latin students and Latin teachers were polled regarding their reasons for taking Latin and teaching Latin, respectively. The preliminary results show that there is a disparity between student and teacher perceptions. The primary reasons students, by self-report, take Latin is to learn English vocabulary and mythology, whereas the primary self-reported goals of Latin teachers appear to be (pending analysis of raw data by Goodman) elements inherent to L2, such as reading literature, the intellectual challenge of language structure, and the aesthetic pleasure of the language (Goodman, 2014; Zammit, 2014; Warnke, 2014). When employing strategies to make learning relevant, it is the student perception that should be addressed, according to the principles of needs analysis (Dick, Carey & Carey, 2014). If a student does not perceive an immediate need for learning a language, relevance can be fostered through affiliation, achievement and power (Keller, 1987).

FLVS addresses this need for relevance by providing opportunities for affiliation including a virtual Latin club, a virtual Latin forum, and participation in the National Latin Exam and other online exams (http://flvslatinclub.weebly.com/). Students synchronously engage with each other and an instructor or club sponsor in a virtual environment. Sessions are also recorded for asynchronous delivery. In a conveniently sampled recorded session (Taylor, 2014), students showed some evidence of emotional engagement, such as expressions of gratitude and use of positive emoticons; however, it should also be noted that this sample displayed some mixed emotions (such as a male student who responded negatively to the facilitator's discussion of a previous student's presentation on her travels to Greece and Rome; his negative language about the cost of the trip suggested that he felt excluded, and later in the session he used standard sardonic emoticons, perhaps reflecting alienation and frustration that the facilitator did not address his class-based concerns). Students interacted relatively little with each other in the text box. Also, it is to be noted that only 14 students attended this meeting, although the average Latin enrollment at FLVS is over 120 students per teacher (total number of teachers in fall 2014 not available). This content analysis suggests that, while online clubs show promise as a theoretical model, challenges to implementation remain that demand further phenomenological analysis and proactive theory generation.

MIL hosts Language Live Sessions in all languages that allow for students to work in interactive teams with a live teacher (pd.middleburyinteractive.com). South Carolina Virtual Public School also hosts a Latin Club, and engages students with a password-protected Ning with information about Latin Club activities, a Latin honor society and the National Latin Exam (SREB, nd), while North Carolina Virtual provides a Culture Café hosted on a monthly basis by staff and focusing on topics of interest that cannot fit in the standardized curriculum. By

participating in these activities, learners also experience social presence, which in turn may lessen anxiety and thereby foster self-regulatory behaviors. Strategies that promote relevance can provide opportunities for discourse and should be learner-focused.

Confidence. In language learning, confidence is related to Vygotsky's zone of proximal development (ZPD) and sociocultural theory (Swain & Lapkin, 2013). In order to influence motivation, student confidence should be fostered. Self-efficacy—the belief that a person will succeed at something—is domain-specific and dependent on the learner's past experiences as well as affective attributions (Ziegler & Moeller, 2012). As students are able to negotiate meaning, they build confidence. However, before they are able to do this, negative student emotions must also be addressed. Indeed, there are negative emotions associated with both online learning and L2 acquisition. Frustration and anxiety are among the emotions associated with online learning (O'Regan, 2013). Foreign Language Anxiety (FLA), a situationally specific anxiety, disrupts cognitive processing and impedes oral collaboration (McNeil, 2014). Shame is another emotion that may be experienced in online learning, and female learners have been found in one study to have a greater experience of shame with the online learning process compared with males (O'Regan, 1993). Shame can be associated with either the content or, if the student has low self-efficacy relative to computing, the online delivery model (as in O'Regan's sample). Shame can also be experienced by L2 learners, who may hesitate to externalize language in order to avoid this emotion (Lantolf, 2003). In order to fully engage online language learners, negative emotions, including anxiety and shame, should be assessed and addressed. Strategies that can help students overcome negative emotions are instructional scaffolding, opportunities for language internalization, positive feedback, formative and dynamic assessments, and instructor self-disclosure.

As learners acquire a new language, they internally process in the native language (Driscoll, 2005). In addition, before a learner is involved in second language acquisition, the learner must be able to negotiate the online environment. Therefore, to facilitate language learning, online navigational instructions, at least for novice learners, are better given in the native language (Swain & Lapkin, 2013). FLVS scaffolds directions for online Latin courses with tutorials and video instructions in English (http://latin1help.weebly.com/cullens-clues-for-module-1.html). For native Spanish speakers, FLVS has a full time support staff employee who scaffolds learning for Spanish speaking students in all subject areas (flvs.net).

In a study that dealt with 12- to 15-year-old Australian middle school students' French immersion courses, private—or internal—speech became apparent in interviews with the students. Before creating public speech, the students would use private speech to practice, processing the prompt or question. They would thus practice and avoid the chance of social shame caused by usage errors (DeCourcy, 1993 in Lantolf, 2003). Therefore, allowing opportunities for private speech can influence confidence. The significance of this finding should not be underestimated given the relative rarity of affect studies of this age group compared with post-secondary groups.

The types of feedback students receive in an online environment can also contribute to or detract from student confidence. Some research suggests that extended feedback that includes grammatical explanations is best for delayed learning, but that pre-emptive grammatical explanations plus extended feedback results in more proficiency in target language composition (Stafford, Bowden, & Sanz, 2012). Other research emphasizes the way that feedback relates to emotion. For example, one study showed that omission of positive words had greater reduction in subjects' content creation than omission of negative words (Kramer, Guillory, & Hancock, 2014). Another study showed that appropriately timed email messages of encouragement can be used to build confidence and motivation. In a study involving 153 college students, students were sent periodically timed mass email messages that contained positive words and encouragement. The students in the control group reported increased levels of confidence, satisfaction and attention, and the treatment group had a low attrition rate. (Huett, 2008). In addition, a study involving involving 12 sections of a blended learning course showed that video feedback is perceived to establish instructor presence, although in a blended environment, text feedback is just as effective. (Borup, West, Thomas, & Graham, 2014). However video feedback may promote instructor presence in an online environment. Teachers at MIL provide audio and video feedback to give personalized instruction and help bridge gaps in the ZPD for L2 understanding. Therefore, positive feedback builds learner confidence.

Formative assessments that are built within the online courseware, and enrichment and engagement activities that target a learner's ZPD can also build confidence. MIL supports learners with a variety of strategies to both remediate and enrich students in their Language Live Sessions (pd.middleburyinteractive.com). Dynamic assessments, which follow Vygotsky's sociocultural theory, are even more effective than formative assessments (Poehner, 2007). Supplementary online tools that provide dynamic assessment and target a learner's ZPD, e.g. Linguachet (linguachet.com), an online Latin tutoring tool, can further build confidence.

Instructor self-disclosure can also facilitate confidence. An additional strategy that can not only build confidence, but actually help shift motivation from introjected to intrinsic, is instructor self-disclosure through social media. In a study involving 104 beginning French students at a major research university in the southeastern United

States, students who had exposure to the instructor's Facebook page had a significant shift in motivation to intrinsic motivation which is the most useful type of motivation for L2 acquisition (Aubry, 2013).

Therefore, as positive emotions are fostered, confidence builds and motivational shift can occur.

Satisfaction occurs when students have an opportunity to apply what they have learned (Keller, 1987). In online learning, this can occur through social presence, which contributes to satisfaction (Ryle & Cuming, 2007). In second language acquisition, this involves using the language: e.g., in listening or reading with understanding or in conversation. MIL's Language Live sessions give this opportunity to apply language to students of all offered languages. Personal recognition, such as positive feedback, coupled with opportunities for application, foster intrinsic motivation (Keller, 2008).

When electronic badge systems are designed to help a learner visualize their accomplishments, they can also theoretically provide satisfaction. (Randall, Harrison, & West, 2013). However, this type of recognition may address *external regulation*, motivation to seek a reward. Nevertheless, DuoLingo (https://www.duolingo.com/) incorporates badges that provide personal recognition. In addition, DuoLingo does provide opportunities for social presence and collaboration on the translation of authentic texts, which also contributes to satisfaction.

Volition/ Self-Regulation. Although strategies and tactics can be employed to facilitate attention, relevance, confidence and satisfaction, volition must be present in order for students to persist in goal-oriented behavior. Much work has been done in the area of self-regulated learning (SRL), which has cognitive, metacognitive and affective components (Ziegler & Moeller, 2012). SRL can be summarized as "an important factor in successful online learning, involving learners' motivation, cognition, behavior, and performance" (You & Kang, 2014). Furthermore, perceived academic control and academic emotions are considered as key constructs of SRL. (You & Kang, 2014, p. 126), and language is situated in the affective domain. Therefore as self-regulation is facilitated, it is important to consider learner emotions in the audience analysis. Self-regulation strategies and tactics employed in vocabulary acquisition and self assessments are described below.

Vocabulary acquisition. Since "lexical development plays a principal role in different aspects of L2 acquisition" (Polat, Mancilla, & Mahalingappa, 2013), and building a vocabulary involves repeated exposure over time (Tseng, 2009), volition for vocabulary development is paramount. In a longitudinal study involving 910 senior high Taiwanese students learning English, researchers, using a psychometric instrument designed to measure self-regulated characteristics—the Motivated Strategies for Learning Questionnaire (MSLQ), administered in Chinese translation—including commitment, satiation, emotion and environmental control, found that volition for vocabulary acquisition decreased over time (Tseng, 2009). And although student-student asynchronous interaction has been found to be effective in web-based courses (Anderson, 2003), for vocabulary acquisition, the motivation behind this success may be avoidance of negative emotions or ego enhancement. This avoidance has been termed as *introjected motivation* (Deci & Ryan, 1975, Ryan and Deci 2000 in Keller, 2010). In a study involving 87 Spanish II students with previous online learning experience at a charter cyber high school, researchers found that students who participated in L2 asynchronous discussion forums did obtain higher vocabulary scores than those who did not. Researchers also found that students who participated in non-anonymous forums and reported introjected motivation had the most gains in vocabulary (Polat, Mancilla, & Mahalingappa, 2013).

Self-Assessments. One strategy that has been proven to be effective to promote self-regulation is the inclusion of prompts for reflection and "preflection" at various points in the course. In a study involving 64 students from a European university (the authors declined to specify the nation where it was conducted), it was found that preflective prompts were especially helpful for novice students because they helped students plan and consider their learning. (Lehmann, Hähnlein, & Ifenthaler, 2014). A similar role is played by the "can-do" statements that coincide with language skill levels defined by ACTFL standards. Such statements are "designed to promote self regulation as they guide students and teachers through a process that includes: setting goals, selecting strategies, self-assessing, providing evidence, and reflecting before setting new goals" (NCSSFL-ACTFL, 2013, p. 1). The effectiveness of can-do statements in a retrospective then/now self-assessment has been supported by a study completed involving 36 university student respondents to a survey regarding the use of these statements. The study found that student evaluation on self-assessments related to can-do and then/now statements coincided with their scores on domain knowledge assessment instruments. (Brown, Dewey, & Cox, 2014). Figure 3 shows an example of a preflective can-do prompt of the type currently used at MIL in all their immersion-based live sessions. These reflective prompts are paired with reflective statements to help students self-assess their learning. These types of prompts assist students in "languaging" about their learning prior to and after immersion. And, in accordance with Vygotsky's theories of second language acquisition, the directions are presented in the native language. The prompts help the learners assess their position within the context of the zone of proximal development, as shown in Figure 4. In addition, the objectives correspond with prompts in one graphic to minimize cognitive load.

As we begin this session, I can...	Yes	Almost	Not Yet
...Talk about the weather in Latin.			
...Talk about the seasons in Latin.			
...Give a simple weather report in Latin.			

Figure 3. Preflective prompt based on can-do statements. Adapted from typical prompts presented in MIL live sessions. (PD.middleburyinteractive.com).

Developed capabilities	Developing Capabilities	Undeveloped Capabilities
	Zone of Proximal Development	
What the child can do unassisted	What the child can do with assistance	What the child cannot yet do.

With appropriate instruction in the Zone of Proximal Development, the zone boundaries may shift thus:

	ZPD	

Figure 4. A conceptualization of Vygotsky's Zone of Proximal Development Adapted from Driscoll, 2005, p. 254.

Another self-assessment system for increasing self-regulation and goal setting for language learners is LinguaFolio Online©. This tool was developed in Europe and refined and made available by NSSFL. ACTFL then collaborated with NSSFL. (http://ncssfl.org/LinguaFolio/index.php?NCSSFL-ACTFL-Collaboration). Originally developed in Europe to provide a common assessment across borders, it has been refined and made available for online use by NCSSFL (National Council of State Supervisors for Foreign Languages.); clearly defined levels which summarize expected achievements range from Novice, through Intermediate and Advanced, to Superior and Distinguished. These definitions provide benchmarks by which to measure progress. They provide the learner with a realistic guide for what is reasonable to expect at any level while learning a new language. They reassure novice learners both by reminding them that language acquisition is a long process, and by providing examples that quantify learning at each level. In this way, students can monitor progress, and be encouraged as they watch themselves move from one level to the next, such as from Novice Low to Novice Mid. This system, designed to scaffold metacognitive SRL strategies, consists of:

- a passport, an overview of a learner's experiences and ability with different language that records formal qualifications and self-assessments;
- a language biography, which includes learning goals and reflections; and
- a dossier, which includes work samples and certificates; this has been successfully implemented to increase SRL behaviors and mastery attribution among students, as demonstrated in the findings below:

A longitudinal study involving 168 students of Spanish and French found that there was a significant correlation with the goal setting process supported by LinguaFolio© and language achievement, as well as a significant relationship between the goal-setting process and language proficiency growth (Ziegler & Moeller, 2012).

These findings generally indicate that volition can be fostered for online language learners through targeted vocabulary acquisition and self-reflective assessments.

Conclusion and suggestions for further research

In order to acquire L2, students must be engaged in the content and in constructing meaning (Swain & Lapkin, 2013). A variety of motivational strategies can be used to foster this engagement. L2 learners also benefit from SRL strategies, which can be scaffolded with motivational strategies. As students are engaged, it is also important to assess how much and what types of motivation would best influence their performance. Since L2 acquisition involves both the cognitive and affective domains, emotions have special consideration when fostering motivation and engagement for L2 learners. As emotions and the interaction between emotions and stimuli is complex, there is still needed research to more precisely determine L2 learner emotions and their transient states throughout L2 online learning. For example, we know that volition for vocabulary decreases over time (Tseng, 2013), but we do not know the emotion that corresponds with that decrease. The fact that motivational shifts can be fostered in L2 online learning (Aubry, 2013) is promising. As more research is completed regarding emotions students experience during online language learning, more strategies that afford motivational shifts may be implemented. Finally, much of the literature review contributing to this paper came from sources whose generalizability to the fast-growing population of American online language learners in grades 9-12 is open to question, as far more literature exists concerning post-secondary learners and/or learners from other countries. This illustrates the urgent need for substantive experimental research and grounded theory case study as increasing numbers of US adolescents study foreign language online.

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[NB: The authors concur with the editorial board of the National Academy of Sciences that this study pushed boundaries of ethics in data collection methods; however, with this caveat, the relevance of demonstrating emotional contagion in the absence of personal contact to the study of e-learning cannot be denied.]

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