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Selected Papers on the Practice of Educational Communications and Technology - **Volume 2**

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Editor: Michael Simonson

Nova Southeastern University, North Miami Beach, Florida

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Preface

For the thirty-fifth year, the Research and Theory Division of the Association for Educational Communications and Technology (AECT) is sponsoring the publication of these Proceedings. Papers published in this volume were presented at the annual AECT Convention in Louisville, KY. 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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Engaging Employees in Continuous Learning and Development With Mobile Devices: Current Research and Practice

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Keywords: mobile devices, employee engagement

Introduction

With the increase in accessibility and affordability of mobile devices such as smart phones and electronic tablets, organizations are using these devices to engage employees in continuous learning and related training and development initiatives. Continuous learning within an organization is a strategic imperative that affects both its bottom line and competitive advantage (assets competitors cannot mimic). One way to achieve competitive advantage is through employing a highly skilled and talented workforce. Thus, organizations must not only undertake the difficult and costly task of finding these highly skilled and knowledgeable employees, but must also continuously train employees to achieve organizational success and maintain a competitive advantage (Daft, 2012; Noe, 2009; Noe, Tews, & Dachner, 2010). Therefore, organizations should provide a variety of ways to increase continuous learning through training and development initiatives.

According to recent surveys, nearly 60 percent of organizations are implementing training initiatives through e-learning (Johnson & Gueutal, 2011) and e-learning accounts for approximately 20 percent of organizational learning (Noe, Tews, & Dachner, 2010). E-learning can be accomplished through the use of computers or mobile electronic devices. According to the Gartner research firm, approximately 90 percent of organizations will promote the use of mobile devices by the year 2014 (Todd, 2011). Mobile device use will likely continue to be a part of many organizations' training and development plans and thus, is an important area of investigation. This paper will focus on the use of mobile devices for e-learning. We will review current organizational practices, impact, and future implications for learning and development.

Current Organizational E-Learning and Mobile Device Use

E-learning refers to learning that occurs from instruction online through the Internet which may be synchronous or asynchronous (Clark & Mayer, 2008). Mobile learning involves the use of the Internet and any electronic Internet-ready device for instruction anytime or anywhere (Heath, Herman, Lugo, Reeves, Vetter, et al., 2005; Todd, 2011). Mobile devices include any electronic device that allows for access to the Internet and may include smart phones, electronic tablets, or any Internet-ready electronic device (Heath, et al., 2005; Todd, 2011).

Mobile devices are commonly used in the workplace for activities such as employee scheduling, data analysis, inventory control, performance reviews, recruitment, completion of required certifications, and soft skills training (Arnold, 2007; Roberts, 2011). Furthermore, corporations typically store most employee and company documents and artifacts online. Examples include corporate training materials, interactive training videos, and policy manuals. Holiday Inn Express recently spent $1.2 million to develop online training that employees could access through mobile devices. In this system, managers could find answers on how to manage difficult employees,

or housekeepers could watch video demonstrations on how to fold sheets (Zeidner, 2007). Another example of mobile device use is with India's NIIT Technologies Corporation. Through mobile devices, employees have access to personalized mobility maps for charting career paths and to personalized career counseling portals (Harris, 2012). At Boston Pizza company, managers have online access to the soft-skills training they need for store success. Consequently, the company has increased retention rates in an industry that typically experiences 300 percent turnover (Noe, 2009).

Academic environments can also benefit from mobile devices used for creative and collaborative purposes. Daniel Cohen of George Mason University and co-creator of Zotero, uses Zotero as a hub for gathering, studying, and sharing research with students and colleagues. Zotero stores documents, images, online videos, polling widgets, language translation for international users, citation-style applications, GPS mapping, and timeline tools (Parry, 2012). Tools like Zotero have made it much easier to form online learning communities.

Impact of Organizational E-Learning & Mobile Device Use

Organizations face many workplace challenges today including knowledge management (Daft, 2012), an aging work force, increased workplace diversity, and a widening job skills gap and demand. These challenges make learning and development more needed than ever. As a result, e-learning as a segment of total training has increased from 11 percent in 2001 to 32 percent in 2007 (Noe, 2009)., In 2008, U.S. organizations spent an average of $134.4 billion dollars on training and development with a mean direct expenditure per employee of $1,100. The mean formal training hours spent per employee was 37.4 (Noe, 2009). Because training is expensive, organizations are interested in finding new ways to deliver training at a lower cost while maintaining effectiveness and maximizing the return on investment. Return on investment (ROI) involves first identifying desired learning outcomes and the benefits (in dollar value) of effective training and development and dividing by total costs. Total costs include direct costs, indirect costs, turnover costs, development and overhead costs, and compensation for time while training and down time due to training. Ideally, the ROI will be positive if benefits exceed costs. Organizations are focusing on increasing ROI and devising metrics to evaluate the ROI of current and proposed training and development (Noe, 2009).

Impact on the Organization

While ROI is an important organizational factor for consideration, some advantages for organizations concerning mobile device use and e-learning include reduced costs, more efficient management and tracking of employee training, and credit toward organizational green initiatives. For example, e-learning can reduce costs up to 50 percent within two years. For example, in 2004, IBM reported over $400 million saved annually because of e-learning (Johnson & Gueutal, 2010). Examples of reduced costs include less paper use, less overhead for face-to-face meetings, and more flexibility due to the availability of training anytime or anywhere.

Better tracking and management of employee training is another organizational benefit. For many organizations, employee training is either required by law or necessary for developing knowledge and skills to master one's current job or for promotional advancement. Examples of online training are sexual harassment prevention, OSHA certification completion, or routine job skills training (Noe, Tews, & Dachner, 2010). Most large organizations store the training courses and content in Learning Management Systems (LMS) to manage the tracking of employee training completion and evaluation (Noe, 2009) The LMS reduces the burden of paper and employee file management. Both employees and employer have online access to monitor employee training progress.

Impact on the Employees

Employee engagement has recently emerged as a research variable when examining factors such as motivation, job satisfaction, stress, absenteeism, individual and organizational productivity, and learning (Hallowell, 2010; Noe, Tews, & Dachner, 2010). Employee engagement involves psychological engagement (Noe, Tews, & Dachner, 2010) which is defined as "the harnessing of organization members' selves to their work roles; in engagement, people express themselves physically, cognitively, or emotionally during role performances" (Kahn, 1990, p. 700). Conversely, "disengagement means people withdraw and defend themselves physically, cognitively, or emotionally" (Kahn, 1990, p. 701). Disengagement was found to be linked with underachievement and depression. In one study of 20,000 international employees, those that were disengaged were more likely to miss work, become ill, or suffer a heart attack (Hallowell, 2010). On the other hand, employee engagement has been linked to improved employee performance and a increased sense of workplace connectedness (Hallowell, 2010).

Two factors found to impact employee engagement include the sense of employee connectedness in the workplace and stimulating employee activities. Connectedness includes the allowance of *small talk* among employees, paying attention to all employees (Hallowell, 2010), and building a strong and cohesive workplace culture that nourishes employee connectedness (Masalin, 2003). A workplace that provides stimulating employee activities during training (which vary among individual employees) has been shown to trigger deep brain activity that releases dopamine hormones (feel-good hormones) and leads to the generation of new neural pathways (Hallowell, 2010). Since training and development initiatives are concerned with employee engagement, it is worth reviewing research that reveals any possible factors that affect employee engagement.

With the advent and popularity of apps and other creative technological advances, mobile devices can help contribute toward employee engagement in training and development goals. In one study, 65 percent of employee participants perceived that they were highly engaged because of using mobile devices (Roberts, 2011). Richard E. Mayer, a cognitive scientist, has conducted over thirty years of research in the area of exploring factors that influence cognitive learning and engagement. He concluded that effective learning occurs with the use of visuals, including images or videos, within learning environments (Mayer, 2005). Mobile devices can potentially enable those type of learning experiences.

Many employees view mobile learning as a flexible and convenient way to access training at any time or in any place. However, not all employees perceive e-learning positively. For example, most employees age 40 and older prefer self-paced learning and peer collaboration, but do not favor e-learning over face-to-face training (Noe, 2009). Also, employees have reported feelings of isolation regarding e-learning. Thus, organizations should consider creating collaborative and social learning experiences (Noe, 2009). Some studies indicate that isolation reduces employee engagement and increases attrition rates in online training (Noe, 2009). More research is needed to determine methods of reducing issues such as isolation, and increasing employee engagement.

Impact on Training and Development Initiatives

Learning via mobile devices will not completely replace face-to-face training (Arnold, 2007), in part because the use of the devices is complementary to traditional employee training. In some cases blended learning should occur. For example, soft-skills training is more difficult to complete solely online. Some studies indicate that while basic knowledge can be learned online, application of etiquette and team-building skills needs to take place in face-to-face training (Noe, 2009).

There are some practical considerations for employees using mobile devices for training. A ringing phone or a text message can easily distract the learner. Using proper cell phone etiquette applies when collaborating with distant colleagues. Employees may need a power management strategy (back-up batteries or chargers) for extended uses of mobile devices. Employee burnout or resentment can occur because of the constant reminder of work when using a mobile device for off-the-clock personal use (Jarvenpaa & Lang, 2005; Johnson & Gueutal, 2011).

Implications For Adoption of Mobile Devices

Although there are many benefits of using mobile devices in the workplace, organizations must address practical, legal, and security concerns. For example, corporate policies should clearly specify the proper use of mobile devices while on company time to avoid security breaches or inappropriate behaviors that could lead to legal problems. Corporate espionage is of the utmost concern for all organizations, especially with the rise of worldwide Internet connectedness and the growth of electronic crime. Organizations will need clear policies and practices regarding the monitoring of mobile devices, and the activities employee engage with them. Organizations will need to continue to communicate with and train employees on what is appropriate behavior while working and learning online (Roberts, 2011). Organizations will need clear policies, discussion, and training about what constitutes off-the-clock or on-the clock activities in compliance with the Fair Labor Standards Act (Roberts, 2011). Clarification means that organizations will need to define and determine hours worked for overtime pay purposes. Finally, mobile learning through the use of mobile devices is viewed differently by various cultures. For example, currently, mobile devices are an optional means for Internet access and for delivering training to employees in the United States. In Africa and Japan, mobile devices may be the most common, most preferred, or the only means of Internet access. Some cultures value self-directed learning more than others. Since many organizations include a diverse workforce, these cultural issues will need to be recognized (Babcock, 2011). In conclusion, the international, legal, cultural and security issues are important and should continue to be investigated.

Continuous learning through mobile device use will continue to evolve. As new and innovative uses for technological devices emerge, organizations will employ mobile devices for training and development initiatives

that support organizational success and competitive advantage. More research needs to be conducted to determine the optimal use of mobile devices for learning in the workplace. We also need more research on improving and optimizing learner engagement with mobile devices. Finally, since ROI is critically important, creating effective organizational learning environments will help organizations achieve ROI success.

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Using Narrative Based Games for Reading Complex Text in Middle School

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Abstract

Narrative based computer games are used to enhance reading in the science content area. Middle School students interact with multimodal characters, view posters of pathogens, and read complex text to find clues and solve the mysterious illness that has plagued the virtual scientists. Generative organizational tables (GOTS) are used to analyze complex reading passages. Data are collected from several sources. Comparison of in-game pre and post tests will show gains in reading comprehension in science content area. Transcripts from teacher interviews and focus groups revealed teachers' reaction to narrative based games and response to use of generative learning strategies mapped to Common Core Standards in English Language Arts.

Introduction

This case study reports on a one year project using a narrative based computer game to enhance reading in the science content area. The game design includes use of generative organizational tables mapped to the Common Core Standards in English Language Arts. Emphases are on Reading Informational Text. Policy makers and educators in support of Common Core ELA recommend an increase in use of informational text in the K12 classrooms, thus the focus of the Crystal Island Lost Investigation game is reading in science content area. Comprehension is measured using complex reading passages for grade 8 students. Using a case study approach (Yin, 2009): the researcher is looking for the following: 1) favorable teacher response to use of narrative based games in the classroom (Horizon Report, 2011); 2) favorable teacher response to design of the curriculum which includes instructional strategies aligned with new Common Core Standards in English Language Arts (CCS ELA); 3) teacher response to use of generative learning as a method for teaching reading in the science content area (Grabowski, 2001); and 4) impact on student performance in reading complex text as recommended by Common Core Standards English Language Arts.

Methods

Funding provided by the Gates Foundation (NC State University & East Carolina University, 2012) made it possible to design narrative based games for use in middle school classrooms. The virtual world within the game is a remote island in which a team of scientists become gravely ill from exposure to pathogens (commonly found in middle grade science curriculum.) The middle school student must travel within the world (Crystal Island) to collect clues from avatar-like characters, view posters with striking images, and read science-content articles to determine the source of the mysterious illness. Each article in the game includes a generative organizational table (GOT) in which students will select the most appropriate keyword for each of the 6 to 12 cells within the design of the table. Correct response is determined as the reader can make connections between and across ideas within the text (Wittrock, 1985.) The GOT often will require the reader to return to the reading and identify terms and ideas that fit within the relationships defined in the table. This is a skill typically included in Common Core standards for reading informational text (Common Core State Standards Initiative, 2011). During the development of the game, readings in grade 8 microbiology were written by a master teacher and reviewed by the researchers. As part of the design process, the readings were analyzed for "text complexity" (Adams 2010). Complexity, which leads to deeper learning, is determined in several ways (Atherton, 2012). The online Lexile Analyzer (Lexile, 2012) provides quantitative measures with sentence length, structure, and number of words. Complex text characteristically includes more than one idea per sentence, interaction among and across ideas in the reading, and a larger number of technical terms and unfamiliar vocabulary (Chall, Conard, & Harris, 1977; Common Core State Standards Initiative, 2011; Miller, 2012). An important goal for use of Common Core Standards is to prepare students to read and understand college level materials and workplace documents. This includes Reading Informational Text as defined by the Common Core Standards in ELA. Research in reading education reports a growing concern with students' ability to read complex text (Camara & Quenemoen, 2012). The Lexile Framework for Reading (http://lexile.com/) was used as a resource in determining the level of complexity for the articles used in the Crystal Island game. Through the use of GOTS, interaction with the avatar-like characters in the story, and reading of narrative based multimedia, several

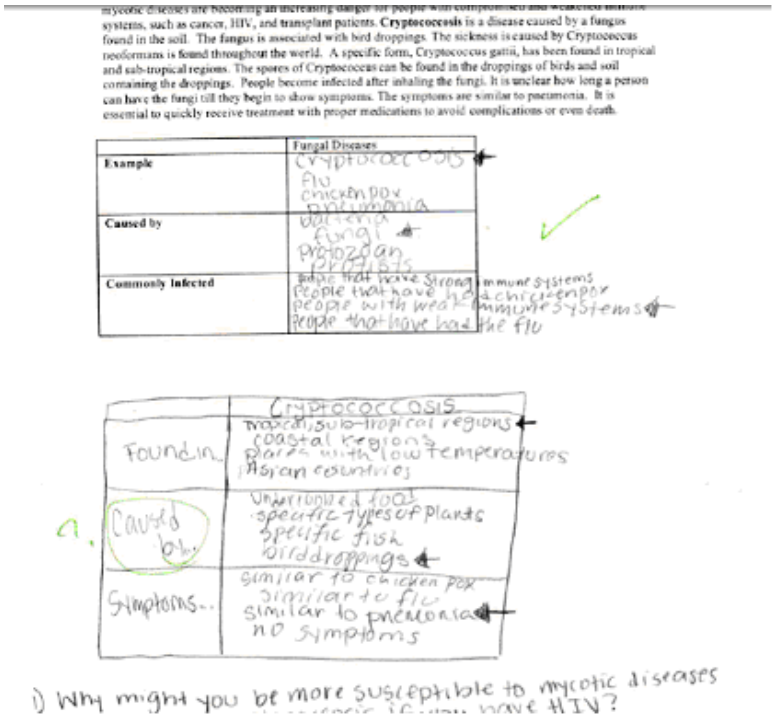
core standards are supported. Instructional methods within the game were designed specifically to support the following standards for Reading Informational Text:

> 1. Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.
> 2. Determine a central idea of a text and analyze its development over the course of the text, including its relationship to supporting ideas; provide an objective summary of the text.
> 3. Analyze how a text makes connections among and distinctions between individuals, ideas, or events (e.g., through comparisons, analogies, or categories).
> 4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of specific word choices on meaning and tone, including analogies or allusions to other texts.
> 5. Analyze in detail the structure of a specific paragraph in a text, including the role of particular sentences in developing and refining a key concept.
> 6. Determine an author's point of view or purpose in a text and analyze how the author acknowledges and responds to conflicting evidence or viewpoints.
> 7. Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
> 8. Delineate and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient; recognize when irrelevant evidence is introduced. (Standards are accessed from http://www.corestandards.org/assets/CCSSI_ELA%20Standards.pdf)

As can be seen in Figure 1 an organizational table accompanies each reading in the game. The reader has the option to return to the text as often as needed to be able to make connections between terms in the table with ideas within the reading. Terms within the table were selected to represent concepts in microbiology rather than fact based vocabulary drills. GOTS were designed as a method for analyzing text and as scaffolds for understanding of ideas within the text.

Figure 1. Readings and organizational tables are included in the design of the Crystal Island game.

During the four week project, classroom teachers assigned paper-based GOTS in addition to students' opportunity for interaction within the game. As students demonstrated understanding in the thinking processes required for matching keyword ideas with concepts within the text, the next level of learning required students to generate an original GOT using science concepts lifted from their textbook and online readings assigned by the classroom teacher. See Figure 2 showing a student work samples of his own GOT artifact.



	Fungal diseases	**Mycobacteria**
Microbes	Fungi/fungus	Bacteria
Examples	Cryptococcosis	Tuberculosis (TB) Leprosy
Caused by:	Fungus in the soil and associated with bird poop	**TB:** Mycobacteria spread through the infected air **Leprosy:** Mycobacterium-infects skin and respiratory system
Infects		People with weak immune system and other chronic illnesses (economically poor countries)
Where are they found?	Tropical or sub-tropical	Everywhere-living and nonliving organisms
Treatment	Quick treatment with medicine before it causes death	No treatment until testing occurs

Figure 2. Student generated GOTS following completion of teacher-assigned GOT.

The classroom curriculum accompanied the Crystal Island game and was based on generative learning theory with emphases in integration, organizational, and elaboration strategies. Students applied organizational thinking when completing GOTS or generating original GOTS from an assigned reading. Integration strategies were applied through question-generating activities. Elaboration strategies were most appealing to students as they designed their own posters using such online resources as Glogster (www.glogster.com) and through the use of presentation software in which students create an original comic strip (http://www.makebeliefscomix.com/Comix/). Teachers responded favorably to use of Web 2.0 tools such as Glogster and comic book generators. During the focus groups one teacher reported:

A lot of work went into creating those assignments, and I really appreciate it. I will be using them. We have used Glogster for reading reports and I know they love it. I will be able to send some students to the library (we only have 6 working computers there) to do some acceleration perhaps. I loved the program where they could draw the comic strip.

Table 1 shows a one-week sample taken from the four week classroom curriculum. Teachers had the option for applying a generative based activity each day. Online professional development modules were made available to teachers to provide refresher (or new) training in use of the generative based assignments. Focus interviews suggested that most teachers had been using generative strategies in their classrooms but were unfamiliar with the theory base used to support the activities. An online database containing science content articles was also linked to the online professional development modules.

Table 1. Week 1 from the four week curriculum accompanying the Crystal Island Lost Investigation narrative-based game for reading and science.

Terms in yellow	represent Generative	Learning strategy*	In game activity is purple	
Day 1 Week 1	Day 2 Week 1	Day 3 Week 1	Day 4 Week 1	Day 5 Week 1
15 min-- Teacher Demo of CI; Guided practice 15 min --Students will be grouped into pairs to work on CI. <u>Paired Activity R.I. 8.4</u> Part 1. –Following initial work in the game, pairs will begin to develop a plan on how they will solve the Crystal Island Outbreak mystery Part 2. –Pairs will create an organizational chart in their science notebook (or a spreadsheet) with basic microbiology vocabulary terms they have used. The students can use a paper notebook, spreadsheet or database to record their vocabulary words, definition, and its application.)	<u>Group Activity R.I. 8.4; R.I. 8.1</u> 30 min --Group two pairs of students together to make a group of 4. --Students will be given a note card with a list of symptoms of a particular disease (that has already been studied in the microbiology unit). Using their organizational vocabulary charts, they are to provide a diagnosis and cure for the disease on their card. 30 min. --Groups are to present their card to the class as well as their findings. They will have to provide (textual) evidence to support their findings.	Individual <u>Reading R.I. 8.3; R.I. 8.5</u> Students will select from several reading passages (Lexile score 800) to prepare a concept map using key ideas in text. Using the GOTS in the software as examples, students will generate their own GOTS to analyze text. --Students will answer questions on the passage which develops their vocabulary and contextual knowledge.	Individual <u>Reading R.I. 8.3; R.I. 8.5</u> See handout being developed. -- Students will be given a passage(s) on a particular bacteria, virus, or disease. Using the GOTS in the software as examples, students will generate their own GOTS to analyze text. -- Using their own GOTS students will generate questions on the passage which develops their vocabulary and contextual knowledge.	Individual Reading <u>R.I. 8.3; R.I. 8.5</u> Students will select from several reading passages (Lexile score 850) to prepare a concept map using key ideas in text. Using the GOTS in the software as examples, students will generate their own GOTS to analyze text. -- Using their own GOTS students will generate questions on the passage which develops their vocabulary and contextual knowledge.

Note in Table 1 each day's activity is mapped to the Common Core English Language Arts standard for Reading Informational Text Grade 8. The design of in-class activity was predominately focused on strategies for reading complex text. Each assigned article had been written specifically for the project. Content of the articles were analyzed for level of complexity using the Lexile Analyzer. The articles were carefully written as original content using public domain sources such as the National Science Foundation or the National Institute for Health. The use of the original articles ensured designation of appropriate reading levels based on Lexile scores and also to avoid copyright infringement. In order to support Common Core Standards for Reading Informational Text, students received direct instruction in how to connect keywords and ideas within organizational tables with specific content in the text.

Results of Classroom Curriculum and Teacher Response

Classroom Materials. Teachers responded favorably to the use of the classroom materials and lesson activities. One lesson (reciprocal teaching) needed more explanation as many teachers were not familiar with this instructional method. Many teachers recommended placing all classroom materials in a centralized location: online with links, organized and saved to a CD, or organized and displayed on a wiki.

Timeline. Teachers recommended future projects be scheduled in October, November, January, or February. Late spring caused many conflicts with EOG prep and scheduling of the computers. Most of the concerns with technical problems were related to old and limited hardware. Teachers understood this dilemma but did not have a solution.

Generative Learning in-game use. There was much discussion on use of generative learning and GOTS and how this relates to Common Core, EOG, and levels of learning as suggested in Bloom's taxonomy (Forehand, 2005; North Carolina Department of Public Instruction, n.d.). Teachers spoke favorably about the systematic approach using organizational tables to analyze text. Teachers observed students using the toggle to read, work in GOT, and re-read the articles. They also observed students guessing and using trial and error methods for selecting appropriate words for the GOTS, however, gains in post test scores would suggest thinking processes used while toggling between tables and text, including guessing, resulted in good outcomes for both reading and science.

Generative Learning in-classroom use. Students were able to relate generative learning tables to the more familiar activities using cognitive maps. This relieved anxiety in use of the classroom GOTS. Students required some guidance in how to identify main ideas for the GOTS. The copies of articles and GOTS as pdf were displayed on white boards as teachers explained the process for identifying the main ideas in the articles, keywords, and thinking processes to generating categories for an original GOT. Teachers understood the connection between organizational tables (GOTS) and the Common Core standards for reading Informational Text, especially as two or more columns connected ideas within the GOT.

Other Generative Strategies. Students generate questions from readings to be able to develop their own GOTS. Teachers provided scaffolding through the use of stems based on Bloom's taxonomy, beginning with Knowledge and moving up to more abstract questions. The thinking processes for generating questions to develop GOTS is the method teachers used to explain the meaning of "text analysis", a skill included in many of the Common Core standards however, the daily reading of articles and GOT activities became tedious for students. Teachers see value in other generative strategies such as question-writing and elaboration of text through the use of online comic book generators and Glogster. Even with limited access to computers many of the teachers reported using these in addition to Crystal Island game. Many of the teachers reported the glossary of microbiology activity as a favorite and used this activity to prepare for EOG. A clear theme emerged suggesting that teachers used the classroom activities as a preparation for EOG. Students generated questions to develop original GOTS. The key words and "foils" in the GOTS were written at varying levels as defined by Bloom's and used as practice over the weeks prior to EOG exams. One teacher reported students' concern over learning "science in the language arts". Teachers also expressed concern that students would perform better in the science EOG than on the Reading EOG, but results from standardized tests indicate increase in both reading and science. The researchers see teachers' use of GOTS to prepare for End of Grade tests as a positive outcome from the project. Teachers generally commented favorably to use of GOTS:

> We found using the GOTS to be very beneficial. And we are actually making it a little more EOGish since it's the season, by having the students complete one and then writing 3 or 5 EOG self-questions and then having someone else answer them about, you know, whatever material we gave them to read that day. It's working well for warm-ups even for them to spend 10 minutes in the beginning of class doing an activity like that….. as a team we decided that this was the best remediation prep you could have before your EOG.

Playing the Game. Teachers liked how students responded to the game, especially those who "struggle and usually finish last". Some of these students excelled in use of the game and were able to model for peers their solution paths in the game. This was a common theme through discussion threads and focus group interviews. Students were motivated to read articles to be able to solve the mystery, although some students were able to solve the mystery through trial and error and missed the important benefits of the GOTS analyses. Teachers suggested adding a "hint" button for students and provide this kind of scaffolding even while in the game. Students reported font size was too small in some of the articles and also complained that the Challenge game repeated itself. (Randomizer was not working). They reported feedback within the game as helpful. There was no clear preference for hearing voices with game characters. The most appealing characteristics within the game were authentic animation, challenge of the mystery, option to self-select navigation in the game, and several different sources of information for solving the mystery. Students were very excited when the "clue" prompts were lighted on the screen. Teachers recommended expanding the game to include several islands with a choice of mysteries and content area. Teachers also recommended the option for students to be able to generate an original GOT online, either through the game or through auxiliary program such as Démodé. Teachers also recommended enhancing the game with longer articles.

Results of Narrative-based Games Using Generative Learning Strategies

The results of generative activities show a high level of success in completing online GOTS tables. In Table 2, using trace data from the software in the game, success rates are displayed for the students completing GOTS activities within the game.

Table 2. Success rates of students completing the GOTS activities within the Crystal Island game.

GOT Topic	N	Percent Succeeded	Percent Failed
Carcinogen	653	81.5	18.5
Diseases Spread	796	84.1	15.9
Immunization	767	72.8	27.2
Influenza	829	88.8	11.2
Illness	1032	84.8	15.2
Microbes	842	83.4	16.6
Mutagens	840	41.4	58.9
Salmonella	842	88.0	12.0
Vaccines	147	72.2	27.8
Viruses	792	70.3	29.7

Success rates are important to meet goals for the project. In addition, researchers were looking at impact on student performance on tests and potential increases in knowledge gained for science content as well as reading comprehension of complex text. NC State University partner and the researcher's home university (East Carolina University) were able to negotiate administration of standardized tests as a measure of gains in both science and reading. Results from the tests show increases in both content areas. See increases as shown in Table 3.

Table 3. Science Content Learning Gains and Reading Skills Acquisition (N C State University, 2012).

Gains in Performance	Pre test	Post test	t	Df
Science Content	6.41	7.40	12.30	620
Reading Skills	2.64	2.54	-1.02	701

The researcher predicts use of narrative based games as an ideal learning environment for use of complex text due to three factors in the design of the software. Students will be highly motivated to solve the mystery through reading; interaction with organizational tables to promote deep learning; and exposure to technical terms contextually embedded throughout each article. The curriculum map for four weeks provided a guide with a recommended timeline for beginning the game, when and how to implement classroom activities and methods for connecting classroom lesson plans with use of the game (See Table 1). Teachers were provided with rigorous, microbiology-related daily readings intended to improve students' reading skills of complex text. Teachers participating in the project commented on the students' positive response to these activities, as well as the highly motivational draw of the game. In addition to the motivational characteristics associated with digital tools, students were engaged in problem solving, data analyses, and perspective taking. Outside of the game, students engaged in text analysis to create original concept matrices, write summaries, and generate original questions for their peers.

Summary of Results and Commentary

Tests were conducted to determine if students exhibited science learning gains and reading skill acquisition as a result of interacting with Crystal Island Lost Investigation. The results indicate that there was a significant increase on the science content test. Similarly, tests were also conducted to compare the reading and concept matrix completion performance of each student before and after the intervention. Again, there was a significant increase in students' reading skill scores before and after the Crystal Island experience. Crystal Island problem-solving scenarios are complex tasks that require synthesis and application of scientific knowledge obtained by reading complex informational texts about science concepts, as well as other scientific media. Thus, the Crystal Island environment affords a unique opportunity to assess deeper learning skills such as critical thinking and solving complex problems. Students also apply self-regulated learning (e.g., planning, strategy use) to successfully complete, and progress through, the problem-solving scenario. Of the 864 students who completed the pre- and post-assessments, 581 successfully solved the problem-solving task. This result implies that 67% of students successfully exercised strategic planning, interpreted technical information, and thought systematically to determine the identity of the mysterious disease, thereby demonstrating the acquisition of deeper knowledge (NC State & East Carolina University, 2012).

Teacher response was highly favorable toward continued use of the game. At mid-point through the game implementation, focus groups were conducted to identify problems and gather data on positive feedback from use of both the game and in-class curriculum. Teachers emphasized the high level of student motivation when engaged in the game. Even students with problems in reading at appropriate grade 8 materials were persistent in indentifying appropriate responses for the GOTS and for solving the mystery. Students used the in-game posters as prompts for recalling various bacteria and viruses. Permitting review of the GOTS and readings also helped students identify key ideas leading to solutions in the game. (See Common Core ELA R.I.3).

The Crystal Island Lost Investigation experience adds to the body of literature reporting successful use of game-based learning for motivation and for use of problem-solving strategies. It is also an example in research-based classroom curriculum can be used to support and enhance game-based learning. Students and teachers were motivated to continue in use of such resources for reading in the content areas. Many teachers recommended using the narrative based game and generative learning strategies for other content areas, specifically social studies and middle school classes in English literature. Teachers also reported linking higher level thinking processes associated with Bloom's Taxonomy for the classroom activities. In North Carolina, Common Core State Standards are designed to reflect Bloom's higher level thinking processes. Teachers report success in applying higher level thinking while engaged in the Crystal Island activities. Crystal Island is a success story in how games can be used to motivate students while ensuring a level of learning needed in preparation for college classrooms and the demands of 21st century workplace.

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A Review of Intercultural Training in the Workplace

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Abstract

As the number of multinational corporations and other organizations increases, more employees find themselves interacting and at times, immersing themselves in new cultural settings. In order for them to be successful and achieve their business goals, they must be well trained in the culture and language of their assigned region. When conducted correctly, intercultural training can be an effective way to ensure multinational employees are comfortable and effective in international settings. Unfortunately, current practice in intercultural training is generally ineffective because of (1) organizations disregarding or omitting intercultural training for managers; (2) lack of validated theory and practice for the development of intercultural training; (3) and the influx of developers selling low quality intercultural training programs. More in-depth studies on international businesses and the use of ability indicators such as cultural intelligence can help lead to more effective intercultural training programs.

Introduction

The world of business is becoming more dynamic as corporations strive to increase branding and profits by expanding into global markets. Walker and Jeurissen (2003) identified current trends in business including continued globalization, enhanced information technology, and increasingly diverse workplaces. Increased global competition has led firms around the world to pursue new markets, new sources of raw materials and other components, and more cost-effective locations for their manufacturing operations (Johnson, et al., 2006). This global growth necessitates that employees interact and at times, immerse themselves in new and different cultural settings. In order for them to be successful and achieve their business goals, they must be well trained in the culture and language of their assigned region. Earley (1987) makes the case that an ill-prepared individual will be unable to effectively perform required work duties or may unintentionally offend a foreign host and possibly jeopardize existing long-term relationships. Therefore it is incumbent upon current learning and development professionals to understand the issues surrounding effective intercultural training.

In order to have a meaningful discussion about intercultural training, we must establish a working definition of the concept. Intercultural training, sometimes referred to as cross-cultural training, can be defined as any procedure intended to increase an individual's ability to cope and work in a foreign environment (Early, 1987). It involves learning factual knowledge about other cultures, cultural norms and values, social and work roles, and language. As companies continue to operate and compete globally, it is important for learning and development professionals to focus on how employees are trained for intercultural work. Training professionals must understand the various approaches typical for intercultural training such as informational programs, simulators and assimilators, and experiential learning. Furthermore, in order for the learning experience to be meaningful, the learning objectives and *who* determines those objectives are key to ensure employees are effective in international environments.

While designers of intercultural training programs are moving toward a more engaging approach through experiential learning, most designers still assume that all participants need the same information – regardless of the learner's background knowledge and/or prior experience (Early & Peterson, 2004). With the increased popularity of intercultural training, more than one thousand vendors worldwide are packaging cross-cultural training seminars, CDs, workshops, etc. and selling them to human resources departments of global companies (Lang, 2004). This generic design can pose problems such as loss of time, effort, and resources for both the training professional and the employee who is required to participate in the training. With this in mind, training developers should consider not only the general design of the training, but also how the learning goals and objectives are determined to help ensure a useful and effective experience for the learner.

In the midst of the current intercultural training boom, "interculturalists" (specialists in intercultural relations) and others in the intercultural training industry are working to develop theories and models to help guide the industry. Earley and Peterson (2004) offered the idea of a "CQ" or cultural intelligence for managers. Cultural intelligence measures one's ability to adapt across cultures by being able to interpret and react to different cues and nuances, and thus function effectively. This approach suggests that intercultural training should include metacognitive, motivational, and behavioral components. Another development is the model of intercultural sensitivity presented by Bennett (2011). This model offered six stages (Denial of difference, Defense against difference, Minimization of difference, Acceptance of difference, Adaptation to difference, and Integration of difference) of how individuals cope with new cultural situations. The model is relevant to intercultural training professionals because, according to Bennett, people are not capable of effectively working in another culture until stage five (Adaptation to difference). Therefore, it would be important for training professionals to assess the current stage of the learner to appropriately design instruction.

When done correctly, intercultural training helps to ensure that multinational employees are comfortable and effective in international settings. Unfortunately, current practice in intercultural training is generally ineffective because of (1) organizations disregarding or omitting intercultural training for managers; (2) lack of validated theory and practice for the development of intercultural training; (3) and the influx of developers selling low quality intercultural training programs. This is evidenced by the 40% to 80% failure rate of international mergers and acquisitions, and/or international joint ventures (MacDonald, 2005). The international business failure rate jumps to 80% to 85% when international business success is measured by whether or not there is an increase in value to shareholders (2005). Therefore, until interculturalists and instructional theorists seriously explore these issues and use research to develop operative models and theories, intercultural training experiences will be less than optimal, and thus result in a significant waste of organizational resources.

Review of Issues

The Impact of the Global Manager

The global manager could be in charge of global operations (or a division of global operations) working from headquarters in the home country, or be working internationally as an expatriate. A manager's ability to direct global tasks effectively is critical for a corporation competing on an international level (Templer, 2010). Both types of managers are responsible for ensuring successful business operations in the international arena. These operations should include not only understanding the marketplace, but also understanding and being able to operate in the local culture. Global managers are key personnel who will have a significant effect on the success of any international business. The relationship between a manager's cross-cultural preparedness and the effectiveness of a multinational corporation should not be overlooked. Johnson, Lenartowicz, and Apud (2006) support this with the following:

> Some foreign ventures succeed, but many do not, and the inability of firms and their managers to adjust to the demands of the international business environment has been advanced as a primary

> cause of international business failure. Two general themes emerge from the literature: expatriate failure, and a broader inability by headquarters managers to appreciate the cultural challenges of doing business overseas (p. 525).

While some corporations are successful with their international operations, it is instructive to review some notable failures by U.S. corporations in international ventures. Our first example comes from Mattel Corporation and one of their key product lines—Barbie dolls and accessories. Many adult American women today carry memories of playing with Barbie dolls. It is fair to say that the Barbie product line has become a cultural icon in the United States. And of course Mattel hoped and planned to market Barbie products across the globe. However, Mattel closed its large, pink, flagship store in China after only two years in operation (Anderlini, 2011). Analysts cited poor adjustment to consumer preferences as the primary reason for failure, as well as poor location of the store, and doll clothing that was too provocative for a "Hello Kitty"-style market (2011). Stores like Best Buy and Home Depot have also recently closed stores in China. Best Buy did not recognize that local customers can negotiate and get the same products at smaller retailers. Home Depot missed the cue that Chinese customers do not resonate with the company's "do-it-yourself" approach toward home improvement (Rein, 2011; Flanagan, 2011). Companies such as Apple and Nike, on the other hand, have had great success in China (Anderlini, 2011). While a company will not get it right every time, an effective global manager should understand and capitalize upon customer mindset preferences, and practices within a particular culture.

Another example of a large U.S. corporation failing in an international market comes from Wal-Mart. This massive corporation has not missed many growth opportunities. However their closure of sixteen stores in South Korea demonstrated they misread the market and by extension, the culture. Analysts called Wal-Mart a typical large global corporation that failed to accurately discern what South Korean housewives wanted in a shopping experience. Similar failures by Nokia, Nestle, and Google were also reported (Sang-Hun, 2006). Executives and managers making decisions within these multinational corporations must have a deep understanding of the market and culture in which they are trying to do business. Certainly a major corporation like Wal-Mart can recover from a failure such as the one in South Korea. However, a lack of cross-cultural competence can lead to poor business decisions, which can be very expensive.

The Expatriate Factor

Expatriates are persons from one culture who have chosen to live in another culture, but still identify at some level with their original culture. Unlike a global manager operating from within the home country, expatriate employees are actually relocated from their original country to work for their same company in another country; and as O'Donnell asserts (2000), serves as an extended form of headquarter's supervision. Recent estimates show that more than 100,000 U.S. expatriates are sent overseas each year (Johnson, et al., 2006). Generally, corporations use expatriates for periods ranging from a few months to five years in hopes that a vested employee can help ensure the success of the international venture. These corporations want a skilled individual to get a business running, establish the corporate culture in the new location, and sometimes, find and train a new manager from the local community to continue operations (Neyman, 2007). Veteran expatriates bring key benefits to their companies such as the ability to build relationships and synthesize best practices from many cultures, as well as first hand cross-cultural knowledge and skills – both of which lead to a competitive advantage for the company (Cassiday, 2005).

The cost of deploying an expatriate (called "expatriation") overseas is daunting, even for large corporations. Although expatriation can require an investment of up to $1,000,000 (Foster, 2012), a properly trained and effective expatriate is a priceless commodity for a multinational corporation, especially when considering the costs incurred with expatriate failure. Light (1997) stated that expatriates are a "critical asset…often making the difference between a company's success or failure in the marketplace." Between 40% to 50% of expatriates fail in their assignments, with a loss to the company ranging from $250,000 to $1,000,000 (Johnson, 2006). When lost opportunities, costs of finding a replacement, and the possibility of damaged long-term relationships are included, the loss can grow to as much as $3,000,000 (Foster 2012). Corporations can significantly reduce the rate of expatriate failure through better cross-cultural preparedness for these individuals. Human resource managers in the U.S. agreed that cross-cultural adaptability is the most important factor for expatriates--even more important than technical and managerial skills (Templer, 2010). Effective intercultural training costs much less than a failed expatriation effort.

Cultural and Intercultural Competence

As more companies compete internationally, managers and corporate leaders are challenged to ensure successful business practices and relationships across many cultures. Organizational effectiveness is increasingly reliant on people who can be effective and respectful in various cultural settings (The Cultural Intelligence Center, 2012). Therefore, training professionals, instructional designers, and interculturalists are challenged with how to best prepare individuals for international work. However, most intercultural training efforts are unsuccessful because of the lack of agreement on defining cultural competence, the absence of cultural studies in international business (Johnson, et al., 2006), and the inadequate training methods that rely solely on country-specific knowledge. Thus, researchers have begun theorizing and developing models for measuring cultural competence in hopes of increasing effectiveness of intercultural preparation efforts.

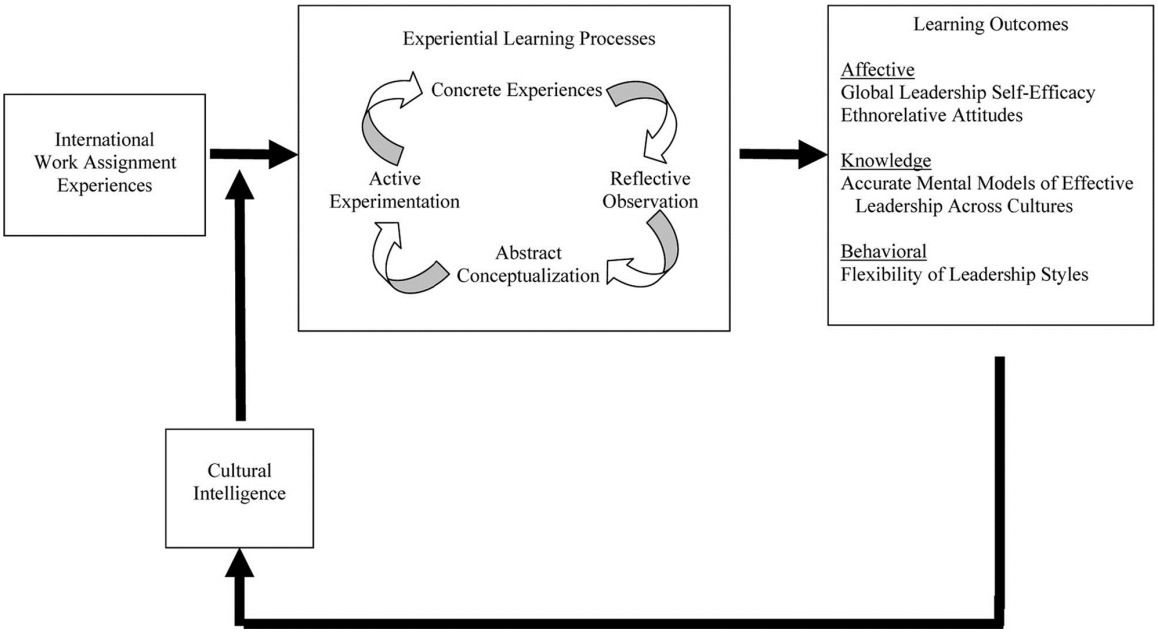
Cultural Intelligence

The idea of cultural intelligence, or CQ, emerged as theorists looked to overcome the country-specific style of intercultural training where learners were taught basic information about a designated country or culture. This style failed to take into account the adaptive abilities of the individual to gather, interpret, and act upon different cues to function effectively across cultural settings or in multinational situations (Early and Peterson, 2004). Cultural intelligence captures these capabilities as it is based on metacognitive, cognitive, motivational, and behavioral indicators (Early and Peterson, 2004, & Ng, Van Dyne, and Ang, 2009). The following table briefly summarizes the cultural intelligence model based on Ng, et al (2009).

CQ Type	Description	Application
Metacognitive	Consciousness and awareness during intercultural interactions	Planning, monitoring, revising mental models
Cognitive	Knowledge of norms, practices, and conventions in different cultural settings acquired from education and personal experience	Knowledge of economic, legal, and social systems of different cultures
Motivational	Capability to direct attention and energy toward learning about and functioning in situations characterized by cultural differences	Intrinsic motivation and self-efficacy
Behavioral	Situationally appropriate behaviors from a broad repertoire of verbal and non-verbal behaviors	Exhibit culturally appropriate words, tones, gestures, and facial expressions

A scale, entitled the CQS (cultural intelligence scale), was created and validated (Van Dyne, et al, 2008), and is currently being used to assess cultural intelligence (The Cultural Intelligence Center, 2012). As a whole, this model continues to impact current research on cultural competence and intercultural training, and will likely be a driving force for future research.

In continuation of cultural intelligence research, Ng, Van Dyne, and Ang (2009) connected cultural intelligence theory with experiential learning theory, of which Kolb (1984) is credited. Their idea is to capture the role a global manager's international experience plays in affecting learning and change – specifically, how the four CQ components increase the likelihood that a global leader will be actively engaged in the following four stages of experiential learning during an international assignment: (1) Concrete experience, (2) reflective observation, (3) abstract conceptualization, and (4) active experimentation. The following graphic (Ng, et al., 2009) connects CQ with experiential learning outcomes.



This connection can be used to support the idea that an individual's CQ can determine not only the success of the assignment, but also of the international work assignment as a learning opportunity. This is analogous to how an individual's IQ (intelligence quotient or cognitive intelligence) has various levels and can lead to various outcomes.

Intercultural Sensitivity Model

Moving from ethnocentrism to a stage where one is able to fully integrate and accept cultural differences is indeed a process. Bennett's (2011) intercultural sensitivity model is a six stage development tool designed to identify a person's sensitivity stages, as well as to offer guidelines for intercultural trainers on how to develop, support, and challenge learners in each stage. The following is a brief summary of the model.

- Stage 1: "Denial of difference." Individuals in this stage are "in denial" about cultural differences and make superficial statements of tolerance, such as, "live and let live" or "all big cities are the same".
- Stage 2: "Defense against difference." In this stage, a mentality of "us vs. them" abounds. Frequented statements are, "Boy, we could teach these people a lot of stuff" or even, "I wish I could give up my own cultural background and be one of these people."
- Stage 3: "Minimization of difference." Bennett (2011) characterizes individuals in this stage with descriptors such as "we are the world" and "just be yourself." Similarities are focus between cultures in stage three.
- Stage 4: "Acceptance of differences." The word *acceptance* does not signify that individuals necessarily agree with other cultures, but rather recognize the world consists of varied cultures. One might say, "The more differences the better…It's boring if we're all the same," or "My homestay family and I have had very different life experiences, and we're learning from each other."
- Stage 5: "Adaptation to difference." This stage is described as "intuitive empathy" or "intercultural empathy" as it is not until this stage that an individual is ready for intercultural work assignments. "The experience of adaptation is one of consciously shifting perspective and intentionally altering behavior…It is likely the predominant experience when there is a need to actually interact effectively with people of another culture" (Bennett, 2011).
- Stage 6: "Integration of difference." In this final stage, an individual is considered bicultural or multicultural and has the ability to move effortlessly among and between cultures.

This model is robust in that it shows the intricacy of one's growth toward multicultural integration, and further supports the position that intercultural training efforts must be individualized and designed well in order to properly prepare managers for global assignments.

The Intercultural Training Boom

The more diversity and cultural awareness and integration become corporate issues, the more opportunity for intercultural training arises. The business of intercultural training has grown rapidly in recent years, with more than one thousand vendors worldwide (Lang, 2004). Intercultural training courses aim to equip individuals with specific knowledge, skills, and abilities ranging from knowing appropriate behaviors when interacting with different cultures, to conversing in another language (Ng, et al, 2009). Intercultural training efforts come in various formats including courses from in-house training departments and face-to-face, online, and packaged workshops from outside contractors. The Cultural Intelligence Center, Dean Foster Associates (DFA), Communicaid, and Kwintessential are examples of agencies with offerings that are generally representative of the intercultural training field.

The Cultural Intelligence Center (CIC) offers "the only academically validated instrument to measure cultural intelligence" (The Cultural Intelligence Center, 2012). The CIC offers online tools for assessing cultural intelligence, and provides training, coaching, and opportunities to become certified to assess and teach about cultural intelligence to others (2012). The CIC offers workshops ranging in duration from four hours to a few days, and include titles such as "CQ for work", "CQ and Faith-based Contexts", and "CQ and the Classroom".

In contrast to the CIC, Dean Foster Associates (DFA) (2012) offer "intercultural global solutions" with more current, Internet savvy offerings. In addition to face-to-face workshops, DFA offers online public webinars at a cost of $295. This fee includes books and materials. The course covers a lengthy list of topics including "dos and don'ts", negotiating techniques, and information about gender roles in the workplace. The DFA website includes a blog, research articles, an online store, and an interactive tool (login required) that provides "a powerhouse of intercultural information" when needed. The tool provides individualized, strategic recommendations based on one's responses to a 40-item questionnaire.

DFA has three core programs. The first is cross-cultural coaching, where although objectives are in place, there is no planned agenda. This allows DFA to respond to a client's particular needs. The second includes DFA's global training programs that take a client's real-life issue, and uses it as a foundation for creating action plans. Finally, DFA also offers corporations strategic consulting services. DFA promotes itself as a one-stop shop for intercultural services (Dean Foster Associates, 2012).

Other firms such as Communicaid (2012) and Kwintessential (2012) offer online opportunities for learning. Communicaid promotes its ability to offer each client a dedicated client manager, and being able to assess a client's current knowledge and skills. They also offer training videos. Kwintessential offers intercultural training and includes services for translation, interpreting, and design work (such as website and desktop publishing). As the market for intercultural training grows, we see more companies like these competing to create and maintain a unique niche.

Recommendations

With increasing ethnic and cultural diversity within nations, and increasing international competition among corporations, it is essential that managers and employees can function effectively in multinational and multicultural settings. A leader who can understand and manage in the global environment is a rare and valuable resource who can offer firms a competitive advantage (Ng, et al, 2009). It is in a company's best interest to grow and expand the capabilities of leaders working in these settings through effective intercultural training.

Based on our review, we recommended that trainers begin with a solid theoretical foundation as the basis for instructional interventions. Both the cultural intelligence and intercultural sensitivity models presented here offer a baseline to consider. Use of either would require an analysis of learners that would yield better individualized and more focused goals for instruction. This, in turn, would increase the likelihood of success of the instructional efforts due to initially selecting more qualified training participants, and due to providing more useful and appropriate experiences for those participants.

An additional recommendation is for those in the business of intercultural training to increase web-based efforts with more interactive and experiential-style learning opportunities. As Internet capabilities and use grows worldwide, effective training can be delivered online via modalities such as synchronous and asynchronous courses, informal learning (social media), and simulations and virtual worlds.

Intercultural training is a relatively new field, and thus there are many opportunities for future research. Just as the CQ model has been validated, research can also be done to validate the intercultural sensitivity model proposed by Bennett (2011). Research can also be done to connect either theory directly with corporate return on investment as a measure of effectiveness. Study is also needed about efforts to incorporate one of the abovementioned theories and experiential learning into the development of online intercultural training environments.

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Does the Segmenting Principle Counteract the Modality Principle in Multimedia Instruction?

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Descriptors: segmenting principle, modality principle

Abstract

This study investigated the segmenting and modality principles in instructional animation. Two segmentation conditions (cued recall vs. pause only) were presented in combination with modality principle. The results showed that the significant effect was found in segmentation condition whereas the modality effect was not significant. The groups with cued recall between segments outperformed pause-only groups on both retention and transfer tests regardless of the modality of text. The findings imply that a stimulus (e.g., cued recall) would be more effective than only pauses between segments.

Introduction

Instructional animation is a dynamic visual representation that vividly presents complex events, and it is increasingly used to show motion or procedure in instructional settings (Lin & Atkinson, 2011; Mayer & Chandler, 2001). However, instructional animation is not always effective comparing static visuals, because dynamic information may impose greater cognitive processing demands because various objects and events are replaced with other information during the animation (Hegarty, Kriz, & Cate, 2003; Mayer, Hegarty, Mayer, & Campbell, 2005; Spanjers, Wouters, van Gog, & van Merriënboer, 2011; Tversky, Bauer-Morrison, & Bétrancourt, 2002).

In order to overcome cognitive overload with transient information in animation, modality and segmenting principles along with other multimedia principles have been proposed (e.g., Ayres & Paas, 2007; Hasler, Kersten, & Sweller, 2007; Mayer, 2009). The modality principle refers that animation with spoken-text (i.e., narration) is more effective than animation with written-text (i.e., on-screen text), because negative consequences of split-attention (Mayer, 2009; Mousavi, Low, & Sweller, 1995). Meanwhile, 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 provide pauses between segments with either learner-paced or system-controlled time 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). However, there have been little studies on a meaningful stimulus rather than pauses between segments. Moreover, the effect of modality principles has not been investigated with segmented animation. Therefore, this study investigated (a) whether segmenting with cued recall was more effective than segmenting with pause only, and (b) whether animation with spoken text was still more effective than written text in segmented condition.

Theoretical Background

Modality principle

Proponents of the modality principle argue that if words are presented visually (e.g., on-screen text), then the visual subsystem of working memory can become overloaded based on Baddeley's model (1992) that states that there are two sub-systems (one for visual information and another for verbal information)in working memory. On the other hand, spoken text allows more resources to be allocated to learning by activating verbal processing system. The modality effect has been explained with the cognitive load theory (Paas, Renkl & Sweller, 2003; Sweller, 2005) and the cognitive theory of multimedia learning (Mayer, 2005, 2009). However, some recent studies have found a reverse modality effect in which written text was superior to spoken text with learner control over the pacing of instruction (e.g., Cheon, Crooks, Inan, Flores, & Ari, 2011; Crooks, Cheon, Inan, Ari, & Flores, 2012; Ginns, 2005; Schnotz, 2005; Tabbers, Martens, & van Merrienboer, 2004). Hence, as Mayer (2009) stated, the modality effect would be more applicable when a multimedia is fast-paced with familiar words.

Segmenting principle

Since working memory has a limited capacity (Baddeley, 1992) and time constraint (Barrouillet & Camos, 2007), continuous multimedia (e.g., animation) causes working memory to be overwhelmed especially when material is complex or fast-paced. For example, while learners are integrating incoming words and pictures with other information, there will be little capacity left to process following materials (Mayer, 2009; Sweller, 2010). In other words, the transient dynamic information induces high extraneous cognitive load (Ayres & Paas, 2007; Mayer & Chandler, 2001; Mayer & Moreno, 2003). Thus segmentation can reduce the negative load by dividing whole unit into smaller segments. For example, pauses between segments provide learners sufficient time to process information previously presented. In addition, the segments can provide chunking information as a temporal cue that enhance the understanding of the structure of the procedure with sub events (Spanjers, van Gog, & van Merrienboer, 2010).

Most segmentation research used pauses between segments of instructional multimedia, and the findings were consistent in both learner controlled and system controlled pauses. Under learner controlled pause condition, learners were allowed to pause at their own rate with only one option to move the next segment (Hasler, Kersten, & Sweller, 2007; Mayer & Chandler, 2001; Moreno, 2007) or two options to repeat the previous segment or move to the next one (Boucheix & Guignard, 2005; Mayer, Dow, & Mayer, 2003). On the other hand, Spanjers et al. (2011) limited pauses to two seconds as a system controlled condition. All those studies found that segmented learning environment performed better on learning performance.

However, the modality principle and segmenting principle have not been empirically compared each other. Both principles tend to reduce cognitive overload, but, the modality principle may not be found with a segmented instructional animation, because segmentation already reduce the amount of information. Next, little research has investigated other stimuli during pauses between segments. Even though the previous studies revealed the effect of the pause, the pause could be considered a passive way for learning. In other words, learners are responsible to encode the information during the pause. In contrast, we employed cued recall questions that require learners to not only encoding information but also retrieving information to answer questions.

Method

Participants

We collected data from ninety six undergraduate students at a large southwestern university (Female: 59, Male: 37; Freshman: 27, Sophomore: 37, Junior: 28, Senior: 4).

Instructional animation

The instructional animation was about the formation of lightning. Based on the original instruction that contains 16 static slides with text (Mayer & Chandler, 2001), we created four 40-second animations that cover each four steps. All segmented animation contained either spoken text (i.e., narration) or written text (i.e., on-screen text).

Data collection

There were four groups depending on segmentation condition (cued recall vs. pause only) and modality condition (written text vs. spoken text). Regarding segmentation condition, group 1 and 2 were asked to take two embedded short-answer questions (i.e., cued recall) from the previous segment at the end of each four segmented animation, while group 3 and 4 had a pause between segments. The groups with pause (3 and 4) were asked to answer the eight embedded questions at the end of all four segments in order to determine the difference of the scores in terms of cued recall occasion. There was no limited time for either cured recall or pause only between segments. Regarding modality condition, a narration as spoken text was provided to group 1 and 3, and written text was presented inside of the animation in group 2 and 4.

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 formation of lightning. Last, they were asked to take a retention test and four transfer tests. All tests including the embedded questions were open-ended and scored by authors with cross check. For the retention test, two more data were calculated: (a) scores for items related to the cued recall questions, and (b) scores for items unrelated to the cued recall questions.

Results

Table 1 shows the means and standard deviations for each of the learning outcome. Separate 2 (modality: written text vs. spoken text) X 2 (segmenting: cued recall vs. pause only) between-subjects ANOVAs were conducted on all measures.

Table 1. Means and Standard Deviations for All Measures

	Segmenting with Cued Recall		Segmenting with Pause Only	
	Written Text (n = 25)	Spoken Text (n = 25)	Written Text (n = 22)	Spoken Text (n = 24)
Cued Recall Questions	7.08(3.01)	8.04 (2.26)	5.09 (1.80)	5.29 (2.63)
Retention Test	5.12 (3.30)	6.24 (3.99)	3.36 (2.44)	4.21 (2.04)
Related Cued Recall Questions	2.76 (2.20)	3.64 (2.22)	1.59 (1.14)	2.04 (1.23)
Unrelated Cued Recall Questions	2.36 (1.44)	2.60 (1.96)	1.77 (1.58)	2.17 (1.31)
Transfer Test	4.76 (2.50)	5.16 (1.91)	3.00 (2.56)	2.92 (2.00)

* Standard deviations are presented in parenthesis

We found that the segmentation effect was significant while no significant results were found for the modality effect and interaction effect. In regard to the segmentation condition, groups with cued recall outperformed group with pause only on cued recall questions ($F(1, 92) = 21.768$, $MSE = 134.293$, $p < .001$), retention test ($F(1, 92) = 9.140$, $MSE = 85.861$, $p = .003$), and transfer test ($F(1, 92) = 18.862$, $MSE = 95.899$, $p < .001$). The difference of the retention test was caused by the significant difference in the scores related to the cued recall questions ($F(1,$

92) = 14.215, MSE = 45.827, $p < .001$) rather than unrelated scores that was not significant ($F(1, 92) = 2.461$, MSE = 6.233, $p = .120$). On the other hand, the modality effect was not significant on all measures: embedded questions ($F(1, 92) = 1.307$, MSE = 8.062, $p = .256$), retention test ($F(1, 92) = 2.459$, MSE = 23.097, $p = .120$), and transfer test ($F(1, 92) = .188$, MSE = .600, $p = .732$).

Discussion and Conclusions

The results showed the superior test performance of segmentation with cued recall regardless of the modality condition. Cued recall task was more effective than pause only between segments. Pauses might provide learners with sufficient time to process transient information without having to simultaneously attend to the next unit of information (e.g., Mayer & Moreno 2003: Moreno & Mayer 2007). However, we conjecture that embedded cued recall may promote germane cognitive load by requiring learners to respond to a set of questions directly from the animation (Ayres & Paas, 2007). The findings imply that a stimulus (i.e., cued recall) between segments could enhance cognitive processing in instructional animation.

This study has a number of limitations. First, the higher learning performance may not be simply due to the embedded recall between segments, because the average time spent for whole instruction in the cued recall groups was 104 seconds longer than the average time spent in the pause groups. We did not measure time the participants spent between segments. A further study should investigate whether the effect of cued recall was due to more time or recall test itself. Thus, system controlled length of time for both pause and cued recall between segments may answer the question. Second, different types of stimuli between segments could be investigated. For example, a simple message for learners to reflect information presented or a short summary text could be considered for further studies. Last, appropriate lengths of segment should be investigated with learners' prior knowledge. This study predefined the length of the segments, but a further study may explore the differences of the length of segments depending on learners' characteristics.

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The Usability of School Library Websites: A Nationwide Study

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The usability of school library websites: A nationwide study

This study embraces the conference theme of *Learning in the Age of Globalization* by exploring how basic cognitive information seeking behaviors and needs differ between adults and K-12 youth on the Web. Emerging 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 then goal-oriented when seeking information (Cai & Zhao, 2010; Large, Beheshti, & Rahman, 2002; Milligan & Murdock, 1996).

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-readers 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 when they have cues guiding them. Youth older than 12 or 13 years old 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 years old) prefer visual cues over dense text and their information seeking behavior focuses more on exploring 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 years old) still prefer to browse rather than conduct specific key word searches (Large, Beheshti, Clement, Tabatabae, & Yin Tarn, 2009). They like sites that have "cool" graphics and are interactive, where they can socialize with others and leave their mark 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 usable 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).

Prensky (2008) coined youth born with digital access to computing and the Internet *digital natives*, while older generations represent *digital immigrants*. 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 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 create 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 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 that the *cognitive domain* reflects age-appropriateness for youth entails seven primary factors: 1. Amount of text on a page (Bilal, 2005), 2. Vocabulary (Cooper, 2005; Dubroy, 2010), 3. Graphics (Large, Behesti, & 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 minimizes 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 engage with. 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 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 slightly less colorful based on high school student feedback and focused more on social communication (blogs and polls), careers, answering more specific questions such as types of jobs and salaries, and sharing real stories.

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

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

Since 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 been unable to find any other studies in the literature examining this question. 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, 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 randomly 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 in each of the 50 states (three from a rural county and three from a urban county) in the United States (n=300) and total of 269 school websites (37% elementary, 38% middle, and 38% high school) have been evaluated using the School Website Checklist to date. In addition, each of the school libraries selected were sent an online survey and 57 school librarians (33% elementary, 39% middle, and 63% high school) responded, which represents a 21% response rate.

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 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 website 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 84% (n=227), of the 269 schools evaluated had a school library website. Overall the sites evaluated based on the checklist criteria 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).

Cognitive Design

In terms of best practices for cognitive design, 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=3.4), 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=.79). 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=4.6).

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=1.6), allowing for and responding to child input (M=1.4), 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?	3.37
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?	1.64
Does the site offer quick feedback?	1.64
Does the website allow for and respond to child input?	1.44
Does the site have a URL that's easy to remember?	1.24
Does the site use animation?	0.79
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 best practices, 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 (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 it 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

Content	Response Percent	Response Count
Access information literacy resources	79.7%	177
Access databases	73.0%	162
Access an OPAC	62.2%	138
Find library hours	48.6%	108
Find book recommendations/reviews	44.1%	98
View library news and events	42.8%	95
View library policies (checkout, overdue policies, etc.)	41.0%	91
Access personal account	39.2%	87
View the library	36.9%	82
Receive help with research from a librarian	6.3%	14
Renew library materials	4.1%	9
Sign-up for a class with the librarian	3.6%	8
Reserve a library resource online	3.2%	7
Schedule a classroom	2.7%	6
Reserve technology	1.8%	4
Search for available hardware and software	0.5%	1

Figure 3 shows an example of one of higher rated school library websites evaluated. The site contained the primary design layout, color scheme, and innovative use of technology that engages youth.

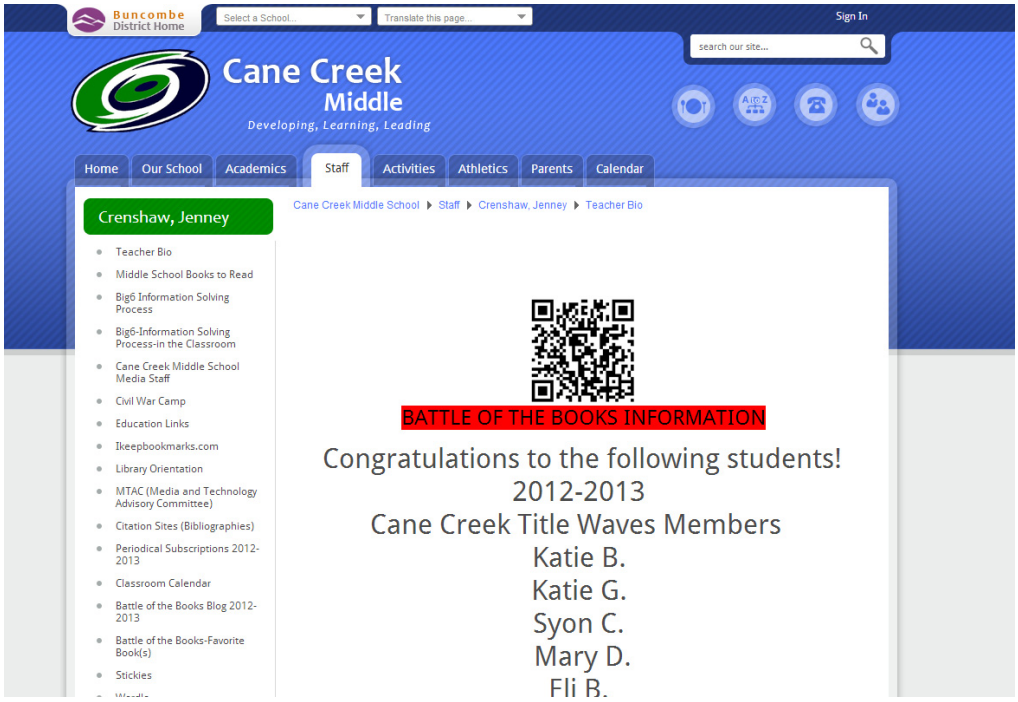

Figure 3 - Cane Creek Middle School (http://www.buncombe.k12.nc.us//Domain/387)

School Librarian Perspectives

Websites designed for students. For the librarian survey, 89% (n=49) 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=6.5), teachers (M=5.8), parents (M=5.1), and administration (M=4.7). See Figure 4.

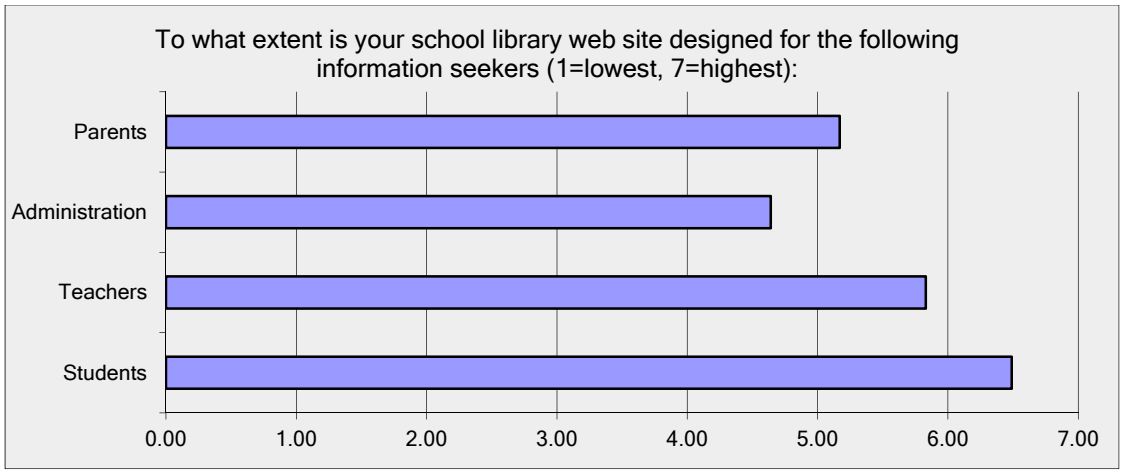

Figure 4 - Who are School Library Websites Designed for?

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	Response Percent	Response Count
Books, journals, and other print material	100.0%	47
Online databases	95.7%	45
Computers or other technology	93.6%	44
Instruction or training	91.5%	43
Studying	89.4%	42
Meeting space	87.2%	41
Technology support	85.1%	40
CDs or other media	78.7%	37
Testing	63.8%	30
Socializing	61.7%	29
Access to social media (i.e. MySpace, Facebook, YouTube, etc.)	14.9%	7
Other (please specify)		7
Access to gaming	12.8%	6

High priority services. Overall the main services used by patrons and library priorities were similar. Librarians felt that both their number one goal and the patrons' 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 providing a place to study for patrons(M=3.38). 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	Patron Usage	Library Priority	Difference
1. Books, journals, and other print material	1.47	1.67	-0.20
2. Computers or other technology	2.06	2.79	-0.74
3. Instruction or training	3.22	2.39	0.83
4. Studying	3.38	4.11	-0.74
5. Online databases	3.61	3.11	0.49
6. Technology support	3.95	4.21	-0.26
7. Meeting space	4.05	4.22	-0.17

Librarians manage their own websites. School librarians are for the most part the site developers (76%) followed by school IT staff (14%) and district IT staff (8%). See Figure 5.

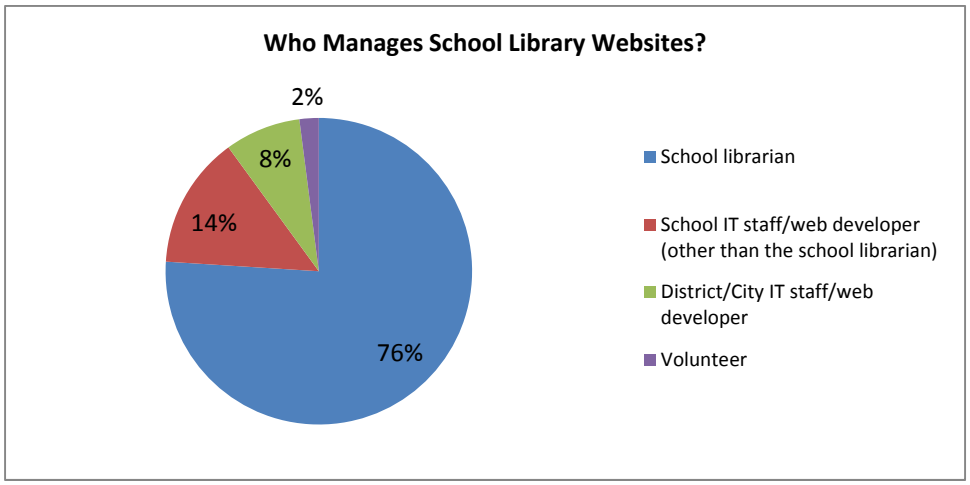

Figure 5 - Who Manages School Library Websites?

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).

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.

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, 2012) 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 business hours on the homepage. Furthermore, access to other expected services was 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 class 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 predominately 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 patrons 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. In terms of cognitive design, only one factor – age-appropriate graphics and vocabulary – rated a mean of 5.0 (on a 10 point scale) followed by providing access to electronic resources. Other major cognitive factors affecting youth information seeking – use of symbols for concrete object, use of bright colors, well though-out and catchy site names, and use of animation or sounds all rated extremely low. It would appear there are no central goals for school library websites although approximately half served as content providers for resources.

Ratings for affective or emotional design were rated even lower. Such factors as designs that encouraged exploration, allowing for and receiving child input, and social interaction were all 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 patrons and the primary goals of library. Librarians identified 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 is only focused on providing information to meet 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 second perspective is to examine 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. The 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 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 services. First, the representativeness of the sample studies based on random sampling, the inclusion of both urban and rural districts, and the perspectives of some of these school librarians helps triangulate the data; it builds 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 three major limitations. First, the study does not include input from actual school library website users, only school librarians. Feedback from students, teachers, parents, and administrators needs to be collected, which will help determine a respective site's usability and the specific information looked 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. Lastly, 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.

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.

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Appendix A

School Website Checklist

School Website Checklist (2)

***1. What is the Name of the School/Institution?**

***2. What age group does the school/library serve?**

- [ ] Elementary
- [ ] Middle School
- [ ] High School

Other (please specify)

***3. Does the school have a library website?**

- ○ Yes
- ○ No

Other (please specify)

***4. What is the website's URL?**

***5. What is the name of the website?**

***6. Contact information for librarian**

Name:

Email Address:

School Website Checklist (2)

Cognitive

*7. Does the website use symbols related to concrete objects?

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

*8. Does the site allow for trial-and-error with physical, not abstract, objects?

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

School Website Checklist (2)

***9. Does the site use bright and engaging colors that attract attention and keep the youth interested?**

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

***10. Are graphics and vocabulary age-appropriate?**

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

***11. Does the site use animation?**

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

School Website Checklist (2)

*12. Does the site use sound effects?

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

*13. Does the site use creative and significant icons?

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

*14. Does the site have a URL that's easy to remember?

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

School Website Checklist (2)

***15. Does the site have a well thought-out portal name?**

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

***16. Does the site include a link to the OPAC?**

- ○ Yes
- ○ No

Comments

***17. Is there a link to access electronic resources including databases, online reference, and e-books?**

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

School Website Checklist (2)

*18. Are there search tips or instructions for searching?

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

*19. Does the site include library contact details (general phone and email)?

- ○ Yes
- ○ No

Comments

School Website Checklist (2)

Affective

***20. Does the site reduce cognitive load by limiting distracting information and presenting only the information desired in a prominent, singular fashion?**

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

***21. Can users enjoy themselves through play and learning?**

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

School Website Checklist (2)

***22. Can users leave their footprint on the site?**

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

School Website Checklist (2)

Design

*23. Does the website design emphasize user control?

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

*24. Does the website's design encourage exploration (by being open-ended)?

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

School Website Checklist (2)

*25. Is the website design active?

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

*26. Does the website involve multiple senses?

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

*27. Does the site offer quick feedback?

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

School Website Checklist (2)

***28. Does the website balance familiarity with novelty?**

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

***29. Does the website allow for and respond to child input?**

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

***30. Does the site allow for progressive levels of expertise facilitating competence while offering new challenges?**

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

School Website Checklist (2)

*31. Does the site support social interaction?

	0	1 (Lowest)	2	3	4	5	6	7	8	9	10 (Highest)	N/A
High or Low?	○	○	○	○	○	○	○	○	○	○	○	○

Comments

*32. In your opinion, this site should be considered a:

- ○ Top Tier youth website (upper 33%)
- ○ Mid Tier youth website (mid 33%)
- ○ Lower Tier youth website (lower 33%)

Please elaborate

School Website Checklist (2)

33. On this site are you able to:

- [ ] Access an OPAC
- [ ] Reserve a library resource online
- [ ] Schedule a classroom
- [ ] Sign-up for a class with the librarian
- [ ] Reserve technology
- [ ] Access databases
- [ ] Access information literacy resources
- [ ] Access personal account
- [ ] Renew library materials
- [ ] Search for available hardware and software
- [ ] View the library
- [ ] Find library hours
- [ ] View library policies (checkout, overdue policies, etc.)
- [ ] View library news and events
- [ ] Find book recommendations/reviews
- [ ] Receive help with research from a librarian
- [ ] None

Other (please specify)

School Website Checklist (2)

34. Based on your analysis, is this site designed more for adult or youth information seekers?

- Adults
- Youth
- Both

Other (please specify)

School Website Checklist (2)

Location Information

35. Where are the main navigational tools located?

- ☐ Top Left
- ☐ Top Center
- ☐ Top Right
- ☐ Side Left
- ☐ Center
- ☐ Side Right
- ☐ Bottom Left
- ☐ Bottom Center
- ☐ Bottom Right
- ☐ Not on Homepage

36. Where on the homepage is the library name and logo located?

- ☐ Top Left
- ☐ Top Center
- ☐ Top Right
- ☐ Side Left
- ☐ Center
- ☐ Side Right
- ☐ Bottom Left
- ☐ Bottom Center
- ☐ Bottom Right
- ☐ Not on Homepage

School Website Checklist (2)

37. Where on the homepage are the library contact details (phone number and email)?

- ☐ Top Left
- ☐ Top Center
- ☐ Top Right
- ☐ Side Left
- ☐ Center
- ☐ Side Right
- ☐ Bottom Left
- ☐ Bottom Center
- ☐ Bottom Right
- ☐ Not on Homepage

38. Where on the homepage is the library location information (address, directions, etc)?

- ☐ Top Left
- ☐ Top Center
- ☐ Top Right
- ☐ Side Left
- ☐ Center
- ☐ Side Right
- ☐ Bottom Left
- ☐ Bottom Center
- ☐ Bottom Right
- ☐ Not on Homepage

Appendix B

School Librarian Online Survey

School Librarian Website Survey

Consent Form

***1. CONSENT TO ACT AS A HUMAN PARTICIPANT: LONG FORM**

Project Title: School Library Website Usability

Project Director: Anthony Chow, Ph.D.

What is the study about?
This is a research project examining the overall usability of the nation's school library websites. We are interested both in how well school library websites adhere to recommended best practices espoused by the literature as well as how well school library websites meets the needs of its users.

Why are you asking me?
We are asking you because you are a school librarian who is able to speak to the school library website.

What will you ask me to do if I agree to be in the study?
You will be asked to complete a seven question online survey seeking the types of services and resources your library provides and what kind of information your website provides.

Are there any audio/video recording?
There is no audio/video recording.

What are the dangers to me?
The Institutional Review Board at the University of North Carolina at Greensboro has determined that participation in this study poses minimal risk to participants.

If you have any concerns about your rights, how you are being treated or if you have questions, want more information or have suggestions, please contact Eric Allen in the Office of Research Compliance at UNCG at (336) 256-1482 Questions, concerns or complaints about this project or benefits or risks associated with being in this study can be answered by Anthony Chow who may be contacted at (336) 334-3411 or aschow@uncg.edu.

School Librarian Website Survey

Are there any benefits to me for taking part in this research study?
Results of our nationwide study may assist you in refining your website to improve information services for your users.

Are there any benefits to society as a result of me taking part in this research?
Results of our nationwide study may assist school libraries in refining their websites to improve information services for their users.

Will I get paid for being in the study? Will it cost me anything?
There are no costs to you or payments made for participating in this study.

How will you keep my information confidential?
All data will be stored behind server and computer password protection, not collecting or identifying participants by name when data are disseminated. All information obtained in this study is strictly confidential unless disclosure is required by law.

Absolute confidentiality of data provided through the Internet cannot be guaranteed due to the limited protections of Internet access. Please be sure to close your browser when finished so no one will be able to see what you have been doing.
What if I want to leave the study?
You have the right to refuse to participate or to withdraw at any time, without penalty. If you do withdraw, it will not affect you in any way. If you choose to withdraw, you may request that any of your data which has been collected be destroyed unless it is in a de-identifiable state.

What about new information/changes in the study?
If significant new information relating to the study becomes available which may relate to your willingness to continue to participate, this information will be provided to you.

Voluntary Consent by Participant:
By signing this consent form you are agreeing that you have read it, or that it has been read to you and you fully understand the contents of this document and are openly willing to consent to take part in this study. All of your questions concerning this study have been answered. By signing this form, you are agreeing that you are 18 years of age or older and are agreeing to participate, or have the individual specified above as a participant participate, in this study described to you by Anthony Chow.

○ Yes, I agree to participate

School Librarian Website Survey

- ○ No, I do not want to participate

School Librarian Website Survey

***2. Does the school have a library website?**

- Yes
- No

Other (please specify)

School Librarian Website Survey

***3. What age group does the school/library serve?**

- [ ] Elementary
- [ ] Middle School
- [ ] High School

Other (please specify)

School Librarian Website Survey

Design

4. To what extent is your school library web site designed for the following information seekers (1=lowest, 7=highest):

	1 (lowest)	2	3	4	5	6	7	N/A
Students	○	○	○	○	○	○	○	○
Teachers	○	○	○	○	○	○	○	○
Administration	○	○	○	○	○	○	○	○
Parents	○	○	○	○	○	○	○	○

Other (please specify)

School Librarian Website Survey

5. Identify below what services and resources your school library provides:

- [ ] Books, journals, and other print material
- [ ] Instruction or training
- [ ] CDs or other media
- [ ] Access to gaming
- [ ] Access to social media (i.e. MySpace, Facebook, YouTube, etc.)
- [ ] Computers or other technology
- [ ] Testing
- [ ] Studying
- [ ] Socializing
- [ ] Technology support
- [ ] Meeting space
- [ ] Online databases

Other (please specify)

School Librarian Website Survey

6. 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):

	1 (highest)	2	3	4	5 (lowest)
Books, journals, and other print material	○	○	○	○	○
Instruction or training	○	○	○	○	○
CDs or other media	○	○	○	○	○
Access to gaming	○	○	○	○	○
Access to social media (i.e. MySpace, Facebook, YouTube, etc.)	○	○	○	○	○
Computers or other technology	○	○	○	○	○
Testing	○	○	○	○	○
Studying	○	○	○	○	○
Socializing	○	○	○	○	○
Technology support	○	○	○	○	○
Meeting space	○	○	○	○	○
Online databases	○	○	○	○	○

Other (please specify)

7. What are, in rank order, your library's top five priorities (regardless of user preferences- 1=highest, 5=lowest). Please only choose five:

	1 (highest)	2	3	4	5 (lowest)
Books, journals, and other print material	○	○	○	○	○
Instruction or training	○	○	○	○	○
CDs or other media	○	○	○	○	○
Access to gaming	○	○	○	○	○
Access to social media (i.e. MySpace, Facebook, YouTube, etc.)	○	○	○	○	○
Computers or other technology	○	○	○	○	○
Testing	○	○	○	○	○
Studying	○	○	○	○	○
Socializing	○	○	○	○	○
Technology support	○	○	○	○	○
Meeting space	○	○	○	○	○
Online databases	○	○	○	○	○

Other (please specify)

School Librarian Website Survey

8. In terms of managing website, who is primarily responsible for designing, developing, and updating content on the site?

- [ ] District/City IT staff/web developer
- [ ] Students
- [ ] School library assistant
- [ ] School librarian
- [ ] Consultant
- [ ] Volunteer
- [ ] School IT staff/web developer (other than the school librarian)

Other (please specify)

9. To what extent are the following true for your school library website:

	1 (lowest)	2	3	4	5	6	7 (highest)	N/A
Adequate resources for site maintenance	○	○	○	○	○	○	○	○
Autonomy to change and update content and design	○	○	○	○	○	○	○	○
You are properly trained to manage your website	○	○	○	○	○	○	○	○
Your school library website serves the information needs of your users	○	○	○	○	○	○	○	○

Other (please specify)

School Librarian Website Survey

10. If you would not mind us contacting you to follow up regarding this research topic please leave your contact information below (optional):

Name:

Email Address:

Using Communities of Practice to Promote Universal Design and Accessibility in Distance Education

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Abstract

Postsecondary institutions are increasingly offering online classes in an attempt to cut costs, reach a more diverse student population, and keep pace with emerging technologies. These institutions are required by law, including Section 508 of the Rehabilitation Act and other disability rights legislation, to ensure that online courses and related technology are accessible to students with disabilities. By using standards developed by the World Wide Web Consortium (W3C) and the principles of Universal Design for Learning (UDL), online classes can be made accessible. However, research shows that most instructors fail to implement these guidelines and institutions fail to enforce them. Although reasons for lack of accessibility in distance education are well recognized, for example perceived cost, faculty resistance to change, and technology design issues, few solutions to these barriers are being implemented. This paper explores how creating communities of practice comprised of institutional stakeholders can break down perceived barriers, stimulate change, and lead to positive outcomes in access to distance education for all learners.

Introduction

Distance education (DE) courses, delivered via the Internet, are increasingly common in postsecondary institutions. DE is being offered in various forms and in conjunction with traditional classroom instruction. Non-traditional students (over 25-years old, employed, military veterans and active personnel, parents, and people with disabilities) are finding that DE classes are better able to meet their needs than traditional courses because they allow for flexibility in scheduling and location. Postsecondary institutions are searching for ways to attract a larger student body at reduced costs. Disability Service Providers (DSP) at campuses routinely need new ways to accommodate students with disabilities with effective interventions to overcome physical and costly barriers to a postsecondary education.

Federal laws covering access to public telecommunication channels, such as television, telephones, and now, the Internet, have been in place since the passing of the Rehabilitation Act of 1973. The European Union, Australia, New Zealand, Canada, and other countries have passed similar legislation to reduce barriers to telecommunications for people with disabilities and create greater access for all citizens. The United Nations has put forth resolutions recognizing the need for accessible communication as a basic human right.

Internationally recognized guidelines for Internet web accessibility and technology have been continuously updated and refined through the World Wide Web Consortium (W3C), founded in 1997 by the inventor of the web, Sir Timothy Berners-Lee. Universal Design principles have been applied to learning through research on cognitive and learning theories by the Center for Applied Special Technology (CAST) at Harvard University since 1984, and have resulted in Universal Design for Learning (UDL) guidelines focused on technology-based educational strategies dedicated toward expanding learning opportunities for everyone.

Surveys on Internet/web accessibility awareness and institutional adherence to W3C guidelines have shown a study in contradictions. Higher education's acceptance of UDL's potential is reflected in academic literature and education research. Federal disability laws, rarely enforced, appear throughout postsecondary institutional accessibility information and on schools' homepage website compliance standards. Administration, faculty, and students know more about accessibility than a decade ago, but studies show a lack of compliance in postsecondary DE courses.

Research Method

An exploratory review of the literature was done to determine what research has been done in the area of accessible postsecondary distance education. Google Scholar was used with the key words: accessibility, W3C, distance education, and postsecondary (higher education). This yielded 366 articles, which came up and were narrowed down to peer-reviewed academic journal articles dated 2005 to the present; nine journal articles, three of which were research studies, were chosen to represent the topic area for review. The articles were all determined to be primary sources.

Literature Results

Postsecondary DE is widely regarded as a necessity for growth and access to a larger student audience. Administrators see DE as an important issue, as shown in two studies (Farr et al., 2008; Johnsrud et al., 2006), which were instigated to find barriers to implementing DE courses with the Farr study concentrating on accessibility needs assessment for the California Community College System. Both studies came to similar conclusions about faculty resistance to teaching DE, namely that faculty are focused on time restraints in terms of class preparation. Supports and knowledge about DE were found to be available (Burgstahler 2006; Roberts & Crittenden, 2009; Seale, 2006), but lack of motivation to teach a DE course centered around concerns of academic recognition (tenure and promotion)(Johnsrud et al., 2006).

Awareness about accessibility, by students, faculty and administration, is wide spread but who is responsible and how to apply the guidelines is lacking (Farr et al., 2008). Confusion surrounding these two accessibility issues is never resolved nor given much attention beyond acknowledgement in the literature. One study using an intervention developed by the researcher, met with similar resistance from disability service providers, many of whom had expressed interest in finding ways to increase accessible DE (Burgstahler, 2006).

Federal laws, such as Section 508 of the Rehabilitation Act, are cited throughout the literature. Reference to its importance in making postsecondary DE accessible is present in a majority of the articles (Burgstahler, 2006; Farr et al., 2008; Keeler & Horney, 2007; Myhill et al., 2007; Ortiz et al., 2009; Roberts & Crittenden, 2009; Seale, 2009). Although the law is noted as a potential threat, lawsuits or actual pending litigation, is never discussed. Cases of postsecondary institutions non-compliance are not used as examples of the consequences of non-compliance.

The literature verifies the W3C as the only universally accepted source for guidelines on accessible web technology. Only one article (Seale 2006) mentioned possible alternatives and these were regionally-based standards written with the W3C as a primary source. UDL was introduced as a complement to the W3C guidelines to make DE courses accessible. Both the W3C guidelines and UDL are used as references in individual articles where the authors have developed their own set of instructions and guidelines for local institutional use (Burgstahler, 2006; Keeler & Horney, 2007; Roberts & Crittenden, 2009).

Implications for Communities of Practice

With developed technology guidelines and strategies, enforceable laws, and a high awareness around the issue of delivering accessible DE, postsecondary institutions should have the means to easily implement policies and provide resources. Challenges surround responsibility, time restraints, and stakeholder priorities, all within an institutional community's sphere of influence. DE and its accessibility needs are closely linked to the people who are ultimately responsible for delivery and acceptance. Administrators,

faculty, IT specialists, and students all have different needs and agendas, all important, but not necessarily in alignment with one another.

Communities of practice (CoP), as defined by Wenger, McDermott, and Synder's *Cultivating communities of practice: A guide to managing knowledge* (2002), provides a workable platform within the postsecondary academic organizational structure. "Communities of practice are groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (Wenger et al., 2002 page 4). Stakeholders could be tasked with choosing a set of established guidelines and figuring out ways to overcome institutional barriers at all levels. As opposed to a structured task force or appointed committee, a community of practice would have the flexibility of including a wider and changing range of people in formulating its recommendations. An ongoing CoP could accommodate new information and changes to the institution's personnel and DE programs. The CoP has the potential of crossing over into similar postsecondary institutions and professional organizations.

Conclusion

Creating CoPs focused on accessible postsecondary DE is a beginning for truly universal education. However, without major incentives for stakeholder follow-up, success may not be a reality. Institutions will have to provide ways for faculty to direct more of their most important resource, time, in order for accessibility to be mainstreamed into DE curriculum. Tenure/promotion requirements and class load allocations are not just processes which a committee can arbitrarily change for faculty; other stakeholders such as unions and faculty senates, must be included. Student organizations, locally and nationally, must be made aware of the CoPs and their stated purpose. IT administrators job requirements will have to include provisions about technical accessibility. Administrators will have to incorporate accessible DE into institutional objectives and long-term strategic plans. Lastly, current laws such as Section 508 will have to be enforced before any of the fore mentioned stakeholder groups will be energized to come together and fully participant in a community of practice to make accessible education, distance or not, a reality for all.

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A Scaffolding Framework to Promote the Transfer of Argumentation Ability

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Descriptors: Argumentation, Transfer of learning

Abstract

Argumentation is a core scientific practice and a central goal for science education. As such, it is critical for researchers to help students improve their argumentation ability. Computer-based scaffolding has been proved effective to support students during argumentation process, few studies have addressed the transfer of scaffolded argumentation skills. In this paper, a theoretical framework is proposed to integrate initial learning and transfer of learning to improve middle school students' argumentation ability as well as promote the transfer of scaffolded argumentation ability.

Introduction

Argumentation in Science Education

Recently, researchers in the field of science education have called for more attention to helping middle school students learn the nature of science, including both the nature of scientific knowledge and methods for making it (Belland, Glazewski & Richardson, 2008; Sandoval & Reiser 2004). To this end, some researchers stated that students need to understand not only core scientific knowledge but also how evidence is evaluated and used in scientific explanations (Osborne, Erduran & Simon, 2004). In short, students need to gain skill in argumentation, which can be defined as a process of thinking and social interaction in which individuals to support claims with evidence and premises (Golanics & Nussbaum, 2008, Perelman & Olbrechts-Tyteca, 1958). As both a product and a process, argumentation has been viewed as a critical epistemic practice in science (Bricker & Bell, 2008; Kelly & Bazerman, 2003; Osborne et al, 2004). As such, helping students gain argumentation ability is a high priority.

Difficulties Students Have in Constructing Arguments

To develop scientific argumentation ability, middle school students need to be able to argue about scientific problems in science class (Jonassen & Kim, 2010). One way to do this is by having students engage in authentic problem-based learning (PBL) units in science class. In PBL, students work in small groups to solve authentic, ill-structured problem—problems which have no clear solution path and multiple possible solutions (Barrows 1985; Hmelo-Silver, 2004). To solve ill-structured problems, students need to define and represent the problem, gather relevant information, create a possible solution to the problem, and present their solution with evidential support (Barrows 1985; Belland, Glazewski, & Richardson, 2008; Hmelo-Silver 2004). However, middle school students typically do not have sufficient argumentation skills to succeed in PBL (Kuhn, Black, Keselman, & Kaplan, 2000; Kyza & Edelson 2005). It is well documented that middle school students have difficulties in producing both oral and written arguments (Belland, Glazewski, & Richardson, 2008; Sandoval & Reiser, 2004; Yoon, 2011). They struggle identifying and gathering relevant evidence (Pedersen and Liu 2002–2003) and linking relevant evidence to claims with premises (Cho & Jonassen 2002). The challenges result from two reasons: 1) the skills needed when engaging in argumentation are complex and difficult to acquire for students (Kuhn & Udell, 2007); 2) students, especially young adolescents, do not have sufficient epistemological understanding of the foundations of argument—what it means to know and justify something (Kuhn, Cheney, & Weinstock, 2000; Mason & Boscolo, 2004).

Using Scaffolding to improve students' argumentation ability

Scaffolding is interactive support provided by a more capable person to enable students carry out a task that they would be unable to do without help (Wood, Bruner, & Ross, 1976). Scaffolding can support students by 1) providing conceptual help for students to guide what to consider during problem solving; 2) helping students manage the learning and problem solving process; 3) guiding students on how to use tools and resources to solve problems; 4) providing students with strategies, which can be used in the learning process (Hannafin, Land & Oliver, 1999). Although in the original notion of scaffolding, scaffolds are provided by humans, recently, researchers have been using computer-based scaffolding to support students by providing needed structure for difficult tasks (Puntambekar & Hubscher, 2002; Quintana, Reiser, Duncan, Kyza, & Edelson 2004).

To improve students' argumentation ability, computer-based scaffolding has been used to help students create arguments. Computer-based scaffolding has been demonstrated effective by supporting students to (a) construct more coherent arguments (Cho & Jonassen, 2002), (b) gather more relevant evidence (Ge & Land, 2003), (c) organize and link the evidence to claims (Lajoie, Lavigne, Guerrera, & Munsie. (2001). When provided with scaffolding, students engaged in PBL can be supported in the process of and gain skill in creating evidence-based arguments.

Transfer of Scaffolded Skills

Although scaffolding is an effective way to support students to create arguments, few studies examine transfer of scaffolded skills. It remains unknown whether students can apply what they learn after receiving scaffolding. This area needs to be explored for two major reasons. First, scaffolding is supposed to help students to both accomplish and gain skill at tasks that they cannot accomplish by their own (Puntambekar & Hubscher, 2002). Thus, if scaffolds are successful students should be able to perform the scaffolded skill on their own (Belland, 2011). Second, argumentation skill is a crucial skill which is needed in many different contexts (Coffin & O'Halloran, 2008). Researchers need to explore what students can retain after they receive scaffolding, as well as how well students can apply scaffolded skills in future situations . To fill the gap in literature, in this paper, we propose a research model to promote and assess transfer of scaffolded skills. A theoretical framework which includes an initial learning unit and a transfer learning unit is proposed.

Initial Learning Unit

A sufficient degree of initial learning is crucial to effective transfer learning (Bransford & Schwartz, 1999). In the initial learning unit, student groups adopt stakeholder perspectives to address an ill-structured problem. In so doing, they need to provide a feasible solution to the problem and use evidence to back up their solution. In this unit, computer-based scaffolds are employed to support middle school students' creation of evidence-based arguments.

Generic Scaffolds

There are two ways of creating computer-based scaffolds – embedding support in specific contexts and creating domain-generic support. Many current computer-based scaffolding approaches for science inquiries are associated with specific contexts. For example, in one study, scaffolding embedded in *Alien Rescue* was designed to help students find a new home for aliens (Liu & Bera, 2005). As an example of a generic scaffold, consider the *Connection Log*, which has helped middle school students' create evidence-based arguments (Belland, 2010; Belland, Glazewski, & Richardson, 2011). The *Connection Log* embeds all scaffolds within a web-based system that divides construction of arguments into different stages. It can help students define the problem, find and organize evidence, eliminate irrelevant evidence, and link evidence to claim in a generic approach that can be applied to units of different content. Using a generic approach may facilitate students' application of the scaffolded skills to new problems because students may experience the scaffolded skill as a generic process that can be applied to many domains rather than a context-bound skill set that may not be perceived to have wide applicability.

Promoting Transfer of Responsibility

Insufficient attention to transfer in the scaffolding literature might result from the theoretical issue of how to fade computer based scaffolding. In the original notion of scaffolding, fading was described as a process in which the tutor gradually reduced or removed the support if the student could complete tasks independently (Collins,

Brown, & Newman, 1989; Wood, Bruner, & Ross, 1976). By fading the support, the instructor can promote transfer of responsibility (Wood et al., 1976). But in computer-based scaffolding, fading cannot be achieved easily due to computers' difficulty continually diagnosing students' ability (Belland, 2011). If computer-based scaffolds cannot be faded, it becomes problematic to prove whether students can transfer scaffolded skills.

Transfer of responsibility might be a more appropriate lens to understand whether scaffolded skills can be transferred (Belland, 2011). As the ultimate aim of scaffolding, achieving transfer of responsibility means students can complete the tasks by their own after scaffold is removed. As fading is one possible means to achieve transfer of responsibility, whether fading can be achieved should not become a major concern if transfer of responsibility can be achieved. Enabling students to apply the scaffolded skills in new contexts could be one way to examine whether transfer of responsibility is achieved. Hence, in this framework we propose a transfer learning unit in scaffolding design to assess students' argumentation without scaffolds as well as promote transfer of transfer of learning in new learning situations.

Transfer Learning Unit

Conceptualization of Transfer

Although studies on transfer in the scaffolding literature are insufficient, current transfer of learning approaches can shed light on promoting and assessing the transfer of scaffolded argumentation skills. The traditional perspective on transfer views transfer as a process in which people apply what they learned from one task to a new problem or situation (Nokes, 2009). The classical transfer perspective originated from Thorndike's identical elements theory, according to which transfer occurs to the extent to which original learning and transfer situations share identical elements (Cox, 1997). Although the notion of identical elements was reformulated as mental symbolic representations, the historical focus on common elements has remained (Lobato, 2003). In recent decades, researchers have questioned the traditional conceptualization of transfer since it cannot capture the complex nature of transfer processes (Lobato, 2006, 2012), or guide the measurement of transfer (Bransford & Schwartz, 1999). According to the *actor-oriented* transfer approach, transfer is defined as the "personal creation of relations of similarity, or how the 'actors' see situations as similar" (Lobato, 2003, p3). Students' perception of the new situations might be connected with their perception of previous situations. *Preparation for future learning* also emphasizes the active nature of transfer (Bransford & Schwartz, 1999; Schwartz & Martin, 2004). Based on this approach, transfer is not a process in which people directly apply old understand and practice in a given situation, instead, people will actively "change the given situation into something that is more compatible with their current state and goals" (Bransford & Schwartz, 1999, p24).

Assessment of Transfer

According to *preparation for future learning* approach, transfer can be demonstrated if what students learn prepares them to acquire the knowledge and skills needed to solve new problems in the future (Bransford & Schwartz, 1999; Schwartz & Martin, 2004). Students can be prepared for future learning from a variety of learning activities, but the usefulness of their preparation of future learning might not show up until they have the opportunity to learn new information.

From the perspective of *actor-oriented transfer* approach, students' perception of what constituted surface and structure features between the learning and transfer tasks might be different from what expert judgments assume (Lobato, 2003 & 2006). Based on this definition of transfer and empirical evidence, Lobato (2003 & 2006) argued that using normative performance or expert models of performance to predetermine what counts as transfer is unwarranted. In the traditional transfer paradigm, researchers assess students' performance from an observer's point of view. This kind of assessment can underestimate how students' generalization of learning happens. In *actor-oriented transfer* approach, researchers use qualitative approaches to investigate how students make connections between their prior experiences and their activity in the transfer situation (Lobato, 2012).

For the design of transfer assessment, these two alternative approaches indicate that: 1) to better understand how initial learning prepares students for future learning, it is critical to assess students' performances when they are provided with opportunities to learn new information; 2) to examine how students make connections between learning and transfer tasks, researcher need to investigate students' generalizations of learning from an actor-oriented perspective rather than use assessment based on expert models.

Transfer Learning Tasks

In transfer learning units, multiple learning tasks related to students' argumentation ability can be used. Based on the *preparation for future learning* approach, engaging in new learning tasks will enable students to utilize their prior learning and acquire new learning (Bransford & Schwartz, 1999). Additionally, since argumentation can be viewed as a product and a process (Bricker & Bell, 2008; Kelly & Bazerman, 2003; Osborne et al, 2004), students' argumentation ability can be reflected by how well they produce arguments, how well they engage in argumentative dialogue, and how well they can present arguments. Using multiple learning tasks from different perspectives will enable researchers to examine students' argumentation ability more thoroughly. Also, from the *actor-oriented transfer* perspective, investigating how students make connections between their prior experiences and their activity in the transfer situation is the focus of transfer assessment. When students engage in multiple learning tasks, it allows researchers to explore how students make connection between learning and transfer tasks. According to *preparation for future learning* approach, to be succeed at transfer, students need to critically evaluate new information and change their previous perception. In the transfer of learning unit, students can receive feedback from multiple learning tasks so they can accommodate their perception and understanding of argumentation.

In the literature, researchers have already used several learning tasks to promote argumentation ability such as constructing and evaluating scientific explanations for natural phenomena (Sandoval & Reiser, 2004), engaging in argumentative discourse (Kuhn & Udell, 2007), and conducting argumentative writing (Hillocks, 2010; Rex, Thomas, & Engle 2010). Hence, three different learning tasks: evaluation of arguments, argument dialogue, and argumentative writing are included in the transfer learning unit since these three learning tasks bear similarities but reflect different perspectives of the construction of argumentation.

The first learning task in a transfer learning unit is evaluation of evidence-based arguments. Argument evaluation ability is essential to students' ability to comprehend arguments created by others and produce their own arguments (Larson, Britt, & Kurby, 2009). To evaluate the quality of an argument, students need to be able to identify and judge the association between claim and premises (Drive, Newton, & Osborne, 2000). There are three major steps for students to accomplish this learning task. First, students need to create their criterion to evaluate evidence-based arguments created by their classmates in the initial learning unit. The quality of their criterion can reflect their understanding of what constitute good arguments. Second, students use their criterion to rate arguments. During this process, students will have opportunity to identify and evaluate the link between claims and evidence. Last, based on the implementations of their criterion, students can revise their criterion to make their criterion more applicable and reasonable. To examine the change they made in their criterion can help researchers to capture students' conception change of their understanding of argumentation.

According to dialogue theory, arguments unfold in the dialectical interchange between two or more parties (Walton, 2007). To engage in argumentative dialogue, students need to recognize the perspective of the opposing position and address it in dialogue (Kuhn & Udell, 2007). Identifying weaknesses in the opponent's arguments can be beneficial to support one's own claim (van Eemeren, Grootendorst, & Henkemans, 1996). By representing different stakeholder positions, students can engage in an argument dialogue related to the topic they learned in the initial learning unit. Felton and Kuhn (2001) proposed that improving argumentative discourse skill can potentially promote students' understanding of discourse goals, and the application of effective strategies to meet these goals. By enabling students to engage in argumentative discourse, researchers can uncover the method by which students build arguments. Researchers can examine whether students build arguments consistent with how they built arguments in the initial unit.

In the last learning task in transfer learning unit, students need to write an essay on the topic about which they argued in previous learning tasks to present their arguments. Recent research proved that argumentative writing can be a suitable way to teach argument reasoning, even among students who struggle with academic writing (Rex et al., 2010). In the study of Reznitskaya et al. (2011), by engaging in argumentative oral discussion, students' argumentation skills were transferred to the individual task of persuasive writing. After completing the first two learning tasks, students will have opportunity to summarize their claim and evidence by creating arguments in a written format on their own. The quality of their argumentative writing can be used to assess how students can use evidence to back up their claim logically.

To assess students' argumentation ability, researchers can examine students' performance data from these three learning tasks as well as investigate students' learning and transfer process during these learning tasks.

Conclusion

To fill the gap in current scaffolding literature, a conceptual framework of using computer-based scaffolding to promote skill gain in and transfer of argumentation ability was presented. In the initial learning unit, computer-based scaffolding can support students in the construction of evidence-based argument in a generic approach, which can help students understand the crucial components of evidence-based argument and essential steps to solve an ill-structured problem. In the transfer learning unit, students are provided with opportunities to consolidate their knowledge and skills of argumentation and applying it by engaging in three different learning tasks presenting different facets of argumentation ability, which will prepare them for transfer of argumentation skills in the future.

Future Direction

This conceptual framework is designed to be situated in a design-based research project which intended to help middle students improve their argumentation ability. Based on the previous study, we already received positive results of using *Connection Log* to help middle students to build evidence-based arguments. We predict that by participating in the transfer learning unit in *Connection Log*, students' transfer of learning will be promoted by engaging in multiple learning tasks, and whether and how transfer of learning happen will be better assessed. In the future, this framework will be examined through empirical study.

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A Medical Virtual Teaching System with Three-dimensional Interaction Technology: Design and Primary Implementation

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Abstract

There are many contradictions in present medical instruction. For example, information contained within medical abstracts is minimally provided; the result is that much practical knowledge and practical experiences are seldom accessible. The development of virtual reality (VR) technology provides several approaches that can now address these contradictions.

In this article, VR technology is applied to the medical teaching domain, and a medical virtual teaching system is constructed that is designed to improve the effect and efficiency of instruction. Taking the example of Wrist-Ankle Acupuncture teaching in Chinese Medicine, functions of the virtual teaching system, design of its main modules and choices of teaching media are introduced according to theories of information processing, knowledge management and cognition flexibility as well as the mostly technology bases of exploiting the virtual teaching system. Moreover, the most important techniques during the course of system development are also disclosed. Secondly, in accordance with the design above, the exploited system is implemented for Chinese Medicine learners and corresponding feedback information is provided. This system has received a positive assessment after being put to practical teaching use. Meanwhile, the design and development of the virtual teaching system of "Wrist-Ankle Acupuncture" has not only set a rewarding precedent but also put forward a concrete solution in trying to introduce VR as a new teaching method into medical instruction.

Keywords: virtual reality, medical virtual teaching, system design, Virtools

1. Introduction

Many contradictions and difficulties exist in the presentation of medical instruction. First, the resources of experimental instruction are limited. Increased student numbers decrease per capita experimental resources so there remain fewer opportunities for learner practice. Second, much medical knowledge is abstract. On most occasions, much medical content is not only invisible but also unreachable so as to be expressed accurately; the resulting effect is poor teaching. Third, some instructional experiments are dangerous. For instance, virus-focused research may expose researcher to contagious diseases and, if poorly conducted, be harmful to people. Therefore, in such experimental teaching, using instructional videos rather than conducting true experiments and live learners often limits the perceptual stage of cognition. Furthermore, clinical practice is insufficient. Considering the human use of subjects, a reasonable and optimum quantity clinical practice cannot be conducted through the patients so that the clinical experience of students is severely limited.

The development of VR technology provides several approaches that address the contradictions mentioned above. Currently, extensive research studies and practices have been carried out on the application of VR technology to medical education by a large number of research institutes and commercial corporations; great achievements have been made. In China, many follow-up studies have also been done in the medical circles. So the problem of how to introduce VR technology into medical instruction has become a common focus of attention in the field of medical education and educational technology.

VR technology can create a lively and living environment for learners, where abstract knowledge is more easily visualized, thus allowing learner interaction through three-dimensional interactive technology. These benefits then overcome previous cognitive difficulties in the instruction, emphasize practical skills and ignite learner imagination. On the basis of understanding the meaning, classification and current research situations of virtual reality both domestically and abroad, efficient ways are put forward to improve traditional teaching methods. This is accomplished by means of constructing a virtual teaching system, and the effect and efficiency of instruction can then be improved.

In a virtual teaching system, desktop VR technology is applied to medical teaching. By means of exploiting VR software, abstract and practical medical knowledge is reproduced within the system. Meanwhile, the system provides real-time feedback accomplished through engagement via interactivities of the learners with the virtual

content, which then helps them to grasp the corresponding knowledge skillfully through the interaction between themselves and the virtual teaching system.

2. Theoretical and practical basis

2.1. Information processing theory

The emergence of the information processing model (often called the "cognitive" model) is sometimes referred to as the "cognitive revolution" within the field of psychology and education. (http://web.mst.edu/~rhall/ed_psych/info.html (Richard H.Hall. Information Processing Theory .Last visited 19.08.10))

The information processing theory approachs to the study of cognitive development evolved out of the American experimental tradition in psychology (Hetherington & Parke, 1999). In the 1970s some psychologists commenced to explain the learning activities by the information processing model, and the information theory of learning came into being.

Robert M.Gagnè was an influential psychologist in the domain of information processing theory who was concerned with learning and instruction. Gagné described learning as a series of 8 phases that the learner goes through but is unaware of (Gagné, 1974). He proposed that like the computer, the human mind is a system that processes information through the application of logical rules and strategies.

2.2. Knowledge management theory

Knowledge management (KM) is the combination of organizational culture, strategic goals, individual needs, and the expertise of its people to create an atmosphere of learning and growth (Newman, 1999). Philosophically, knowledge management must be a vital part of corporate principles and individual jobs for knowledge sharing to succeed. Assessing and meeting each person's needs is essential to the process. Through the use of this knowledge, people and organizations can improve.

Knowledge and information are increasingly becoming key assets for organizations. Three key terms to understand as the building blocks for knowledge management include data, information, and knowledge (Groff and Jones, 2003). Data gets turned into information, which then provides knowledge upon which decisions are based. The key for organizations to harness the power of knowledge management is to turn information into accessible and reusable knowledge. The goal of knowledge management is the effective sharing of knowledge throughout an organization for the benefit of the organization or the individual (Rumizen, 2002).

2.3. Cognition flexibility theory

Cognitive Flexibility Theory is championed by Spiro and et al. They offer a constructivist theory of learning and instruction that emphasizes the need to treat complex, ill-structured knowledge domains differently from simple, well-structured domains (Spiro, et al, 1991). Examples of ill-structured domains such as history, medicine, law, literary interpretation, and teacher education are prime targets for flexible instruction, in part because learners must apply what they have learned to novel and unique situations (Spiro, et al, 1992). Cognitive Flexibility Theory supports the basic assumptions of constructivism and promotes authentic, realistic experiences for each individual. It encourages the use of multiple pathways and multiple purposes when approaching problems (Godshalk, Veronica, Douglas, Leslie, 2004).

Traditionally, instructors present information using a linear model. Often, however, as the difficulty of the material increases so does ill-structure. When the knowledge domain to be taught is complex and contains ill-structured data, the use of traditional linear instruction may be ineffective (Spiro, Feltovich, Jacobson, & Coulson, 1992; Spiro & Jehng, 1990). In other words, well structured information can be taught in a traditional linear fashion. When a subject is ill-structured and complex, Cognitive Flexibility Theory is most effective" (Dick, 1991). When the approaches recommended by Cognitive Flexibility Theory are used, the learner develops the ability to transfer the information from one situation to another. One way transfer is facilitated as is the use of multiple contexts or perspectives the student can use to explore the subject.

2.4. The characters and advantages of Virtools

Interactions between learners and the system is the most prominent character in a medical virtual teaching system, where three-dimensional interaction technology is the core. When the Wrist-Ankle Acupuncture virtual teaching system was exploited, Virtools software is chosen to build it from several VR software sources for the following reasons.

The Virtools Software is a complete development and deployment platform with an innovative approach to interactive 3D content creation. The Virtools production process facilitates prototyping as well as the robust

development needed for full-scale applications, immersive or online, lifelike experience delivery. Breaking away from traditional authoring environments, Virtools solutions help optimize time scales and budgets: meet your production requirements, and remain on schedule, while signi?cantly reducing production costs and overall risks.Virtools technology combines the power of a solid authoring environment with the versatility of multimedia development platforms to provide clients with superior, ground-breaking software solutions that suit a wide range of production and speci?c applications needs - together with a state-of-the-art rendered engine (http://www.3ds.com/products/3dvia/3dvia-virtools/ (Last visited 19.08.10)).

3. System design and development—using Wrist-Ankle Acupuncture teaching in Chinese Medicine as an example

The system was designed and exploited as a series of four phases that are developed independently and carried through in turn. The processes of it involve four phases: target confirmation, system design, system development and evaluation and maintenance which are shown in Figs.1.

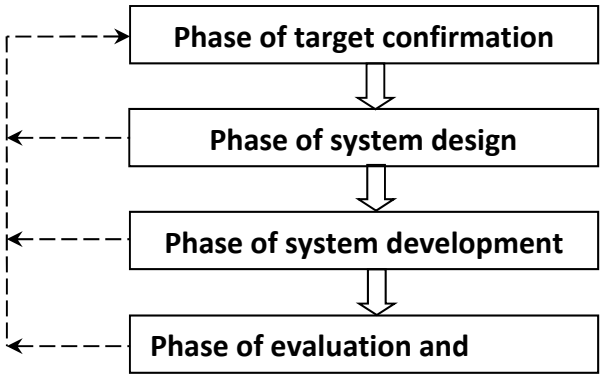

Fig.1. Process of system design and development

From the practical research perspective, we developed the virtual teaching system of “Wrist-Ankle Acupuncture” with a kind of VR exploitation tool-Virtools to meet the need of teaching the Wrist-Ankle Acupuncture in Chinese Medicine.

3.1. Wrist-Ankle Acupuncture teaching in Chinese Medicine

Wrist-Ankle Acupuncture is named for curing patients with needles in their wrists and ankles, which is applied extensively for its safety and convinience. The basic means is to separate both sides of body into six parts each, where one point of acupuncture is located apiece in wrists and ankles. Furthermore, relevant point of acupuncture is chose and inserted the needle hypodermally according to the symptom of diseases. In a word, the main teaching contents are the following: Firstly, what are the subareas of the body? Secondly, how to locate the point of acupuncture in wrists and ankles? Thirdly, how to choose the accurate point of acupuncture in accordance with the symptom of diseases and how to insert the needle hypodermically?

3.2. Functional design of the system

According to the instructional objectives of Wrist-Ankle Acupuncture, three functions are considered when designing the virtual teaching system. First, the subareas of body are expressed visually. Second, the locations of points of acupuncture in wrists and ankles can be identified accurately. Third, the technique of choosing the right point of acupuncture and inserting needles accordingly can be practiced repeatedly in the virtual environment. Thus, the Wrist-Ankle Acupuncture virtual teaching system consists of two parts, that is, learning system and training system. In the learning system, a three-dimensional body model is constructed. When the mouse moves and stays over some sub-area or point of acupuncture of the three-dimensional body model, the relevant name will be displayed in time. In the training system, learners can simulate the diagnosis of the patient and insert the needle into the chosed point of acupuncture of the virtual body. Moreover, the system will feed back the corresponding information to learners.

3.3. Main module design and teaching media choice

The Wrist-Ankle Acupuncture virtual teaching system consists of four main modules. Their framework is shown in Fig.2.

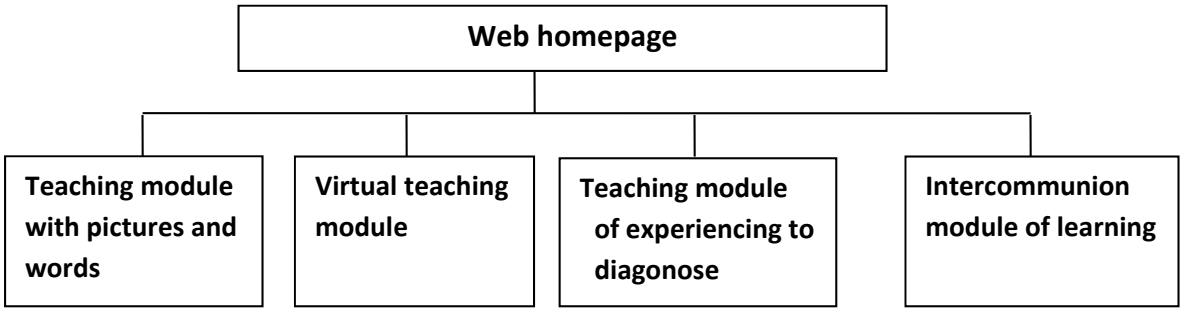

Fig.2.The framework of Wrist-Ankle Acupuncture virtual teaching system

(1) Teaching module with pictures and words

In this module, the basic knowledge of Wrist-Ankle Acupuncture is explained through traditional media formats such as words and pictures so that learners can obtain an elementary impression about the outlines of Wrist-Ankle Acupuncture. How to choose a media for instructions lies in the instructional contents. If some knowledge can be transferred to learners clearly and directly with words, let it. If it is hard to do so, pictures may be helpful for learners to form an intuitive impression in cooperation with words.

(2) Virtual teaching module

In this module, a three-dimensional virtual body model is constructed. And the two teaching emphases ---the sub-areas of body as well as the locations of acupuncture points in wrists and ankles, are expressed visually by the different materials given to the body model. In practice, because of the particularity of the sub-areas of body in Wrist-Ankle Acupuncture, if they are presented only by pictures, it will be hard for learners to understand the contents. And that, different colors mark different sub-areas and the locations of points of acupuncture in wrists and ankles are correlated to the three-dimensional virtual body model. The model can be operated freely so that learners take stock of the two teaching emphases mentioned above through choosing observed angles and distances at liberty.

(3) Teaching module of experiencing to diagnose patients

This module is designed to solve the difficulties of Wrist-Ankle Acupuncture instructions. In this module, learners can simulate patient diagnosis with VR technology in accordance with specific cases. And the system will feed back the corresponding information to learners that their manipulation is right or not, thus being beneficial to learners allowing them to correct their mistakes in time. Moreover, the opportunity to conduct several simulations of diagnosing patients makes learners intensify their grasp and comprehension of critical instructional concepts.

(4) Intercommunion module of learning

This module provides a platform for teachers and learners, where they can exchange study feelings and experience as well as questions raised during the course of learning. Thus, it not only promotes the intercommunions among learners but also helps teachers to know the learning situation of learners and correct them in time.

3.4 .System developing environment and main tools

The system is based on browser-server technology. On the browser side (client side), we use HTML and JavaScript to display the web pages seen on the browser by learners. HTML, the acronym of Hyper Text Markup Language, is the predominant markup language for web pages, and a computer language devised to allow website creation (Shannon, 2007). It specifies the structure of documents for retrieval across the Internet using browser programs. JavaScript, first designed by Netscape©, is a script language widely used in client-side web development.

On the server side, we use several software such as Virtools?Poser?3DSMax to realize dynamic pages and complex functions. Poser and 3DSMax are used to create three dimensional body; Virtools includes hundreds of BB action modules to achieve interaction function and its powerful scripting language---VSL(Virtools Scripting Language) makes the workflow automatically.

3.5. The key technologies of developing

The key technologies of developing the system lie on carrying out the three-dimensional interaction in virtual scenes with Virtools.

(1) Object identification triggered by mouse

In the virtual teaching module of Wrist-Ankle Acupuncture virtual teaching system, 2D Picking action modules of Virtools are used to identify body so that learners can access the hint of the body subareas and acupuncture points. The main function of 2D Picking action module is to detect the collision of mouse, which is shown in Fig.3. Its main interfaces are the following:

In: the entrance point for procedure flows to pass into the module;

True/False: the exit point for procedure flows to check out the module; when the mouse detects the body and adopt True, otherwise adopt False;

Object Picked: output parameter, the identification for mouse to pick up object;

Intersection Point: output parameter, the monitoring point for mouse to collide;

Intersection Normal: output parameter, the normal vector of the mouse's colliding monitoring point.

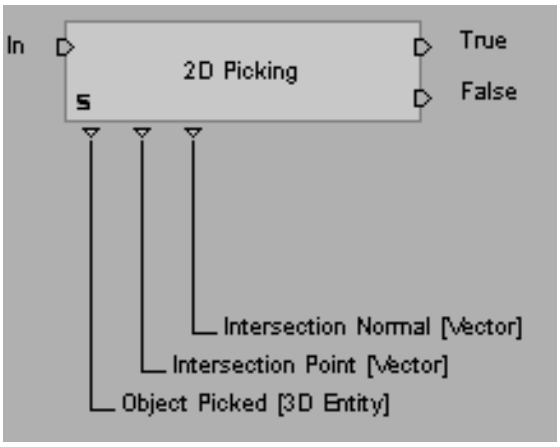

Fig.3. 2D Picking action interaction module

When the program is running, the mouse slides one of the sub-areas or acupuncture points and the corresponding name of them are shown on the screen. For example, when the mouse is sliding the right side of the second region, the information is shown as the Fig.4.

Fig.4. the interactive working sketch of virtual teaching module

The principle is that 2D Picking module picks up the object touched by the mouse and returns the related name, then it is shown on-screen through Text Display module. The process is shown in Fig.5.

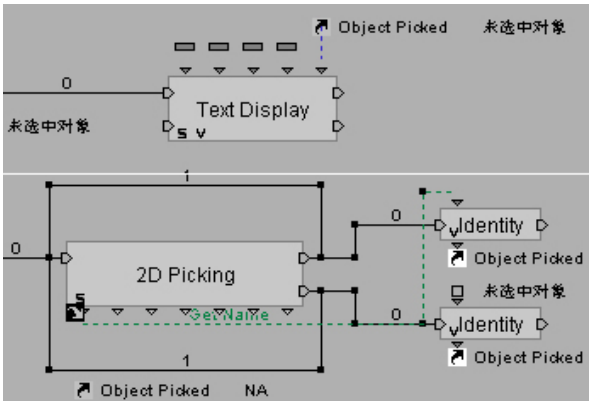

Fig.5. the procedure flow of body identification

(2) Control of viewing angle

The learner can modify viewing angle such as rotation and scaling of model through the keyboard. According to the custom of game operation, we arrange the following cooperation: W—move up; A—move left; S—move down; D—move right; PgUp—zoom in; PgDn—zoom out; the four arrows are used to rotate model.

(3) Judgment of acupuncture points

In the teaching module of experiencing to diagnose patients, learners need to choose the right acupuncture points in accordance with specific cases and the system will feed back the corresponding information to learners that their manipulation is right or not. The function is achieved by VSL. It combines interface input parameter design and C++ code style, which makes the complicated program design simple and efficient.

(4) Control of needle

The numeric key 8,4,6,2 are used to modify the angle and direction of acupuncture points. Pressing key 5 means inserting needle and flicking means stopping inserting. The function is achieved through the interaction modules' cooperation of Switch On Key, Rotate, Translate, which is shown in Fig.6.

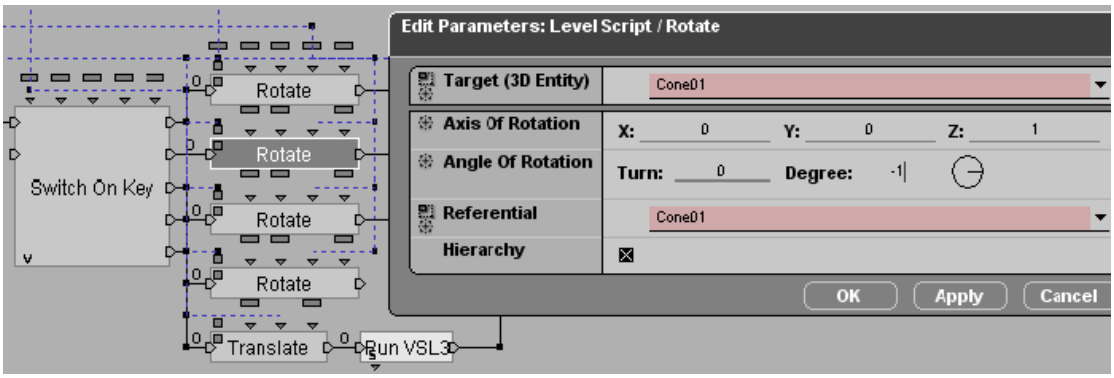

Fig.6. direction control program of needle

Moreover, it is important to choose the right reference coordinate system in order to simulate inserting needle with any angle and any direction.

(5) The feedback of acupuncture depth

When learners stop inserting needle, the system will report the depth of acupuncture back to them, which is finished by VSL and the main codes are as following:

```
shared bool iIn1;
static int a;
void main()
{
  if(iIn1)
        {a=0;iIn1=FALSE;}
        else
        {++a;pOut0=0.1*a;}
}
```

Here iIn1 is the sharing variable. It will be cleared when a needle is to be inserted newly. 0.1 is the scale factor of inserting distance.

4. Primary implementation

In this section, we will illustrate problems of the system in implementing several main functions, based on the design of the Wrist-Ankle Acupuncture virtual teaching system above.

4.1. Implementation of main modules

When learners enter the host interface of the system, they can freely choose the teaching module according to their practice. Teaching module with pictures and words offers the thorough content for learners to study systematically. Virtual teaching module helps learners understand and remember teaching information by operating freely the model. Teaching module of experiencing to diagnose patients provides the practice platform for learners to apply the knowledge mentioned above. This kind of simulation helps them correct their misconceptions promptly. Intercommunion module of learning not only promotes intercommunion among learners but also helps teachers to know the learning situations of learners and induce and disabuse them in time.

4.2. Most problems

The system will automatically feedback the information to learners in accordance with their operation, which shapes the system's character. However, the operation is usually finished through several keys in the keyboard and if the learner has never or seldom played PC game, he or she will feel the operation in the system somewhat complicated and not easy to grasp it. Thus the teaching effect is affected to a certain degree.

5. Results and discussion

In order to examine the system, we invited some learners randomly to use it and comment on it. Here are some typical comments in the system from these learners:

"This system is not only fit for the assistant instruction, but also suited to learning on their own. Compared with the traditional learning way, it makes us to grasp focal points and difficult points more easily."

"It is the interesting learning style that helps us to understand abstract knowledge more visually and its interaction makes the content communication more efficiently."

"We have improved both the related medical technology and our exploration ability by ourselves through this system."

From the feedbacks of learners, we can find they are basically satisfied with the design and implementation of the system. But the user interface of the system needs to be improved indeed. We deeply understand that the manipulation convenience is very important for the success of a system. At the phase of system design, the feelings and habits of users should be taken as a premise: the function we design should be usable and friendly.

In order to examine the effect of the system further, we tested the instructional main points after one class hour in a Chinese medicine subject of 49 students. The result shows that the average score of the students is above 86(the full mark is 100), that is, they have grasped most of the content. Could they apply the knowledge slickly into practical cases and analyze them accurately? We arranged three typical cases in the teaching module of experiencing to diagnose patients and 49 students actually do the work. Finally the correct rate of case analysis is 58%, which means knowing instructional content is not instead of having the ability to applying knowledge into solving the actual problem. It must be acquired through making practice constantly.

6. Conclusion

It is shown by practice and feedback that the virtual teaching system with three-dimensional interaction technology is feasible and welcomed. Firstly, its visualization boosts the interest of knowledge, the important factor triggering learners' enthusiasm and their initiative to study. Secondly, its operability fully expresses the learners' principal status during the course of instruction. According to the theory of Piaget, only when the learner practices in person, will knowledge be transferred to their own cogitation by the construction of meaning. Thirdly, its interactivity enforces the higher level of teaching objectives. Besides the information interaction between the system and learners, it collects wisdom and experience from different learners through the information sharing platform.

This article takes "Wrist-Ankle Acupuncture" as an example to illustrate the design and implementation of the virtual teaching system with three-dimensional interaction technology. It has not only set a rewarding attempt precedent but also put forward a concrete solution in trying to introduce VR as a new teaching method into medical instruction. Besides medical instruction, the design idea and implementation methods can be applied to other subjects easily.

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Facilitating Continuous Learning: A Review of Research and Practice on Individual Learning Capabilities and Organizational Learning Environments

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Abstract

In a continuously changing work environment, employee knowledge and skill quickly becomes obsolete and requires constant updating. This paper will present a review of current research and practice on two intertwined topics: how organizations create and sustain a "continuous learning" culture and how individual employee attributes determine one's readiness for continuous learning. By identifying factors that improve the continuous learning culture, an organization can better motivate its employee to become continuous learners that will eventually lead to sustainable competitive advantage for the organization.

Descriptors: Continuous Learning; Employee Attributes.

Introduction

Continuous learning is important for short and long term success of both individuals and organizations. Among various benefits of continuous leaning for the individual is to learn better skill sets, enhance their ability to meet organizational goals, and to remain competitive in this job market and in the expanding global economy. Since continuous knowledge acquisition can potentially lead to increased productivity, it benefits organizations to remain effective, innovative and competitive.

Given the importance of continuous learning for both the individuals and the organizations, the topic demands attention. Since the workplace environment is so dynamic and every employee has unique attributes, continuous learning involves a combination of several things, and means different things to different people. When factors facilitating continuous learning are identified, organizations can benefit by implementing those factors to optimize continuous learning.

As organizations struggle to survive and prosper in the increasingly competitive environment, continuous learning is becoming an important component within an organization. The ability to learn and develop one's skills is becoming a core career competency (Hall & Mirvis, 1995). Individuals are increasingly responsible for their own career path that often requires varied skill sets and knowledge bases. This shift has radically changed the process of learning and the ability to continuously gain new skills and to improve on existing ones has become an essential recipe for career success (Maurer & Weiss, 2010).

The workplace activities and job requirements can have a deep impact on an employee's professional development. New skills can be acquired from a variety of sources: training, education, communication, but the work environment determines if these newly acquired skills translate into changed behavior on the job. Lack of opportunity to apply new skills reduces the motivation for learning. On the other hand, if an organization's culture is such that it recognizes or rewards the individuals who apply new ideas and skills, this might positively impact the continuous learning among the employees.

Along with the dynamics of work environment, individual learner attributes can also determine the motivation and desire for continuous learning. Literature suggests that older employees are less oriented towards learning and development (AARP, 1995; Cleveland & Shore, 1992; Maurer, 2001). Similarly experience can also hinder continuous learning. Schmidt, Hunter, & Outerbridge (1986) argue that if a person performs work that requires continuous learning but has been doing the work for a long time, it is possible that he/she is less inclined to engage in continuous learning as compared to an inexperienced person. However, Maurer and Weiss (2010) argue

that the experienced person knows the work in greater detail and hence recognizes the need for continuous learning to be an effective performer.

In addition to the above factors, individual's attitude towards learning can also influence continuous learning. Attitude towards learning include any or all of the following factors: ability to learn new things readily, tendency to pursue new development opportunities, openness to new ideas, readiness to learn, unlearn and relearn, identifying one's weaknesses (Maurer & Weiss, 2010).

This paper is about individual learner attributes and workplace learning environments. More specifically, our review addressed the following questions:

- What are the individual learner attributes (e.g., age, gender, educational background, self-objectivity, independent learning ability, work ethics) that indicate a learner is amenable to continuous learning?
- What factors within an organization (e.g., training support, dealing with subordinates, technical problem solving, networking) contribute to creating and sustaining a continuous learning environment?

This literature review provides a brief review of (a) What is a Continuous Learning? (b) Need for Continuous Learning at Individual and Organizational level (c) How individuals learn? (d) Attributes of Continuous Learners (e) Continuous Learning Culture.

To guide the literature search, various keywords such as 1) Continuous learning 2) Continuous learning in workplace 3) Learner Attributes and Continuous Learning 4) Employee Attributes were used in different combinations in electronic databases such as Eric, JSTOR, Project Muse, Springer, EBSCO host, and Wilson Web. World Catalog and Google Scholar were also searched with these keywords. The initial searches for articles in the databases were limited to last five to six years. But, due to the dearth of potential articles this restriction was skipped. The bibliographies of the references were mined to help locate the original works.

The results from this paper may provide some general insights about continuous learning and the factors that facilitate such a learning environment. We will discuss how these results can be applicable and can help improve the continuous learning culture within an organization.

Literature Review

What is Continuous Learning?

Presented below are some definitions of continuous learning, following which the authors try to conceptualize the term for the current paper.

Articles	Definitions
London and Smither (1999)	They define continuous learning as "self-initiated, discretionary, planned, and proactive pattern of…activities that are sustained over time for the purpose of applying or transporting knowledge for career development (p. 81)
Rasow and Zager (1988)	They explain "evolution in training" as a movement towards a continuously learning philosophy where employee efforts shift from formal training to everyday training.
Sessa and London (2006)	In their analysis of the definitions of continuous learning of their participants the themes that emerged are "learning is transformational" "continuous learning satisfies passion, compulsivity, or drive as well as a tendency to be curios that transcends job requirements." "Continuous learning means "trying something new" and "experiencing something old in a new way""(p.17) "Continuous learning at the individual level is regularly changing behavior based on a deepening and broadening of one's skills, knowledge, and worldview" (p. 18)
Tannenbaum (1997)	"The process by which individual and/or organizational learning is fostered on an ongoing basis"

After reading the definitions from the literature the author agrees with Kluge and Schilling (2003) who note that continuous learning is a relatively abstract concept. Here is how the authors conceptualize continuous learning.

- Continuous Learning is an ongoing process of learning and development in the organizational context. It does not have a clear beginning and end. However at the "end" it has to benefit the individuals' professional career and/or the organization. Thus, in a way continuous learning is a subset of lifelong learning.
- Continuous learning can be both formal and informal. It can encompass all day, every day, and every moment of learning; where ever an individual is consciously thinking, reflecting, learning.
- Continuous learning happens at individual to group to organization level and vice versa. At individual level it is self-directed; at group level it is collaborative; at organizational level it is providing opportunities, establishing structures and processes that support continuous learning.
- Continuous learning is difficult to measure.
- An example of continuous learning could be when a working individual finds out about a social networking site and takes the initiative to explore more about it and share the information with other colleagues that how they can also expose themselves to vast resources and opportunities through the networking site. Marsick and Watkins (1992) lay out three examples of continuous learning.

Need for Continuous Learning at individual and organizational Level

Various factors relative to business and organization trigger the need for continuous learning at all levels of employment. Expanding global economy and thus global competition, new inventions and innovations, fast-changing and updating technology, customer expectations, quality management, changes in demographics, skills demands depicts challenge for the flexibility of an organization operating in this scenario. Organizations are forced to adjust quickly and adopt new ways to remain competitive. Continuous learning thus becomes essential for surviving and prospering in dynamic and competitive environments (Mayo, 2000; Howard, 1995; Ilgen & Pulakos, 1999; London & Mone 1999; Thayer, 1997; Adler, 1999). Thus understanding factors that contribute to continuous learning are essential.

Since organizations learn when the employed individuals learn it is important for individuals to work hard and keep up with the expectations of the workplace. Frequent changes of knowledge and skill requirements on the job and the pursuit of better and multiple careers make continuous learning a necessity (Hall & Mirvis, 1995; Ilgen & Pulakos, 1999; Gibb, 2001). Continuous learning is also important for preventing skill obsolescence of unemployed persons. Seeking additional training/learning can help in reemployment (Wanberg, Hough, & Song, 2002; Leana, Feldman, & Tan, 1998; Vinokur, Schul, Vuori, & Price, 2000; Vuori & Vesalainen, 1999). Continuous Learning is also important for older unemployed individuals to ensure employability (Wanberg, Kammeyer-Mueller, & Shi, 2001). Continuous learning is a timely and important topic for both employed and unemployed individuals.

How individuals learn?

The heavy research in various disciplines on the topic of learning at the individual level shows the very importance of learning. Whereas various learning theories such as behaviorism, cognitivism explain how learning in general takes place there are many theories that just focus on adult learning because researchers believe and studies have been conducted to prove that adults learn differently than children. Since, there does not yet exist any theories of continuous learning the authors try to create a base by discussing theories about adult learning in order to explain continuous learning in the later part. However, the author does not assert here to capture every theory on adult learning.

Andragogy

According to Knowles's concept of Andragogy an average adult learner 1) is self-directed learners, 2) draws on his/her experiences to aid learning, 3) is ready to learn with changing social roles, 4) is problem centered in their learning, and 5) is best motivated by internal factors (Knowles, 1980). However, does all these characteristics always apply when it comes to continuous learning at workplace? Are all adults' self-directed learners at all stages of life? Are there more than these characteristics that can affect one's intent to learn continuously?

Experiential Learning

According to Kolb's experiential learning theory adults learn and create new experience for themselves when they actively test their abstract concepts which are formed after reflecting on an immediate experience they had had. It is

a four-stage cycle of learning which can be ongoing. Do all adults actively test/reflect and change as per their experiences? There is a big difference between having experience and learning from them (Marsick & Watkins, 1992).

Systems approach: Sessa and London (2006) propose three ways how individuals learn based on various learning theories and models: 1) Adaptation 2) Generation 3) Transformation.

Adaptation: Individuals learn adaptively by reacting to a change in the environment. This learning is often unintentional and unintended but plays a very important role in everyday learning as the learning is automatic, individuals learn without conscious additional effort.

Generation: Individuals can learn by generating new knowledge and conditions. This learning is often purposeful and more related to the cognitive learning process. This learning is important as it requires individuals to identify their learning gap/need.

Transformation: In the process of adaptation and generation, individuals can transform by creating and applying frame-breaking ideas and bringing about radically new conditions. This type of learning is important as it encourages reflection and result in transfer of knowledge from learning to work.

In order to explain continuous learning it needs more than this general learning theories/approach.

Attributes of Continuous Learners

The phenomenon of adult learning is complex and though it has been studied for decades, we are far from fully understanding the workings of an adult mind amidst the complex environment. To make matters more complex now the term "continuous" is more valued with learning in workplace. Despite the fact, as discussed earlier, that learning is a natural process for all individuals; many individuals are not active continuous learners at work (Sessa and London, 2006). Such people require considerable support for meaningful learning (Bunker & Webb, 1992). By identifying attributes of continuous learners we can encourage those who need to learn. Some of the important variables that could have an effect on continuous learning are age, position, job experience, occupation, career insight, self-esteem, career interest etc (as cited in Rowold & Schilling, 2006). Informed from Rowold and Schilling's article, discussed below are some of the factors, often interrelated, that determine which individuals are more amenable to learn continuously.

Cognitive ability: There has been found empirical evidence that cognitive ability may influence individual's own perceptions of their development needs and/or capabilities to develop, which in turn determine the participation in developmental activities (Maurer et al., 2003). Individuals with high cognitive ability (Ellis et al., 2003; LePine, 2003) **e**nhance their own learning as well as team learning. Holding all other factors constant, groups composed of individuals with high cognitive abilities and positive personality characteristics will more likely to learn and outperform groups made of individuals who are low on these traits (Tannenbaum, Beard, & Salas, 1992). Thus, organizations that want to increase learning should include individuals who are high in cognitive ability, for group projects.

Personality Characteristics: Candy (1991) suggests that to continuously learn an individual manifests personality attributes of personal autonomy in self-managing learning efforts. He provides a composite list of characteristics of an autonomous learner (p. 459-66). One of the many groups in the list is named "Show Confidence/Have a Positive Self-Concept" (p. 464). Extensive research on Bandura's theory of self-efficacy has shown that self-efficacy is a strong predictor of an individual's behavior and performance. Bandura argued that the stronger the self-efficacy, the more likely it is for an individual to select challenging task, persist at them and perform successfully (Bandura, 1997). Noe and Wilk (1993) support this in their finding that individual's self-efficacy had a significant effect on participation in developmental activities.

London, (2003) found that people who are higher in their confidence in self-other relationships and the desire to enhance their own development will have higher motivation for self-verification and self-disclosure behaviors. The desire for self verification will encourage individuals to set learning goals and value differences among fellow group members. Groups members also help one define and reinforce their self-image, and enhance their social self-view. Individuals will join, stay, be committed and make individual contribution when fellow team members give feedback that supports one's self-concept. However, individual's don't appreciate others speculating inaccurately about their capabilities (De La Ronde & Swann, 1998; Corey & Corey, 2002). People who have distorted view of themselves or others are likely to have trouble working with group members (Chen &

Mallinckrodt, 2002) and thus can prevent interpersonal learning. For suggestions regarding ways to influence or manage development self-efficacy of employees see Maurer (2001).

Organizational Power: Organizational hierarchy of individuals may have an effect on an individual's intent to learn continuously. Individuals higher on the ladder are better at achieving their goals because they have improved executive function ability and, more specifically, the ability to update goal-relevant information and ignore goal irrelevant information (Smith, Jostmann, Galinsky, & Dijk, 2008); are more aware of and adaptive to stated organizational goals (Overbeck & Park, 2006); and have more resources and less constraints/restrictions. Individuals lower in position are concerned about appearing incompetent in front of those with more power. Thus when they are in a team with wide range of power levels present, these individuals may not be willing to actively contribute their ideas/suggestions (Edmondson, 1999) and thus limit interpersonal learning. Individuals may also hoard knowledge thinking that they would lose power to others by sharing their unique knowledge or they might want to get some benefit out of it and hence would release only part of their knowledge at strategic times (Wittenbaum, Hollingshead, & Botero, 2004; Haas, 2006). Furthermore, Bunderson and Reagans (2011) explain that individuals lower in position and power are less inclined to take learning-related risks because

"*Keltner et al. (2003) concluded that power advantages appear to prompt an "approach" response pattern (positive emotion, attention to rewards, uninhibited behavior), whereas power disadvantages prompt an"inhibition" response pattern (negative emotion, attention to threats, inhibited behavior). An impressive and growing body of evidence supports this basic proposition. Individuals in positions of lower power experience more negative emotion (Langner and Keltner 2008), act in more situationally constrained ways (Galinsky et al. 2008), are less optimistic in their assessment of risks and less likely to take risks during social interaction (Anderson and Galinsky 2006, Magee et al. 2007), and are less likely to take initiative (Galinsky et al. 2003).*" (p. 1184)

Last but not the least, when contributions or initiatives made by subordinates or individuals lower in the position are neglected or go unnoticed, it has a negative effect on further learning. Thus, organizational power and position may have an effect on individual's continuous learning intentions.

Age: Evidence indicates that older individuals (40 years or older) are less motivated to learn than younger employees and participate less in formal training and development activities (Niessen, 2006; Sonnentag et al. 2004; Warr, 2001). They perceive training as less supportive for their careers than younger workers. This might be because older persons have more knowledge and experience and consequently job related learning and development might not be important for older individuals. However, a contrasting view is that since older persons have more knowledge and experience they might overcome the learning difficulties. The relationship between age and continuous learning differ according to personal and situational factors.

Research on learning and cognition has demonstrated that older individuals learn slower than younger persons which might negatively affect their motivation for continuous learning. This is supported by Kanfer and Ackerman (2004) that when increased effort cannot compensate for the decline in the capacity for information processing it further impairs the self-efficacy of older learners. Age discrimination can also have a negative influence on self-efficacy to learn and develop.

Research with unemployed persons showed no age effects on retraining (Leana, Feldman, & Tan, 1998; Vuori & Vesalainen, 1999). However, with increasing age; 1) when finding a new job is more difficult for older individuals (Wanberg et al. 2001) 2) when there is lower expectation of getting a job 3) when there is decrease in desire for reemployment 3) when there is negative self-perception and self-efficacy due to age discrimination and negative views of society of their potential to adapt to a new job; 4)when there is a decrease in learning opportunities (Tucket and McAulay 2005); there is a disengagement in career related educational goals, learning and development. When workers close to retirement lose their jobs they often do not opt for further learning and development (Hanisch 1999).

Older individuals do not value relentless value of new skills. They value the social learning process. They believe in sharing work and experiences (Canning, 2011). Thus due to some of these reasons continuous learning may differ between younger and older individuals.

Gender: Tharenou (1997) reported in his study that women participate less in continuous learning than men. This might be due to various barriers as discussed in Women and Learning by Susan Knights (200). However, being the "Other" sex, women have to be continuously "engaged in a process of self-analysis; learning what a female manager

is by identifying the traits of a male manager that she does not possess" (Patricia & Sharon, 2003, p. 128). Role played by gender in continuous learning is poorly understood and needs more empirical evidence.

Educational background/aspirations: Birdi, Allan and Warr (1997) in their study found education-level differences in participation. There was positive relationship between more educated employees and work-based development in work time, voluntary job-related learning in one's own time and career planning activities.

Job Position: Birdi, Allan and Warr (1997) found in their study that higher level employees participated more in the required training courses, development activities and career planning. They also cite Green (1993) to mention that lower level employees are traditional non-learners.

Ability to recognize one's strength or weakness (Self-objectivity): Sessa and London (2006) are of the opinion that continuous learning is a risky affair for individuals because in this case one has to admit that either s/he does not know something or has to learn to it differently to be most productive. This ability to recognize one's weakness or strength, according to Maurer and Weiss (2010) is critical for continuous learning because then an individual realizes that he has room for improvement to reach relevant goals. This is supported in the research by Maurer, Weiss and Barbeite's (2003) that perceived need for development indirectly predicted participation. In the study conducted by McCall (1994), the interviewed executives indicated that knowing their strengths and weaknesses is one of the many characteristics of managers showing that they are open to learning.

Ability to learn from experience/mistakes: In the study conducted by McCall (1994), interviewed executives looked for signs of openness to learning and learning from mistakes when seeking managers with top-management potential. This means that when individuals recognize their mistakes and carefully reflect on their action they generate more learning from the available opportunities.

Work ethics: Research supports that employees who report strong job involvement are more likely to engage in formal continuous learning activities organized by the organization which are career related and goal oriented (Maurer & Tarulli, 1994; Cheng & Ho, 2001; Maurer et al., 2003; Rowold & Schilling, 2006).

Motivation to learn: Birdi, Allan and Warr (1997) found learning motivation as a significant predictor of a person's participation in voluntary activities. Maurer, Weiss and Barbeite (2003) found in their study that the major predictor of participation in learning activity was perceived intrinsic benefits (such as career planning/ exploration) or outcomes more than the expectation that participation will lead to economic rewards or other tangible extrinsic outcomes. When there is desire on the part of an individual to learn they take "education initiative"-comprises participation in continuing education and refers to the degree to the participation is self-started (Warr & Fay 2001). They also involve in activities that aim at keeping knowledge and skills up-to-date, referred to as "updating behavior" (Fossum, Arvey, Paradise, & Robbins, 1986). Research has demonstrated that motivation to learn is positively related to learning outcomes (Colquitt et al., 2000).

Today younger individuals entering labor market may be more motivated for this self-initiated learning and development because they are faced with multiple careers, fast changing technology and globalization. Shared vision (Senge 1990) also provides direction and motivation for individual learning (Sessa & London, 2006).

Expertise: Novices learn better from beginners than from experts (Hinds, Patterson, & Pfeffer, 2001). Hinds et al. (2001) found that experts and beginners differ in how they communicate information. Experts' use of more abstract concepts and advanced sentences may interfere with learning in novices. Thus matching skill levels of the trainer and the trainee can leverage transfer of knowledge.

Mental Models: According to Argyris and Schon (1978) people unknowingly think and act according to their established mental models. Learning happens when people consciously reflect and modify their actions according to the difference between expected and obtained outcomes as a result of their response to a certain situation. Argyris & Schon name this single-loop learning. When individuals are able to question and analyze the very basis of their response to a certain situation in the first place, double-loop learning occurs. Argyris and Schon (1978) distinguish between two mental models: Model 1 and Model 2 referring to individual behavior. Individuals engaging in Model I behavior inhibit their potential for growth and learning due to their defensive routines. Model II behavior, on the other hand, welcomes and encourages feedback and change. For more information on Argyris' approach see Argyris and Schon, 1974; Argyris, 1970, 1980, 1994).

Continuous Learning Culture

In order to encourage and keep employees motivated to engage in continuous learning openness to new ideas, taking a chance must exist in the work environment. (Gundry et al, 1994; McGill et al, 1992). Then there should be a culture of support and forgiveness (Colquitt et al, 2000). Tharenou (1997) found empirical evidence that encouragement from supervisor and peers is the most important factor for seeking opportunities for development. Further, a study of Maurer, Weiss & Barbeite (2003) showed that social support for development at work and outside work has a positive influence on people's participation in development activities.

Experience of older employees should be valued. Training has to be more personalized for them that focus upon the utilization of existing knowledge and skills. Working groups should be formed were younger counterparts benefit from their older counterparts (Canning, 2011). In order to induce in individuals greater responsibility for their own learning and development, voluntary employee development programs must be included which are financially supported and outside of working hours. These learning activities can increase self-confidence and instill enthusiasm for additional learning (Corney, 1995).

To mitigate the limitation on learning due to power dynamics, Bunderson and Reagans (2011) present review of studies to support the notion that individuals with greater power or status can use their advantaged position to create an environment characterized by psychological safety, thereby encouraging behaviors and processes that promote learning.

Mohamed and John (2000), Johnston and Hawke (2002) feature case studies of four companies that focus on created a culture of continuous improvement across the organization. Marsick and Watkins (1992) also give examples of what continuous learning means in companies and support implementation of reflective practice and suggest ways to learn continuously.

Conclusion

Sessa and London hold the perspective that all humans have the potential to be continuous learners. However, learning cannot be forced; it can only be triggered and supported. Learning depends on an individual's capacity and readiness to learn. Maurer, Weiss and Barbeite's (2003) research model results "depict a person who will be involved in development as someone who has been involved in such activities before, believes in the need for development and in his or her ability to develop skills, to receive intrinsic benefits from participating, and who perceives him- or herself as possessing learning qualities, as having social support at work and outside of work for development, as being job involved, and as having career insight." (p. 722). They suggest that all of these variables should receive attention when attempting to understand or to enhance involvement in employee development. However, going deep there are many other individual and organizational factors that work differently with different organization and diversity of the workplace. Xerox Corp. insists on making the organization grow and develop through a process of continuous learning at all levels (Mohamed & John, 2000). And the key to continuous learning at all levels is to provide the support by giving directions and providing resources followed by assessment.

Limitation

The limitation of this literature review is that it is very broad in focus. Although, all variables addressed are important, further in-depth literature reviews on individual topics is possible.

Implications of Future Research

In Sessa and London's (date) participant discussion several respondents felt that their motivation for continuous learning came from their parents and that they in turn inculcate this in their family members and students. Other than this, the author did not find any real studies that touched on the effect of family on individual's continuous learning. This can be interesting in this age, as children being digital natives, can trigger motivation for continuous learning in adults. Though the topic of continuous learning is much rage yet limited empirical research exist that is in agreement with describing continuous learning and the way individuals' learn in organizational context. Existing literature on continuous learning does not recognize the relevance of individual differences sufficiently. There are also unanswered questions in relation to continuous learning and enhanced work related competencies, career advancements and in turn return-on-investment. Above all, there needs to be a certain way to measure continuous learning because otherwise how one employee's additional effort to learn can be justified against another employee who gets the same wage, amenities without continuous learning efforts.

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Student Perspectives on an Online Anthropology Course

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Abstract

Higher education institutions have embraced online education as an opportunity to access more students, and the number of students taking courses at a distance has been increasing exponentially. This increasing demand requires strategic planning and high quality learning environments (Kim & Bonk, 2006). The goal here is to present the migration process of a face-to-face Anthropology course into an online format and report student perspectives on the effectiveness of the course in enhancing their learning. The results indicated that although students were mostly satisfied with the online course, they recommended redesigning some of the lectures and reorganizing the discussion forum to improve the course. Based on students' suggestions, the course will be revisited and updated to better serve the needs of online learners.

Introduction

Higher education institutions have increasingly embraced online education as an opportunity to reach out to more students, and the number of students taking courses at a distance has been increasing exponentially. This increasing demand requires strategic planning and high quality learning environments (Kim & Bonk, 2006). One course in particular, *Introduction to Culture and Language*, was developed in an asynchronous online environment to cater to this growing demand. The purpose of this paper is to report student perspectives on the effectiveness of the course in enhancing their learning.

Introduction to Culture and Language encourages students to study language and culture from an anthropological perspective with a focus on language and thought, ethnography of speaking, discourse and narrative, writing and literacy, and media communication (Viatori, 2011). The online course was offered for the first time in Fall 2011, and again in Summer 2012. This paper aims to describe how the course is structured to serve the needs of students at a distance by utilizing different online tools and pedagogies. More importantly, we will present students' perceptions of the effectiveness of each activity in enhancing their learning of the content.

The Course Design

The online course development office at a large midwestern university provides grants as an incentive to faculty members to transfer their courses to online format. In addition to the monetary incentive, faculty members also receive help from the course development team in designing and maintaining their online courses. *Introduction to Culture and Language* was such a grant-funded course that was developed in collaboration with the instructor, the director of curriculum and graduate students. Next, we will explain the design process.

The design process followed a similar process to the ADDIE (Analysis, Design, Development, Implementation, Evaluation) instructional design model, which is an umbrella term for a family of models that share the same underlying systematic approach to develop instruction (Molenda, 2003). However, the model was adapted to meet the needs of the online course development office by the Director of Curriculum Development. Based on the design model, although the designers follow a sequential process in developing the course, they step back and forth to address issues that emerge in each design phase.

The online course development office also follows a set of quality guidelines to ensure the quality of the courses produced. The guidelines are based on the Rubric for Online Instruction (ROI) created by Chico State University and on an adaptation of the instructional design tips created by Joan Van Duzer at Humboldt State University. The guidelines are grouped into six broad categories:

1. Learner Support and Resources
2. Online Organization and Design
3. Instructional Design and Delivery
4. Assessment and Evaluation of Student Learning
5. Appropriate and Effective Use of Technology
6. Student Feedback

The course was designed in two phases. In the first phase, a prototype including graphic design elements was created based on the content of the course as well as the design aspects representing the activities. In the second phase, the course was moved from WebCT to Blackboard, as the university decided to adopt Blackboard as the main course management system. This transfer required some changes in the visual design of the course as the two platforms had quite different ways to structure course content and activities. In the following section, we will outline and describe each online activity in the course.

The course has six main items: course information, student profiles, modules, class discussions, assessments, and a help forum. Course information includes information about the equipment requirements, tools used in the course, textbook, exams, library e-reserve, as well as links to syllabus and schedule. The purpose of this course information section is to orient students in the online course and familiarize them with the structure of the course, as well as ensure that students have the required equipment and software.

Student Profiles

The Student Profiles section require students to make a blog post to introduce themselves to their peers and the instructor. Students provide information, including their major, classification, interests and the reasons for taking the course. They are asked to upload a picture of themselves if they choose to. This profile activity is important to make sure that students in the course are introduced to one another and encourage the development of an online community.

Modules

The Modules section houses the main content of the course and guides students through each module. There are a total of six modules, each of which focuses on a specific topic. Each module starts with an overview, progresses through various topics, and ends with a quiz. Each module contains lectures, films, readings, and discussion forums. The overview informs students about what they will be learning in each module, as well as the due dates for major activities and assignments included in the module.

Lecture Recordings

There are two types of lectures in the course; lecture recordings and mini-lectures. The live lecture recordings consist of longer, 20-30 minute videos with footage taken directly from the face-to-face classroom. During the development of the online course, the instructor was teaching a face-to-face version, so his lectures were recorded to later be used in the online version. These recordings were edited to serve the needs of online students. For example, subtitles were provided for in-class student questions because the audio did not capture those questions well.

The mini lectures are short, succinct ten-minute scripted videos created by the instructor to introduce the main concepts. Our purpose was to provide shorter lectures, making it easier for students to absorb the content in one sitting, and forcing the instructor to concentrate on only a few main concepts in each mini-lectures. The instructor used Microsoft PowerPoint slides and Quicktime software to create a voice-over presentation. There were a total of four lecture recordings, each of which were divided into parts of two or three based on the length of the original lecture. There were a total of eight mini lectures with three or four sub-parts.

Films

The Films section includes several short clips embedded from Youtube, as well as one full-length film streamed through the university's library. The films are included to enhance students' understandings of the concepts covered in the course through examples or further explanations by other pioneers in the field.

Readings

The course requires two textbooks and several online readings. We collaborate with the Parks Library e-Reserve to obtain the proper permissions to integrate these readings into the course.

Class Discussions

Each module has a class discussion topic in which students answer three to four questions related to the topic covered in the module. These questions are posted by the course instructor and students are expected to respond to each other. The overarching goal of these class discussions is to clarify any aspects of the material that students do not understand; explore some of the material in greater depth; and ensure that students understand the significance of the material in relation to the broader themes of the course. Therefore, participation in the class discussions is required and students' responses are graded based on content, relevance and appropriateness, and structure. Specific guidelines are provided to explain each criteria in the course syllabus. The instructor occasionally participates in the discussions, provides comments on students' postings, and clarifies points of confusion as needed.

Assessments

Each module has a quiz that covers material from all readings and video assignments in that week's Module. In each Module, the quiz remains open for several days to make sure that students have enough time to take quizzes and to utilize the 'flexible' nature of online courses. Once the exam closes, it cannot be accessed. These quizzes consist of 10 questions in multiple-choice format. They are pulled directly from the content of the week's readings and video assignments. The tests are delivered through Blackboard's assessment tool and students have one hour to complete the test once they begin. The course has also a midterm and a final exam, similar to quizzes in terms of format, but they are more comprehensive.

Overall, the design process started with analyzing the syllabus for the face-to-face version of the course and identifying the needs for converting the course to online format to ensure high quality learning experiences for students. To evaluate whether the course has achieved this overarching goal, a mid-semester and an end-of-semester evaluation were conducted. In the next section, this evaluation process is described.

Methodology

In Fall 2011, 100 students were registered in the course from a variety of majors. A mid-semester course evaluation was designed and administered in Blackboard during the fourth week of the course, as suggested by Boettcher & Conrad (2010). It was an anonymous survey with open-ended questions asking students about their overall perceptions of the course, as well as their perceptions of the effectiveness of each activity in improving their learning. Thirty students participated in the survey.

Although students indicated areas of the course in need of improvement, we were unable to make significant changes to the course before the next semester it was taught due to time restraints. In the Summer 2012 version of the course, students again evaluated the course. This evaluation, however, was implemented at the end of the semester. It contained the same open-ended questions. Twenty-six students were enrolled, and 12 responded to the survey.

Because few changes were made to the Fall 2011 and Summer 2012 versions of the course, we combined the responses to create a pool of 42 student responses. To protect the identity of the students, they were given numbers, and "S" is used to refer to "student". The following section outlines the student responses and their implications for the next generation of the course.

Results

In the following section, we will briefly describe each activity within the course, as well as the student perspectives we collected in the two distributed surveys.

Overall Impression

Students were asked to reflect on their overall impression of the course. The nature of these responses varies significantly between the two courses. However, one theme emerged between both pools of responses: students' reactions to the online nature of the course.

Interestingly, the Fall 2011 version of the course generated more negative reactions than the Summer 2012 version. The Fall 2011 version generated one response indicating difficulty in keeping up with the pace of the course: "So far I like the content of the course a lot, but I find it more difficult to keep up with because it's online" (S27). Two students commented on the online nature of the course. One student stated, "I think that the class would be my favorite class if it was not online" (S21). Another student responded on the online courses' inability to cater to the personal nature of language, stating "I feel like for a linguistics course, not actually meeting and talking about the material seems a little impersonal, given that the topic is language" (S11). Only one student commented positively about the online delivery of the course, commenting, "This is my first online course and so far I enjoy it. I like having the freedom to choose when and where I listen to lectures, do readings and watch videos" (S06).

The Summer 2012 version of the course generated only positive reactions to the online delivery of the course. One student responded, "Glad this one was online, made it nicely streamlined and flexible around my schedule" (S31). Another student responded, "I thought it has been the best online class I have taken yet" (S33), and another student expressed a similar attitude, stating "I thought this course was better to take online than in class" (S40).

Visual Design and Navigation

Students were asked to reflect on the visual design and the navigation of the course. Most students reflected on the ease of navigation in the course. Twenty-two students provided statements indicating that the course was structured with students' ease-of-use in mind, with statements such as "It was easy to navigate through" (S42) and "The course is very clear and easy to follow" (S21).

Although the majority of the feedback was positive, two students in the Fall 2011 version of the course commented on experiencing difficulties using the discussion forums. One student stated, "I don't care for the way the discussion section is set up" (S01), while the second student responded, "The discussions page is a bit confusing" (S07). Neither student provided additional information explaining their difficulties navigating the discussion forums.

Lecture Videos

The course consisted of several lecture videos, of which were two types. The first were short, succinct ten-minute scripted videos created by the instructor to introduce the main concepts. The instructor used Microsoft PowerPoint slides and Quicktime software to create a voiceover presentation. The second type consisted of longer, 20-30 minute videos with footage taken directly from the face-to-face classroom.

Students were asked to reflect on their experiences with the lecture videos. Students indicated that they found them helpful in understanding the material. In fact, only one response from the 42 students surveyed provided negative feedback, stating "I feel like the video lectures didn't really add a whole lot to the slides that were shown" (S40). The rest of the students provided statements such as "The lecture videos are extremely helpful" (S13) and "The lecture videos that I have been watching have seemed to be the most helpful tool in this course in attempting to understand the key concepts of each module" (S08).

There were some responses, however, that indicated a preference for the shorter, more succinct style of lecture video versus the footage shot directly in the classroom, which were in line with Taplin, Low and Brown's (2012) study on students' satisfaction and valuation of web-based lecture recording technologies, of which findings indicated that most students place little or no value to web-based lecture recording technologies.

One student stated, "The video lectures were quite helpful. They are a bit lengthy so if you could shorten them up a bit it might help" (S36), identifying the need for our development team to recreate the live lecture videos into the shorter, more succinct style of video. Another student responded similarly, "I liked the video lectures. It would be helpful if there was more power points. In the beginning the power points helped me take notes, and towards the end there was no power points" (S37), with the "PowerPoint lectures" referring to the shorter, succinct videos. Finally, one student expressed a disconnect between the live lecture recordings and their online viewing:

> "I liked the "powerpoint" lectures a little better than the video shot in the classroom because they were more concise. The classroom video contained references to material not accompanying the online class (e.g. the material from Foley) and occasional remarks didn't sync with the material currently covered in the relevant module. I've seen this disconnect (but much worse) in another online class as well. This may not be a problem in Winter and Spring classes since my class was given in the summer, and presumably over a shorter time period than in "regular" semester (S39)."

Movies and Films

The modules also include films and short clips, which are directly embedded within the pages. Students were asked to reflect on their experience with these films and short clips. Students provided a variety of responses. Most, however, reflected a positive experience with the movies and films. Common themes throughout the responses included describing the movies and films as "useful," "helpful," and "enjoyable."

Assessments

Students were asked to provide their overall impression of the assessments in the course. Between the two semester pools, only two students provided negative responses. One student stated, "I do not like the format. I worked hard on the material for the course and knew it well, but I thought that the format of the quizzes didn't let me show that I know the material" (S14). Another student responded, "I think it was hard to remember certain facts from the readings unless I read it right before the quiz" (S20).

The rest of the students provided positive feedback, commenting on the effectiveness of the assessments in measuring student understanding of the weekly course materials and their ability to reinforce what they've learned. For example, one student responded, "The quizzes do a good job of testing us over the material that we have covered in the modules" (S08). Another student indicated that the assessments were beneficial to the online learning experience, stating "I have a much harder time learning over the net, but I thought that the quizzes were able to measure my understanding of the weekly material very well (like if I fully understood it or not)" (S34).

Additionally, two students provided suggestions to improve the quizzes. One student identified an improvement of the content of questions, stating "There could have been more questions about general concepts" (S01). Another student suggested adding an additional type of question to the assessments, stating "I would not mind having a mix of multiple choice and short answer" (S09).

Class Discussions

It is interesting to note that when students were asked to reflect on their experience with the discussion forum, the Fall 2011 and Summer 2012 responses differed significantly. The Fall 2011 responses mainly indicated a negative experience. For example, one student responded, "They mostly seem like busy work, there isn't much discussion in them and it doesn't seem to help me understand the concepts anymore than just reading/seeing the material does" (S03). Another student responded, "They are kind of pointless at this time because it is not really a discussion. We simply answer the questions and echo what others have written so it doesn't really help in attempting to understand the material" (S08).

The Summer, 2012 students reflected a more positive experience. One student summed up his experience: "I[t] was nice to see what other people thought of the topics. They would notice things that I didn't and vice-versa. I think it help all of us to see the material is a different light than how it was covered in the lectures, films and readings" (S36).

Many students also indicated room for improvement. Several students stated that since they had almost two weeks to make their postings, they wait until the due date to make their posting which inhibits creating a conversation. Students indicated that more structure to the forums might remedy this situation, suggesting different due dates for initial postings and comments

Suggestions for Improvement

Students were asked to provide suggestions for improvement of future generations of the course. These responses varied significantly, each reflecting the responding student's particular preferences for learning. For example, one student requested more synchronous activity be included in the course:

> "I prefer real classrooms where students and professors can engage in discussions- it especially seems important considering it is a linguistics class. I understand that was not possible this time, but I really think we miss out on an important part of the learning process. I know replying to people's discussions is supposed to fill this gap, but it is hard to have a virtual discussion with a group who post their responses at different times. Would it be possible to do this via Skype? (S02)."

Two students requested the addition of study guides to help them focus on the readings in the course. Another student requested the addition of more videos, stating "Videos are easier to follow than readings. I would suggest one more video and one less reading. I enjoy the lectures. I enjoy that they are about 5mins long. I'd rather have more 5-10 minute lectures or videos than readings" (S18).

Finally, one student requested the addition of a final module, reflecting on the difficulty in establishing connections between the material. The student responded, "Maybe add a course summation at the end (where linguistics was, is, and where it is going). It was sometimes a challenge to see connections between the material in different modules" (S41).

Conclusions and Course Improvement Plan

The purpose of administering the surveys during Fall 2011 and Summer 2012 was to gather data to help us improve the online version of *Introduction to Culture and Language.* As a result of the surveys, we have identified two major improvements to be implemented in the next generation of the course: lecture videos and discussion forums.

There were two types of lecture videos in the course: short, succinct ten-minute scripted videos and longer, 20-30 minute videos with footage taken directly from the face-to-face classroom. Several responses in the survey indicated a preference for the shorter, more succinct style of lecture video. In the next generation of the course, we plan to transform the longer videos into the shorter format. There are four lectures that will need to be converted.

Several students stated that since they had almost two weeks to make their postings, they wait until the due date to make their posting, which inhibits conversation. As a result, we plan to create more structure to the forums, suggesting different due dates for initial postings and comments, which will hopefully initiate more conversation among students.

The ultimate goal of this paper is to describe how an online course can be designed and improved based on student feedback. The instructors, instructional designers, curriculum designers, educational leaders who are interested in developing online courses can get some important insights about what they can do to design similar courses in their own institutions and what they need to be careful about during this process based on the lessons we have learned.

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Skill Development Theory and Educational Game Design: An Integrated Design Framework

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Descriptor: Skill Development Theory, Game Design

Introduction

Skill development is a commonly targeted topic for many types of instruction. The use of skill development theory in designing educational games is pertinent to the future growth of the field of educational gaming. Many recreational games use skill development as a component of the game design. For instance, many Wii games use the motion of the Wii remote to emulate actual action (i.e. Wii tennis requires players to move the "Wii-mote" similarly to how you swing a racquet), and Wii accessories can be added to remotes to assist in simulating the item that you are supposed to be manipulating in the game to accomplish objectives. Games like Sudoku that are often text- based but can assist in teaching problem-solving and math skills.

There are several options available to instructional game designers to help them accomplish their goals of developing skills, be it a physical or mental skill. But, without a basic understanding of how to teach a skill effectively, designing a game based on skill development can be unsuccessful. In this paper, we incorporate skill development theory (Romizowski,2009) with the educational game development methodology proposed by Linek, Schwarz, Bopp and Albert (2010), which provides a framework for game design. The following questions guided the approach to this topic:

- How are individual differences (including skill level and learning styles) of learners addressed in skill development theory?
- Does skill development theory consider environmental features when addressing methods for successful transfer of training?
- Can educational games be an effective way of teaching skills?

- How may skills development theory and the 4M's Method of designing Game by Linek et al. (2010) be integrated in order to build a framework for teaching skills using instructional games?

Instructional Theory for Skill Development

The theory for fostering skill development outcomes, as proposed by Romiszowski (2009), can be used for fostering all types of skills. Romiszowski defines skill as "the capacity to perform a given type of task or activity with a given degree of effectiveness, efficiency, speed or other measure of quantity or quality (p.202)". He distinguishes between intellectual skills (that involve the mind), motor, sensorimotor, or psychomotor skills (that involve the body), personal skills (that involve emotions), and interpersonal skills (that involve interacting with others). Skill is distinct from knowledge, in that it develops with experience and practice, whereas knowledge is something you either have or do not have.

According to the theory, skills exist along a continuum of complexity from reproductive to productive. Reproductive skills are those which are focused on applying standard procedures, or automated processes, such as multiplying numbers or typing. Productive skills, on the other hand, involve the application of principles and strategies, such as creative writing or playing chess. Romiszowski indicates that whether a skill is reproductive or productive has much greater influence on the selection and design of instructional strategy than if a skill is intellectual, motor, personal, or interpersonal.

When attempting to understand the skills cycle, it's important to recognize the types of responses involved in skill practice. According to Romiszowski, there are both "closed" and "open" responses. "Closed" responses involve a static environment, one that does not change with the activity of skilled practice within the space. "Open" responses involve a dynamic environment where the performer must constantly adjust his or her performance based on variables within the environment.

The skills cycle involves more "open" responses in that environmental stimuli affect the decision-making and behavior of the learner/performer. The performer perceives the stimulus, recalls prerequisites based on his or her perception, plans for behavior accordingly, and exhibits behavior, or performs the response to the stimulus which affects the environment and the original stimulus which then must be acted upon again by the performer. This cycle continues throughout the performance of the skilled practice.

Instructional Tactics for Specific Situations

According to Skill Development Theory, specific situations will necessitate variations in the best instructional tactics to be employed. These tactics are categorized into four groups:

- information provided (explanation, demonstration, and guidance);
- practice (frequency, spacing);
- feedback (frequency, form, quality, etc.); and
- transfer and generalization.

Exhibit 1 describes each situational characteristic ("if"), with the optimal instructional design technique ("then"). Example scenarios are provided.

Exhibit 1: Situational Characteristics and Instructional Design Tactics for Skills Development (Romizowski, 2009)

If…	Then…	Example
Imparting essential information		
Simple task, limited background knowledge.	Demonstrate, then explain	If teaching someone how to prepare food by following a recipe, show them how to do it first, then provide explanation and rationale for how or why steps are completed.
Complex task, multiple relationships, new knowledge	Use exploratory activity or model	If teaching a team with no prior experience how to respond in an emergency situation, place individuals in a mock scenario and let them explore the environment and respond.
Want mastery performance	Demonstrate from learner's physical viewpoint, so that the learner does not have to 'reverse' actions when they are performing.	If teaching CPR, physically place learner in the position near to where they will be when performing the actions themselves while they are watching the instructor demonstrating.
Providing practice		
Learning integrated activities	Use "whole task" method	If teaching students how to perform a chemistry experiment, allow them to complete the entire experiment during practice, instead of breaking up the practice into parts of the experiment.
Sequence of relatively independent actions	Use "progressive parts"	If teaching how to stock store shelves, practicing the steps of operating a pallet mover can be done separately from physically placing stock on the shelf.
Prerequisite skills are below threshold	Develop them prior to whole task practice	If teaching students how to perform a chemistry experiment and some students are unfamiliar with lab equipment, develop their skills in working with lab equipment before letting them practice the actual experiment.
Highly coordinated, productive tasks	Provide continuous practice	If teaching a group of musicians to play a piece of music with one another, it is better to have longer, continuous sessions than spaced interval practice
Reproductive high-speed tasks	Use spaced practice	If teaching how to perform tasks on a quick-moving assembly line, space the practice into "chunks", letting them try 2-3 times and then rest or review other information before trying again.
Heuristically- based productive skills	Use mental rehearsal, reflection in action.	If teaching someone the ADDIE model of instructional design, coach instructional designers to state the phase they are performing as they practice and verbalize rationale during performance.
High-speed tasks	Use forced pacing for more rapid mastery	If teaching cooking in a fast food restaurant, practice should mirror the pace of actual task performance.
Giving feedback		
Developing simple sensorimotor skills	Use "learning feedback", not "action feedback"	If teaching someone how to drive a manual car, seeing how far the clutch is out (action feedback) will not result in greater learning, but physically feeling how far the clutch needs to be out (learning feedback) will lead to greater learning.
Developing complex skills	Include process as well as product (outcome) information in the feedback	If teaching negotiation skills, feedback should include information about the learner's actions and results, not just the results of the negotiation.
Promoting transfer		
Productive skill	Vary practice, use debriefing to promote reflection-in-action	If teaching how to fly an airplane, use practice conditions of varying weather conditions, and review practice by asking the learner to debrief their performance immediately after performance.
Reproductive	No need for practice variety, use overlearning	If teaching how to make bricks, the same practice scenario may be used multiple times, but allow abundant practice.
Teaching for transfer	Define / refine concepts in learner's mind	In general, asking for feedback after learning / practice sessions will enhance transfer

Discussion of Instructional Theory for Fostering Skill Development

Romiszowski provides a basic framework for supporting skill development, but the theory largely neglects attributes of the learners themselves. Romizowski acknowledges that the learner's "inner self" -- the personality, intellect, feelings, beliefs, and past experience, "may impact the execution of the task". He states "inner-self factors...require close analysis and appropriate attention in the instructional design" (p.223), but guidance on how to address the learner's previous knowledge, level of skill or learning style in specific situations is lacking. It also does not consider the environment when describing appropriate methods of promoting transfer of training.

When selecting instructional techniques focused on skill development, it is important to provide learners with the appropriate basic knowledge, such as terms or processes that are important for performance. However, not all individuals will have the same background knowledge, and repeating information that a learner already knows can decrease engagement, or an individual's likelihood to absorb and interact with the information. In order to maintain engagement while providing sufficient background information, the learners' level of previous knowledge should be considered, both in terms of performing the task and the procedural knowledge required of the steps needed to complete the task. An individual's skill level may also affect their willingness to participate in the instructional program, particularly during scheduled periods for practice. If an individual is more advanced than other learners, it is not apparent in Skill Development Theory what should be done to increase engagement with that learner (or group of learners).

Another limitation of Romiszowski's framework is the lack of emphasis on the individual's learning style. Cognitive styles can affect the efficacy of methods used in instruction because of the differences amongst learners' abilities to interact with and absorb information (Thornell, 1976). For instance, the skill cycle in Skill Development Theory focuses on the interaction between the learners and their environments, but it does not account for differences in methods of decision-making and behavior between learners. In order to customize feedback on performance to improve processes like perception and planning that occur within the mind of the learner, the instructional designer should understand what works best for a particular learner or at least provide feedback that accounts for differences in learners' styles. Learner analysis may be beneficial as a component in designing appropriate methods and interventions to promote skill development.

Also unaddressed in Romiszowski's framework is that transfer of training.. The theory addresses transfer mainly in terms of how practice is to be provided (e.g. varying practice and debriefing for productive skills and over-learning for reproductive skills), but fails to elaborate on environmental considerations. In order to increase the transferability of instruction, the environment in which learning and practice occurs should correspond to the environment in which the skill will be performed. For instance, simulation of the pertinent variables necessary for decision-making in the skills cycle model is important for promoting transfer of training. Also, simulating different environments for productive skills can increase transfer of skills to novel situations.

Skill Development in Educational Game Design

The lack of attention that skill development theory provides to learner differences and transfer are directly addressed by the affordances of educational game design. Indeed, some of the affordances of e-learning (adaptability of content targeted to different skill levels, learner control over pace and place of learning) address deficiencies related to individual differences. In general, adaptive approaches to e-learning suggest that learning environments should be developed according to individual selection and necessity. There are many different options to apply adaptive approaches in virtual learning environments (Kinshuk & Patel, 2006, Graesser, Chipman, & King, 2008, Scalise, Bernbaum, Timms, Harrell, Burmester & Kennedy, 2007). According to Kickmeier-Rust & Albert (2010), adaptivity refers to three major concepts:

- adaptive presentation: adjusting the look and feel of a learning environment according to individual preferences or needs, for example, different color schemes, layouts or amount of functionality;
- adaptive curriculum sequencing: providing the learner with learning tailored to individual preferences, goals, learning styles or prior knowledge; and
- adaptive problem-solving support: providing the learning with feedback, hints or solutions in the course of problem-solving processes.

Games, by nature, should be engaging and fun for players, and as such educational game design has additional considerations beyond traditional e-learning. Utilizing educational gaming technologies can assist in overcoming some of the issues with traditional instructional methods through a variety of tools to use in providing adaptive interventions (presentation, curriculum sequencing and problem-solving).

Individual Learner Characteristics and Skill Levels

Educational gaming environments offer specific affordances in terms of different skill levels, because game levels and scenarios can be designed so that players with varying skill levels can play. Further, individuals can learn from peers with more knowledge, which may increase a learner's willingness to perform the skill. Including cooperative, social interaction in game play may also be beneficial in promoting bonding and collaboration with skills that will require team work when practiced (Johnson & Johnson, 1987).

Educational game designers must understand that the learner's expertise will affect their game-related behavior (communication, information searching, knowledge testing, problem testing, etc.), which provides vital input for how to best design the game's interface, challenges, and tasks. For example, the educational game designer may add more complicated task components or more variables for the player to consider increasing a performer's engagement and accounting for varying learner skill levels. When using games as the primary mode of learning a skill, you can program different difficulties into the settings so that learners/players can select their preferred level of difficulty. In order to appropriately set difficulty, it may be beneficial to assess the learner's level of skill through a mini-game at the beginning of game-play.

Learning Style

Different students learn differently from one another. This also means they might need to be taught differently according to their preferences and learning styles. There are those who prefer to learn individually while some others learn best interactively. Many students prefer to learn using data, many focuses on theories or concepts, and the rest might be more interested in visual forms and there are those who respond better to spoken and written explanations (Mupinga, Nora & Yaw, 2006). Understanding differences in student's learning styles is an important aspect to effective learning and teaching (Zacharis, 2011).

In educational game design, knowledge about different learning styles can help the designer to be more creative in order to design a game that can really fit with the learner's preferences of learning. For instance, if the learner grasps experience by converging -- that is by abstract conceptualization and active experimentation -- it indicates that they are good at making practical applications of ideas and using deductive reasoning to solve problems (Kolb, 1984). Therefore, the use of riddles in the game might be useful and most beneficial for this type of learner. Learning through games, especially in online environment, might be more flexible that traditional classroom learning, but the environment increases complexity (Ellis & Kurniawan, 2000). Games designer should be aware of the learner's learning styles in order to organize materials and activities in order to accommodate the variety of learning styles possessed by the target users (Zacharis, 2011).

Transfer of Training

In educational game design, designing to assure the ability to prepare player–learners to transfer knowledge from one situation to another requires the answers to several questions:

- How does the game provide a circumstance in which the targeted skills are transferred to similar or new and unique situations so player–learners are able to assimilate and accommodate it appropriately?
- How does the targeted content cause player–learners to be aware of the knowledge and skills in such a way that they will become efficient users of that knowledge to accomplish proficient execution of the skill?

Transfer and adaptation are tightly coupled in their intent in the learning cycle. In a game situation, player–learners might encounter a similar problem to be solved that is restated in other terms or in other contexts that require them to utilize or reapply the information in different formats but not in ways that necessarily map to targeted outcomes (Gunter et. al, 2008). When designing a variety of contexts to perform the behavior within a game, the game designer should incorporate the environment analysis to increase transferability to the work environment and create simulated game environments similar to the real work environment.

The benefits of educational games for teaching skills helps address the limitations in Skill Development Theory. However, to put into a more structured design context, a specific framework for the instructional game process should be used.

The 4M's of Educational Game Design

In response to the lack of an overall design framework for educational games in research literature, Linek et al (2010) proposed a new interdisciplinary approach. They proposed an overall methodology that incorporates ideas

from Dick and Carey's instructional design model, while focusing primarily on the unique qualities of educational game design. They identified "4 M's" that are important elements of an educational game: Macroadaptivitiy, Microadaptivity, Metacognition, and Motivation.

When designing instruction, it is important to manage the learning sequences (i.e. the learning path, based on available resources, learner's prior knowledge/ skills, and the learning objective) (Smith & Ragan, 2005). In Linek's proposed methodology, the concept of **Macroadaptivity** refers to the overall management of the learning situation, which may be thought of as the "learning path" of the game. Macroadaptivity might be closely linked to the overall management of the learning environment and instructional methods used within that environment in instructional design. The "learning path" comprises the adaptations made at the game level, including adaptive presentation or navigation. In educational games, macroadaptivity would be comprised of all game levels and rules that a learner must consider in order to complete the game.

Linek et al. (2010) provides an example of macroadaptivity based on Bloom's taxonomy, where each learning path of the game should be organized in an order that will help players learn gradually as they reach higher levels of the game. Also, in order to provide an enriched gaming experience, managing the macroadaptivity level with the use of methods like curriculum sequencing will make a difference for the player since meeting individual preferences, interests, abilities and goals is key to successful game-based learning (Kickmeier-Rust & Albert, 2010). So, by providing diverse learning situations or a varied learning path in educational games, designers are giving the learner freedom to navigate the game to accommodate their learning needs and available resources (e.g. prior knowledge/skills), as well as what they want to achieve at any particular level of the game.

Microadaptivity deals with adaptations made within a specific learning situation. The very basis of micro-adaptivity is a formal psychological model for interpreting a learner's behavior within learning and assessment situations in an educational game (Kickmeier-Rust & Albert, 2010). At the core of microadaptive assessment is Competence-based Knowledge Space Theory (CbKST) (Korossy 1997; Albert & Lukas 1999), which allows "assumptions about the structure of skills and domain of knowledge and the link to latent skills with the observable behavior". The theory provides a basis for structuring a domain of knowledge and for representing the knowledge based on what skills or knowledge are prerequisite to others. CbKST introduces a separation of observable performance and latent, unobservable competencies, which determine the performance. Essentially, CbKST assumes a finite set of competencies and that the competencies have a relationship with one another.

Micro-adaptivity intends to provide the learner with appropriate educational support without corrupting immersion and the flow of the gaming experience. At this level, more precise interventions occur during game play based on the player's behavior. A player's actions will indicate the level of competence by the display (or non-display) of requisite skills. However, both the assessment procedures and the system's responses to the learner must be educationally meaningful and suitable (Kickmeier-Rust & Albert, 2010). To account for this, the game can be equipped with a set of potential interventions (including feedback) that can be triggered by the learner's behavioral response to appropriate stimuli (Kickmeier-Rust & Albert, 2010). The conditions under which a certain adaptive intervention, or learning activity, is given are developed on the basis of pedagogical and didactic rules while considering a strong integration in the game play context. The nature of this set of rules may also induce different types of interventions and may vary depending on the nature of the learning situations and types of rules.

In the context of digital educational games, Kickmeier-Rust & Albert (2010) suggest following intervention types:

- **Competence activation interventions** may be applied if a learner becomes stuck in some area of the problem space and some competencies are not used even though the system assumes that the learner possesses them.
- **Competence acquisition interventions** may be applied in situations when the system concludes that the learner lacks certain competencies. **Motivational interventions** may be applied, for example, if the learner unexpectedly fails to act for a certain long period of time.
- **Feedback** may be utilized to provide the learner with information about the learning progress or the game.
- **Assessment clarification interventions** may be applied, for example, in the form of a query, if the learner's actions provide contradicting support for the assumption of a certain competence state.

This approach suggests that how the player navigates the game indicates whether he or she needs intervention (i.e. to reduce cognitive load, or inform the learner about the learning progress and the possible deviations from a planned learning path), and the game should provide appropriate tools to support the learner through the game play / learning process.

Metacognition refers to an individual's knowledge of their own cognitive processes, whereby a learner can select, evaluate and modify strategies for learning. Ritterfield and Weber (2006) suggest that video game players benefit from metacognitive strategies in situations in which a challenge cannot be mastered. Pillay (2003) found that

games which demonstrated cause and effect encouraged means-end analysis strategy development, while adventure games influenced inferential and proactive thinking.

Linek et al. consider metacognition to be a particular challenge in the design of educational games. For example, inserting reflective pauses, which is effective in other learning situations, seems to contradict the importance of storytelling and flow which are critical in effective game play. The authors propose to solve this dilemma by indicating self-efficacy in task performance and embedding support for metacognition using parasocial dialogue with a non-player character. For example, the player may debrief with an embedded 'coach' at levels during game play, where the player can receive feedback from the coach on what they may do differently during the next level, based on their performance in the game so far.

Finally, **Motivation** comprises several concepts and approaches designed for enjoyment and learning. It is thought that games have a distinct advantage over other methods of learning, because they engage the learner and encourage a state of flow not necessarily present in other forms of electronic learning. A key advantage of games over adaptive approaches in traditional e-learning is their immersive and motivational potential. Many commercial game designers argue that one of the defining features of a game is that it is "fun" providing a slightly different reason for motivation than traditional practices (Smith-Robbins, 2011; Danforth, 2011). Because of this, effective teaching methods must not compromise gaming experience, immersion and flow (Kickmeier-Rust & Albert, 2010).

Integrating Skill Development Theory and 4M Model Theory for Educational Game Design

In order to apply the principles of skill development theory to educational games, it is helpful to incorporate a game design model that uses the advantages of instructional gaming while also addressing some of the shortcomings of the theory on fostering skill development. An integrated model will emphasize the advantages of digital games, including:

- Utilizing a "learning path" that allows adaptations and navigation to be made at the game level;
- Designing in-play interventions and adaptations triggered by the learner's responses and game-play actions;
- Embedding metacognitive support - or structures that support the awareness of one's thinking processes - using techniques that do not disrupt game flow; and
- Promoting motivation, since games are both intrinsically satisfying and purposefully challenging. Promoting motivation to learn material by the sheer method of instruction is promising when trying to overcome the issues of engagement for learners that may be more advanced in previous knowledge or skill.

An integrated model will also address some of the limitations of skill development theory (lack of attention to individual skill level and learning styles, and lack of emphasis on environment to promote transfer of training). Previously discussed examples of how educational games can overcome these weaknesses include:

- utilizing different levels of difficulty in game play and either permit learners to select their preferred level of difficulty, or assigning a game play level of activity based on a pre-game practice "test";
- designing riddles into the game play environment for learners who use deductive reasoning to solve problems; and
- presenting a problem in game play that forces the player-learner to generalize and apply previously-encountered skills to a new level (environment).

This approach to an instructional intervention for skill development requires the appropriate categorization of the 4Ms discussed in the model previously reviewed. According to Linek et al. there are two components to the learning game design. First, the design of the learning situations should incorporate **macroadaptivity (M1)** (overall learning "pathway"), **microadaptivity (M2)** (pedagogical rules, adaptive elements), and **metacognition (M3) (including in-game self-efficacy assessment design).** Second, the design of the story-based game world should include **motivation (M4),** gameplay situations design, and storytelling situation design. Providing a story for the learners to follow can be motivating since learners often want to find out what happens as a result of the behaviors to be exhibited as part of the story line.

A more detailed description of the integration may lend itself to a linear model that focuses on the skill development component of the game design model. From this stand point, it is important to first describe the overarching ideas of the model, which are as follows: (1) impart essential information, (2) provide practice, (3) give feedback, and (4) promote transfer. Some of the situational design considerations of the Skill Development Theory combined with the 4M game-based design considerations offer greater guidance on how to design skill-based educational games which account for individual learner differences and preferences, shown in Exhibit 3.

Exhibit 3: Key Integration Points of Skill Development Theory and 4M Game Design.

Skill Development Theory	4M Game Design Model
When training complex tasks with multiple relationships and new knowledge, skill development theory suggests using an exploratory activity or model.	**M1, M2**
If mastery performance is desired, instructors should demonstrate from the learner's viewpoint.	**M4**
When the learner is acquiring skills that involve highly coordinated tasks, continuous practice should be provided.	**M1**
When the skill involves heuristically-based productive skills, practice should emphasize mental rehearsal and reflection in action.	**M3**
When the skill being taught requires high speed tasks, skill development theory suggests that force pacing be used for rapid mastery.	**M1, M4**
When developing complex skills, skill development theory suggests that the instruction should include process information as well as the outcome result in feedback.	**M2**
When teaching productive skills, skill development theory tells us to supply knowledge of performance via debriefs and reflection in action.	**M3**
For productive skills, practice should be varied and should use reflection in action.	**M1, M3**
In situations where there is a high need for training transfer, skill development theory indicates that practice should be structured to help define / refine concepts in the learner's mind.	**M1, M2, M4**

Although these areas of integration appear to be the strongest, the situational characteristics can advise each of the 4Ms in educational game design, as illustrated in Exhibit 4.

Exhibit 4: Example Educational Game Scenarios that Integrate Skill Development Theory and 4M Game Design

Skill Development Theory		4M Game Design Features			
	Educational Game Design Example	**Macro adaptive (M1)**	**Micro adaptive (M2)**	**Metacognition (M3)**	**Motivation (M4)**
Impart Essential Information					
When teaching complex tasks with multiple relationships and new knowledge, use exploratory activity or model.	A game that teaches employees how to respond to various emergency situations.	Embed exploratory activities into the macro adaptive design. For example, players may explore different areas of a building, which present different emergency scenarios to deal with.	Design specific adaptive elements to promote exploration. For example, while nearing game play completion in one emergency situation, distress calls to other areas stimulate the player to go to another location when finished.	Players hear information over a public address system from fire, police or medical personnel providing tips for better performance based on how well they respond in a particular area of the building, intended to stimulate transfer to other upcoming scenarios.	The foundation of the game may use a compelling story that triggers emotional response / desire to help. Players may earn points based on performance, which they can display as part of their profile for other players to see. Players may also be given the choice for their demonstrations to

Skill Development Theory		4M Game Design Features			
	Educational Game Design Example	**Macro adaptive (M1)**	**Micro adaptive (M2)**	**Metacognition (M3)**	**Motivation (M4)**
					be viewed by other players.
If mastery performance is desired, demonstrate from learner's physical viewpoint, so that the learner does not have to 'reverse' actions when they are performing.	A game that teaches CPR skills. A physical object that closely mirrors a torso is used, which sends input signals to a video screen with performance indicators and environmental context.	The learning path is always presented in first-person view, whereby the player performs CPR in various environments.	When the player is applying too little pressure to the chest during compression over a period of time, visual health indicators on the screen decline.	An expert CPR instructor debriefs the player after each CPR scenario, based on their actions.	Game play situations and storytelling are designed specifically from the viewpoint of the learner.
Provide Practice					
If teaching highly coordinated productive tasks, provide continuous practice	A game that teaches a group of musicians to play a piece of music with one another.	Play situations will reinforce continuous practice by using elements of high engagement within the 'jam session'. For example, players get extra points for completing the same series of songs with one another repeated times.	Within the game play situation of playing a song, the group may be pulled off stage if their performance is sub-par and given a simpler song to play.	A popular performance artist (germane to the song style and instruments being played) can give players 'pep-talks' in between 'sets'. They will be given feedback about what they did well during the performance, and what they might want to change in future 'sets'.	Players (and groups) are allowed to select the music style, songs, and band composition of their choice, increasing motivation and engagement. The story line may include practice rehearsals and a national tour, to increase enjoyment as the game progresses.
If teaching heuristically-based productive skills, use mental rehearsal and reflection in action	A game that teaches instructional designers how to use the ADDIE model.	Learning paths are structured as 'missions' where the ID will work with different company departments to help them design learning interventions. The learning interventions are simple at first, but then become more complex and introduce	If players are struggling during game play, reflection in action can be promoted using prompts and cues as to what phase they are in and the key actions associated with the phase.	At the end of each 'mission', players rate their own confidence in task completion and can ask for hints. During gameplay, the ID's mission commander will ask the player to provide rationale for their design decision.	Game players choose which level they want to play, relating to their own interest and assessment of skill level.

Skill Development Theory		4M Game Design Features			
	Educational Game Design Example	**Macro adaptive (M1)**	**Micro adaptive (M2)**	**Metacognition (M3)**	**Motivation (M4)**
		scenarios that require non-training interventions			
If teaching high-speed tasks, use forced pacing for rapid mastery.	A game that teaches how to cook in a fast food restaurant.	Practice activities can provide for multiple forced-practice learning situations that mirror the pace of actual task performance.	During specific tasks, a game can be designed to elicit certain stimuli indicating that a behavior is being performed correctly or must be corrected to perform the task perfectly.	As a result of the micro adaptive intervention, a learner-player can then select the appropriate response from prior knowledge to complete the task.	Gameplay situations can be designed to promote motivation by providing forced-paced practice as a critical element of a story.
Give Feedback					
If developing complex skills, include process as well as outcome results in feedback	A game that teaches effective negotiation skills.	Via checkpoints sporadically placed throughout a game, the learner can review skills that he or she has learned, and a review of the story-line can explain how those skills were obtained and how they relate to the overall objectives of the game (video clips might be best to accomplish this objective).	Specific adaptive elements can incorporate action-related information / paths during assessment. Feedback during gameplay should include information about the learner's actions and results, not just the results of the negotiation.	By providing feedback at various points in the game (immediate, periodic, etc.), the learner can be aware of his or her actions that result in positive or perfect skill performance vs. imperfect or negative skill performance.	By using the story line to explain how negotiation skills will help you in future areas of the game, you can use foreshadowing as a motivation tool to continue in the game and practice newly developed skills at future points in the game.
If teaching productive skills, supply knowledge of performance via debriefs and reflection in action.	A game that teaches managers how to conduct performance appraisals with employees.	Including rationale for the development of skills in conducting performance appraisals can be helpful in providing an overall context for the importance of understanding performance and	Using a peer-to-peer method of providing feedback between players after a role-play/simulation can be useful. The player may also be able to choose from a list of pre-determined responses and given feedback	Metacognition can promote reflection in action using prompts and feedback on player confidence. The player may debrief each appraisal about what worked well, and what they might change for future	Using positive reinforcement for desired behaviors might be the best method of promoting learner's motivation, since negative reinforcement or punishment may reduce the likelihood of an individual to

Skill Development Theory		4M Game Design Features			
	Educational Game Design Example	**Macro adaptive (M1)**	**Micro adaptive (M2)**	**Metacognition (M3)**	**Motivation (M4)**
		reflection pauses in game.	based on the selected response via non-player game characters programmed into the game play environment.	sessions.	engage in the activity again (unless learners are specifically motivated by challenging game play scenarios).
Promote Transfer					
For productive skills, vary practice and use reflection in action.	A game that teaches how to fly an airplane.	The use of multiple weather situations can be designed to promote varied practice	Using pop-up signals during game play to promote reflection can be beneficial. Also asking player to explain behavior to another player while performing task can be useful.	Promote reflection in action using prompts and feedback on player confidence.	Learners may be motivated to proceed through game play as a means of satisfying curiosity associated with the game's progress and thus taking advantage of varied periods of practice for skill development.
When teaching for transfer, structure practice to help define / refine concepts in the learner's mind.	Any educational game with a need for transfer to 'the real world'	Learning situations can be structured to facilitate at first definitional concepts, and then progressively refine and more broadly generalize concepts.	Specific adaptive elements can assess concept refinement.	Requiring learner-player to explain rational for use of skills in a new environment or situation can promote learner's awareness of his or her ability to apply the skill in a real situation.	Gameplay situations and stories can design using concepts of proximal development that will enhance player motivation.

Summary

Using educational games for skills instruction is a common practice currently, but may be more effective using guidance from Skill Development Instructional theory. This theory offers insight into how to teach skills in general and situational methods, but inadequately addresses individual learner characteristics, interests, and motivation. Conversely, educational game design can be informed by the principles of skill development theory. By integrating key situational characteristics of skill development theory with an educational game development methodology proposed by Linek et al. (2010), successful game design intended to foster skill development can be improved.

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Dropping Out of High School: The Role of 3 D Alice Programming Workshop

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Abstract

This study explores how high schools, through their curriculum reform with technology, may influence students' decisions to stay in school. There is little focus on how the curriculum with technology projects might hold students in school. This study examines risk factors of why students drop out of high school and further investigate the potentials of a technology-enhanced course that resist those risk factors, and increase protective factors for underprivileged students in an at-risk school.

Introduction

In this study, I explore how high schools, through their curriculum reform with technology, may influence students' decisions to stay in school. Traditional explanations for dropout behavior have focused on students' social background and academic behaviors. There is little focus on how technology-enhanced courses might hold students in school. This study analyses risk factors of why students drop out of high school and further investigate the potentials of a technology-enhanced courses that resist those risk factors, and create a resilient environment that increase protective factors for underprivileged students in an at-risk school.

In this article, AT & T sponsored grant project will be outlined and findings from the qualitative study will be discussed showing how school curriculum can cumulate students' success in school. This pilot program project with 3D Alice programming has developed to serve a group of underprivileged students for becoming statistics in the growing numbers of unsuccessful high school students in the urban areas of Gotham County located in the Southeast of the United States. This has accomplished through the creation of a technology outreach program, in conjunction with a Public University Educational Technology Center, housed in the State University College of Education in partnership with Gotham County Public School System.

When and why young people decide to leave their school depends on many factors. As with any important life decision, adolescents' decisions to leave school draw on a complex web of success and failure experiences of school. Young people continually assess and reassess their successes with people and places in the worlds in which they want to function and fit in: family, peers, school, and the larger world. Some students see schools as locations where they can develop their human capital and stay fit, so that staying in school longer is felt to increase their probability of success in the world, and felt to continue pleasant living experiences. For other students, schools are places where they are reminded on a daily basis of their failure in both the academic world and the social world.

Although the body of researches recognize that the decision to leave school before graduation is made by individuals, a small but growing set of researchers has begun implicate the school in this decision. Riehl (1999) speaks of schools "discharging" students. The drop out phenomena stems from two perspectives: the individual perspective and the school perspective. Researchers and writers concerned with dropping out often divide the construct into two categories: social risk and academic risk. Social risk includes demographic factors associated with a higher likelihood of school difficulties; race/ethnicity, age, language-minority status, gender, family income, parents' education, and family structure. Members of racial and ethnic minority group drop out at higher rates than White students as do those from low-income families, from single-parent households, and from families in which one or both parents also did not complete high school (Natriello et al., 1990; Rumberger, 1987). Individuals also bring academic risks which include a history of absentism and grade retention (Lee & Burkam, 1992), academic trouble (Bryk & Thum, 1989) and more general disengagement from school life (Finn, 1989; McNeal, 1997).

The Context of the Project Development

This project was to provide services to a group of students at-risk for becoming statistics in the growing numbers of unsuccessful high school students in the urban areas of Savannah-Chatham County in an effort to reach targeted benchmarks (aligned with ISTE standards for students), to improve students' grades, to reduce disciplinary problems, to improve regular school attendance and graduation rate. To this end, the project was launched in City

High School with a cohort group of at-risk students as an after-school activity. However, this grant was significantly modified after its administrator learned that the project did not obtain enough number of students from the high school initially selected in September 2010. The reason that the project team did not have enough number of students was that many of students who participated in the project were athletes, particularly football players. During the football season, they had to leave the class for practice. The class attendance was getting down to 2-7 students. Therefore, there was a need for modification of the project after January 2011. The project was relocated to another high school in Gotham County. At this time, the project was implemented as a part of the elective course, called Advanced Web Design. The course was designed to allow the participants of the project to create their own animation project with Alice Computer Programming software, and to incorporate their animation into their advanced Web site. During high school years of 2011 and 2012, there were two cohort groups of 61 students were enrolled in this a year-long Advanced Web design class and learned about how to program animated projects once in a week using Alice Programming software.

A year-long project to teach students programming skills using Alice, an innovative 3D programming environment that makes it easy to create an animation for

- telling a story,
- creating an interactive game, or
- creating a video to share on the web.

Total of 68 students were immersed into the learning environment of Alice(http://www.alice.org/) through building 3D visual worlds from September 2010 to May 2012. Instead of creating traditional text-oriented programs which display meaningless messages such as "Hello World" to the screen, students created and manipulated interesting objects (such as an ice skater). Those objects were programmed to execute highly visual, exciting actions (such as skate and twirl). Students created interesting environments in a short period of time, thereby increasing their satisfaction and motivation to continue. Since the Alice application was freely available, students were able to download from the Website www.alice.org. The screen shot of the Alice environment is shown in Figure 1.

Students created animating creatures using a set of objects which have been pre-programmed with the basic methods for movement and interaction by Alice. Students used these as building blocks to create more complex actions, usually to tell a story or enact some type of scene. Students appreciated an infinite number of programs which can be constructed, from simple interaction to elaborate, highly interactive scenes.

Figure 1 The screenshot of the Alice environment.

Students received a notebook for use during their entire program, making it possible for them to continue working on projects during the time when they were not meeting in class. Initially the facilitating device for this project was a netbook, but the administrator learned that the netbook was not comparable with the software program, Alice, so the device change for the project was necessary.

Instructional Delivery

Armstrong Atlantic State University's College of Education is an experienced teacher preparation institution. Of seventeen state teacher preparation institutions, ours is the third largest producer of minority teachers and the eighth largest producer of all completers of university teacher preparation programs in Georgia. Moreover, the College is accredited by the National Council for Accreditation of Teacher Education (NCATE). The Educational Technology Center at Public Univerisity has a long history of serving the counties in the East Coastal Area. One of thirteen regional Educational Technology Centers (ETCs) strategically located across the state to provide instructional and technical training and assistance for all Georgia school systems, the ETC mission is to work collaboratively to provide professional learning, consulting, and service for regional educators to promote the appropriate use of technology in support of teaching, learning, and leadership. With numbers of highly-qualified instructors associated with the center, the Public Univeristity ETC is in an enviable position to coordinate the kind of instruction with expertly prepared instructors that motivated and provided opportunities for success in the field of technology for students whose futures are uncertain.

Methods

Three groups of 20 at-risk high school students per term (60 total) participated in this study. The subjects of this study are at-risk high school students in one of Gotham County Public High Schools. Students were identified as at-risk students if they meet such characteristics as:

- Repeated grade
- Promotion failure
- Reading or math test scores below grade level
- Attendance problems
- Documented behavioral issues

Subjects was recruited with help of the high school principal and technology specialist. The school principal and technology specialist identified at-risk students based on the characteristics of at-risk students and encourage at-risk students to join the 3 D programming workshop. Upon attending the3 D programming workshop, at-risk high school students were invited to participate in this study. The project evaluator conducted interview to investigate students' perception on problem solving, improvement of other subject areas before and after the participation of the project.

Data Analysis

The data analysis involves in reading and rereading the qualitative data, and identifying coherent themes and categories that summarize and bring meaning to the data. To identify theme, we assigned abbreviated codes of a few letters, words or symbols and place them next to the themes and ideas we find. This will help me organize data into categories. I will make the main categories be broken into subcategories. For interpretation of data, I developed a list of key points or important findings as a result of categorizing and sorting my data. After synthesizing findings and tapping their meaning of data, findings were interpreted based on the theoretical background of this study.

Despite the individual risks that students bring to school even before they arrive at school, this study found that a well-structured technology course can increase numerous following protective factors: 1) Social capital; 2) Effective school academic organization; 3) Personal connection; and 4) Sense of control.

Social Capital

"Social Capital" is a concept that the quality of social relationships themselves either enhances or hinders individuals' capacity to attain desirable social goods (Coleman, 1990). Coleman (1988) pointed out the special significance of social capital for children. As children mature, the focus of their social development shifts from parents to include peers, other adults, and schools. Interviews with dropouts as they left school revealed that half said they were quitting explicitly for social reasons (Caterall, 1998). Qualitative studies have also shown that positive social relationships can create powerful incentives for students to come to school, even students who report that school work is difficult and expectations are hard to meet (Fine, 1991; LeCompte & Dworkin, 1991; Lee, Smerdon, Alfeld-Liro, & Brown, 2000; Wehlage et al., 1989). One showed that social capital (Measured by relationships between students and teachers and by whether teachers reported talking with students outside class) was strongly related to dropping out, even after taking students' social and academic risk factors into account (Croninger & Lee, 2001).

This study found that technology-enhanced curriculum increases the desirable social goods in schools. This study found that students enrolled in 3D workshop experiences positive social relationship with peers and teachers.

Due to the nature of 3 D workshop, which promoted a more project-based, student-centered and -controlled project, students commented that they had more opportunities to communicate with peers and interact with the instructors. 3D workshop environment create a learning environment that increase interactions between teachers and students as well as among students. Further, 3 D workshop environment increases the level of their ability to elicit positive responses from others. The followings are narratives from students.

- (After she showed her project to peers) They like Ahhh, I like yeah (in proud way). Awesomenss.(Lakisha);
- I can show how I really do, how I act. That way I can really make friends and contact outside school (Martin).

Those positive responses accumulated as experiences of success in school, which some of students, who came from the lower academic performance group, never had before. The followings are narratives from students.

- (After she showed her project to peers) They like Ahhh, I like yeah (in proud way). Awesomeness.(Lakisha);
- I can show how I really do, how I act. That way I can really make friends and contact outside school (Martin).
- Alice allowed for me to accomplish something I want to do. (Sierra)
- I can make something I like. (Shanesha)
- I am more friendly with Alice class peers than any other classes because sometimes I need help and then can help. (Natasha)
- We tried to help each other more in Alice class. We get to know people. (Sierra)

Despite the individual risks that students bring to school even before they arrive at school, this project found that a well-structured technology course can increase numerous protective factors which might reduce the risk factors of high school drop-out by increasing social capital. “Social Capital” is a concept that the quality of social relationships themselves either enhances or hinders individuals’ capacity to attain desirable social goods (Coleman, 1988). Coleman (1988) pointed out the special significance of social capital for children. As children mature, the focus of their social development shifts from parents to peers, other adults, and schools. Interviews with dropouts as they left school revealed that half said they were quitting explicitly for social reasons (Caterall, 1998). One showed that social capital was strongly related to dropping out, even after taking students’ social and academic risk factors into account (Croninger & Lee, 2001). The project evaluator found the potential of incorporating a programming project into high school curriculum to decrease high school drop-out rate.

School Academic Organization

Lee and Burkam (2003) concluded that the structure of high school curriculum is associated with holding students in high school until graduation. Regardless of students’ own academic background and school performance, schools with what has been called in other studies “ a constrained curriculum”—more challenging courses, fewer remedial or nonacademic course—hold students in school (Lee et al., 1998). All of interviewees in this study commented that this creating a game with 3D Alice Programming was challenging, but fun. It further promoted their sense of purpose and future because 3D workshop allows students to build a sense of career that is related to computer technology. They say what they would gain from the project which would stress their intrinsic value and the utility value of such skill (Eccles & Wigfiled, 1985). The followings are narratives from students.

- Specially I want to be game programmer, it gets me to the computer field (Lakisha)
- I was gonna open up my private server (Martin).

All of participants commented that creating a game with 3D Alice Programming was creative, challenging, but fun. It further promoted their sense of purpose and future because 3D workshop allows students to build a sense of career that is related to computer technology. They say what they would gain from the project stress their intrinsic value and the utility value of such skill (Eccles & Wigfiled, 1985) through using their own imagination to create a project which they never had an opportunity before this project. The followings are narratives from students.

- Specially I want to be game programmer, it gets me to the computer field (Lakisha)
- I was gonna open up my private server (Martin).
- Alice is more to do than the simple Web design which is the same and old stuff (Natasha)

85% of participants reported that Alice helped to improve their problem solving skills. 90% of participants agreed that Alice allowed them to think the outside box, and to be able to show their personality.

- Alice is creative, spontaneous, and let me think the outside of the box and allowed me to express myself. (Sierra)
- I love to manipulate things that show my personality. (Allen)

Personal Connection

Researchers in the area of student motivation (e.g., McCombs & Pope, 1994; Wlodkowski & Jaynes, 1990) have advocated that teachers address students' needs, related instruction to students' experiences, and emphasize the value of learning activities. Many students do not see learning activities as personally meaningful because they are unable to connect the activities to their lives. However, students in 3D Alice Program Workshop saw those personal meaning of the activity since they played the computer games constantly. Students commented that they thought about how to program the certain game they were playing now. And they even had a desire to create a game for them to play.

Most of participants in 3D Alice Program Workshop saw the personal meaning of the activity since they played the computer games constantly at home or on the way to school. Because of their personal connection to the project, 95 % students reported that the level of enjoyment in class was the highest among other classes. Students commented that they thought about how to program the certain games they were playing now. And they even had a desire to create a game for them to play. Researchers in the area of student motivation (e.g., McCombs & Pope, 1994; Wlodkowski & Jaynes, 1990) have advocated that teachers address students' needs, related instruction to students' experiences. Many students do not see learning activities as personally meaningful because they are unable to connect the activities to their lives.

Most of participants commented that the 3D Alice Programming workshop offered to control their project by letting them to create their own games. Students appreciated the fact of the project that they have control over what to accomplish, not particular assignments that were thrown to them, which would more likely happen in all other classes. They worked for what they wanted to accomplish. They commented that this class was the only class that they could make choices about the projects. A growing body of theoretical and empirical literature supports the view that when students' perceptions of personal control in the learning situation increase, so does their motivation to learn (Alderman, 1990; Ames, 1990; Deci & Ryan, 1991).

- Alice gives better confidence for other classes such as Math and science (Natasha)
- I am proud of myself to see something I came from my hands. (Jaialesha)
- I enjoy creatures that I kindda put myself into Alice. (Justin)
- It is related to my life. If I see the cartoon animation, I felt that I could make something like that with Alice. (Shenesha)

Student interest and enthusiasm are critical for effective learning and classroom management (Borich, 1992), especially for at-risk students. In addition to promoting learning, active student involvement increases interest and enthusiasm. Within teacher-coordinated boundaries, LGB provides student choice in what of learning so that students choose their preferable gaming activities to create. Students have been found to perform above established achievement levels when a topic, skill, or method of instruction is of particular interest (Choate, 1993). Creative applications of technology, such as the use of 3D programming, can increase student interest and enthusiasm to complete projects. Classroom teachers can enhance the interest and enthusiasm of at-risk learners if they encourage and allow students' open creativity with their infinite imagination.

Sense of Control

A growing body of theoretical and empirical literature supports the view that when students' perceptions of personal control in the learning situation increase, so does their motivation to learn (Alderman, 1990; Ames, 1990; Deci & Ryan, 1991). The 3D Alice Programming workshop offers to control their project by letting them to create their own games. Students appreciated the fact of the project that they have control over what to accomplish, not particular assignments that were thrown to them, which would more likely happen in all other classes. They worked for what they wanted to accomplish. In addition they can make choice about the projects.

Conclusion

The continuing rise of student dropout rates emphasizes a need for further investigation into identifying influence of 3 D workshop on creating resilient environments which has been failed to build in school systems. This project offers a model of a framework to help educational administrators and teacher organize and construct their curriculum that promote successful and personally meaningful school experiences both socially and academically. The successful experiences in high school years can reduce the risk factors of high school students and consequently prevent from the drop-out.

While recognizing the importance of teacher models and demonstrations of skill performance fundamental to the instructional process (Meier, 1992), the majority of LGB instructions are composed of examples and step-by-step demonstrations, which students anonymously appreciate for their easy understanding of concepts of

programming. The examples and demonstrations presented as concrete and familiar examples and objects that are preferable to abstraction and unfamiliarity (Choate, 1993) for at-risk students. The inherent nature of programming allows students to share thinking techniques with peers: "How did you do that?" The actual content of examples and demonstrations influences not only learning in computer concepts but also building confidence in learning which seems to transfer to other academic areas according the findings from out qualitative data. Computer programming has been taught within the context of high-interest lessons, real-life content, and high engagement.

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Facilitating Knowledge Construction in an Undergraduate Technology Course: A Case of Hybrid Course Design

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Abstract

This article informs the readers of the challenges associated with implementing an introductory Educational Technology course for pre-service K-12 education majors. The authors examine the content and instructional design tasks which have been found to be effective in facilitating the development of technological, pedagogical and content knowledge (TPACK). More specifically, it examines the instructional design of such a state required course in a hybrid format, challenges faced by instructors and learning procedures built within to successfully integrate technology into the learning process. The benefits of deploying such a course in a hybrid environment as a means for mitigating challenges faced in higher education today are presented. An exploration of instructional design within a hybrid setting addresses the question of how educational media can be used to facilitate knowledge construction. Finally, suggested improvements and solutions for using technology to build TPACK are discussed.

Keywords: Hybrid course, Hybrid learning, TPACK, technology pedagogy and content knowledge, Pre-service teachers, Undergraduate technology course

Introduction

A core requirement for many undergraduate education majors is completion of at least one introductory course in Educational Technology. The overarching objective of such courses is to provide students with cursory knowledge of emerging technologies needed to incorporate technology in the classroom, to provide hands-on, practical experiences with technology and to demonstrate the integration of technology within lesson and task design. The intention is that students will build technological pedagogical content knowledge (TPACK) for application in their future classroom teaching experiences (Koehler & Mishra, 2009). According to a 2009 report prepared for the UNESCO World Conference on Higher Education, the integration of media and technology in education "holds the promise of breaking down barriers of time, space, and privilege; lowering costs; and enabling collaboration and creativity in teaching, learning, and research" (Altback, Reisberg, & Rumbley, 2009).

Theoretical Background

Although integration of technology has been at the forefront of discussion in the realm of higher education for considerable time, colleges and universities still find themselves challenged to deliver content-rich courses in Educational Technology which build sustainable TPACK to pre-service teachers. A fundamental disconnect continues to exist between the integration of technology as a *delivery* tool versus as a *teaching* tool (Gunter, 2001). Garrison and Knuka describe technology and digital media as the "defining transformative innovation" and "the single greatest unrecognized trend in higher education today" (Young as cited by Garrison & Knuka, 2004). More importantly, there is enormous pressure in higher education that this transformation must meet the needs of larger groups of diverse learners and must not be limited to factors of time, place or distance (Altback et. al., 2009).

Pre-service teachers are a specialized group with unique needs with respect to technology integration. However, many teacher preparation programs have not been able to fully meet these needs in practice. Indeed, as So and Kim (2009) point out, "mere exposure to a number of technical tools does not necessarily mean that pre-service teachers can develop abilities to design successful, technology integrated lessons". Among the obstacles facing pre-service teachers include lack of acceptance by teaching institutions, lack of positive student attitudes towards technology integration and lack of confidence, fundamental and practical skills for applying technology (So & Kim, 2009; Gunter, 2001; Pope, Hare & Howard, 2002).

According to Koehler and Mishra, technology use must align with pedagogical beliefs in order to be used effectively and specifically, "integration efforts should be creatively designed or structured for the particular subject matter ideas in specific classroom contexts" (2009, 62). In a study conducted by So & Kim (2009), a clear discrepancy was identified between pre-service teachers' ability to design effective lessons and to integrate appropriate supplemental technology. The study found that even those who were more skilled at using various technologies had difficulty in identifying suitable technology resources for their lessons. Further, the study found that through their lesson designs, pre-service teachers "were not able to translate their beliefs and knowledge to create a pedagogically sound lesson package with the integration of ICT components" (So & Kim, 2009). The overarching effects were that the pre-service teachers perceived technology integration as disadvantageous and therefore, confidence in and inclination to use technology declined.

Research has shown that in order to facilitate knowledge construction, technology education must be used in conjunction with a theoretical model which supports the desired outcome (Cullen & Davis, 2011). Consequently, technology must not be used as an "add-on" within instructional design, but as a mediator of knowledge construction exclusively designed for specific learning outcomes. Effective integration of technology involves having a strong theoretical foundation upon which the technology is utilized as relates to the objectives of individual lessons as well as the course as a whole.

Technology, Pedagogy and Content Knowledge (often referred to as TPACK) (Koehler & Mishra, 2009), provides a suitable framework upon which an introductory Educational Technology course may be based. Both the American Association of Colleges of Teacher Education and the US Department of Education not only underscore the critical value of TPACK as a facilitator of students' "mastery of 21st century skills", but also as a major contributor to the global economy (AACTE, 2010). Further, robust literacy in the areas of information, communications and technology (ICT) is a necessary skill for pre-service teachers as K-12 education continues forward momentum as a tool for research, communication and assessment in the classroom. Within this framework, a symbiotic relationship exists between the three TPACK elements which, when effectively integrated, supports the competencies required for pre-service teachers' successful matriculation into today's schools (AACTE, 2010; Gunter, 2001; So & Kim, 2009).

Hybrid Courses Address Challenges We Face

Financial challenges are also a very serious concern within college and university Boards of Visitors, administrative and leadership circles. With every passing year, public institutions especially, face reduced financial support from federal and state governments. In the decade between 1999 and 2009, higher education experienced an exponential surge in student bodies and expansion of programs and curriculum. While the cost of providing education to support this expansion increased dramatically, most colleges and universities maintained status quo fiscal and operational models which would not remain sustainable long term (Selingo, 2012). During this time, colleges and universities overlooked the looming obstacles which they are now often ill-prepared to face. Further, according to McLendon et. al. (2009), institutions of higher education have "suffered disproportionately" in terms of state funding and appropriations priorities. The inevitability of technology integration as a necessity for preparing students for life after college warrants that colleges and universities begin to seriously address how technology can be leveraged to address fiscal challenges while maintaining strong and diverse curricular offerings.

Technology has the potential to address many of these challenges in higher education including delivery of content-rich curricula, catering to diverse groups of learners, and increasing financial burdens. Specifically, hybrid courses have been found to support the learning process by retaining the community of learning and collaborative learning environment inherent in traditional face-to-face courses, while also maintaining a sense of connectivity through synchronous or asynchronous means when students are physically apart (Olapiriyakul & Scher, 2006). Additionally, amidst the financial burdens many universities face, implementation of hybrid courses also has the potential to help administrators more effectively manage campus resources and free up classroom space to expand course options to larger, more diverse student bodies.

Taylor (2012) asserts that the traditional face-to-face model of education is simply not economically feasible and/or does not fit into the lifestyle of many students. He cites that 85 percent of these "non-traditional" students must work full-time to support themselves and their families, spotlighting the need for an alternative such as hybrid education which addresses the changing demographic of today's students. Students may reap the cost benefits of hybrid courses by decreasing the cost of commuting while still allowing for the exchange of ideas, team collaboration, individualized study and interaction with instructors (Buzzetto-More, 2008; Olapiriyakul & Scher, 2006). In fact, it has been estimated that as of 2009, approximately 29 percent of college students had participated in at least one online course and that by the year 2014, this number will increase to 50 percent (Taylor, 2012).

Universities such as Harvard, Stanford and the Massachusetts Institute of Technology have already implemented platforms which will "enhance campus-based teaching and learning and build a global community of online learners (Taylor, 2012).

Research has shown that the use of technologies such as wikis, blogs, audio and video media have significant and positive implications when used appropriately for creating student learning experiences. These types of educational media, with unique characteristics and affordances, can be used to create project-based learning, to support peer collaboration, and to simplify portfolio creation. By incorporating educational media, these dynamic learning experiences facilitate knowledge construction which is holistic as opposed to knowledge which is short-lived and extraneous. The value of these tools is that "student teachers who learn to use technology during their pre-service studies are far more likely to incorporate technology in their future classes than those who have not had hands-on experience with its use" (Masats & Dooly, 2011). This affirms the importance of effectively incorporating educational media in introductory courses of Educational Technology. Therefore, the purpose of this paper is to examine how an Educational Technology course for pre-service teachers within the framework of a hybrid format mitigates many of the instructional, perceptual and financial challenges faced by students and universities today.

Model for a Hybrid Undergraduate Course in Educational Technology

Here reports a hybrid undergraduate course of Introduction to Educational Technology at a regional, comprehensive state university. The university has six colleges offering 52 undergraduate degrees, 30 graduate degrees, one specialist program and three doctorate programs to over 12,000 undergraduate students and 1,500 graduate students. This hybrid-course study was conducted in an undergraduate course of Educational Technology integration, a required course of Educational Technology programs at the university, as well as a state requirement for pre-service teachers. Total class size for the spring 2012 semester included 26 students, of which 21 were female and five were male.

The course is designed to introduce pre-service teachers to instructional technologies and become competent integrators of technology into their future classroom instruction. The course goes beyond the basic use of computer programs and also focuses on a systematic process for using instructional media such as wikis, audio/video production, and productivity tools to enhance learning and assessment. Hands-on experiences are provided in a lab setting, which supplement online instructional content including videos, audio lectures, and written materials. Assessment for the course involves student participation in discussion forums, personal reflections, completion of all media-based assignments and a final technology portfolio.

A systems approach to designing such learning experiences is vital to the success of these required introductory technology courses and ultimately facilitates the construction of meaningful knowledge. Instructional design in this study refers to a systems approach to create learning opportunities for the students to accomplish the instructional goals of an introductory Educational Technology course. Though control of knowledge construction is in the hands of learner, instructors can design learning experiences which encourage learners to explore target concepts and ideas and their interconnections so that they may navigate learning experiences which are individually relevant.

Although most college and university instructors encounter various obstacles in course design, instructional delivery and institutional and administrative conditions, there exist unique challenges associated with delivering a hybrid course of Educational Technology to pre-service teachers. Along with the challenges discussed in the previous section, perceived challenges from instructors include:

- Rapid evolution of technology requires frequent updates to course content to include more new and interactive media, which subsequently requires the university to have updated computers with fast processors and more RAM.
- Due to financial constraints, the university cannot afford regular upgrades to all the computers in the university labs in order to smoothly run all the required programs in the course.
- As a required course for education majors, this course is usually offered in multiple sections every semester. Unified and consistent instruction between instructors is difficult to maintain, while also seeking to meet the needs of students. Even different sections taught by the same instructor may require specialized attention specific to student needs.
- Due to differences in both knowledge and skills with technology, media and software programs, it is difficult to offer unified instruction that fits all the students in this course.
- Many learning activities in the course call for more individualized attention on the students when they engage in hands-on learning experiences with technologies; necessarily large class sizes often inhibit the ability of the instructors to provide this attention.

These factors must be carefully considered and addressed from both an instructional and institutional perspective. Successful delivery of hybrid courses must be approached strategically so that human, financial and organizational resources align to produce quality instruction which ultimately supports students' technological, pedagogical and content knowledge development.

Learning Tasks for a Hybrid Course in Educational Technology

The design of the course focuses both on enriching students' knowledge of technology and pedagogy and on enhancing students' skills in educational technology and media. The tasks are spread over nine learning cycles which allow students to meet relevant state standards in Educational Technology. The following table describes different types of activities and learning tasks for each learning cycle.

Topic of Learning Cycle	Lessons, Discussions and Reflections	Lab/Tech Tasks	Task Notes
1. Course Introduction	• Course information • Current trends in Educational Tech • Technology skills survey	• Keynote/PowerPoint • Learning Management Systems (LMS) training • Course Wiki	• Individual activity • Individual activity • Individual activity
2. Ethics, Mind Maps & Wikis	• Ethics, security, copyright & Fair Use • Educational uses of Wikis	• Inspiration • Google Sites newsletter • Group Wiki pages	• Individual activity • Team activity • Team activity
3. Administration & Productivity	• Learning, assessment and evaluation	• MS Excel • enGrade	• Individual activity • Team activity
4. E-learning & the Web	• How web browsers work • Mid-term reflection	• HTML primer • Web authoring • FTP	• Individual activity • Team activity • Individual activity
5. Audio message design	• Listening and learning with Podcasts • Educational uses of audio	• Digital audio recording and editing • Audio file formats	• Individual/team activity
6. Principals of Visual Languages	• Manipulating images	• Integration Activity: Picasa and Kerpoof • Using Visual Images to Engage Learners • Group review of newsletters	• Individual activity • Individual activity • Team activity
7. Introduction to Video	• Enhancing learning with video • Introduction to Jing	• Tech Training: Movie Maker/iMovie • Create Music video or meStory • Create a Lesson using Jing	• Individual activity • Team activity • Team activity
8. Open lab	• The Peer Review Process • Interactive Whiteboard	• Interactive Whiteboard/Smartboard lesson	• Team activity
9. Reflection & Presentation	• Final Critical Task: Personal Toolbox • Final Reflection	• Group Presentations in lieu of Final Exam	• Team activity
* This table is adapted from Dr. Kenny's EME 2040 course at FGCU.			

With the hybrid course design, students in each learning cycle (two weeks) met once in the lab for instruction and hands-on lab activities for two and a half hours. Since students need only use the computer lab once every two weeks, two sections of the same course can share the same computer lab throughout a semester. This mitigates the shortage of updated computer labs at the university.

Within the course design, "Lessons, Discussions and Reflections" focuses on both technological and pedagogical knowledge construction through reading, discussions and reflective learning tasks both in and outside the class. Instructors can facilitate learning and knowledge construction through discussion boards, Wikis and Blog pages, email communications and synchronous chats such as Adobe Connect. "Lab/Tech Activities" are hands-on activities to enhance the students' technology and medium skills and translate pedagogical knowledge into application. There are both individual activities and team activities in this category of learning tasks. Also, in "Lab/Tech Activities", students are required to work in groups of three to four members to explore s self-selected technology and then to introduce the technology to the whole class.

Suggestions for Hybrid Educational Technology Instructors

Hybrid course instructors must consider several factors when designing content for hybrid courses. Three key factors for designing instruction in a hybrid format include: (1) existing technological proficiencies (2) individual student goals and (3) logistical considerations. When assessing existing technological proficiencies, instructors should consider students' prior exposure to technology, use of social networking, knowledge of office products and audio/video editing experience. Individual student goals refers to the anticipated subject area and teaching level (i.e. grade level) after graduation; course design and technology integration for a kindergarten pre-service teacher will look significantly different than that of an expectant high school math teacher. Additionally, students may have personal or academic goals related to technology which can be supported and addressed during the course of instruction by guiding them to technologies and projects that will serve as stepping stones to their final goals. Finally, instructors must consider and make accommodations for logistics associated with carrying out the course tasks. For example, students may operate on different operating systems which may interact differently with required course software and downloads. Instructors must also consider students' accessibility to equipment and software outside of labs and be prepared to provide support or differentiated instructional tasks. Each of these factors plays a large role in the success of the course as well as the success of the student.

Instructors of hybrid courses must assess those of their students who are technology natives and those who are not. It is often assumed that students in our digital age possess the knowledge and skills needed to utilize various forms of technology. However, not all students are on an equal playing field with respect to fluency in technology. In order to address the three factors listed above, instructors should conduct a survey, ideally an online survey, which would help determine the level to technological proficiency, student goals and individualized needs in a non-intimidating manner.

Each student should leave each class having gained some kind of new information or knowledge that will help them achieve their academic and professional goals. By gaining this information, the instructors are able to more effectively tweak course content as needed, make group pairings to leverage student strengths to support and scaffold their less proficient classmates, and provide a baseline for evaluation of the effectiveness of the course at the end of the semester. Further, instructors are better equipped to design content which not only meets program requirements, but more importantly, the student is bound to gain new technological content knowledge, thus making it not only a positive experience, but a purposeful one as well.

Suggestions for Integrating Technology into the Learning Process

When it comes to the learning processes and understanding technology, instructors must to be aware that chances are quite high that their students have an inflated view of their fluency with most types of technology. Many students feel that they know how to use a particular device or software, but the tasks that they can do with the technology is limited by what they don't know or refusal to accept that they don't know. Instructors should encourage their students to always try to learn something new about the technology they are utilizing and implement that new knowledge while performing an assigned task. Although a student might be quite capable of producing a standard PowerPoint presentation, they may lack the knowledge of integrating audio, video or animation to create engaging lessons for their future students. Instructional design of lessons in an introductory course in Educational Technology must connect existing familiarity, new content knowledge and practical application.

Suggestions for enhancing this learning process through instructional design include:

- Incorporate the target technologies into the actual delivery of the instruction.
- Through the use of rubrics, require that discussion/forum posts be thoughtful, relevant and engage fellow classmates.
- When standard technologies (i.e. MS Office, Blogs, Podcasts) are used within the course, integrate new and practical aspects of that technology.
- Provide multiple modalities for demonstrating newly gained knowledge.
- Provide additional opportunities to practice using the newly acquired skills.
- Integrate both synchronous and asynchronous communication to maximize student engagement while maintaining course objectives (Castle & McGuire, 2010).
- Create lessons and activities which cater to various learning styles of students.
- In addition to individual and group work, allow for multiple avenues for students to communicate with and interact with instructors.

Discussion questions help guide students' thinking, provide a means for collaboration and create communities of learning. However, in order for them to be fully effective, not only should the discussion question open-ended and engage students to apply their new knowledge, but rubrics must clearly define response expectations. For example, students may be required to respond to at least 2 other class mates; the original author should respond to the classmates. This ensures that the author saw the recommendations, ideas, and improvements that their peers provided and that the collaborative effort has come full circle.

Another way to maximize the learning process is to start with an existing strength and build upon it. It would be quite advantageous for a student to be assigned a particular task or project using a medium they are comfortable with, and having them challenge themselves to take their knowledge to the next degree by learning how to use that particular technology in a way that was not known before. An example might be using an Excel spreadsheet which may have previously been used by the student to create simple lists; the student might be challenged to create a gradebook to capture and calculate future students' grades (see Learning Cycle 3/Administration & Productivity).

Using a scaffolding approach, once students have successfully challenged their capabilities with a technology they were already familiar with, the next step would be to explore a technology of which they are unfamiliar and prepare a presentation to be shared with their fellow classmates (see Learning Cycle 9/Reflection & Presentation). Final presentations may be either face-to-face, synchronous online or asynchronous online using a platform that is also commonly used by many colleges or online schools. Encouraging students to present in an unfamiliar modality, while challenging for some, will help others overcome perceptual barriers which will ultimately enhance their skillsets and prepare them for actual scenarios in their future classrooms.

Lastly, in addition to weekly learning tasks, the hybrid format may, in fact, be new to many students. In order for true learning to take place, students should be encouraged to use non-lab time to prepare, explore and process the week's topic of learning. Lab time is utilized as an opportunity to practice and apply the new skill, pose questions to instructors and collaborate face-to-face with team members. The multiple modes of learning offered through this type of hybrid instruction allows students to acquire new knowledge content in a manner which supports various learner types while simultaneously addressing challenges faced in the overall instructional network.

Conclusion

It is unlikely that the challenges facing all aspects of the higher education continuum will be resolved during the scholastic career of the average undergraduate student. State and federal appropriations to colleges and universities is likely to remain problematic, more and more students will seek to advance their futures by seeking higher education and inevitably, technology will continue to evolve and immerse itself in daily life and work. Colleges and universities will necessarily be required to leverage new and unique ways to seek funding and balance budgets, satisfy the academic needs of diverse student bodies and prepare students for the rigors of "real life". It is unavoidable that institutions of higher learning continue to evolve technology integration to address these challenges. Hybrid courses have the potential to assuage many of the financial, human and organizational obstacles that higher education faces.

This paper discussed a hybrid course in Educational Technology for pre-service teachers and the instructional design which was implemented to facilitate sustained technological pedagogical content knowledge. Building this sustained knowledge within the framework of TPACK allows pre-service teachers to achieve a holistic

view of technology integration by assuming the role of both delivery recipient and user. By implementing a systems approach to course lessons and tasks, instructors are able to deliver instruction in a hybrid setting which cultivates an equivalent community of learning and sense of collaboration as would be found in a traditional face-to-face environment. Based on the reporting of this study, we anticipate that hybrid learning, through the integration of technology will continue to grow as a key means for delivering quality education not only to pre-service teachers, but to students throughout the ranks of our higher education systems.

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Cognitive Presence in Virtual Environments: Analysis based on an Interaction-Based Community of Inquiry Model

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Abstract

The use of computer-mediated communication in both formal and informal education is a new reality that opened new research opportunities in the study on synchronous and asynchronous communication. A question then arises: which conceptual and epistemological parameters should guide the analysis of asynchronous communication in virtual environments? How can we assess the quality of the interactions developed and the process of knowledge construction in online education? There are various qualitative studies in the literature that analyze the asynchronous communication in online environments, however opting for one of them should always be in accordance with the purpose intended. In our case, and since the objective was to examine the concept of "cognitive presence" as defined by Garrison, Anderson & Archer (2001) we choose the Community of Inquiry Model that served as a benchmark for the analysis of the interactions in the social network PROEDI, established in January 2001 as a virtual platform for the professional development of teachers of Portuguese language. In this article we start by characterizing the Community of Inquiry Model, followed by the presentation of an analysis grid that was developed and validated from original instruments proposed by the authors to evaluate cognitive presence, i.e., to understand the construction of meanings in asynchronous discussion forums of the mentioned social network and ending with some final thoughts on aspects important to understand the process of construction of knowledge in virtual environments.

Keywords

cognitive presence, interaction, PROEDI, integration, resolution

1. Introduction

The adoption of computer-mediated communication is a strategy that has been appreciated by many researchers and other educational professionals to understand how people interact and learn in an online environment with predominance of asynchronous communication such as social networks or virtual communities (Garrison, Anderson & Archer, 2001). For these authors one of the challenges is to turn these environments into a Community of Inquiry, that is, a rich environment of interactions, of construction and reconstruction of knowledge, questions and constant analysis and reflections in a continuous system.

The second challenge is to know which parameter must be taken into consideration so that you can analyze these interactions, and most importantly, to realize the trajectory and the commitment of the community in the quest to solve a question, to identify whether there has been attempt to try or exercise what has been learned or even the intention to apply the knowledge acquired there in other contexts. This is a complex process that requires specific instruments that must contain indicators that will satisfactorily meet the requirements and that can assess the quality of text-based discourse, specific of these environments. It was to this end that Garrison, Anderson and Archer (2001) developed a theoretical framework that aimed the identification of essential requirements so that an educational experience that takes into account the computer-mediated Communication –CMC- can succeed. The requirements are: a) cognitive presence, b) social presence and c) presence of teaching. Among the three we chose ‘cognitive presence’ because apart from believing this is an essential component in a virtual community for providing evidence of the quality of the discussions and that can also allow a procedural assessment of critical thinking and organization of reflections of members over time, it will be the component that will serve as a reference for analyzing the quality of discourse in the social network forum PROEDI (teachers in the Digital Age - www.proedi.ning.com).

Therefore, in this article we'll start by characterizing the Community of Inquiry Model, emphasizing the cognitive presence, followed by the presentation of an analysis grid that we developed and validated from original instruments proposed by Garrison, Anderson and Archer (2001) the cognitive presence with the aim to understand how the process of construction of meanings in online discussion forums with predominance of asynchronous communication, taking into account the following phases: Triggering Event; Exploration; Integration; Resolution. Then we will introduce the study of evaluation of cognitive presence in the forum titled "Experiences with the use of ICT". Lastly, we will present some final thoughts about the process of construction of knowledge in virtual environments.

2. Cognitive Presence

According to Garrison, Anderson and Archer (2001), the cognitive presence is an essential component in a community because in addition to providing evidence of the quality of the discussions it also allows a procedural assessment and continuous organization of critical thinking and thoughts of the members over time. For these authors, this type of assessment is crucial in environments where communication is asynchronous and text-based because it follows the rules of written transcripts and so can provide a precise record of individual contributions and also the existing interactions between the members. These features, in the view of the authors, are a necessary and indispensable contribution to help members in attaining their goals and also from the community itself, given the absence of body language communication or paralinguistics. In addition, these transcriptions are reflected in the full recognition of prior knowledge that members have added to their shared repertoire. In general terms the cognitive presence can be “defined as the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in the critical community of inquiry" (Garrison, Anderson & Archer, 2001, p. 11).

However, we agree with these authors when they state that the evaluation of this component should not be an easy task and that brings with it many challenges, given the form of analysis of the contributions that does not invalidate the evaluator's subjective interference. Trying to minimize this dilemma, Garrison, Anderson and Archer (2001) developed an analysis model of this component supported in the pragmatism of Dewey (1976) which stands for that any knowledge includes reflection and practical application in solving problems (see Figure 1).

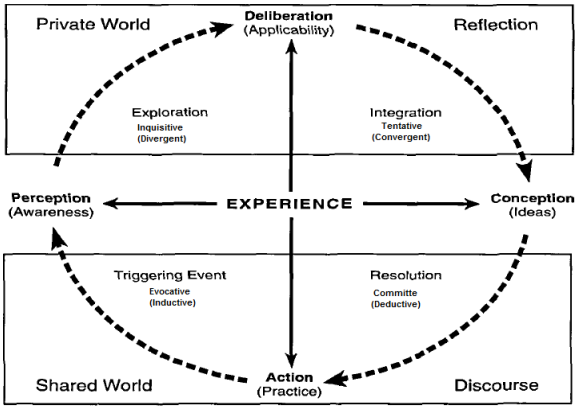

Figure 1:
Categories and descriptors of cognitive presence
(adapted from Garrison, Anderson and Archer, 2001)

As you can see, the first dimension of the model consists of two uninterrupted processes which are ‘action’ and ‘deliberation’, i.e., the practical application of acquired knowledge. The second dimension can be defined as the moment of transition between the awareness of the problem (perception) and the conception of ideas, generating a final product that is the collective knowledge. In addition, this model is still composed of four phases that here we'll call categories, which are:

a) First phase (Triggering Event) - configures itself as the beginning of the research or discussion. In this case, not only the e-moderator but also the members throw challenges and pose questions to be discussed, that is, start a discussion topic. “the first category (triggering event) is a problem-posing event and, therefore, is considered evocative and inductive by nature in terms of conceptualizing a problem or issue” (Garrison, Anderson e Archer, 2001, p. 14);

b) Second phase (Exploration) - in this phase the members begin to realize the problem and then begin to explore the relevant information. The authors claim that in this phase there is a process of getting rid of the private world, since they socialize their ideas within the group. In other words "is the search for relevant information and, therefore, reflects an inquisitive and divergent process in the search for ideas to help make sense of the problem or issue" (idem, p. 14).

c) Third phase (Integration) – Can be characterized as the phase where meanings are generated as a result of the ideas generated in the exploratory phase because it "represents the construction of a possible solution and, therefore, is a tentative conversion or connecting of relevant ideas capable of providing insight into the dilemma" (ibidem, p.9). In this phase we observe that members begin to reflect on the subject, diagnose errors, questioning, and send comments, among others.

d) Fourth stage (Resolution) – it is the phase where there is construction of knowledge and where it is possible its application in practical problems. The authors are also emphatic in stating that at that stage could trigger new discussions, if we consider that the members have acquired useful knowledge. According to Garrison, Anderson and Archer (2001, p. 14) "the fourth category (resolution) is the process of critically assessing the concepts and, therefore, represents a commitment to a solution and deductively testing its validity".

The process of analysis of the content of the posts of the Forum was a way to validate the instrument and to make small adjustments in the writing of indicators in order to make them operational for a more accurate categorization of the speech of the Forum participants.

Based on this principle, we present below a grid (see table 1) adapted from the model of Garrison, Anderson and Archer, (2001), in order to help researchers identify critical thinking within a social network or virtual community through cognitive presence.

Categories	Indicators	Definition
1. Factor generator (Evocative)	1.1. Recognize the problem	Submit information about the subject, culminating with questioning.
	1.2. Sense of confusion or amazement	Ask questions; send comments that lead to discussion on new directions.
2. Exploration (Inquiry)	2.1. Divergence within the online community	Disagreement of ideas, but without theoretical support.
	2.2. Divergence in a simple message	Too many different ideas or themes presented in the same message
	2.3. Exchange of information	Personal narratives/description/facts (not used as argument to sustain a position or conclusion)
	2.4. Suggestions to take into consideration	Comments that denote some restriction or disagreement of ideas. Ex: this does not seem correct; I disagree; Am I exceeding myself?
	2.5. Brainstorming	Adds new ideas, but does not defend them theoretically, and neither develop them systematically.
	2.6. Conclusions	Points suggestions and opinions, but not justifies.
	3.1. Convergence among members of a group	References to the contribution of colleagues, agreeing with their ideas, but also adds new ideas and new meanings.
	3.2. Convergence in the same message	Try to justify, develop and defend hypotheses.

3. Integration (Attempt)	3.3. Connect ideas, synthesize	Integrate information from various sources: books, articles, personal experiences
	3.4. Create solutions	Explicit characterization of a message as a solution by the participant
4. Resolution (Compromised)	4.1 Apply to the real world	Practical application of the knowledge acquired
	4.2. Test and defend solutions	Establish relationships with other existing knowledge; acquire competence in analysis and critical reflection and have the power of argument to support the ideas advocated regarding the challenge.

Table 1: Grid to evaluate the cognitive presence
(adapted from Garrison, Anderson and Archer, 2001)

2. Methodology

The empirical study is analytical or document analysis (Christabel, 2011) by the fact that the research is based on a documentary analysis process in which the data sources have the written text format (contributions from members in a social network Forum PROEDI). Analytical research is a form of non-experimental or descriptive studies (MacMillan & Shumaker, 1997) in which the researcher, based on a grid, shall examine the content of documents in different formats, such as books, newspapers, radio programs or websites. The technique used was content analysis and, according to Berelson (1952), it is a quantitative technique *for the objective, systematic, quantitative description of the manifest content of communication* (idem, 519).

Once chosen the technique for data analysis, the next step was to define what would be the unit of analysis that we would adopt whereas in literature there is a consensus on what would be the most appropriate: the message, the subparagraph or the phrase, because according to Rourke *et al*., (2000), this option has to be in accordance with the purpose and specificity of the study intended. In the case of our study, whose objective is to analyze the construction of knowledge through the development of critical thinking of the members who participated in the discussions of the social networking forum PROEDI (teachers in the Digital Age – www.proedi.ning.com), titled "Experiences with the use of ICT", and we choose as the "analysis unit" the 'message', based on Rourke et al, (2000) and studies of Ahern, Peck, and Laycock (1992) and Garrison, Anderson, and Archer (2001), which state that the more appropriate unit of analysis is the message for the following reasons: i) it's objectively identifiable, since research has shown greater adherence on the part of researchers; ii) it meets the principles of exhaustiveness and exclusivity as needed to ensure the reliability of the investigated object and iii) according to studies conducted by some scholars such as Marttunen (1998) and Ahern, Peck, and Laycock (1992), so it was possible to observe a degree of agreement between encoders when the message was adopted as the unit to analyze asynchronous discussion in discussion forums.

Accordingly, and to ensure fidelity and the principles of objectivity, reliability and systematic consistency described by Rourke *et al*. (2000) we have chosen to use the message as a analysis unit, and for the calculation of the degree of agreement of judges we used the statistical indicator Cohen's Kappa (K), which is a measure in percentage of agreement between independent evaluators for categorical data analysis (Weber *et al*., 2006) aiming to minimize subjectivity, very common in research of interpretative nature, which is based on speech analysis techniques (Lisbôa, 2010).

In the specific case of our study, the analysis process of asynchronous communication content recorded in the Forum of PROEDI social network was carried out by a team of two experts, the researcher, cognizant of the conceptual model, and an expert in the field of educational technology, that did not know the model yet but that was accustomed to do content analysis of written discourse. In order to achieve the greatest possible objectivity throughout the process, they had a meeting beforehand and worked on examples of the various phases and situations for assessment of cognitive presence in posts left by the participants in the discussion forum. So, they decided not to encode messages of greeting or others with little relevance to the discussion. Clarified the concept underlying the process of content analysis, it was randomly selected a sample of posts corresponding to about 25% of all posted messages that were encoded independently by the researcher or by the expert. Finally, it was calculated the level of reliability that has a percentage of agreement of 86.7%, that according to several authors (De Weber *et al*., 2006) it corresponds to a strong level of agreement.

3.1. Data collection instrument

The instrument used in the analysis grid was adapted from the model proposed by Garrison, Anderson and Archer (2001) containing five processes with their respective descriptors.

3.2. Characterization of the sample

Our sample is composed of 11 members, of whom 04 are male and 07 female, 07 unmarried, 03 married 03 and 01 divorced. With respect to age, 04 of them belong to the 31 to 35 years range, 03 to 36-40 years range, 01 to 20-25 years range, 01 to the 26-30 range years , 91 to the 41-50 years range, 01 to the 51-55 years range and 01 is above 60 years.

The vast majority (09) is from Brazil and only 02 are from Portugal. With respect to employment, 06 are public municipal and state employees, 02 are teachers in private institutions and university teachers, 01 is a federal public employee, 01 is from a private company and 01 did not respond. With regard to the level they teach, 05 teach in elementary and secondary education, 02 teach in early childhood education and elementary school, 03 teach in higher education and postgraduate and 01 did not respond.

When it comes to ICT training, of the 27 that responded, 04 have advanced knowledge, 03 average knowledge, 01 basic knowledge, 01 had no knowledge and 01 did not respond.

4. Analysis and discussion of the data

As mentioned above, we had a participation of 11 members with a total of 37 posts with extension that varied from a minimum of 24 to a maximum of 765 words. All contributions have been considered in full and constituted the corpus.

Whereas the unit of analysis was the message, and that its extension was very variable (on average a message varied between 10 and 17 rows), soon we realize that it would be inappropriate and inaccurate to encode these messages in a single category since many of them showed different levels of critical thinking. Faced with this reality, we have adopted the procedure referred to in several other studies, choosing in the encoding process the more advanced category found in the message.

In the analysis we realized that the category that presents a higher percentage was *Integration* with 29.73% (11 messages), followed by the *Resolution* with 27.03% (10 messages); *Exploration* with 27.03% (10 messages) and *factor generator* with 16.21% (06 messages).

With regard to category "integration" which represents a stage of critical thinking in which members express the attempt to connect ideas relevant to the construction of critical and reflective thinking about the theme placed or even the desire and the manifestation of the group in building knowledge collectively in a community, it was possible to observe that all indicators of categories were covered, i.e. the group acknowledged and highlighted the contributions of colleagues, but also added new knowledge (3.1 *convergence among members of a group*); the group also expressed the desire to justify their positions which for us is an indicator of intellectual maturity and development of higher psychological processes (3.2. *convergence in the same message*). In addition it was possible to observe that the group was involved in the discussion and, above all, focused on providing other sources such as books, articles, links of interest or even share personal successful experiences to encourage colleagues in the proposed challenge (3.3 *connect ideas, synthesize*). And finally it was possible to realize the attempt by the participant to present a solution to a question or questions of other colleagues (3.4. *create solutions*), as can be seen in table I below.

3. INTEGRATION						
Nr of messages	%	**Number of evidences by Indicator**				
		3.1	**3.2**	**3.3**	**3.4**	**Total**
06	16,21	07	07	03	08	25
Example	Finally a direct and free participation. However, to say you did this or that action without demonstrating it makes this not a constructive processes. Since the beginning I have prompted education proposals open to reconstruction. Proposals where we can make use of modern ICTs as well as observe the feedbacks and evaluation methodologies					

Table 1: Presentation of data from Integration category

The category "resolution", as the last stage of the development of critical thinking, can be defined as the time when the group is already mature enough to be able to critically evaluate concepts, establish relationships with other knowledge, in short, this is the phase in which people are able to draw their own conclusions about the subject matter discussed, and expressing interest in testing its validity. In our study, it presents itself as the second in number of evidences, proving that the group has taken the knowledge acquired there and, more importantly, was motivated to learn collaboratively. All indicators were included in this category, however it was possible to observe that the group has not expressed much interest in applying some knowledge acquired there in practical situations of classroom (4.1. *apply to the real world*). On the other hand, we achieved a considerable number of evidence (see table 2) that allowed us to realize that the group established relations with previous knowledge, was assertive in the arguments used, which were consistent and coherent (4.2. *test and defend solutions*)

4. RESOLUTION				
Nr of messages	%	**Number of evidence by Indicator**		
		4.1	**4.2**	**Total**
10	27,03	07	12	19
Example	In the face of these problems, learning the use of the platform was the first course discipline where the participants and we had the opportunity to explore and express our doubts. After the "loss of fear", the obstacles have been overcome and the goals reached!			

Table 2: Presentation of data from Resolution category

With regard to category "Exploration" that is about the moment the group searches in the discussion and in the contributions relevant information from colleagues to meet satisfactorily the proposed challenge, in our study presented a number of evidence similar to the previous phase (resolution). The only indicator that was not contemplated in this category was *the divergence within the online community* (2.1). However it was possible to observe the interests of members to share various ideas (2.2. *divergence in a single message*), pointing hypothetical solutions (2.6. *Conclusions*), or even in the simple exchange of information (2.3. *Exchange of information*). Among the indicators contained in this category, the most highlighted were "suggestions to take into consideration" (2.4) and "Brainstorming" (2.5). We believe that the results obtained at this stage were decisive for the greater engagement in the group in subsequent stages, i.e. "integration" and “resolution” (see table 3)

2. EXPLORATION							
Nr of messages	%	**Number of evidence by Indicator**					
		2.2	**2.3**	**2.4**	**2.5**	**2.6**	**Total**
10	27,03	02	03	04	04	02	17
Example	I noticed that you have a blog about languages NTIC. Have you ever thought about using the site as a teaching strategy? Think about it!						

Table 3: Presentation of data from Exploration category

Finally we have the phase called "factor generator" that was the category that had a lower index of evidence. It is a phase that aims to invoke and remember and is more inductive. It is an important phase because in addition to encouraging a questioning can also give other connotations in discussions (see table 4).

1. FACTOR GENERATOR				
Nr of messages	%	**Number of evidence by indicator**		
		1.1	**1.2**	**Total**
06	16,21	06	05	11
Example	Try to work with pedagogical projects that use technological tools and always in line with the textual genres, in a socio-interactionist perspective. From the moment that I was awakened to this proposal of work, the results have been significant. I realize that the lessons flow more freely, without the traditional weight.			

Table 4: Presentation of data from Factor Generator

In the specific case of our study it was a surprise that this phase presented the fewest number of evidence. We believe that this Is due to the fact that the themes presented may not have been a novelty or were not a major concern by the group needing more questioning (1.1. *to recognize the problem*) or it has not been an issue unknown to group that could cause a sense of amazement (1.2 *sense of confusion or perplexity*)

5. Lessons learned

The study provided results that have now presented a reflection on three distinct levels. In the first place, and given that the instrument used in the study is an adaptation of the original model of Garrison, Anderson & Archer (2001), we can say that the version adapted and used in the analysis proved appropriate for the study of computer-mediated, asynchronous communication within a community of teachers who share the Portuguese language. In fact, the categories and indicators proposed by the authors proved effective to evaluate the group's involvement in the discussion, once organized in a very effective logic, i.e., part of induction for the deduction, allowing us a procedural assessment of cognitive processes of organization members over time.

Secondly, we should make reference to the analysis process itself, since, as in many other authors, the unit of analysis chosen was the message because, and according to Rourke *et al*. (2000) it's a unit "objectively identifiable (...) and whose parameters are determined by the author of the message" (p. 10). In fact, it was the first time that the authors used the message as content analysis unit of asynchronous communication PROEDI network, which was a huge challenge. Also, when using the message as the unit of analysis we must be careful when it comes to analyzing long messages that contain multiple ideas, presented in a coherent discourse, with beginning, middle and end that sometimes match more than an indicator of the same category or even more than a category of the theoretical model. Thus, after several attempts in order to find most systematic and objective way to analyze each one of the messages, we decided to start by categorizing all the indicators contained in the message. Once there were messages with different categories of indicators, we chose to follow the suggestion of the authors of our theoretical reference (Garrison, Anderson & Archer, 2001), who suggests that when the message reflects multiple phases of the coding scheme, the coder can either *code down* if it is not clear which message is evident or *code up*, if clear evidence of multiple phase is reflected. In the case of our analysis, after having discussed the matter between the two coders, we decided to *code up*, i.e., thus assigning the highest phase reflected in the message. Thus, and reflecting on the past experience (Lisbôa & Coutinho, 2012a; 2012b-in press; 2012c 2012d) in which we used not the message but the phrase (semantic unit) as the unit of analysis, we can say that, although more complex and demanding for the encoders, the use of message ensures greater reliability to the analysis process mirrored in the high value of the value of the agreement coefficient of Cohen's Kappa we have achieved in this study (0.87). In short, we have no doubt that the message is the unit of analysis more consensual and undoubtedly the most suitable for the short post analysis, without great extension. However, and according to Rourke *et al*. (2000), the researchers should be aware that there is no better unit than the other; everything will rely solely on the goals, needs and interests of each researcher and research in particular.

On the other hand, apart from ensuring the reliability of the analysis process, we were able to validate the original instrument was translated and adapted for our study and that can serve as a reference for future studies. In addition, the strategy is in line with literature (Potter & Levine-Donnerstein, 1999) when it comes to the need to validate the data of an investigation that must meet two basic issues: i) the existence of a theory that supports the concept of an encoding and, more importantly, that serve as guidance to the work that will be developed by encoders/evaluators and ii) make it clear what will be evaluated and what is the purpose. These criteria were certainly taken into account in our study because our study was based on a model internationally

recognised and used by many other researchers who, like us, have contributed to increase the internal validity of the theoretical model.

Finally, and in order to respond to the original question, that is, to detect the presence (or absence) of thought in the speech of members of PROEDI, the results allow to affirm that the cognitive presence is, in fact, a component that enables participants of a particular community to create meanings, establishing relationships with other existing knowledge, acquiring analysis competence and critical reflection. This is because it allows us to focus on higher thought processes as a result of the interaction and knowledge sharing of members of a discussion forum, rather than in individual learning processes and outcomes (Garrison, Anderson, and Archer, 2001). Furthermore, it allows us to a procedural assessment of some indicators such as, for example, creativity, problem solving, intuition and insight, which according to Garrison and Archer (2000), are strong indicators of intellectual maturity of a network or a virtual community. In our study this was evidenced mainly on the phases of 'exploration' and 'resolution'. In the 'exploration' phase it was possible to verify that, in addition to the existence of the evaluated component (cognitive presence), there was also the presence of teaching. We say this based on some posts where it was possible to verify that not only the e-moderator but also some members were decisive elements to diagnose possible misunderstandings and produce comments in order to help the community in the development of critical sense and, consequently, in the appropriation of knowledge. However, in the 'resolution' phase, it was possible to realize that the knowledge acquired there were significant by providing their participants strong arguments to sustain and defend an idea and, more importantly, appropriating a useful knowledge and applicable in other contexts of their professional and personal trajectories.

We hope that this study will serve as an incentive for more researchers can evaluate and test the model of Community of Inquiry and so provide another perspective of the importance of its use for analyzing computer-mediated communication with predominant use of asynchronous communication.

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Teaching College Courses with Students from Multiple Generations

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There are many challenges to teaching multi-generational groups. Each generation has different values, experiences, work habits, and communication styles. In this paper we review how the values, habits, and preferences of four generations of students affect decisions about teaching and learning activities.

Growth of the Multi-generational Student Population

Several factors have contributed to the increase of multi-generational groups working and learning together in the workforce and in higher education. People are living longer and working and studying into their latter years. Advances in health care, plus greater access to health care information and services have helped increase the average human lifespan since the mid-twentieth century.

The recent economic downturn has required many would-be retirees to delay retirement. Many worker who have lost jobs are going back to school to retrain for new work. "Three-quarters of all undergraduates are 'nontraditional,' according to the National Center for Educational Statistics" (Oblinger & Oblinger, 2005, p. 2.8). Oblinger (2005) says nontraditional students are those who have delayed enrollment, attend part-time, work fulltime, or have dependents. "About one-third of undergraduates are adult learners" (Swail, 2002). Wager (2005) says, "… the landscape of higher education is changing... For example, the number of adult learners continues to increase at many colleges and universities." Regarding the challenges for adult learners, Wagner stated "Beyond the obvious difference of age and time away from the classroom, adult learners may not have the same comfort level or familiarity with technology—and they may be the least advised on how to use it" (Wager, 2005, 10.6). Consequently, organizations and higher-education institutions are experiencing the challenges of educating a multi-generational student population.

Generations Defined

Generations can be divided into definable categories, although there are differing opinions on the time periods and labels assigned to each. A generation is an identifiable group that shares birth years, age location, and significant life events at critical developmental stages (Kupperschmidt, 2000). Lancaster & Stillman (2002) divide generations into Traditionalists, Boomers, Generation X, Millennials (also known as Generation Y and Nexters) and Generation 2020s (or Neomillennials). Table 1 below shows these generations and the years that roughly delineate them.

Table 1 – Division of Generations (Lancaster & Stillman, 2002)

Traditionalists	Boomers	Gen Xers	Millennials (Or Generation Y, Nexters)	Generation 2020s
Born before 1945	Born between 1946 and 1964	Born between 1965 and 1980	Born between 1981 and 1999	Born around 2000

Oblinger and Oblinger (2012) define the generations slightly differently, as seen in Table 2 below. They label the generation born before 1945 as "Matures," instead of "Traditionalists," The dates for the "Millennials," or as Oblinger and Oblinger call them, the "Net Generation," range from 1982 to 1991, and Oblinger and Oblinger do not include "Generation 2020s".

Table 2 – Generations by Birthdate, Description, Attributes and Preferences (Oblinger & Oblinger, 2012)

	Matures	Baby Boomers	Generation X	Net Generation
Birth Dates	1900–1946	1946–1964	1965–1982	1982–1991
Description	Greatest generation	Me generation	Latchkey generation	Millennials
Attributes	Command and control Self-sacrifice	Optimistic Workaholic	Independent Skeptical	Hopeful Determined
Likes	Respect for authority Family Community involvement	Responsibility Work ethic Can-do attitude	Freedom Multitasking Work-life balance	Public activism Latest technology Parents
Dislikes	Waste Technology	Laziness Turning 50	Red tape Hype	Anything slow Negativity

Birth year is only one factor to consider in distinguishing among generations, and it may be a minor one. Experts say "generations are shaped much more by history than by chronological dates. It is important not to make assumptions about any one person based on birth year" (Reeves, 2008, p. 3).

Traditionalists and Baby Boomers

"Traditionalists and Baby Boomers grew up before the advent of the personal computer, much less the Internet, and, in general, aren't as comfortable with technology" (Worley, 2011, p. 32). "One of the top values of the Baby Boomer generation is relationship building, a valuable asset in team learning" (Worley, 2011, p. 32).

Generation X

Walmsley (2011) says that Generation Xers generally have a "more informal style than Baby Boomers and are self-motivated." She says "this generation is relatively good at personal communication and interactions, but they also use the Internet and email to make their lives more productive" (p. 26).

"The Generation Xers were the first 'latch key' generation and strongly influenced by emerging technological developments. Financially, they experienced wide-scale job loss and runaway inflation that led to their sense of economic and social skepticism. These events shaped their hallmark characteristics: they mistrust most of society's organizations and institutions, and they believe that stabilizing influences such as job security are a myth. They seem impertinent because of their confrontational style. For Generation X, versatility is the key to stability" (Hartman et al., 2005, p. 6.7).

Millennials

Millennials are also referred to as Generation Y, the Net Generation, or Nexters. "These members are very comfortable with the Internet and technological advances, as they grew up with the development of the Internet" (Black 2010, p. 95). Black (2010) suggests that Millennials think and process information differently than previous generations." This can cause a disconnection between students and instructors. Black also says some research

suggests “digital technology has transformed the human brain and the way it receives and processes information….Digital natives, fluent in acquiring and using technological tools and learning this technology quickly with an intuitive understanding of digital language, seem to use these tools as an extension of their brains. As members of the first generation to grow up with digital technology, they can speak its language” (Black, 2010, p. 95).

Students of the Millennial generation like to decide which learning technique works best for them. They are self-directed and approach learning as a “plug-and-play” experience (Black, 2010). They are very visually oriented and would rather see a concept instead of reading about it (Worley, 2011). Millennials must be entertained as they are being educated (Worley, 2011). Millennials are confident, independent and autonomous which makes them more assertive and affects how they learn in the classroom (Barnes et al., 2007).

Neomillennials

Neomillennials are those born after 1994—just over a decade after the Millennials. This generation has experienced an unprecedented digital immersion. The Pew Research Center’s Internet & America Life Project - 2011 Parent/Teen Digital Citizenship Survey showed that usage of the Internet by teens was 95% (The Pew Research Center, 2011a). The survey also showed the percentage of teens ages 12-17 who own different types of different devices: 77% owned cell phones, 74% owned desktop or laptop computers, 79% owned iPods or MP3 players, 80% owned game consoles, and 51% owned portable gaming devices (The Pew Research Center, 2011b). Dede says, “Differentiating between the two millennial generations, millennial learners are those who learn using the world-to-the-desktop interface, whilst Neomillennials are involved in immersive e-learning environments” (Dede, 2005a, pp. 15.1-15.2). Sankey also defines Neomillennials in terms of learning modalities. “‘Neo’ means ‘new’ and ‘millennial’ referring to the learning modality required for the new millennium” (Sankey, 2006, p. 82).

Technology Generations

The various generations of people experienced different technologies during their formative years. “Matures were exposed to large vacuum-tube radios, mechanical calculators, 78 rpm records, dial telephones, and party lines. Baby Boomers grew up with transistor radios, mainframe computers, 33- and 45-RPM records, and the touch-tone telephone. Gen-Xers matured in the era of CDs, personal computers, and electronic mail. For the Net Generation, the prevailing technologies are MP3s, cell phones, and PDAs; they communicate via instant messaging, text messaging, and blogs” (Hartman et al., 2005, p. 6.2).

Technological tools and processes can also be categorized into a series of generations. In computing, the focus has shifted from huge mainframes to minicomputers to personal computers, and, most recently, to mobile devices. And, as computing and communication devices have decreased in size, they have increased in performance (Hartman et al., 2005).

“Connectivity has experienced a similar transition across generations, from no connectivity to proprietary device-to-device cabling, to globally interconnected local area networks, and, now, to wireless” (Hartman et al., 2005, p. 6.2).

“Computers were initially developed as number crunching devices. The early emphasis on processing numbers, then words, has been joined by multimedia: graphics, images, video, sound, and interactive games. Prevalent among today’s applications are interpersonal and group communication tools” (Hartman et al., 2005, p. 6.2). “The use of early computers was batch-processing-oriented and required programming skills and arcane commands. Today’s graphical user interfaces and the Web make the operation of computers highly interactive and achievable by nearly anyone. The Internet has led to the kind of global village of information and communication envisioned by Marshall McLuhan” (Oblinger & Oblinger, 2012).

Generations and Instruction

A challenge for an instructor is to account for differences among the generations and maintain an effective learning environment. An instructor must consider each generation’s values when creating group activities. In cross-generational learning teams, each member brings different skills, values, and expectations to the group. Team-based learning provides the opportunity for each generation to teach the others and share their knowledge and skills..

Because of the diversity of experiences and preferences, it is important to make available a variety of learning experiences and opportunities for communication and collaboration. Each generation may be different, but they also have similarities. Zaporzan (2012) says the similarities include a need for communication and feedback, a

desire for meaningful work that is connected to their interests, wanting to be included and heard, and a need for social interaction.

Walmsley's (2011) perspective about teachers from different generations working together is also applicable when instructors work with students from different generations. She says, "Differences in opinion are key for challenging traditions and making changes." She also talks about having respect for each other's experiences, which will create a more positive culture (p. 26).

Challenging Traditional Instruction

Hartman et al., (2005) reported that students could determine characteristics of excellent teachers independent of generation, learning style, course modality, and technological sophistication. They identified six characteristics, independent of age, gender, and academic achievement that students attribute to the best faculty. Good teaching appears to be universal across generations. Excellent instructors:

- Facilitate student learning.
- Communicate ideas and information effectively.
- Demonstrate genuine interest in student learning.
- Organize their courses effectively.
- Show respect and concern for their students.
- Assess student progress fairly and effectively (Hartman et al., 2005).

"Higher education is going through significant changes stimulated by the rapid growth of the Internet, the increasing globalization of higher education, and the ever-pressing question of institutional and instructional quality. New modes of educational delivery through virtual networks are breaking the traditional mold of instructional provision" (Swail, 2002, p. 16). The availability of the Internet has given students many more options for learning beyond the classroom. New mobile devices that allow Internet access at any time have influenced student expectations for real-time and anytime communication.

What do these innovations mean for instructors? An instructor must be cognizant of learning preferences and attitudes, communication styles, and educational experiences of up to four generations within a single setting. The unique values, experiences, and preferences of these generations affect organizational decisions about learning and development activities. Instructors may need to redesign courses to meet the needs of four generations, and they must also be aware of their own particular preferences and capabilities relative to those of younger generations who may be more fluent with recent technologies.

Dede asserts "the technology and media used by children during their formative years do have an influence on how they learn, as do the media used by adults" (Dede, 2005, p. 15.1). "The growing prevalence of interfaces to virtual environments and augmented realities is beginning to foster Neomillennial learning styles" **(**Dede, 2005, p. 8). "Shifts in students' learning styles will prompt a shift to active construction of knowledge through mediated immersion (Dede, 2005, p. 7).

So how does the influence of the World Wide Web affect students' learning preferences? Dede says, "By its nature the Web rewards comparison of multiple sources of information, individually incomplete and collectively inconsistent. This induces learning based on seeking, sieving, and synthesizing, rather than on assimilating a single 'validated' source of knowledge, as from books, television, or a professor's lectures" (Dede, 2005b, p. 7). Dede shows a comparison of Millennial and Neomillennial learning preferences in Table 3.

Table 3 – Comparison of Millennial and Neomillennial Learning Preferences (Dede, 2005a, pp. 15.15)

Neomillennial	Millennial
Fluency in multiple media, values each for the types of communication, activities, experiences, and expressions it empowers.	Centers on working within a single medium best suited to an individual's style and preferences
Learning based on collectively seeking, sieving, and synthesizing experiences rather than individually locating and absorbing information from some single best source; prefers communal learning in diverse, tacit, situated experiences; values knowledge distributed across a community and a context, as well as within an individual.	Solo integration of divergent, explicit information sources
Active learning based on experience (real and simulated) that includes frequent opportunities for embedded reflection (for example, infusing experiences in the Virtual University simulation <http://www.virtual-u.org/> in a course on university leadership); values bicentric, immersive frames of reference that infuse guidance and reflection into learning-by-doing.	Learning experiences that separate action and experience into different phases
Expression through nonlinear, associational webs of representations rather than linear stories (for example, authoring a simulation and a Web page to express understanding rather than writing a paper); uses representations involving richly associated, situated simulations.	Uses branching, but largely hierarchical, multimedia
Co-design of learning experiences personalized to individual needs and preferences.	Emphasizes selecting a pre-customized variant from a range of services offered

Learning Engagement and Generations

"Blended learning provides a unique opportunity to bridge generations, providing the face-to-face contact requested by Baby Boomers, the independence preferred by Gen-Xers, and the interaction and sense of community desired by Net Geners. Extensive use of e-mail, discussion groups, and live chat increases communication and collaboration among students, as well as between students and the instructor" (Hartman et al., 2005, p. 6.8).

The Research Initiative for Teaching Effectiveness at the University of Central Florida conducted a survey of students' online learning experiences. The "positive narratives" for all three groups emphasized "flexibility, convenience, and self-paced learning for their online experiences. The less positive perceptions of the generations varied widely. Baby Boomers lamented the lack of face-to-face interaction in the online environment--a comment consistent with this generation's tendency to discuss and tell stories. Generation X was uncomfortable with the continual connectedness of online learning that contradicts their penchant to 'get to the point' and 'move on with it.' The Net Gen respondents were disappointed; they perceived a lack of immediacy in their online courses and felt that faculty response times lagged behind their expectations" (Hartman, et al., 2005, p. 6.8).

"Generational differences were also found in whether students changed their approach to learning as a result of their online experience… More than half of the Boomers claimed that they modified their learning techniques; the Net Geners decreased to a low of 23 percent. The narratives showed that Baby Boomers enhanced their technology skills and integrated them into their modified student roles, Gen-X students improved their ability to manage time effectively, and Net Geners felt a heightened sense of responsibility and motivation" (Hartman, et al., 2005 p. 6.9).

Brown says "In addition, faculty who are baby boomers and GenXers are acquiring Net Gen characteristics as they become more facile with—and dependent upon—IT. Planning for Net Gen requirements cannot be dismissed as catering to a single generation. IT and the work habits that IT encourages are here to stay; planning for the Net Generation is tantamount to planning for the future" (Brown, 2005, p. 12.20).

Writing about the design of physical learning spaces, Brown noted that, **"**In order to best serve the educational enterprise, we must design leaning spaces that optimize the convergence of the Net Generation, current learning theory, and information technology." What used to constitute a learning space, a classroom, has opened up to also include any space where resources can be delivered via a wireless network" (Brown, 2005, p. 12.1).

Digital, portable network connectivity "make it possible for learning to happen informally, in areas outside

the traditional classroom, library, and faculty office" (Brown, 2005, p. 12.2). "This means that learning, too, can occur any time and anywhere" (Brown, 2005, p. 12.3). Students can meet on or off campus and anytime of day.

Course Design

Hartman et al. (2005) report that at University of Central Florida, "beginning faculty are encouraged to redesign their courses to focus on being student centered and interactive. Beyond the course structure, faculty learn to integrate formative and summative assessment mechanisms, both for themselves and for students. The focus is on faculty facilitating instruction and students becoming active and interactive learners" (Hartman et al., 2005, p. 6.9).

"Blended learning provides a unique opportunity to bridge generations, providing the face-to-face contact requested by Baby Boomers, the independence preferred by Gen Xers, and the interaction and sense of community desired by Net Geners." Communication and collaboration "among students as well as between students and the instructor" is increased by "extensive use of e-mail, discussion groups, and live chat" (Hartman et al., 2005, p. 6.9).

Designing courses for Net Gen students should balance their strengths, which also may be their weaknesses." "The expectation for fast-paced, rapidly shifting interaction coupled with a relatively short attention span may be counterproductive in many learning contexts. Repetition and steady, patient practice—key to some forms of mastery—may prove difficult for Net Gen students." And, in "a variety of learning situations, individual work is important" (Brown, 2005, p. 12.7).

Students should be included in the design experience as "active participants in the learning process." "Design principles should include terms such as analyze, create, criticize, debate, present, and classify—all directed at what the space enables the students to do… Outside class, they should have access to applications and materials that directly support analysis of data, text, and other media. Forums for discussion and critical debate, both real and virtual, are key to encouraging learning and will be looked for by Net Gen students" (Brown, 2005, p. 12.7-8).

"Learning space needs to provide the participants—instructors and students alike—with interactive tools that enable exploration, probing, and examination. This might include a robust set of applications installed on the computer that controls the room's displays, as well as a set of communication tools. Since the process of examination and debate leads to discovery and the construction of new knowledge, it could be important to equip spaces with devices that can capture classroom discussion and debate, which can be distributed to all participants for future reference and study" (Brown, 2005, p. 12.8).

The end of the class meeting "marks a transition from one learning mode to another." "The real and virtual spaces outside the classroom … should encourage learning." Students should have access to class materials (which are increasingly digital) so that the active and social work of learning can continue outside the formal classroom. Institutions also should consider "well-integrated work environments that support collaborative projects and resource sharing" in virtual workspaces (Brown, 2005, p. 12.8). While not physical spaces, virtual learning environments such as Second Life and RuneScape are growing in popularity and in usage in higher education. This is in part due to their nature as visually rich, non-linear, and collaborative (Willems, 2008).

Conclusion

Even though learning trends are described in generational terms, age may be less important than exposure to technology. "Individuals who are heavy users of IT tend to have characteristics similar to the Net Gen" (Oblinger & Oblinger, 2009, p. 2.10). With this in mind, it is important not to oversimplify when analyzing learners. "Differences among individuals are greater than dissimilarities between groups, so students in any age cohort will present a mixture of neomillennial, millennial, and traditional learning styles" (Dede, 2005, p. 15.19).

Instructors should recognize how values and experiences shape learning needs and expectations. Creating a positive learning environment will enhance "student learning and meets the needs of all adult learners" (Worley, 2011, p. 31A).

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The Use of Electronic Mobile Technologies Among Distance Learners in Rural Communities for Safe and Disruptive Learning

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Introduction

Several studies have indicated the potential of electronic mobile technologies in reaching (safe learning) underserved communities and engaging (disruptive learning) disadvantaged peoples such as women, the homeless, prisoners, the disabled, and the rural poor, affording them learning experiences (Attewell, 2005; Horowitz et al. 2006; McNeal & van't Hooft, 2006; Stead, 2006; Viljoen et al., 2005). However, the potential benefits of e-mobile learning have not been well understood from the contexts of these underserved, disadvantaged, and marginalized in higher education.

There is currently little research describing the relationship between use of the electronic mobile technologies to access resources and the possibilities of adopting them in developing economies such as Botswana's higher education system that traditionally marginalizes those in rural communities (Akinpelu, 1997; Botswana, 2009). A high percentage of Botswana's population (almost 70%) resides in rural communities (Dhunpath, 2004) that have no higher education institutions but weak infrastructure (Boitshwarelo, 2009; Chisholm et al., 2004; Sebusang, 2006). Access to higher education stood around 10% in 2007/2008, despite that higher education index is a key indicator of a society's socio- economic well-being (Siphambe, 2007; Botswana, 2008).

Literature brief

As indicated by some studies on e-mobile learning electronic mobile technologies have the potential of reaching and engaging learners normally excluded from education because of their location, social status, and technology infrastructure. Attewell (2005) found that electronic mobile technologies helped homeless and illiterate populations in Britain develop better reading skills. Stead (2006) explored ways to engage and empower British citizens who were hard to reach and have not benefitted from mainstream education. Horowitz et al. (2006) evaluated the impact of cell phone delivered video clips on participants from different economic demographics in the United States of America. They found that the greatest level of learning success in the video clip program was reported from families below poverty line. Viljoen et al. (2005) found that many distance learners in South Africa have electronic mobile technologies (e.g., cell phones) and that network infrastructure exists in even the most remote rural areas.

However, the value of e-mobile learning globally, regionally or in particular contexts has not been investigated directly (Koszalka & Ntloedibe-Kuswani, 2010). For instance, many studies have been driven from developed and industrial economies where these technology devices are produced and marketed for business and leisure (Barlow-Zambodla, 2009; McNeal & van't Hooft, 2006). Many studies were conducted in lower socio-economic environments within developed economies, not in developing economies where many sectors of society are disadvantaged and marginalized as most of them reside in rural communities.

Given the ubiquity and mobility of electronic mobile technologies and their potential to reach rural communities, this study explored contextual uses of these technologies and how the realities grounded on contextual activities may enhance distance education to better meet the needs of learners in rural communities. Reaching these disadvantaged and the marginalized rural communities and engaging their populations in taking more control of learning and education will achieve an inclusive and democratic form of higher education where many can participate (Freire, 1970; Keough, 2005).

Methodology

An embedded case study design; with 2 cases and 2 units of analysis, was employed to investigate (1) the penetration of electronic mobile technologies in samples drawn from two school districts in rural communities of Botswana, (2) how distance learners (and their tutors) in the drawn sample used electronic mobile technologies they already have, and (3) the interest of learners and readiness of tutors regarding the use of electronic mobile technologies in distance learning. However, data reported in this paper mainly reflects research question 2, which explored the use of electronic mobile technologies among distance learners (and their tutors). These data are important in helping to understand how the current and potential uses of electronic mobile technologies among distance learners may inform instructional design strategies to enhance safe (access) and disruptive (participation) learning in higher education for rural communities.

The research took place in two school districts made up of rural communities in the South and North of eastern part of Botswana. The research participants consisted of two groups: distance learners in rural communities and their tutors in cities. Fifty four (54), out of the 59 selected participants, took part in the study. Out of the 54 participants, 30 were elementary school teachers from rural communities (16 from Case 1 in the South and 14 from Case 2 in the North), 20 college lecturers**,** and 4 high school teachers from cities (14 from Case 1 in the South and 10 from Case 2 in the North). The elementary school teachers were mostly registered distance learners in a local distance learning program to upgrade to a diploma level. The program used self study print materials and face-to-face tutorials during school vacations. However, there were five learners registered with an external program; four upgrading to a diploma level and one upgrading to an honorary degree. Most of the tutors were teaching a similar, but full-time program at colleges of education. All but two of the participants had no experience in an on-line (e-learning) type of distance learning.

Findings

Demographic descriptions

The overall demographics for the two cases reveal some dominant characteristics of the participants. Eighty nine percent of the participants (n=48) were aged between 40 and above – with age mean of 45.39, while 85% of the total participants were females (n=46). Eighty three percent (20 out of 24) of tutors have earned master's degree. The participants' teaching experience ranged from one to twenty eight years, with mean of 11.59 years. The participants' involvement in distance learning ranged from one to ten years, **with mean of …** Most of the learners were two years into the program while tutors were four.

Demographics indicate the dominant characteristics of participants as adult, women, with many years of conventional teaching and few years of involvement in distance learning. This suggests that female teachers in rural schools and residing in underserved rural communities are one of the most disadvantaged groups in this society in terms of their opportunities for higher education. Their access to higher education was limited by waiting time and distance. Women in rural communities, therefore, represent a high percentage of people who are affected by limited admission into a few higher education institutions, none of which are found in their local communities.

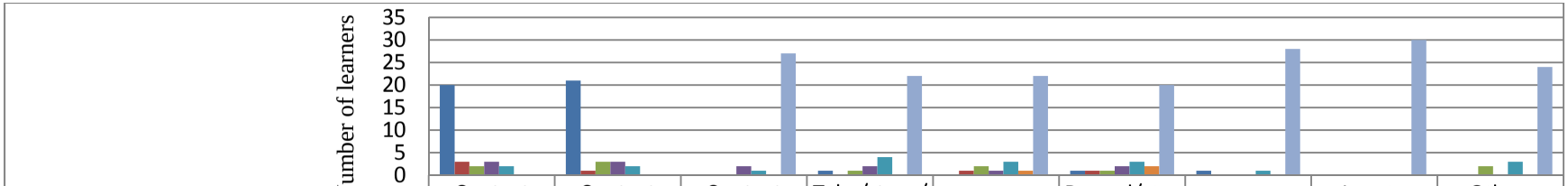
Ownership

All the participants - learners and tutors - had personal electronic mobile technologies mostly in the form of mobile phones. Of the 54 participants, 37(69%) had standard cellular phones and 17(31%) had smart phones. Seven students out of 30 (23%) (rural communities) and 10 tutors out of 24 (42%) (cities or urban) had smartphones. In case 1 (South) only two learners (13%) and five tutors (36%) in the city had smartphones. In case 2 (North), five learners (36%) and five tutors (50%) had smartphones. Although all participants owned electronic mobile technologies, learners were subjected to weak wireless connections in rural communities while tutors had better connections in the cities.

All participants in both cases had at least one cellular phone and a few had others such as MP3s and laptops. Several learners and tutors kept more than one phone (maximum of three) because of different wireless networks coverage (3) in different communities. As mobile learners with limited resources in their schools and communities, distance learners found themselves looking for help in different places with different networks; hence some kept several phones because they wanted to stay connected all the time for both social and learning purposes.

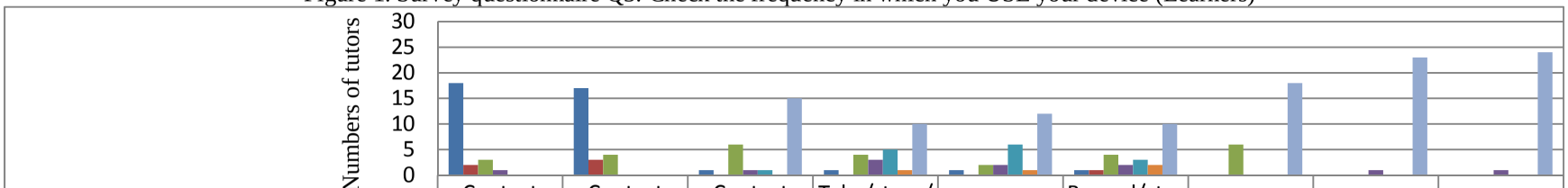
Uses

Almost all participants reported primarily using their cellular phones to communicate with people. For both learners and tutors, the dominant functions used were basic such as voice calling and texting *(see Figure 1 for learners, and Figure* **2** *for tutors)*, with the frequency of using those functions ranging from several times a day to a few times a month**.** Although some functions were used sparingly, e-mail and Internet were least used. A few learners reported searching for additional information from the Internet but not necessarily using their phones but Internet cafés.



	Contact others (voice)	Contact others (texting)	Contact others (email)	Take/store/ view pictures	Take/store/ view video	Record/store/play audio	Browse internet	Locate position (GPS)	Other: _____
several times a day	20	21	0	1	0	1	1	0	0
once a day	3	1	0	0	1	1	0	0	0
less than daily, several times a week	2	3	0	1	2	1	0	0	2
once a week	3	3	2	2	1	2	0	0	0
few times a month	2	2	1	4	3	3	1	0	3
once a month or less	0	0	0	0	1	2	0	0	0
never	0	0	27	22	22	20	28	30	24

Figure 1. Survey questionnaire Q3: Check the frequency in which you USE your device (Learners)



	Contact others (voice)	Contact others (texting)	Contact others (email)	Take/store/ view pictures	Take/store/ view video	Record/store/play audio	Browse internet	GPS	Other
several times a day	18	17	1	1	1	1	0	0	0
once a day	2	3	0	0	0	1	0	0	0
less than daily, several times a week	3	4	6	4	2	4	6	0	0
once a week	1	0	1	3	2	2	0	1	1
few times a month	0	0	1	5	6	3	0	0	0
once a month or less	0	0	0	1	1	2	0	0	0
never	0	0	15	10	12	10	18	23	24

Figure 2. Survey questionnaire Q3: Check the frequency in which you USE your device (Tutors)

Some learners contacted people elsewhere to find information on their behalf from the Internet and libraries. Occasionally distance learners phoned administrators for schedules and libraries seeking information on availability of relevant textbooks. For instance, two learners from the North had such contact persons (relatives). They preferred families or friends because they would be patient with their level of technical skills:

> *People tell me if I go to the Internet café I have to pay and open the computer for myself and search information. But because I do not have such skills I use my cellular phone to contact my husband who is computer literate and residing in the city where there are better resources. He will use the computer and search the information for me over the Internet. My husband searches the Internet, prints the information and mails it to me by post (#1, N.L)*

Very few learners (3 out of 30) indicated having used the Internet once a week, or a few times a month, except the one who had registered for an on-line program with an external university. She used her smartphone to access wireless Internet several times a day for doing her assignments and participating in on-line chats. Although this learner sometimes accessed Internet services from an Internet café at a local post office, she found her personal wireless Internet connection convenient:

> *I have NOKIA N70. I bought N70 because I knew it has a web that can enable me to access Internet. There are not enough resources in my community to help me as a distance learner. The phone has many features but I mostly use its web function to access Internet. It uses GPRS card or settings from a local wireless company, and it comes with something called a PC suit disc that connects it to the computer to enable me to use it as modem in case I want to use a larger computer screen. I use my personal Internet anywhere unlike the one I sometime use at the post office. I submit any of my assignments using the phone and it is very helpful. I am using phone in learning because here in school where I am working right now, there is almost nothing in regards to technology (#9, N.L).*

Although tutors, in the cities, sometimes used their phones to access Internet, their Internet usage was still low as compared to voice and texting functions. For instance, a total of nine tutors used their phones for e-mails ranging from several times a day (1 tutor), several times a week (6 tutors), once a month (1 tutor) or few times a month (1 tutor). One tutor used her smartphone several times a day to access the Internet because she was a part time university student. She used the phone to access additional information from Internet. Tutors reported limited use of their smartphones' Internet function because most of the time they had Internet access from their offices and the cost for personal phone Internet was prohibitive.

Learning activities

The cellular phones were still put to use where there were no network connections; the distance learners used them as calculators (for class grading), calendars, and reminders (for teaching and learning activities). Camera phones were used to record some activities of interest used for teaching and learning. For instance, about two learner recorded agricultural activities to be used for their distance learning and classroom teaching.

One tutor who was a part time learner at a university used her smartphone to access Internet and download documents. She had bought an additional memory card to increase the capacity of her phone to about 1.5G (gigabytes) in order to store information. However, she was not using her phone in tutoring her distance learners as she found it too expensive to use for her own learning and for tutoring without being paid. Another tutor gave an example where she used her smartphone in her teaching full time students:

> *I once gave my young full time students an assignment on solar system and adaptation. Usually I would not send them to search the Internet without knowing what kind of information to expect. So what I did, when I am home in the evenings, I used my phone to access the Internet and find out what to expect from them when they go to the computer lab to search for assignment information* (# 13, S.T).

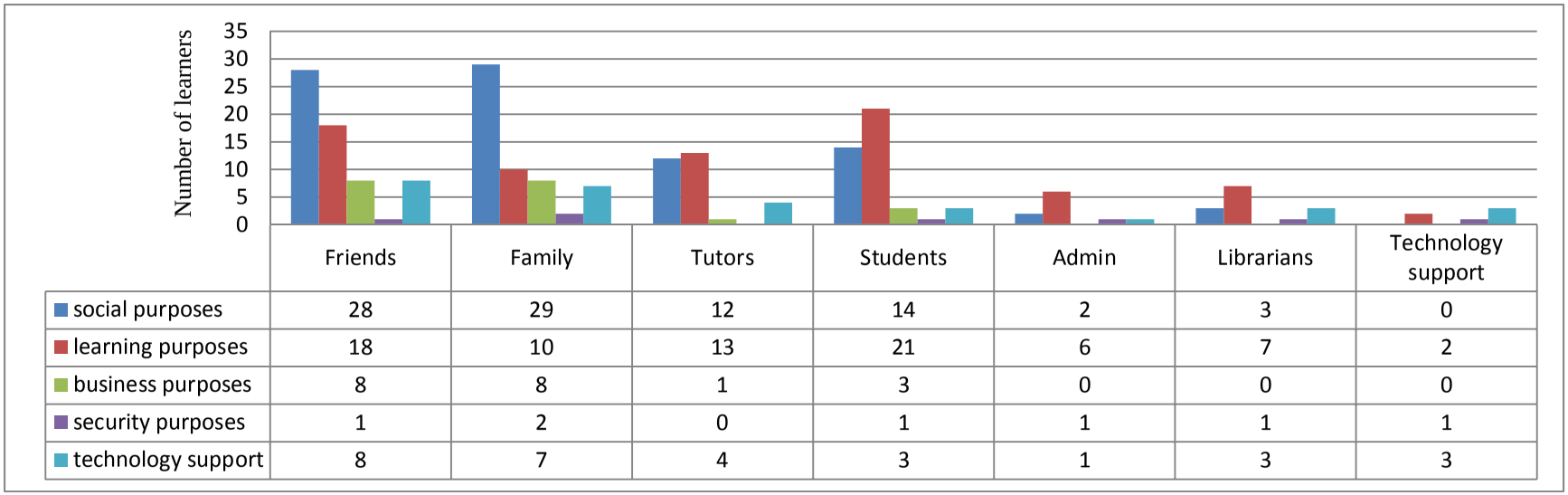
Contacts

The participants were highly mobile, travelling for social and learning purposes. They also kept several phones in order to stay connected:

> *I keep two phones because I have a 9-year-old child who is sick. So I have to be always contacting her father who works far from us. I also take the child for medical checkups. Before I had two phones I used to borrow from other people when my phone network was down. I now find it cheaper to use the phones to contact other distance learners who use the same networks (#1, S.L).*

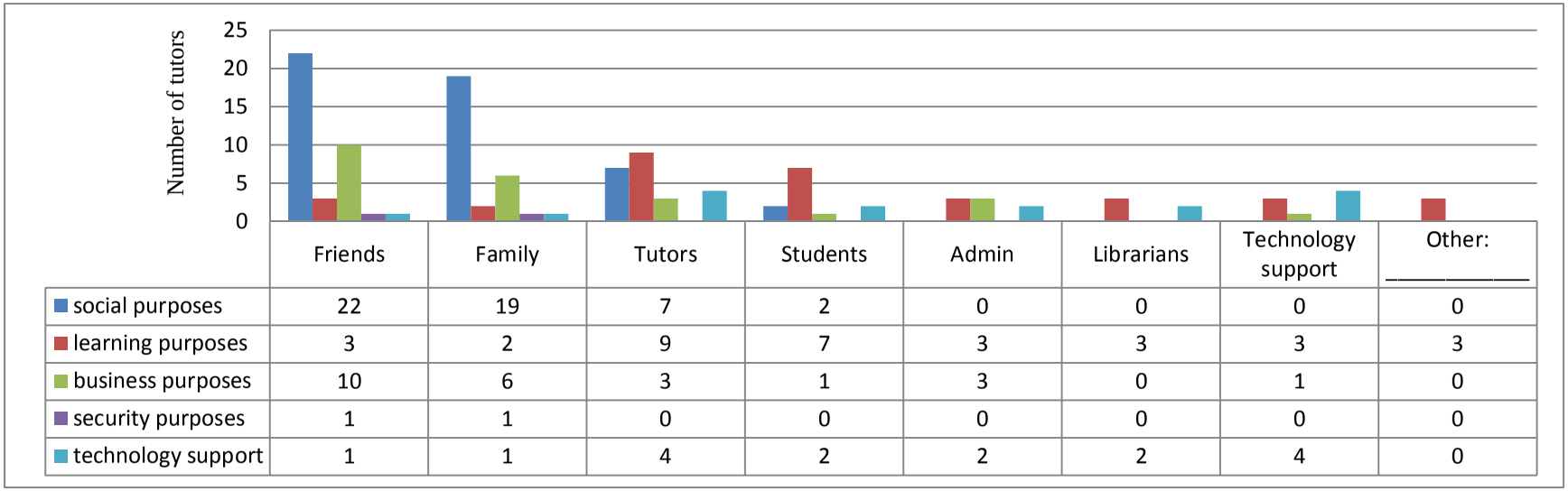
Most of the learners and tutors contacted friends, family, and peers (learners mostly contacting learners; tutors mostly contacting tutors) for social and learning purposes ***(****see Figure 3 for learners and Figure 4 for tutors).* As tutors indicated, they rarely contacted distance learners; only seven tutors indicated that they once contacted learners for learning purposes. Most of the time it was the learners who contacted their tutors; about 15 (50%) contacted their tutors for learning purposes. Tutors believed that it was those who needed help (learners) who were supposed to phone to seek help. For instance, almost all tutors had provided their distance learner tutees with their cellular phone contacts.

Though they all had their tutors' contacts, many distance learners did not phone their tutors except later in the program (4th year) when they were doing project work. For instance, many learners who were two years in the program had never contacted their tutors using their phones, but instead sought help from peers. Those learners working on their projects reported having contacted their tutors or supervisors for help with the projects. It also happened that; the few tutors who at times phoned learners did so towards the end of the program, following-up on their supervisees who did not meet deadlines for the teaching portfolio or project work.



	Friends	Family	Tutors	Students	Admin	Librarians	Technology support
social purposes	28	29	12	14	2	3	0
learning purposes	18	10	13	21	6	7	2
business purposes	8	8	1	3	0	0	0
security purposes	1	2	0	1	1	1	1
technology support	8	7	4	3	1	3	3

Figure 3. Survey questionnaire Q4: Who do you CONTACT using your electronic mobile device and for what purposes? (Learners)



	Friends	Family	Tutors	Students	Admin	Librarians	Technology support	Other: _____
social purposes	22	19	7	2	0	0	0	0
learning purposes	3	2	9	7	3	3	3	3
business purposes	10	6	3	1	3	0	1	0
security purposes	1	1	0	0	0	0	0	0
technology support	1	1	4	2	2	2	4	0

Figure 4. Survey questionnaire Q4: Who do you CONTACT using your electronic mobile device and for what purposes? (Tutors)

Value

Regardless of standard functions and the kind of resources accessible, the participants, especially learners, considered their cellular phones valuable *(see* Figure 5*)* in their distance learning. A total of 77% or 23 learners - 12 from case 1 and 11 from case 2 – and 58% or 14 tutors – 8 from case 1 and 6 from case 2 - considered their cellular phones valuable: *"There is no way I cannot use a cellular phone as a distance learner. For instance, it connects me with other learners and tutors to ask for help. But also it depends on the type of phone. Right now I think my new phone can do better than the old one" (#4.S.L).*

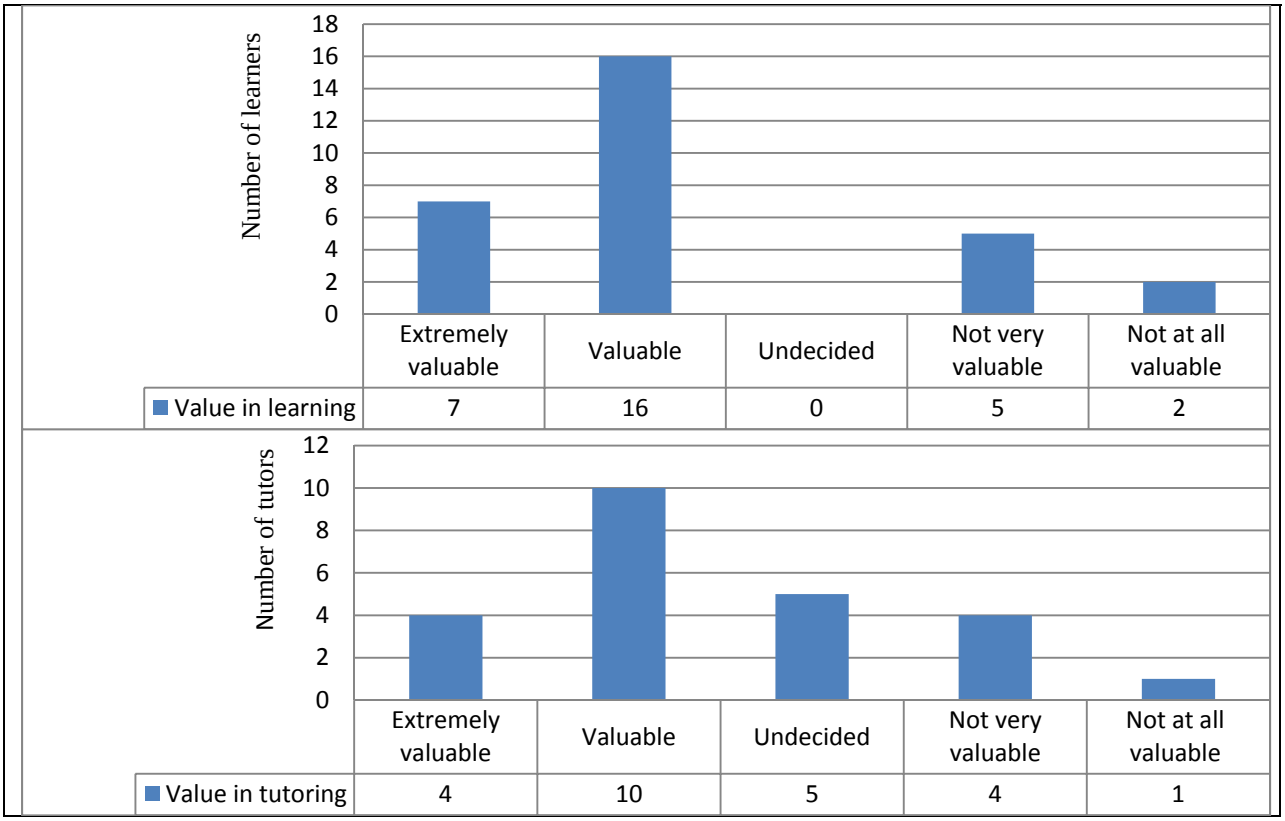


Figure 5. The value of electronic mobile devices in learning and tutoring

Use implications

Basic phones and basic functions: A majority of participants owned standard phones. The participants predominantly used basic functions such as voice calling and texting to access human resources for both social and learning activities. However, there were isolated examples where a distance learner (rural community) and a tutor (city) demonstrated the potential of using the devices to access learning resources. Many of the participants may have been restricted to the basics, first, because of technology infrastructure, and second, because of their print-based distance learning program that had no electronic content. Thus, instructional designers may explore how e-mobile learning management platforms may be introduced to enhance technology driven distance learning that can address a variety in distance learning. The e-mobile learning platform then may be designed as inclusive as possible in order to avoid a situation where advanced technology features are used to reduce accessibility and/or participation. A comprehensive inclusive design will be needed to maximize access to learning resources by

currently available technologies such as standard phones (voice, texting, pictures) and smartphones (Internet, downloads, video, pictures).

An inclusive e-mobile learning design may not conform to the rigid traditional pedagogies of instructions at higher education institutions. The flexibility of inclusive learning may increase access that can empower learners to practice and contribute to the labile (ever changing) process of 'coming to know' (learning) (Sharples et al., 2005). For instance, because of the ubiquity of electronic mobile technologies, the distance learners initiated social interaction between themselves and their tutors through voice calling and texting. The distance learners in rural communities bring into learning new and flexible initiatives that need to be further tested in order to learn how they can be used to contribute towards access and participation in higher education.

Human resource: Though distance learners had limited access to material (information and facilities) resources, they contacted various people, like friends, family, peers, and tutors, to help in their studies. The cellular phones were equally used for social and learning purposes, but in most cases human mediators were dominant. This predominance of human-to-human communication, may account for the limited development of information literacy skills noted by the study participants. Although learners engaged in activities that involved others, primarily by travelling to meet each other, they were still restricted in their learning by their limited access to information resources. Thus, the kind of control they had during their distance learning was limited. However, the frequent human communication may be an indicator that the learners were beginning to engage more with others during their learning: to help them find resources and discuss issues. To a limited extent the distance learners may be *disrupting the silence* of their tutors and the loneliness they are subjected to as distance learners in their communities.

Safe and disruptive learning implications

Human mediated access - safe learning: Learning situations where the learner's immediate context has limited or no required resources, have promoted distance learners to seek and use whatever tool to access whatever resource they need. Human resource, for example has been accessed to the full extent allowed by weak technology and transportation infrastructures. To a larger extent, distance learners struggled to access information as independent learners except through human mediators. For example, there were cases where learners arranged, via cellular phones, to meet with their peers on weekends and at times with their tutors. Some learners phoned their relatives in urban areas to find, print, and send them information. However, with access to human resources, the learners failed to attain meaningful and empowering learning experiences. Adult learning theory suggests that adults motivated to learn will search for a way to participate and learn regardless of resources, instructional materials, teaching and learning strategies (Imel, 1998; Merriam, 2001). However, the ways that were found by these adult distance learners confined them within the traditional learning paradigm where teachers play the power role of the masters vis-à-vis the subject position of learners (Bartholomae & Petrosky, 2008; Freire, 1970; Hickling-Hudson et al., 2004).

Limited participative - disruptive learning: Although much of the current debate around e-mobile learning is looking beyond the safe learning model (access), this study reveals that the social and learning activities, (as defined by Wenger (1998)), in which the distance learners in the rural communities and their tutors were engaged in, did not support the kind of disruptive learning paradigm that empowers them to take control (Stead, 2006). For instance, basic functions such as voice calling and texting, which were dominantly used to access human resources, were too limited to disrupt the power role of masters, thus learners had to continue depending on teachers as sources of information. Although their social interaction was critical, these learners continued to consume information and learning materials as conceived and developed by their teachers. The learners' engagement or collaborative activities between themselves and their tutors were very limited, thus prompted learners to look for other people to help them as they did not have access to facilities (e.g., libraries, Internet) that they could use independently and directly to search for information. The communications and participation of the learners, although authentic and contextualized, were peripheral and limited to accessing people, which was not that different from the traditional ways of teaching and learning where the teacher and her content continued to play a major role (Corbeil & Valdes-Corbeil, 2007; Vooslo & Botha, 2009; Yousuf, 2007). Data indicated that in most cases voice calling and texting were used for setting appointments for face-to-face help, instead of the learners searching for additional content independently (Lave, 1991).

The distance learners' activities, however, may partly be classified as disruptive as they were done outside the traditional instructional environment. However, the activities did not help learners develop enough collective intelligence from a community of practice that can leverage their combined expertise to inform potential stakeholders in addressing the problem of lack of learning environments that they face in rural communities

(Jenkins, 2006; Lave & Wenger, 1991). Thus, the need for pilot projects that can be deliberately designed toward the disruptive character of e-mobile learning is important.

These pilot tests should initiate a legitimate community of practice on the periphery that can eventually perform functions of those at the heart of the practice (Lave & Wenger, 1991; Thorpe, 2003). Retaining a context that supports the existing patterns in higher education will continue to benefit the privileged, at the expense of the disadvantaged, who lack access to facilities, information and highly skilled human resources at their local sites. As Sokal (1996) argues, a different community of practice is necessary to disrupt the epistemologies of the privileged and not hesitate to embrace counter-learning strategies from the marginalized perspectives.

Just like the studies conducted by Keegan (2002) and Nailsmith et al., (2004) suggested, this study reveals that although electronic mobile technologies are ubiquitous and cellular phones, in particular, have penetrated the rural communities, their full potential may still to be realized in the future. Although this study showed signs that distance learners may be interested to use electronic mobile technologies, the future success of e-mobile learning depends on many factors that need to be considered in order to establish effective e-mobile learning environments.

The technology infrastructure in the rural communities, for example, is critical to such kinds of environments. No access means no connections among distance learners, tutors, and materials. Higher education institutions need to work with potential partners to address the need for technology and wireless access. Further, instructional design scholars and practitioners have a mammoth task of creating models and guidelines to support re-designing of programs and materials to facilitate re-training of tutors for an inevitable paradigm shift in the curriculum and the pedagogies. However, caution should be observed, as much research is still needed to help identify general principles of instruction and learning to monitor or guide the success of these activities.

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#9, N.L: Interview 9 from Case 2, North, Learner
#1, S.L: Interview 1 from Case 1, South, Learner
#1, N.L: Interview 1 from Case 2, North, Learner
#13, S.T: Interview 13 from Case 1, South, Tutor
#2, S.L.: Interview 2 from Case 1, South, Learner
#4, S.L: Interview 4 from Case 1, South, Learner

Concept Learning in e-Learning Environments

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Introduction

University instructors face major challenges in designing optimally effective online instruction. This paper identifies some of those challenges and offers recommendations for meeting them. More specifically, it offers an instructional strategy in the form of a case study for assisting e-learners in learning new concepts. The case study is derived from the literature and the author's experiences as an e-learning instructor, designer, and developer. The author also provides a procedure for developing e-learning activities to promote concept learning and offers examples of related online learning activities.

Online Learning: Overview of Some Fundamental Challenges

Various authors have provided suggestions for strengthening the design of e-learning activities. Rossett (2003) suggests that a key challenge for those involved in delivering e-learning is to recognize factors which may threaten e-learners' success, then act to build learners enthusiasm and commitment. For her . . . "e-learners are the crucial link in e-learning success" (2003, p. 46). Rossett suggests that online courseware may be sound: lack of student success may be attributable to lack of student engagement. To overcome this obstacle, Rossett suggests providing meaningful instructional content and designing courses for a range of learning preferences.

Providing opportunities for action is another key to successful e-learning according to Rossett (2003). She recommends incorporating inquiry-oriented activities such as WebQuests which promote learner engagement by requiring the exploration of Internet resources. "The essence of action is nudging the learner to do something" (Rossett, 2003, p.44). Other types of action include decision making, comparing the known with the unknown, and communing with other e-learners via asynchronous discussion and instant messaging.

Rossett goes on to discuss the importance of structuring e-learning activities to promote student success. Related strategies include keeping the content well focused, specifying expected learning outcomes so learners can decide whether or not to pursue them, and maintaining a user-friendly computer interface which allows e-learners to recognize their location in the instructional sequence and to know how to achieve success. Palloff and Pratt (2003) build upon the work of (Paulsen, 1995) in identifying four main categories of online learning activities. These include one-alone activities such as doing Internet research or reviewing databases or journal articles; one-to-one activities such as independent studies, internships, and making learning contracts; one-to-many activities including online lectures, whiteboard sessions, or watching videos or listening to audio materials; and finally, many-to-many activities. This last category includes the most commonly utilized activities such as discussion groups, discussion boards, debates, simulations, role plays, cases studies and brainstorming sessions.

Other authors have conducted formal research on factors that influence the relative success of e-learning. Lin, Lin, and Laffey (2008) write that " . . . understanding and supporting the social nature of online learning is becoming recognized by online learning researchers" (p. 4). Their research was built upon a four component model which included social ability, learning goal orientation, perceived task value, and self-efficacy. They concluded that learners who value the task and the instructional content had greater learning satisfaction than those who did not. According to them, satisfaction concerns the pleasurable fulfillment of needs and wants after completing an activity. They go on to suggest that the social ability instrument used in the study may be used in the future to evaluate the quality of social interaction in online courses toward improved learning and decreased attrition. Their findings

appear to be consistent with Rossett's comments about the importance of maintaining the relevancy and applicability of content and learning tasks.

In summary, based upon this brief review of literature, suggestions for facilitating learners' success in online learning environments include the following:

- providing meaningful instructional content;
- designing courses for a range of learning preferences;
- providing opportunities for action;
- keeping the content well focused;
- promoting the value the learning task and the instructional content;
- providing satisfaction by fulfilling learners' needs and wants after completing an activity.

Concept Learning

What are concepts? Fleming (1987) describes concepts as objects, events, or ideas that share common characteristics. Both Fleming (1987) and Gagné and Medsker (1996) distinguish between concrete and abstract or defined concepts. According to these latter authors, concepts of both sorts are at the heart of the intellectual skills domain. These same authors explain that a concrete concept is concrete because it possesses identifying physical characteristics. For instance, one can tell a motorcycle from a bicycle by looking at each and noting that one has a motor and the other does not. A defined or abstract concept cannot be classified by its physical characteristics. Rather, "Defined concepts . . . are abstract rules for classifying objects and events" (Gagné & Medsker, 1996, p. 61). Gagné and Medsker (1996) also note that learning a defined concept requires use of verbal definition and that it is also important to provide examples in instruction which address this type of concept. The e-learning activity discussed in this paper utilizes videos from the Internet as examples of the to-be-learned defined concepts of issue. It is also worth noting that both types of concepts are at the heart of the intellectual skills domain. Discriminations are seen as prerequisites for learning concepts, which are in turn prerequisite to applying rules, which are subordinate to problem solving (Gagné, Wager, Golas, & Keller, 2005).

Concrete concepts are learned best when the instruction provides specific examples and non-examples and provides practice activities for classifying same. Providing a definition is also supportive but should not supplant provision of examples and non-examples. Defined concepts are best learned when instruction includes a definition of the concept, and, as with concrete concepts, presents examples and non-examples (Gagné & Medsker, 1996)

Concept Learning Online

Jonassen and Easter (2012) offer a useful model for building conceptual change in online environments. They suggest that model building is central to conceptual change. According to these authors, model building is a natural cognitive phenomenon with a strong constructivist flavor. "Model building is important because it is among the most conceptually engaging processes that can be performed . . ."(p. 106).

Kolodner, Dorn, Thomas, and Guzdial (2012) offer a related discussion on case-based learning. They suggest that case-based instruction promotes learning by prompting students to interpret, reflect upon, and apply experiences. Their discussion suggests the importance of providing vicarious experience using a concept or skill. These same authors note: "While most traditional theories of cognition emphasize how general-purpose abstract operators are formed and applied, case-based reasoning makes concrete cases, representing experience, primary" (p. 142). In the two provided examples of online concept learning activities, video cases are utilized. While video instances are not as concrete as, say, first-hand experience, they are certainly more concrete than text-based examples. The video medium provides for visual depiction of human actions with accompanying audio. So, it is reasonable to believe that videos are inherently more interesting than text. And they are more concrete than text as suggested by Edgar Dale's well known cone of experience.

Kolodner et al. (2012) offer three suggestions for the utilization of case studies. First, they suggest that e-learning designers avoid one-shot approaches. They comment:

> Learning from experience is not a one-shot deal. Ideas extracted from one's experiences need to be debugged and tried out again and again. The sequencing of activities and facilitation of discussion in a learning environment can be engineered to increase the frequency of accessing cases in one's memory and ultimately the educational impact of learners' experiences. (p. 143)

Second, the referenced authors recommend incorporating reflection within learning activities. They suggest providing learners with a reason to interpret experience and incorporating prompts and guidance to support personal reflection. And third, these same authors suggest using libraries of case studies as a resource. They also recommend requiring learners to write about personal experiences in support of reflection and development of useful cases stored in memory.

Kolodner et al. (2012) go on to identify four challenges associated with what they call "case-based reasoning." First, they comment that it is useful to address learner motivation in regard to reflecting upon provided cases. Second, they note that reflection is "easy to 'fake' . . ." (p. 152) and suggest incorporation of encouragement for learners to produce quality reflections. Third, the authors note the importance of feedback on students' reflections. They comment that computer-based supports are typically incapable of responding intelligently to students' reflections. In online discussion fora, then, the relative quality of discussants' comments impacts the quality and possible expansion of reflections. The implication here is that the online instructor should monitor the quality of posted comments in light of their quality as reflections. And, posing discussion questions to support quality reflection from the start should be useful in addressing this challenge. Finally, Kolodner et al. (2012) recommend that the instructor avoid excessive use of reflection activities. They argue against forcing reflection when it interferes with other thinking processes or becomes " . . . a hated activity" (p. 152). These same authors suggest finding a happy medium in the use of reflection activities.

Chen and Mo (2004) offer additional insights about learning concepts. They note: "One critical factor facilitating schema construction is the opportunity to process multiple instances . . ." (p. 583). These authors also suggest that providing a variety of examples supports inductive learning of concepts. Accordingly, the first example of an online learning activity on instructional methods provides two or more video examples of each method of issue.

Two Examples of Online Concept Learning Activities

The two examples of online learning activities provided here and their underlying instructional strategies build upon this conception. The activities were developed as WORD documents and embedded in course content in the BlackBoard ® 9.1 learning management system. Videos were made accessible via hyperlinks. The two learning activities were employed in two graduate courses entitled educational technology foundations and instructional design. The goal of the first activity was to enable learners to describe and classify instances of traditional instructional methods and to relate those to their own experiences. The author developed an e-learning activity which incorporated a case-based library of instructional methods comprised of Internet links; the activity requires review of the provided video-based cases and reflection and articulation of personal definitions of given methods in a paper, resulting in generation of a personally meaningful model of instructional methods. This activity may be accessed at https://docs.google.com/open?id=0B8XBeNC1YJxnMkhDUE9ILVBsOEU. The goal of the second activity was to enable learners to classify behaviors exemplifying different types of learning outcomes as described by Gagné et al. (2005). More specifically, learners were asked to classify behaviors as verbal information, intellectual skills, attitude, psychomotor skill, or cognitive strategy. This activity may be accessed at https://docs.google.com/open?id=0B8XBeNC1YJxnRy1jcVdHYnBCenc.

The Development Process

Switching from traditional classroom-based delivery of instruction to online delivery has been an intriguing and creative challenge for this author. Following is the general process the author utilized in developing the two provided examples of online learning activities:

1. identify the desired learning outcome and goal;
2. classify the learning outcome by type;
3. if outcome is conceptual, find and review available video examples of the concepts;

4. select representative video examples, avoiding those that are excessively lengthy;
5. find and review related websites;
6. select useful websites for inclusion in the activity;
7. develop guidance, content, and learner activities and specify deliverables in a WORD document;
8. create assignment and related rubric in the learning management system's course content;
9. release the activity to students;
10. grade student submissions and provide other feedback;
11. review student feedback on the given activity;
12. revise the activity, as required.

The first activity on instructional methods required students to develop a reflective paper on the provided video examples and their own related experiences. The second assignment on types of learning outcomes incorporated a classification exercise and completion of a provided table in which students were to include definitions and unique examples of each type of learning outcome. Informal feedback from students indicated that they found both assignments to be useful learning experiences and felt the use of videos helped them learn.

In Closing

The rapid proliferation of online instruction in higher education has posed new and real instructional design challenges for instructors. The author hopes that this discussion and the provided examples have provided useful insights into the ongoing work of developing useful, effective online learning activities which maximize appropriate use of Internet resources—especially as concerns the learning of concepts. Readers are welcome to adapt the provided examples with appropriate acknowledgement for their own instructional purposes.

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Designing Instruction for Social Media

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Index Descriptors: Social Media, Instructional Design

Abstract

Social media provides a source of user-developed learning content never before available. What we are currently seeing is only the beginning of the untapped learning potential of social media. Social media offers a user experience that encourages students to create and share new content while enabling communication about content and lessons. Unlike other content-centric websites, social media-enhanced tools like Pearson's Open Class and Khan Academy are the intersection of best of class content and community connecting people, content, and ideas for the purpose of learning. In this paper we will explore how learning with social media could be more effective by leveraging appropriate learning theory and instructional design. We begin with examples of how social media is currently being used in educational contexts and then review the available research that investigates the connections between social media and education. To understand how social media may be better utilized for learning, we next identify social media's unique learning affordances and learning theories that complement those affordances. Finally, we present a preliminary model for designing learning for social media.

Introduction

Educators and students alike are using online content to enhance their learning experience. From an algebra teacher using YouTube clips with worked examples as a resource for her students, to a Twitter newbie reading about what is happening around campus, social media is currently being used to meet both formal and informal learning needs The rise of Web 2.0 technologies has been so rapid that research that investigates implementation of the technologies and how effective and efficient they are in a variety of learning contexts has not been able to keep up (Leping Liu & Maddux, 2008). Similarly, instructional designers assert that instructional design models have not kept up with the technology either, suggesting that Web 2.0 technologies provide different affordances than do previous educational technologies (Leping Liu & Maddux, 2008). However, jumping straight from a technology's learning affordances directly to an instructional design model skips a crucial connection between the two; learning theory. It is important to give significant thought and discussion to the learning theories that may fit best with the unique affordances of social media. For example constructivism which states that "learning occurs when learners actively create their own knowledge by trying to make sense out of (their learning environment)" (Mayer, 1999, p. 143) seems especially in tune with the use of social media for learning.

Due to the proliferation of social media for learning and the lack of instructional design to support it, questions arise. The questions we pose are:

1. How is social media currently being integrated in classrooms?
2. What does current research say about social media use in educational contexts?
3. What are the unique social media affordances that could enhance learning?
4. How should learning theory guide the implementation of social media?
5. How can instructional design leverage the unique affordances of social media?

Examples of Learning with Social Media

In a review of articles that focused on Web 2.0 technologies in educational contexts written by researchers and educators, Leping Liu and Maddux (2008) found that wikis were the most frequently used tool and that Web 2.0 tools were used mostly for teaching and learning of language. While these articles were discussing the use of Web 2.0 technologies in educational contexts, they did not discuss the need for new strategies or instructional design to facilitate the use of these new technologies (Leping Liu & Maddux, 2008). The results suggest that the potential for Web 2.0 technologies for learning has not yet been well explored. The results also suggest that educators that are using these new tools may not realize the positive learning outcomes they expect because they are not cognizant of the need for new strategies of instructional design (Leping Liu & Maddux, 2008).

Anecdotally, many teachers are taking advantage of the popularity of social media among their students and integrating social media into lessons. Although there is a lack of empirical research on the effectiveness of social media on learning outcomes, some accounts of the practice of integrating social media into learning are emerging. One such example is from an undergraduate writing class in which the instructor uses micro blog and social network site tumblr.com. The instructor posts class info and readings to the class tumblr. The students create their own tumblr blogs and each student follows the course blog and every other student's blog (Young, 2011). The students are directed to post and share course assignments on their blog. The instructor and each student can review and comment on all the work posted on the individual blogs through their dashboard. The instructor uses her dashboard to comment on assignments, "like" them or reblog student assignments to the main class tumblr. Once a week the instructor shares the most challenging, problematic or exceptional assignments (Young, 2011). The instructor sites a variety of benefits to the use of tumblr. For those students that are initially less likely to share in person, tumblr provides an entry point for discussion. Tumblr facilitates a consistent feedback loop with input from both the teacher and other students. Class assignments posted on tumblr gain relevance by virtue of the a class readership. This readership motivates students to produce quality work and not just for the sake of completing an assignment (Young, 2011).

Another teacher uses wikis to support class reading assignments. Students are assigned a reading and are tasked to collaboratively write a summary of the reading. In addition to creating a summary, students use the comment section to post reactions, questions and comments about the reading (Mejias, 2001). Because this communal work is often foreign to students, the teacher scaffolds the summaries by providing an outline of the reading that students can expand. As the semester continues, the scaffolds are reduced to minimize the student's reliance as they become more familiar with the content. Initially students are compelled to write complete summaries of the reading and sign them so that they get credit for their work. When this happens, the teacher deletes the student's name and reorganizes the paragraphs into the existing summary (Mejias, 2001). This gives rise to discussions about collaborative writing and the roles it requires, including organizing, editing and formatting. A set of high-quality group notes is created and can be used as study aids and a reference for other assignments. The teacher finds that this process provides many topics for class discussion and gives students perspective on technologies, like Wikipedia, that they use every day (Mejias, 2001). In addition to the enhanced learning experience, the teacher finds that this process is a great way to measure reading assignments as the revision history logs the contributions of each student (Mejias, 2001).

In a business or marketing course, social media could be integrated into a problem-based learning activity. A teacher could reach out to a community organization and offer social media services provided by the teacher's students (Moss, 2012). With the client, the students would decide on the goals of the activity, whether it be to increase traffic to the client's website, or to gain more followers or "likes." The students would set up the social media accounts if the client did not have an existing presence. They would then create the social media strategy which would include crafting messages, promoting local events or providing special offers. Students would manage and respond to questions and comments from both their client and client's customers (Moss, 2012). This type of activity would provide practical business and marketing experience for the students along with social media expertise and problem solving and collaboration skills.

Current research on Social Media in Education

A corpus of empirical studies that examines the effect of social media use on learning outcomes within instructional contexts does not yet exist, studies that explore the usage of social media by educators and students are beginning to

emerge. Most of this emerging work focuses on higher education populations, leaving K-12 educators with only anecdotal reports that support the use of social media with primary and secondary students (Hew, 2011).

Higher education faculty has a high awareness of social media and many use it in their personal and professional lives, including in the classroom. More than 90% of faculty are aware of social media sites like MySpace, Facebook, Twitter, YouTube and blogs in general (Moran, Seaman & Tinti-Kane, 2011). This awareness did not vary significantly over years of teaching with more experienced faculty having the same level of awareness as newer faculty. Awareness also did not vary between faculty that taught full or part time, their tenure status or whether they taught predominantly online or face-to-face classes. The only difference was that male faculty were more likely to be aware of LinkedIn that their female counterparts (Moran et al., 2011).

This high level of awareness translated into personal use of social media as more than 75% of faculty visited a social media site in the past month, with 50% posting content in that timeframe (Moran et al., 2011). Of the faculty that posted content, 40% posted on more than one social media site. There were differences in usage between more experienced faculty and newer faculty as those with more than 20 years of teaching were less likely to use social media. Of the faculty with less than five years of experience, 80% visited a social media site and 60% posted content within the last month (Moran et al., 2011). Faculty that teach online are also more likely to visit (80% vs. 75%) and post (57% vs. 47%) on social media sites than those that do not teach online (Moran et al., 2011).

Faculty also use social media on the job. In job-related, but not teaching-related work, 78% of faculty use social media, while 66% of them use social media in the classroom (Moran et al., 2011). Classroom uses of social media include assigning reading or viewing of social media (40%), posting content for use outside of class meeting times (30%) and commenting or posting assignments (20%) (Moran et al., 2011). Those who teach online are more likely to post content and assign social media content reading or viewing and are also more likely to use social media during class and assign students to post content.

Despite high awareness and personal and professional usage of social media, only 40% of faculty believe that educators should use social media to reach students (Moran et al., 2011). Faculty are concerned with the lack of integrity of online submissions, privacy, the time it takes to implement social media in the classroom and the lack of faculty training in the instructional use of social media. Faculty seem to view social media more as a teacher-centered tool rather than a student-centered tool for collaborative learning, as 70% agreed that social media was a valuable tool for teaching, while only 58% agreed that social media was a valuable tool for collaborative learning (Moran et al., 2011).

The use of blogs in a higher education instructional context has been documented in the sciences, language learning, teacher education and business (Davis, Deil-Amen, Rios-Aguilar & Gonzalez, 2012). Institutions recognize the value in social media as a tool to communicate with their students with 100% of 456 four-year institutions using some sort of social media with Facebook (98%) and Twitter (84%), the most popular (Davis et. al., 2012). While institutions of higher education and their faculty have created public profiles and course groups on social media sites to connect and communicate with their students, research that explores the effect student social media use has on their student's academic performance is rare but emerging (Davis et al., 2012).

Some researchers have found that social media use has an adverse effect on academic achievement with findings that suggest that social media users had lower grade point averages than did non-social media users (Hernandez, 2011; Phillips, 2011; & Kirschner & Karpinksi, 2010). Junco (2012) found that students who spent more time on Facebook and posted more tended to have lower GPAs. These findings are tempered by results that suggest that time spent on Facebook as a predictor of undergraduate GPA is only half as strong as high school GPA (Junco, 2012). However, other researchers found no impact on grade point averages (Kolek & Saunders, 2008 & Pasek, More & Hargittai, 2009). Finally, some other studies suggest that social media has a positive effect on academics, engagement and satisfaction. Twitter users have higher grades and higher levels of engagement (Junco, Heiberger & Loken, 2011). Students who use Facebook were more engaged in offline school activities, had stronger connection to their schools and had higher levels of life satisfaction (Heiberger and Harper, 2008).

Although there are worries that students are spending more time on social media than on academic activities (Davis et al., 2012), no relationship was found between time spent on social media and time spent on academics (Higher Education Research Institute, 2007). The simple use of social media measured on a gross level may not be the most

accurate way to determine the relationships between social media and academic outcomes. While the frequency of Facebook use negatively predicted academic engagement, students who engaged in more non-communication activities (playing games, checking on friends and posting photos) on Facebook had lower levels of academic engagement while students who engaged in more communication activities (commenting, creating events and viewing photos) had higher levels of academic engagement (Junco, 2012). There was no relationship between the frequency of general Facebook use and time spent preparing for class, however there was a negative relationship between frequency of Facebook chat and time spent preparing for class (Junco, 2012).

Although student motivations for using Facebook are mostly to develop and maintain relationships, pass time and manage personal digital content, learning can also be a motivation to use Facebook (Hew, 2011). One study found that Facebook can serve as a learning resource for students to find answers to questions about courses, assignments and to share ideas about projects and lectures (Bosch, 2009). The use of Facebook for educational purposes does happen organically, but not that often with only 4% of wall postings that were education related and only 10% of undergrads admitting they discussed academics on Facebook while fewer (2.17%) sought help with schoolwork (Madge, Meek, Wellens & Hooley, 2009; Pempek, Yermolayeva, & Calvert, 2009; Selwyn, 2009). These results suggest that students perceive the purpose of Facebook, and possibly other social media, is not for academic work (Madge et al., 2009).

Students are not the only ones that have a problem viewing technologies as academically relevant because many educators primarily see the value of digital media as entertainment or administrative tools (Weigel, James & Gardner, 2009). Despite the significant changes, technology has enabled in other parts of our society, there have been relatively few changes in education that are as significant (Weigel, et al, 2009). This stagnation certainly isn't for a lack of trying, since over $60 billion has been invested in placing technology in schools over the past two decades (Christensen, 2008).

The expectations for how technology can and will transform education have long been high (Wellings & Levine, 2009). As far back as 1913 when motion picture projectors were first introduced in schools, Thomas Edison predicted, "Books will soon be obsolete in the schools. . . . It is possible to teach every branch of human knowledge with the motion picture. Our school system will be completely changed in the next ten years" (cited in Reiser, 2001, p. 55). Throughout the history of educational technology, proclamations like Edison's have made it difficult for the empirically measured effects of technology to stand up to the outsized expectations (Reiser, 2001). Technologists and educators have been too confident that the significant institutional change required to reap the benefits of technology would be easily accomplished and over time, there has been a lack of documentation on implemented technologies' impact on "student learning, teacher practice and system efficiencies" (Lemke, Coughlin & Reifsneider, 2009, p. 5). Regardless of the lofty expectations and implementation issues, educational technology is contributing to student learning. In a meta-analysis of educational technology, researchers found that across the 15 types of technologies reviewed—from classroom response systems, to interactive whiteboards, and to virtual worlds—all have "primarily promising effects" on learning across content areas (Lemke et al., 2009, p. 7)

Technologies are often used in ways that maintain existing practices in teaching and it is most often used in computer education courses, vocational education, exploratory use in elementary school and word processing (Brown, 2006). Most of the most prevalent approaches to integrating technology into education are techno-centric, in that they focus first on the affordances and constraints of the technologies and technological skill rather than on students' learning needs. Contributing to the gap between expectations and results has been a lack of vision, access to research, leadership, teacher proficiency in integrating technology in learning, and professional development continue to be significant barriers to realizing the potential of currently implemented technologies for teaching and learning.

Affordances and Learning Theory

Understanding the affordances and constraints of a new technology implemented in a learning context is necessary, but not sufficient. The successful integration of an educational technology also requires knowledge of relevant learning theory, pedagogy and subject-matter content specific to that context. Social media has the potential to help move towards learning that is individualized, learner controlled, interactive and social (Weigel, et al, 2009). To aid in realizing the potential of social media for learning, we examined its affordances, relevant learning theories and models with the goal of moving towards a model of online social interaction for learning.

Affordances in relation to educational technology are characteristics of a technology that determines the viability of enabling a particular learning behavior and how that learning behavior will be enacted in a specific context (Kirschner, 2002). Noakes (2009) identified 10 affordances of social media including: flag, tag, share, rate, comment, subscribe, syndicate, remix, publish, and edit. To these we add connect, communicate, create, curate, customize and manage. In regards to learning, there are some social media affordances that stand out more than others. Among the affordances that have the potential to enable positive learning behaviors are: connect, communicate and create. The potential we see for these three affordances is based in learning theory, in particular constructivism and related theories which posit that people learn best through the knowledge construction process; a process that must be modeled by others.

Within a learning environment, constructivist learning happens when knowledge is actively created by learners (both individually and socially) as a result of engaging in and making sense of their environment (Jonassen, 1999; Mayer, 1999). A constructivist learning environment embeds learning in complex, realistic and relevant situations which provide ample opportunities for social interaction (Driscoll, 2005, p. 349). These learning environments also include information and knowledge building tools that are shared by the learners to support multiple perspectives and multiple modes of representation (Driscoll, 2005; Jonassen, 1999). When this type of learning environment is implemented, a learning community forms where the learners collectively become involved in the learning effort (Bielaczyc & Collins, 1999).

The tenets of constructivist theory link up well the social media affordances of connect and communicate. While there is overlap, the theory that best describes the potential of the create affordance is constructionist learning or learning by design. Learners in a constructionist environment design and create an external, shareable artifact. Constructionists assert that learning arises through the processes of designing, sharing, piloting, evaluating, modifying, and finally through reflecting on the experience (Han & Bhattacharya, 2001). A constructionist learning environment is usually a collaborative workshop-type space where interventions include project-based design work. The research often describes students designing and developing computational artifacts as the origin of constructionism was in MIT's Media Lab (Reynolds & Caperton, 2011). Students spend significant time on a daily basis over the course of several months working in the collaborative environment with a subject matter expert to guide student learning. Regular reflection on the design and development process is built into the learning environment as is sharing of knowledge and presentation of work and works in progress (Reynolds & Caperton, 2011).

The design of either constructivist or constructionist learning environments is complex. Some researchers eschew the often direct nature of instructional design in favor of pedagogical design which is a more indirect approach (Häkkinen & Hämäläinen, 2011). The argument is that socially organized learning activities cannot be predicted and therefore the design should not be prescriptive. In designing these types of environments, it is a struggle to find the balance between enabling open and self-directed activities as well as providing the correct level of structure and support, since significant collaboration and knowledge-sharing does not automatically happen when a group of learners come together (Häkkinen & Hämäläinen, 2011). An additional challenge to this type of learning is environments that often include the simultaneous use of multiple tools and resources that invites multi-tasking, which could lead to increased cognitive load and less efficient learning. Learners need the skills and strategies for handling these complex learning environments in order to be successful (Häkkinen & Hämäläinen, 2011). If we are to leverage the affordances of social media through the lenses of constructivism and constructionism, it is clear that we need a model that will help guide our design of learning activities and interactions.

Towards a Model for Designing Instruction for Social Media

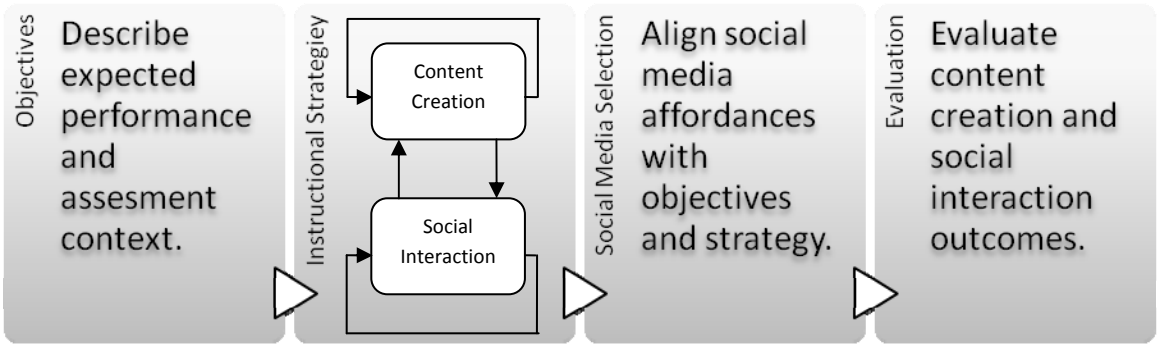
Drawing inspiration from Dick, Carey and Carey's (2008) instructional design model and Bower's (2008) affordance analysis e-learning design methodology, we present the first iteration of a model for designing instruction for social media (Figure 1). The description of each of the steps in the model's sequence is as follows:

1. Objectives: Write worthwhile objectives that describe the expected skill, knowledge or attitude and the context for assessing the skill, knowledge or attitude.
2. Instructional Strategy: Design instructional strategies and activities that provide opportunities for content creation and social interaction. As suggested by the arrows, the acts of content creation and social

interaction should be reciprocal, i.e., one action leads to the next, and self-propagating, i.e., one action leads to more of the same action.

3. Social Media Selection: Select social media with affordances that align with the objectives and instructional strategy.
4. Evaluation: Evaluate both the outcomes of the content creation and social interaction as defined by the objectives.

Figure 1. Designing learning for social media model.



Devising a model to guide the design of instruction related to a specific type of technology could be misunderstood to suggest that a designer of instruction should select a technology first and design the instruction based on the affordances of the selected technology. We do not agree with this sequence of instructional design and fully recognize that successful learning outcomes depend on the goals and objectives that drive the design of instructional strategies and selection of technologies. However, research suggests that there is a need to address the absence of instructional design from the conversation about social media in educational contexts (Leping Liu & Maddux, 2008). We hope that an instructional design model that specifically addresses the use of social media will raise awareness of the need for instructional design among educators that implement and research social media for learning.

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Systemic Change Going Public: Prelude to Scene 2

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KEY WORDS: Systemic change, Web Design 2.0

> *"My interest has indeed changed/grown as a result of this website. I would like to know more about what parents and school districts can do to begin making this change. Rather than begin a conversation about systemic change on this website, I feel I need to observe and learn first before engaging" (Survey respondent, October 2012)*

The *Educational Systemic Change Web Project* began 2011 as a move to bridge the gap between researchers and practitioners aligning with the division's strategic goals. Project aims: begin a conversation about educational systemic change with practitioners, increase the systemic change profile on the Web, and serve as a viable resource center to practitioners. In this session, participants will view the published videos and website, determine how practitioners perceived the media, and discuss the gaps.

Background of the Systemic Change and Efforts

The scholars of Systemic Change in education have written profusely, however, change, innovation, and reform proliferate USA education with little incentive to create positive sustainable – educational systemic change (Reigeluth & Duffy, 2008). The writings include but are not limited to the following: need for systemic change (Chow, 2008; Reigeluth, 1995), theories of systemic change (Banathy, 1996; Duffy, 2003; Fullan, 2010; Senge 1990; Squire & Reigeluth, 2000), framework for understanding (Chow & Bucknall, 2011; Joseph & Reigeluth, 2010), case studies of implementation (Chow, 2008; Richter & Reigeluth, 2006), roles of stakeholders (Peck & Carr, 1997; Richter & Reigeluth, 2006), methods for employing (Duffy, 2008; Jenlink, Reigeluth, Carr & Nelson, 1996;Watson, Watson & Reigeluth 2012) and evaluation (Chow & Guerra-Lopez, 2011). Despite scholarly work, the pragmatic and theoretical understandings of educational systemic change goes unrecognized by those who may directly or indirectly influence education in our society.

Unlike piecemeal reform efforts, educational system change depends on society and values the inclusion of all stakeholders (Coburn, 2003; Goodman, 1995; Hargreaves, 2006). Therefore, the natural extension of the AECT Systemic Change division is to coalesce and broaden an understanding of systemic change for researchers and practitioners. In order to broaden understanding, communication must ensue. Communication often begins with one party initiating a conversation. Thus, the Web and YouTube project are just that; a useful way for others to learn about systemic change through a medium that is safe to examine, critique, and contribute. The videos and website examined are an attempt to commence a larger conversation about systemic change with the practitioner audience.

Moving and merging the academic writing and ideas to a practitioner-focused outreach in educational systemic change takes considerable thought. The free dictionary (http://www.thefreedictionary.com/practitioner) defines a practitioner as "One who practices something, especially an occupation, profession, or technique." The definition contrasts with most writing produced up this point. Previous writing and resources on educational systemic change have not targeted practitioners of systemic change as an audience, but rather it has be useful for other researchers as the writings appear in academic journals. However, moving from research or theory to the realm of practice is not without cost. When moving academic ideas from research/theory audience to practitioner audience, the message needs to be re-interpreted for the different audience, possibly modifying concepts so they are clearly understood (Rogers, 1995).

There is a Need

Society is signifying a need for a greater understanding of sustainable educational systemic change. The International Society for Technology in Education (ISTE) program and administrator standards point to the need to facilitate these changes. College and University programs accredited with ISTE are preparing facilitators to be visionary leaders: "Technology coaches inspire and participate in the development and implementation of a shared vision for the comprehensive integration of technology to promote excellence and support transformational change throughout the instructional environment" (ISTE-NETS, 2011). Technology facilitators include a vast number of teachers and technology coordinators. Likewise, the administrator standards espouse "Visionary Leadership" to support "transformation", "inspire and facilitate among all stakeholders," develop "shared vision while advocating" on local, state and national levels for policies, programs"(ISTE-NETS, 2011).

The national movement towards understanding change points to a ripe time for the AECT division. Creating an accessible repository of material may bridge a divide between practitioners and academics/researchers of systemic change.

In contrast, a web search on systemic change yields disheartening results. Currently, when the keywords "systemic change" is searched in Google, the first item listed is an obsolete web site by the National School Boards Association (NSBA). The NSBA definition of systemic change was created nine years ago in 2003, and links to AECT through a broken link. The fact that NSBA has a stated interest in systemic change suggests the potential for the value of this project. However, the concept of systemic change needs to be articulated on the Web with greater precision and with the voices of those who are working on this issue in a long-term, sustained fashion.

Design Rationale

A practitioner focused website was created in 2011 and was vetted by practitioners summer/fall 2012. Practitioners are defined as individuals, who have not formally studied systemic change but who may be interested in how to lead, participate, evaluate, or recognize an inclusive change process. Practitioners may be teachers, administrators, policy makers, or any stakeholder engaged in educational change.

Due to its general ease of use, the practitioner focused website was created using the WordPress® platform. Interoperability with YouTube and other Social media such as Facebook and Twitter make WordPress® an ideal choice. WordPress® allows users to upload media, including pictures and video, research reports, and journal articles. A general information architecture was designed to specifically ensure that information from different audiences were seeking could be easily found.

In an effort to communicate the multifaceted nature of systemic change, web video became a high priority. Video can potentially convey complex messages in a short amount of time with the use of audio and visual displays (Braverman, 2010; Osgood & Hinshaw, 2009;).

In lieu of a traditional method section for research, this paper describes the workflow used in the website and video creation. The concept of workflow seems more valuable as it encourages transparency throughout the design and development process and includes a rationale for the decisions made by the people involved (Gotto, 2004). In addition, workflow is the language of the practitioner who produces media aligning with the end goals of the project, and produces a timeline that can be easily critiqued or modeled for further development.

After description of the workflow, the preliminary results of the usability test will be shared.

Workflow

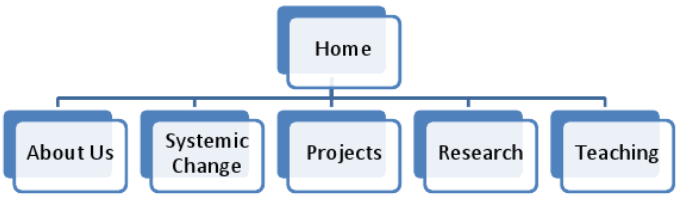
Overall Website and Video Creation Workflow

The website and video project began as collaboration between the current, incoming and elect communications officers of the Systemic Change Division. We determined that there was a need for practitioners to be involved within the systemic change efforts, which was aligned to the strategic plans. The first author took the lead on the video; the second author led the website creation and usability study and the third author refined and supported all processes.

Through multiple communication devices, the design and development process was completed, despite geographical distance. The following tools were used for virtual communication: Skype between officers; Google Docs/Google Spreadsheets for scheduling, task lists, and overall writing components; WordPress hosts the website; YouTube hosts the private videos for reflection and the public video; and Qualtrics administered the usability survey. Technology used for video creation included the following: Adobe Premiere, Adobe Photoshop, and GarageBand.

The site was initially designed by developing an information architecture based on preliminary user analysis and identified information needs for each user group. See Figure 1.

Design Specifications



User Analysis and Feature Checklists

Policy Makers	Teachers	College Educators	Researchers	Students	AECT Members
What is it?	What is it?	What is it?	What is it?	What is it?	What is it?
About Us	Why use it?	Why use it?	Examples	Examples	Examples
Why use it?	How to?	How to?	Research	Research	Research
Examples	Examples	Examples	Why use it?	Why use it?	Why use it?
ROI	ROI	ROI	How to?	How to?	How to?
How to?	How to?	How to?	ROI	ROI	ROI
	About Us	About Us	About Us	About Us	About Us

Figure 1 - Website Information Architecture

The site itself was designed around the theme of children and students and delivering specific information about systemic change to policy makers, teachers, university educators, researchers, students, and AECT members centered on five main content and navigation areas – About Us, Systemic Change, Projects, Research, Teaching, and a general area for discussion. See Figure 2.

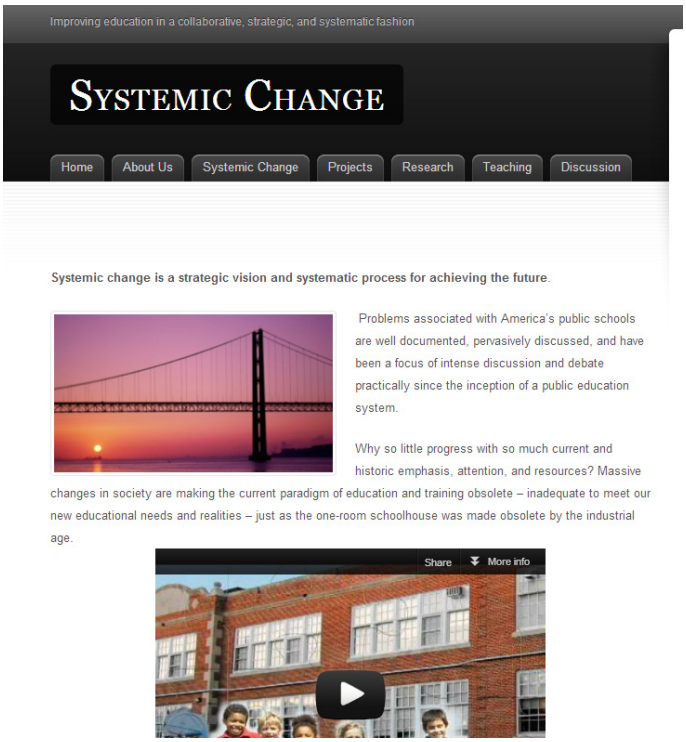


Figure 2 - Systemic Change Website

Video Workflow

***Video Pre-production*:** Spring 2011 the goals all of the video were vaguely established: videos were desired to reach a practitioner focused audience. The interview protocol (see interview questions in Appendix A) was created by the three communications officers and vetting between one another. The interview questions focused on describing and contrasting systemic change with current forms of educational change and reform. Other interview questions sought to illicit personal experience, practices, benefits, challenges, and ways to become involved. The Division Leadership and active members were notified before the AECT 2011 conference and interview times were arranged. Members, who were not contacted prior to the meeting, were solicited for participation at the Systemic Change Division meeting.

Video Production: During production the goal was to maintain a conversational tone so that members would be relaxed in front of the intrusive video camera. The video questions were posted in large print on the walls so that the interviewee could easily navigate through the questions. Communications officers conducted the interviews using an informal semi-structured interview approach (Stringer, 2007). Many times the interviewee led the interview tackling the questions he/she felt more comfortable addressing.

During AECT 2011, fourteen members of the AECT Division of Systemic Change were interviewed creating six hours of video. Each interview was video recorded with the intention of editing the content and distributing the shortened movies on YouTube. The members interviewed varied in their expertise and experience with the hopes of ascertaining diverse perspectives. During production, room lighting was problematic particularly due to lack of contrast between the wall and the interviewee.

Post-Production - Moving from academic concepts to practitioner focused work: With approximately six hours of video, post-production of the introductory video was broken down into three stages. After various individuals viewed a rough video edit, viewer critiques were taken into consideration in refining video content. First, the videos were initially watched for a general overview by the first author. Second, the interview videos were parsed into segments addressing key introductory concepts. Third, one introductory video was created based on the portions created on the salient issues that could create a coherent story (See *Figure 3*). The next paragraphs in post-production discuss greater detail of the three stages in video creation.

The first stage took place Spring 2012. The first author viewed all videos. Due to shear volume, it was challenging for all three authors to view all the videos. During viewing, the areas of agreement, variations in perspectives, and the divergent views were noted. In order to create a concise overview of systemic change, the authors chose to focus on the common elements that could be accessible to a novice of systemic change concepts.

Stage two took place in early Summer of 2012. The videos were cut into segments created by the first author and discussed with the second and third author. The segments addressed the following concerns: what systemic change is; what it is not; why is systemic change important; what are the benefits; what are the consequences of not thinking systemically; and interviews that lend themselves to good visual images or b-roll. A Graduate Assistant (GA), with little background of systemic change, was asked to complete the video segments. The goal of the videos was to appeal to the non-systemic change thinker. By choosing a Graduate Assistant with little systemic change background to view/edit the video, the creation team had a better chance of insuring that the general message of systemic change was clear and easy to understand for someone who is not familiar with systemic change.

After the video segments were created, the first author shared the privately shared You-tube video segments with the second and third authors. Together, the videos were viewed and vetting to determine the most important aspects for a practitioner audience. During this time, it was determined that an introductory video was needed that grabbed the audience's attention, simultaneously built credibility, and spoke to the concerns of the viewing audience. From the segments, the communication officers determined that an overall introductory video needed to be created.

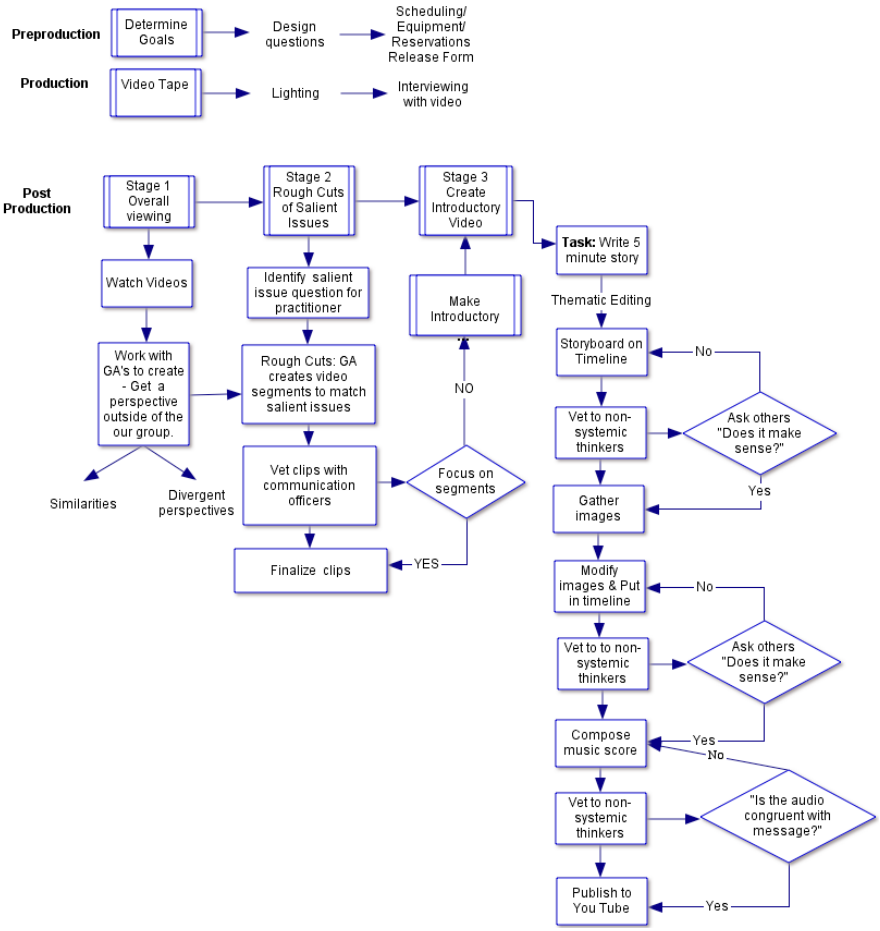


Figure 3 - Video Workflow

The third stage began August 2012 with the first author piecing together segments that would create a meaningful story and met the goals for the project. The first author vetted the story through graduate assistants and others who had little background on educational systemic change. During the process, critics helped to modify, move video segments, and vet the title slides that were used to enhance understanding.

Figure 4 - Systemic Change Video

When the video clips were selected, it was clear that the video was going to use thematic editing (Hurbis-Cherrier, 2012). B-Roll was needed to give visual explanation of the dialogue. B-Roll criteria: Images needed to be free of copyright violations. Therefore many Creative Commons and public domain images were used. Additionally the GA students took some photographs with permission from the subjects. Through collaboration, a music score was created using Garage Band Loops. The final video was vetting through people that were novices to systemic change thinking before making the movie public on YouTube.

Website and Video Usability

"*If I was considering systemic change, I would use this website to develop a better understanding of what it is. I can definitely see the potential impact of systemic change and realize we need to get started now as educators and parents.*" (Survey respondent, October 2012).

In the summer/fall 2012 a pervasive usability process followed a nearly complete design emphasizing general utility, ease-of-use and the site goals (Chow, Smith, & Sun, 2012; Lazar, 2006; Nielsen & Loranger, 2006). The goals were established to align with the division's strategic plan with a high priority features for administrators, teachers, policy makers, and researchers. A 17-item usability survey was administered to 11 graduate students.

Overall feedback was extremely positive. Of the students, three of whom were full-time parents as well, they felt that the site increased their interest in the concept of systemic change (M=5.0 on a 7-point scale), represented a good opportunity to be able to have a "conversation" about the potential systemic change (M=5.7), and did a good job of professionally representing the topic (M=5.6). While the site received high marks for beginning the discussion a common theme was the need for more concrete examples of actual systemic change implementations. One respondent noted, "This is the first time I have heard about systemic change. While it interests me and I recognize its importance, I think I would need more information before engaging in a conversation."

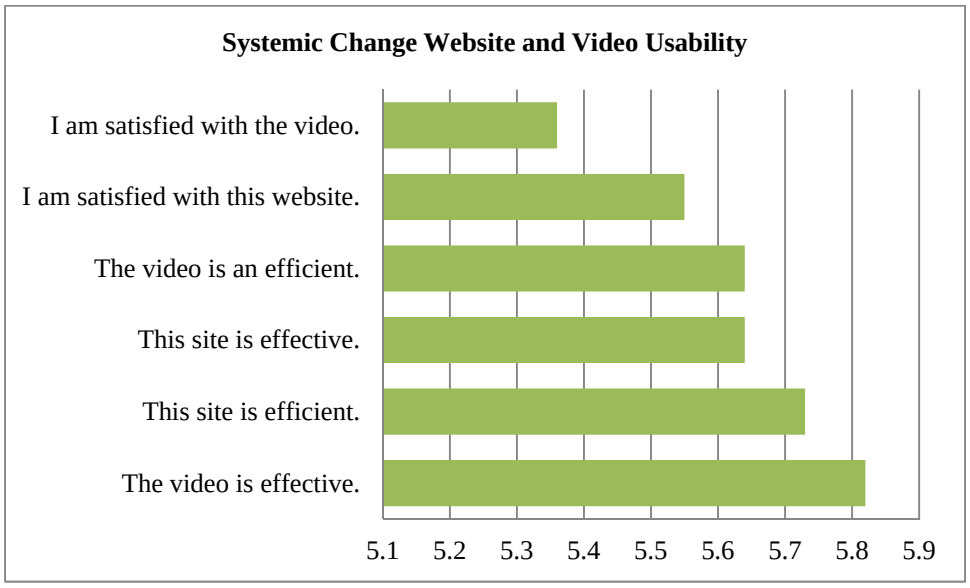


Figure 5 - Website and Video Usability

The video also received high marks. Respondents felt it was "well done" (6.0), helped them better understand what systemic change was (M=5.4), was easy to understand (M=6.4), and was interesting and engaging (M=6.0). According to one respondent, "The video was OUTSTANDING! Throughout the entire website, the video had the most impact on me."

In terms of graphic design and general web design standards, the site and video were well received. Overall graphic design of the site (M=5.0) and video (M=5.8) were rated high, the site and video were found to be easy-to-use (M=6.0) and easy-to-watch (M=6.2), the site was easy to navigate (M=6.4), and was found to be useful and relevant (M=6.1). Overall, respondents felt the site was effective (M=5.6), efficient (M=5.7), and satisfying to use (M=5.6). The video also was rated highly for effectiveness (M=5.8), efficiency (M=5.6), and satisfaction (M=5.4).

As far as overall strengths, one respondent noted, “It gives a description of what systemic change is, and it doesn't come across as over educated people just talking.” The video in particular received high praise, “The video held the most impact. The overall message of the need for immediate systemic change was powerful.” Another respondent offered, “I think the video is the most engaging part of the site.”

Major opportunities for improvement centered on the need for more specific examples. One respondent felt the site was weak in, “Providing concrete examples of how systemic change works in public education.” Another noted, “I think seeing real to life examples and results (if there are any yet) would be helpful. Add some content to FAQ and Getting Started and you're "good to go."”

Conclusion

The initial goal of the website and video project was to appeal to practitioners in order to begin a conversation about educational systemic change. Our beginning goals were met, but we are not ready to begin the conversation.

Preliminary results suggest that video was key to bridging the initial understanding of educational systemic change. For greater understanding, more videos need to be created. However, creating the videos deemed more challenging than anticipated due to the time consuming process. Interviewed Systemic Change members provided insightful answers to all questions, and so it was a daunting task when navigating the complexity of the answers in order to simplify the message into an accessible manner. Stage 2 of the post-production process was an attempt to focus on the initial key issues for someone new to Systemic Change in Education.

In stage 3 of post-production the first introductory video was created. It was a balance to remain mindful of audience needs and the goals of the Systemic Change Division. It was hoped that AECT Systemic Change members would approve the opening story of systemic change, and as reiterated, provide accessible content to a practitioner focused audience. Yet, the interviews point to a distinct difference among the concepts of systemic thinking, systemic theory, systemic change, and the prescriptions that are appealing to a general audience. Practitioner audiences often desire prescriptions of change more clearly, but it is the prescriptions that can get us into trouble – piecemeal change.

There is further work. More videos will be created based on the video segments created in Stage 2. Also, there is a dearth of practical examples of those that have undergone a systemic change process for creating an exemplary education system. The usability study also supports the need for more practical examples. Simultaneously, the dearth was the impetus for the website and video project. To our advantage, researchers have worked with districts and schools that have undergone an educational systemic change process and have positive results to share. In the future we hope to create and design more videos with the practitioners and provide web resources so that others can also make a positive-sustainable impact in education. Indeed, this project was a prelude to Scene 2 where we intend for Educational Systemic Change to go viral.

Acknowledgements

We would like to thank many participants. Systemic Change division members gave their time and permission to be interviewed. Ashley Scott and Patricia Douglas helped in the initial production process. Ashley Scott, Sylvent Otieno, Regina Sayles, and Krista Hess all gave input into the story line for the introductory video segment. Stacy Keller and Regina Sayles worked tirelessly to find and create images as well as create the final music score.

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Appendix A

Interview Questions

1. Why are you excited about systemic change in education?
    a. Please describe the projects you are working on with regard to systemic change --- that gets you excited?
2. What is systemic change?
3. How do you practice systemic change? Describe your involvement with systemic change: consultant, researcher, practitioner, political, teacher of...
4. Please describe the products have you produced through your involvement? How have you made a difference in this field?
5. Many reform efforts have been labeled as systemic: No Child Left Behind, Charter Schools... How do you distinguish systemic change from these other kinds of change?
6. What is the value (benefit) of seeing things systemically? Policy maker? Administrator? Teacher?
7. What is the biggest ***challenge you face*** with your systemic change work?
8. Are there any examples of *educational systemic change* that have had **positive** results?
9. What could I do to ***understand educational system change*** better?
10. If I want to *make systemic change happen*, how would I do that?
11. If I want to c*onnect with others that are advocates of educational systemic change,* how do get involved?
12. What are some of the consequences of ***not*** thinking systemically?
13. What should we ask you that we did not?

Experiences

In the field of systemic change what project are you excited about?

What are the challenges?

Appendix B

Systemic Change Website Usability Survey

Q1 This survey seeks to understand your thoughts about the website http://systemicchange.wordpress.com. It should take approximately 15-20 minutes to complete this survey.All responses are completely confidential and anonymous.Do you agree to participate in this survey?

- ❍ Yes, I agree to participate in this study. (1)
- ❍ No, I do not agree to participate in this study and do not want to complete this survey. (2)

Q2 What are your professional affiliations (choose ALL that apply)

- ❑ Student (1)
- ❑ Graduate Student (2)
- ❑ Teacher (3)
- ❑ Coach (4)
- ❑ Spiritual Leader (5)
- ❑ Professor (6)
- ❑ Administrator (University or PK-12) (7)
- ❑ Business Owner (8)
- ❑ Management (9)
- ❑ Sales Associate (10)
- ❑ Full-time Parent (11)
- ❑ Healthcare Professional (12)
- ❑ Member of AECT Division of Systemic Change (13)
- ❑ Other (14) _____

Q3 React to the following statements (for the website http://systemicchange.wordpress.com):

	1 (Strongly Disagree) (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (Strongly Agree) (7)
My interest in the concept of systemic change has increased because of this website. (1)	❍	❍	❍	❍	❍	❍	❍
The website does a good job of providing an opportunity to have a "conversation" about this. (2)	❍	❍	❍	❍	❍	❍	❍
I would be interested in beginning a conversation about systemic change on this website. (3)	❍	❍	❍	❍	❍	❍	❍

Q4 Please elaborate on your ratings above:

Q5 React to the following statements:

	1 (Strongly Disagree) (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (Strongly Agree) (7)
The URL for this website systemicchange.wordpress.com is easy to remember. (1)	❍	❍	❍	❍	❍	❍	❍
This website does a good job of professionally representing systemic change. (2)	❍	❍	❍	❍	❍	❍	❍
I have a good understanding of what the purpose of this website is. (3)	❍	❍	❍	❍	❍	❍	❍

Q6 Please elaborate on your ratings above:

Q7 React to the following statements:

	1 (Strongly Disagree) (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (Strongly Agree) (7)
I would use this website if I was considering using systemic change. (1)	❍	❍	❍	❍	❍	❍	❍
This site helped me better understand what systemic change is. (2)	❍	❍	❍	❍	❍	❍	❍
This site helped me get excited about the potential impact of systemic change on education. (3)	❍	❍	❍	❍	❍	❍	❍
I found this site boring. (4)	❍	❍	❍	❍	❍	❍	❍
I found this site confusing. (5)	❍	❍	❍	❍	❍	❍	❍

Q8 Please elaborate on your ratings above:

Q11 React to the following statements:

	1 (Strongly Disagree) (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (Strongly Agree) (7)
I thought the video on the homepage was well done. (1)	❍	❍	❍	❍	❍	❍	❍
The video on the homepage helped me better understand what systemic change is. (2)	❍	❍	❍	❍	❍	❍	❍
The video on the homepage was easy to understand. (3)	❍	❍	❍	❍	❍	❍	❍
The video on the homepage was too long. (4)	❍	❍	❍	❍	❍	❍	❍
I found the video on the homepage interesting and engaging. (5)	❍	❍	❍	❍	❍	❍	❍
The video on the homepage was boring. (6)	❍	❍	❍	❍	❍	❍	❍

Q10 Please elaborate on your ratings above:

Q9 React to the following statements (for the website http://systemicchange.wordpress.com):

	1 (Strongly Disagree) (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (Strongly Agree) (7)
I liked the graphic design of the website. (1)	❍	❍	❍	❍	❍	❍	❍
I liked the graphic design of the video. (2)	❍	❍	❍	❍	❍	❍	❍
The site was easy-to-use. (3)	❍	❍	❍	❍	❍	❍	❍
The video was easy-to-watch. (4)	❍	❍	❍	❍	❍	❍	❍
The information on this site is relevant and useful. (5)	❍	❍	❍	❍	❍	❍	❍
The information in the video is relevant and useful. (6)	❍	❍	❍	❍	❍	❍	❍
The navigation of the website is intuitive and easy-to-navigate. (7)	❍	❍	❍	❍	❍	❍	❍

Q12 Please elaborate on your ratings above:

Q13 React to the following statements:

	1 (Strongly Disagree) (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (Strongly Agree) (7)
This site is effective in representing systemic change. (1)	❍	❍	❍	❍	❍	❍	❍
This site is efficient in learning about systemic change. (2)	❍	❍	❍	❍	❍	❍	❍
The video is effective in representing systemic change. (3)	❍	❍	❍	❍	❍	❍	❍
The video is an efficient way of representing systemic change. (4)	❍	❍	❍	❍	❍	❍	❍
I am satisfied with this website. (5)	❍	❍	❍	❍	❍	❍	❍
I am satisfied with the video on the website. (6)	❍	❍	❍	❍	❍	❍	❍

Q14 Please elaborate on your ratings above:

Q15 What are the site's major strengths?

Q16 What are the site's major opportunities for improvement?

Q17 Any other final comments or suggestions about this website?

Q18 If you are a student in either Dr. Beth Rajan Sockman or Dr. Anthony Chow, please email us your name and email address with the code HARLESS so we know you have a completed this survey.

Inquiry-based Learning Environment Using Mobile Devices in Math Classroom

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Abstract

SMILE (Stanford Mobile Inquiry-based Learning Environment) is an inquiry-based mobile learning framework designed to promote student-centered inquiry and reflection leveraging mobile media in the classroom setting. Students can quickly create their own inquiry items based on their own learning and knowledge using SMILE. This paper introduces seven phases of SMILE that are applicable to math classroom environments, and presents the findings from SMILE implementation studies in Argentina and Indonesia. The students had a mobilized inquiry-based learning in math, which was facilitated by teachers and researchers by tapping into the affordances of mobile technologies for supporting their own question generation in class. SMILE was found to engage students in heterogeneous/mixed ability classes and promote both team collaboration and competition in learning math.

Keywords: SMILE, mobile learning, inquiry-based learning, math education

Inquiry-based Learning Activities Using Mobile Devices in Math Classroom

To date, few researchers have conducted mobile learning practices in math education, not to mention proposing effective inquiry-based learning activities or supporting tools to facilitate math learning in classroom settings. To deal with this issue, this research aims at suggesting an inquiry-based mobile learning system, SMILE (Stanford Mobile Inquiry-based Learning Environment), for supporting math learning in the classroom environment. SMILE is an inquiry-based mobile learning framework designed to promote student-centered activities in an engaging way using mobile devices in classroom settings. This study introduces seven phases of SMILE that is applicable to math classroom environments, and presents the findings of SMILE implementation in Argentina and Indonesia. In addition, this study focuses on a mobile inquiry-based activity that guides students to learn during a math activity with mobile devices and wireless communications.

Background

Technology and Math Education

Mobile devices have been prevalent in recent years impacting the global society in numerous and profound ways. Mobile devices are the most widespread information and communication technologies, and the increasing rate is rising rapidly (Valk, Rashid, & Elder, 2010). With the rapid growth of mobile technologies, mobile devices enable educators to focus on the potential to leverage the power of these new technologies to facilitate learning and improve performance, because of their increasing computing power, portability, affordability, ubiquitous accessibility, and storage which can be equipped with diverse educational content, including mobile videos, learning simulations, and education games (Kim, Miranda, & Olaciregui, 2008; Kim, Buckner, Kim, Makany, Taleja, &

Parikh, 2011). Mobile technologies and its innovations are creating new possibilities and mounting pressure to take advantage of such innovations to enhance creative/critical thinking and positive attitude (see Cavus & Uzunboylu, 2009) as well as student learning and engagement.

There have been several approaches of leveraging technology to enhance math teaching and learning, and many studies have tried to find out effective methods to improve learner performance in math. For instance, Nilsson and Pareto (2010) developed a technology enhanced learning game (called *TEL*) to support conceptual understanding of math for learners with math difficulties. In their case study, the result showed the beneficial effects of visual representation, learning-by-exploration, and learning-by-teaching activities to low-performing students. Hwang, Chen, Shadiev, and Li (2010) investigated a multimedia Web-based annotation system (called *Virtual Pen*) to foster math learning process of individual and collaborative learning. In their quasi-experiment over a period of four months, their technological solution has a significant impact on math learning achievement.

In addition, there has been an effort to conceptualize this area. Zhang and Jiao (2011) categorize technology-based math teaching approaches into two areas: (1) online learning environment using already developed math contents; and (2) dynamic math software in which the teaching contents have not been developed. The first category is a traditional courseware based on online learning environment, in which teachers and students can use passively the instructional materials. On the other hand, dynamic math software enables learners to benefit from learning-by-doing (e.g., Nilsson & Pareto, 2010) which is difficult to be achieved by traditional tools or technologies (Zhang & Jiao, 2011). Dynamic math software (e.g., Stahl, Rosé, O'Hara, & Powell, 2010) supports learners' self-explorations. However, dynamic software-based instructions might have negative effect to the high performance students (see Zhang & Jiao, 2011), and it still needs more engaging and collaborative activities.

Mobile technology in math teaching and learning.

There have been attempts to use mobile technology in math teaching and learning. As a result of the reciprocal research and development process, Jimenez, Nakaue, Pea, and Russell (2009) suggest a mobile application (called *Go Math!*) for supporting collaborative activity and encourage math practices of daily life. Through the interview session with 74 participants they drew design implications for mobile math environments, such as situation-driven, promoting enjoyment of math, or a complement to school. van't Hooft, Swan, and Bennett (2009) investigated the use of a mobile application that provides learners with basic math facts. The results show that mobile technology group has a positive impact on the math knowledge improvement. Hawkes and Hategekimana (2009) conducted the quasi-experiment comparing mobile and classroom environments of an algebra course. The result shows there are statistically significant positive effects of mobile learning on their math assessment scores. Wijers, Jonker, and Kerstens (2008) developed a mobile math application (called *MobileMath*) which is for a group to gain points by creating virtually constructed mathematical shapes. They demonstrated the math learning application can be employed in an ordinary school setting. In sum, most of these researchers concluded that the mobile technologies have the potential to be an effective pedagogical tool for math teaching and learning.

There are a variety of formats for technology-based resources that serve specific goals by using interactive technologies, which provide immediate feedback and create visual representation. However, Bos (2009) points out that not all uses of technology lead to the desired result in math teaching and learning. She suggests that in order to use technologies effectively the software should not be limited in the math content, and should lead a conceptual understanding of math principles.

The current use of mobile technology may help learners grasp the conceptual understanding of math principles. In particular, mobile math games may engage students to think critically before planning and executing solutions to solve mathematical problems. For instance, Fire Rescue Math (Kim, Buckner, Kim, Makany, Taleja, & Parikh, 2011) engages children to recognize the need to rescue people on different floors by picking the right size ladder. The game is not asking students math questions directly, but it asks students how many floors you need to be go up or down to save people. The game includes multiple reinforcement mechanisms to facilitate numeric skill development. It teaches the concept of positive or negative number addition and subtraction. However, these approaches have limitations in the use of technology to facilitate student collaboration and reflection in math education. As part of the effort to overcome the limitations, we introduce new approach to math teaching and learning using inquiry-based activities using mobile technology. SMILE (Stanford Mobile Inquiry-based Learning Environment) is better situated to increase student engagement, interaction, reflection, peer evaluation, competition, collaboration, learning outcome tracking, and multimedia use in broad learning scenarios.

SMILE

SMILE is a Stanford University project led by Dr. Paul Kim. SMILE enables students to create their own questions (e.g., multiple choice questions) and share them with their peers using mobile devices. Students can

review personal and question-related data including which student answered the most questions accurately and which student created the highest-rated question. They respond to and rate each other's questions. In addition, SMILE provides an activity management application for teachers. It allows the teachers to control the progress of the activity in real time and to view all student activity data.

SMILE has been tested in various conditions and settings and found positive outcomes. Seol, Sharp, and Kim (2011) report that participants were satisfied with SMILE in their implementations. Students specified that they most enjoyed the opportunity to create their own questions and share them with peers. In their study, the participants also reported that they viewed SMILE as a valuable way to review class materials. The students created highly relevant questions for each other with a range of complexity spanning multiple levels of Bloom's Taxonomy (Seol, Sharp, & Kim, 2011).

SMILE could be an appropriate tool for math learning because of the identified advantages. SMILE provides unique sets of advantages in increasing learner participation, engagement, motivation, competition, and collaboration which all lead to better learning and enjoyment. As suggested in the study of Seol, Sharp, and Kim (2011), there are five significant features of SMILE: (1) students can include photos in their questions and gain learning benefits associated with presenting materials in multimedia; (2) students create multiple choice questions requires them to think critically in order to create three distractors for each question; (3) students rate each other's questions provides feedback and incorporates an element of peer-assessment; (4) students experience the review process in a less-pressured competitive learning environment, which has been demonstrated to increase intrinsic motivation; and (5) SMILE supplies teachers with all of the students' questions and responses through the activity management application provides invaluable formative assessment information, which has been demonstrated to improve student learning. For all of these reasons, SMILE may provide particularly effective means of promoting student-created activities in the math education field.

Since mobile devices have advantages of reaching even the most marginalized areas, it has the potential to widen access and supplement education in developing areas of the world (Kim et al., 2011; Song, Karimi, & Kim, 2011). However, inequalities of opportunities to access to educational resources continue in the developing world, and the delivery of cost-effective and quality education remains a problem (Valk, Rashid, & Elder, 2010). We believe SMILE has great potential to cause substantial pedagogical paradigm shift especially in the developing world because there is generally more lack of resources, less hierarchical bureaucracies in regions where formal schooling is not an available option or found to be ineffective. Whereas in the developed regions, there are usually rigid curriculum standards and strict periodic tests that students need to prepare for, leaving little room for innovative pedagogies. In this respect we have tested SMILE for math learning in Argentina and Indonesia. In this paper, we report the SMILE math model, its process, and initial findings. We also offer suggestions for educators and researchers.

SMILE Math Learning Model

We have modeled the inquiry-based math learning process to foster learners' self-directed learning and collaborative activities of their inquiry-based learning. As students are creating their own math questions, they can use SMILE tools available on the mobile devices to support their activities. Teachers, students, and researchers can have access to students' questions, answers, and results of peer evaluation during and after classes. Mediated by mobile technology, students share their questions with images that they took by themselves or got from their Internet searches and cooperate together on their learning activities. Students can collaboratively compare and contrast their own questions and answers on their individual mobile devices.

Phase 1. Introduction and device exploration.

The introduction and device exploration phase is necessary for those who are not familiar with mobile devices. Students' technology skills need to be refined in order to develop a meaningful and successful experience (Kim, 2008). Although teachers may be present in the classroom to observe student learning, it is not necessary to engage in the student exploration. In this phase, we let students freely explore and also teach themselves as they quickly augment and exchange knowledge of the devices within less than 40 minutes. This process has dual goals: (1) to get students to quickly understand how to effectively manipulate the devices to capture photos, videos, or type text to generate questions; and (2) to provide an opportunity for teachers – especially skeptical, inexperienced, and technically challenged – to watch and observe how fast children can quickly get the handle on the devices and ready themselves for productive work.

Phase 2. Prompt for problems.

Students are asked to generate their own math questions that they believe to be well-designed and difficult (e.g., tell students that “try to generate questions your teachers would not be able to solve!”). We expect that this process will maximize the sense of challenge and motivation for students to engage in the inquiry-based activity. In

this phase, students are told that they can create multiple choice questions and use photos or other images as appropriate to express their questions.

Phase 3. Student grouping and generating questions.

If students have never created questions or have not been familiar with generating questions by using mobile devices, they are asked to make questions on papers. While students are generating questions, facilitators go around and guide them or help them understand what good versus bad questions may be. In this process, students attempt to solve their own questions and verify the proposed answer to the exclusion of all other possible answers (i.e., distractors). This process typically takes the most of the time in the SMILE process. Students are grouped into three or four members so they can collaborate in generating questions. This creates a sense of competition between groups.

Phase 4. Question generation.

Students draw mathematical figures or graphics on paper and take pictures with the mobile devices while typing question texts or answer options on the mobile device. As students submit questions, the teacher's screen shows the students questions in real-time as they are generated. The facilitator can see which group has finished or is still working on generating questions. Once all groups submit a question or as many as planned by the facilitator, the facilitator can click on a button to distribute the entire questions set back to the students. Though each group may have created one question, they can be solving all questions generated by the entire class.

Phase 5. Question solving.

Students solve their peers' questions and review them. After identifying a correct answer for each question, they are asked to rate each question. This provides the students with an opportunity to reflect on peer generated questions. The facilitator can monitor which group has completed answering and rating all questions in real-time through the activity management application. Once all of the ratings and answers are submitted, the facilitator can click a button to send the automatically tallied rating and score card to all student groups.

Phase 6. Result review.

Students review the correct answer and compare it with their own answer for each question. Students get to see the question ranking (e.g., which question received the highest rating) and also student group ranking (e.g., which student or group answered the most questions correctly).

Phase 7. Reflection.

After the review, students are asked to explain why they created their specific math questions and why they chose certain sets of answers for their questions. Usually, the group or individual that received the highest ranking will get the first opportunity to explain their questions.

Repetition and enrichment.

After the first round of SMILE, students will tend to want to do it again because they now understand the whole process of SMILE and are more motivated to generate higher ranking questions. Facilitators can decide the follow-up activities at this point (i.e., repeating with the same guidance, providing extra supports, giving instructions to cover certain question topics or types, etc.). In most cases, students learn to generate better questions over time. At the same time, students get to solve and reflect on a variety of questions generated by peers.

SMILE Implementation

For this project we implemented SMILE through classroom observations, analysis of classroom photos and videos, analysis of the artifacts produced by participants, assessment of learner performance, and interviews with the teachers and students. The students in Argentina and Indonesia experienced a total of 1 week of the math class using SMILE. The mobile device chosen was the smartphone Motorola which runs Android (version 2.2) operating system.

Implementation 1 – Argentina.

The students in Argentina experienced a total of 1 week of the mobile inquiry-based math class using the SMILE application. Students identified how questions created by their peers may have been incorrectly designed, how certain questions may generate multiple answers, and why the assumed correct answer was not indeed correct. During the class, the students did not reveal the questions they generated to their peers (see Figure 1. c). Most groups spent over 50 minutes verifying their answers and making sure the answer proposed was correct.

Technical challenges.

Initially, participants' photo quality was poor. They had to rewrite text questions in boldface with a larger typesetting so the camera could capture their questions or figures more vividly. Some photos were incorporated at wrong angles. Thus, the students received some basic guidelines to assist in taking better quality pictures of their questions.

Figure 1. SMILE in Argentina. a) Taking a Picture of Math Questions (Left); b) Solving the Questions Created by Peers (Middle); c) Covered when Creating Math Questions (Right).

Implementation 2 – Indonesia.

The students in Indonesia experienced a total of 1 week of the mobile inquiry-based math class using the SMILE application. In most groups, there was a dominating member of each group that led the process of generating math questions (see Figure 2. a). Students were excited to see their questions posted and projected on screen (see Figure 2. b). Other students appeared to look and make distracting noises (see Figure 2. c).

Figure 2. SMILE in Indonesia. a) A Student Leads the Solving Process (Left); b) Projected Screen (Middle); c) Other Class Students are Peeking (Right).

Discussion

Mobile learning has increased access for students who cannot attend schools (e.g., who would not be able to follow courses in a traditional educational setting) (Valk, Rashid, & Elder, 2010). However, mobile learning does not particularly need to be in the outside of school situation nor individualized context. Mobile learning could be effective in classroom settings. In both two implementations, students shared their math questions and answers using SMILE, which activities led collaborations in the classroom environment.

Despite the effectiveness of technology and its potential for math learning, teachers still need to leverage technology resources in ways that extend and increase their effectiveness as meaningful pedagogical tools (Ertmer & Ottenbreit-Leftwich, 2010). Even though teachers have increased their professional uses of technology (see Zhao, Wan, Yu, & Luo, 2006), with the rapid development and enhancement of mobile technology, teacher training programs have a limitation for meeting the needs of recent students. In SMILE implementations, students were enthusiastically adopting and learning with mobile technology without additional teachers input. Students could get started mobile learning in several minutes since they adopt new technologies immediately and mobile learning devices minimize the initial learning curve (Kim, 2008). Overall, the mobile learning technology adoption was rapid,

seamless, and actively driven by the students rather than the teacher (Kim, Hagashi, Carillo, Gonzales, Makany, Lee, & Garate, 2011).

As to the technology and its integration into the classroom, a teachers' role could be less focusing on teaching, but more on facilitating. The SMILE framework provides the flexibility for a teacher to be a facilitator by enabling students to create questions that are appropriate to individuals' and/or subgroups' levels for personalized learning. The activity management application allows teachers to control and monitor all of the students' activity in real time. The approach of SMILE is one solution that reduces teachers' burden to learn new technologies and provides engaging learning activities for students. In addition, given that social interaction plays a significant role in effective learning, mobile devices need to impact educational outcomes by facilitating communication (Valk, Rashid, & Elder, 2010). In this sense, SMILE provides students with collaborative learning opportunities creating, reviewing, and discussing their own questions and answer.

This paper describes the implementations of a mobile inquiry-based learning environment designed to promote student-created questions in math teaching and learning. We focused on applying inquiry-based learning strategies to facilitate student-centered learning in math education. In this study, students shared their math questions and answers using SMILE, which aided in providing activities led to collaboration in the classroom environment. The students enthusiastically adopted learning with mobile technology without additional teachers' input. It may be clear that there was a minimal initial learning curve, as it only took participants several minutes to start using the mobile learning devices. The students pursued inquiry in a personalized way without teachers' unidirectional instructions or its sequential order.

Conclusion

The pedagogical paradigm shift from teacher-centered to student-centered learning utilizing an inquiry-based learning technique is becoming possible. In the traditional concept of the classroom, particularly in the developing world, pedagogies and curriculums remain highly unidirectional and teacher-centered. Students need to be empowered to explore and learn by themselves. SMILE is an inquiry creating and assessment tool which allows students to quickly create their own inquiry items based on their own learning and prior knowledge. Inquiries drive knowledge generation and more knowledge leads to more useful and creative inquiries. SMILE can create a new global learning community of inquiry generators by sharing global knowledge through mobile technology. Our redesigned math teaching approach using mobile technology can be adoptable in real classrooms. Our inquiry-based learning approach is intended to provide instruction and learning designed around peer-created math questions and the pursuit of significant collaborations.

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Increasing Employee Participation in Voluntary Training: Issues and Solutions

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Introduction

In most instances, employee training is provided as either part of new employee orientation ("onboarding") or to meet safety, legal, or other regulatory requirements (compliance). When training is mandatory, employees participate, willingly or not. However, many companies and organizations offer training that is voluntary (non-mandatory) with the purpose of increasing the knowledge and skills of employees. With the growing use of distance and online learning, offering voluntary training has become more cost effective and wider in reach, especially for larger companies with employees dispersed around the world. For this paper we define voluntary training as any training opportunity that is not required (non-mandatory) as a part of one's continued successful employment within an organization.

The purpose of this paper is to summarize research findings about factors that influence whether or not an employee participates in voluntary training. We will describe key factors related to employee participation in voluntary training, and offer solutions for increasing employee participation in voluntary training. These topics are important because:

- Companies dedicate significant resources to voluntary training, and those finite resource must be allocated as effectively as possible.
- Companies expending these training resources want their employees to learn and grow by participating in learning and development opportunities.
- Companies need to know how to design and promote voluntary training so that employee participation increases.

Voluntary training is typically a part of a company's strategy to improve employee knowledge, skills, and job performance. However, it can be difficult to get employees to participate in these programs because they are voluntary. Increasing participation in these training programs not only increases organizational effectiveness, but also is of benefit to the individual employee. Voluntary training can be a win-win situation. Also, if the company infrastructure for web-based training is present (networks, computers, learning management system, etc.), the cost of providing the training opportunity is relatively low.

Problem Statement

Problem: *Companies desire to increase employee and organizational capabilities via voluntary training, but in many cases and for various reasons employees do not participate.*

If the factors that influence voluntary training participation are better understood, then solutions can be implemented to address non-participation. By examining the needs and motivations of various categories of employees, it may be possible to increase participation in voluntary training programs. It also may be necessary to

conduct research studies that attempt to gain a better understanding of best practices in regard to training certain segments of the employee population.

Factors Related to Participation in Voluntary Training

Certain factors influence the likelihood of an employee participating in voluntary training. Some of those factors include one's organizational tenure, age, gender, education level, hierarchical position, employment status, and self-efficacy (Renaud, Lakhdari, & Morin, 2004; Noe & Wilk, 1993). Employers can examine these factors within their own companies, and determine how they influence the rate at which employees participate in voluntary training opportunities.

Organizational Tenure

Certain trends in training have emerged in the published research, and employers and human resources personnel should be aware of them. For example, training programs have the most benefit for employees who have been with a company for one to ten years and/or employees who are on the lower end of the pay scale (Heng, et al., 2006). One study found a positive correlation between organizational tenure and participation in voluntary training, but the relationship occurs with decreasing probability, meaning that the longer an employee stays with a company, the more likely they are to participate in voluntary training, but the correlation becomes weaker over time (Renaud, Lakhdari & Morin, 2004). The decreasing probability may be related to the age of the worker, which will be discussed in that section. Another study that examined gender, organizational tenure, and participation in voluntary training showed that there is no relationship between tenure and participation in voluntary training for men. For women, there was a weak, but significant positive correlation between years of service and participation in voluntary training (Cloutier, Renaud & Morin, 2008). This could be related to gender issues in voluntary training, which is discussed later in this paper.

Age

Another area of consideration is the age of the employee. Older workers tend to be less motivated to participate in training than younger workers (Maurer, Weiss, & Barbeite, 2003; Tharenou, 1997). This motivation leads to a negative correlation between age and participation in training (Renaud, Lakhdari & Morin, 2004). The research also shows that individuals over 50 years of age have a lower probability of participating in voluntary training. However, it is documented that employers expend more training resources to train those who already have a higher level of education (Frazis, Gittleman, & Joyce, 2000). Complicating things further is generational differences as they relate to views on training. It is possible for companies to employ people from four different generations, with each generation drawing from different experiences over the last fifty years (Hart, 2008). Workers from the different generations exhibit certain patterns when it comes to views on training. Generation Y employees (born between 1981-2000) prefer to learn by doing and to work in teams, while the Baby Boomers (born between 1946-1964) and the Silent Generation (born between 1933-1945) look for the practicality of training, and learning from experiences. Generation X employees (born between 1965-1980) generally desire a lot of feedback, and prefer a casual learning environment (Cekada, 2012).

Research has shown that age is negatively correlated with training effectiveness, and that older employees take longer to master training content, while also taking longer to perform the tasks they are being trained to do (Kubeck, et. al., 1996). Additionally, older workers tend to report more doubt in their ability to learn, and view training as less helpful for their career, when compared to younger workers (Guerrero & Sire, 2001). Age and self-efficacy are also negatively correlated, which could be one reason why training effectiveness decreases as employees age. (Maurer, 2001).

The same holds true for relative employee age. Employees in situations where they are older than their coworkers tend to receive less training support (Maurer, Wiess & Barbeite, 2003). Older workers also tend to view themselves as less cognitively able, and thus believe that training will not be as beneficial for them (Maurer, Wiess & Barbeite, 2003).

Gender

When looking for a relationship between gender and willingness to participate in voluntary training, the secondary factors associated with gender become important. The research shows that women with children and

spouses are less likely to participate in training (Tharenou, 1997). The primary reason for this is that time constraints lead to working less and/or not being able to dedicate more time for training. Women with spouses and children also received less support from employers for training (Cloutier, Renaud & Morin, 2008; Pocock & Skinner, 2012). This finding could hold true for men or women with time constraints brought about by family and spousal responsibilities. These gender-related issues are thus influenced more by societal pressures than with direct gender differences. This finding is confirmed by more recent research that documents women participating in training at higher levels, and for different reasons. Over time, participation in voluntary training by women has increased, and gender has become less of a factor (Renaud, Lakhdari, & Morin, 2004). The researchers suggest that this change has occurred because of gender equality changes in the workforce, and that the original disparity arose from a greater percentage of women occupying lower-tier jobs (Renaud, Lakhdari, & Morin, 2004).

A study of managers showed that women participate in voluntary training more often than men, and if women are not offered mandatory training, they are twice as likely to participate in voluntary training (Cloutier, Renaud & Morin, 2008). Researchers also found that this increased participation in voluntary training helps fill a training void brought about by systemic discrimination in terms of mandatory training (Cloutier, Renaud & Morin, 2006). Interestingly, male managers, regardless of age, generally do not perceive participating in voluntary training to be beneficial (Cloutier, Renaud & Morin, 2008). This creates a paradox for organizations, because the more mandatory training they offer, the less likely employees will be to participate in any voluntary training opportunities. These results also highlight potential discrimination issues that can arise when subsets of employees receive a disproportionate amount of mandatory training (Cloutier, Renaud & Morin, 2008).

Education Level

A negative correlation exists between education level and participation in voluntary training (Renaud, Lakhdari, & Morin, 2004). With regard to mandatory training, researchers have also concluded that more educated employees tend to receive more training from their employers (Altonji, Spletzer, 1991; Renaud, Lakhdari, & Morin, 2004). There are a variety of reasons for this. Often, more educated employees are viewed as more capable of being successfully trained (Renaud, Lakhdari, & Morin, 2004).

In the case of voluntary training, some employers may perceive that employees with less education would be more interested in training programs because they have the most to gain from participation (Renaud, Lakhdari, & Morin, 2004). This also relates to the findings of Cloutier, Renaud and Morin, (2008), which found that employees will fill voids in mandatory training with voluntary training. Conversely, workers with higher levels of education tend to need less training, while they receive more mandatory training (Cloutier, Renaud & Morin, 2008), which shows that workers will not have a training void to fill if there are adequate levels of mandatory training.

Hierarchical Position

Managers receive more training than non-managers (Renaud, Lakhdari, & Morin, 2004; Cloutier, Renaud & Morin, 2008). Since managerial positions often require advanced degrees, mangers have often received extensive formal education in their field. These two factors combine to create a smaller gap for managers between the training needs and the mandatory training that is offered (Cloutier, Renaud & Morin, 2008). There is also evidence that as employees receive training, they are more likely to enter into higher paying positions, and are also less likely to find themselves sliding back into lower wage positions. (Pavlopoulos, Muffels & Vermunt 2009). Lower-wage employees feel less supported than higher-wage employees when it comes to training (Pocock & Skinner, 2012). Lower-wage employees also indicate that they participate in training often at the request of employers, and that job security is perceived as the primary benefit (Pocock & Skinner, 2012). Also, voluntary training can cause strain on a worker's time and resources when it is not integrated into work processes. These work-life strains caused by training increase with low-wage workers in a way that is not seen in higher wage workers (Pocock & Skinner, 2012). Lower paid workers have also been found to show less interest in participating in training (Pocock & Skinner, 2012).

Self-Efficacy

Studies have shown that a worker's self-efficacy, or one's belief that one can handle challenging situations, influences one's attitude toward training. An employee with high self-efficacy is more likely to take personal responsibility for his or her development as employee (Noe & Wilk, 1993).

Self-efficacy also influences intentions and behaviors. Employees with higher self-efficacy are more likely to be intrinsically motivated to use voluntary training for self-development (Maurer, Weiss & Barbeite, 2003).

Extrinsic factors such as increased compensation or recognition are also important motivators (Maurer, Weiss & Barbeite, 2003).

Increasing Participation in Voluntary Training

Information Delivery

One strategy that has been shown to improve participation in training is providing employees with the correct information regarding training opportunities (Noe & Wilk, 1993). As self-evident as this seems, the way in which employees are notified can influence how well that message is received. Investigation into the best methods for delivering information about training would be of great benefit to anyone wanting to increase participation in voluntary training opportunities.

Focusing on the Benefits

Promoting training by highlighting the benefits of the training, and tapping into employee self-efficacy is also important (Guerrero & Sire, 2001). Employees will voluntarily participate in training opportunities if they perceive that they will be rewarded by participating (Guerrero & Sire, 2001). Higher wages, recognition (especially from the employee's direct supervisor), and devoting resources (time and money) to training are all potential benefits that can be promoted, and lead to increased participation in voluntary training (Maurer, Weiss & Barbeite, 2003; Pocock & Skinner, 2012).

Supporting Employees

Creating a culture that encourages participation in training programs is also important, and there should be a system that recognizes and positively reinforces achievement and personal development. Specifically, an employee's direct supervisor should emphasize and encourage participation in voluntary training (Tharenou, 2001). Also, there is a positive correlation between voluntary training participation and an employer supplying funds and fostering a positive learning climate (Tharenou, 2001). This is particularly true for lower-wage employees. These employees benefit from employers that encourage participation in training, provide time and funding for training, and provide training that leads to job-security (Pocock & Skinner, 2012). Some companies have gone further and allowed employees to take training sabbaticals, allowing in some cases for a partial reduction in work hours to accommodate training, and in some cases, up to two years of leave to dedicate to training (Pocock & Skinner, 2012).

Support from a direct supervisor, supplying funds for training, and providing time for employees will help create a positive work environment, which has also shown to be an important factor to increasing participation in development activities (Noe & Wilk, 1993). Allowing employees to choose specific training programs is also important. When an employee chooses to participate in training, the employee is more highly motivated to learn (Tomlinson, 2002).

Participation Expectations

Since having a strong mandatory training program can lead to lower levels of participation in voluntary training, participation rates in voluntary training programs need to be put into perspective. Having a high rate of voluntary training participation may indicate a problem with the levels of mandatory training (Cloutier, Renaud & Morin, 2008). This is especially true if certain demographic groups show a disproportionate participation rate when it comes to voluntary training.

Conclusion

There are a multitude of factors that will influence an employee to participate in voluntary training. It is important for a company to identify the demographics of their workforce, and use the strategies mentioned above if they wish to increase the rates of participation in voluntary training. Companies should also recognize the downfalls of striving for 100% participation in voluntary training, and how high rates of participation in voluntary training may indicate deficiencies in the mandatory training programs.

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Quick Response with QR Code in the Curriculum

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Abstract

QR code, abbreviated to Quick Response code, has become widespread in modern life. People encounter this barcode in commercial, cultural and educational areas. As the bridge between online and offline media, QR code's features include being easy to generate, quick readability, and an abundant information load. Because of these features, QR code shows promise for the future in education. QR code is expected to refresh the curriculum and bring more convenience, mobility, and interaction to the learning environment, for both mobile learning and face-to-face instruction. This paper concentrates on how to integrate QR code in the curriculum. Initially, the paper will define and introduce the application of QR code. Then, based on the curriculum-related features of QR code, the paper will propose specific examples of integration in the curriculum. Finally, after the analysis of potentials and current challenges, its future use in education will be discussed.

Introduction

Definition of QR Code

QR code is an alternative terminology for a "Quick Response" or "2D" barcode which can be decoded by downloadable readers on mobile devices with camera-scanning capabilities (Masis, 2011). The reason for its quick response is that QR code builds a bridge between online and offline media. Abundant online materials can be embedded in the barcode, including Uniform Resource Locator (URL), text, image, audio, and video. QR code can be found on magazines, marketing brochures, flyers, bookmarks, product tags, packaging, restaurant menus, trucks or trailers, Websites, and even video information screens in shopping malls (Michael, 2010; Masis, 2011). Once detected and read by QR code readers, the barcode will navigate users from those offline media to limitless online resources.

In spite of its powerful functions, QR code only pictures several black modules arranged in a square pattern against a white background, which are all the components of a complete QR code. The matrix structure of the pattern makes it possible to decode the barcode at a high speed from any direction in 360°. Additionally, this structure enables QR code to handle a large volume of information in various formats, such as numeric and alphabetic characters, Kanji, Kana, Hiragana, symbols, binary, and control codes.(Byrne, 2011; Denso Wave Incorporated, 2012). One QR code is expected to carry up to 7,089 numeric-only characters (Denso Wave Incorporated, 2012).

Application of QR Code

Barcode technology has been widely employed for specific purposes in the fields of commerce, logistics, merchant, and customer management (Baik, 2010). Actually, QR code was first invented in the area of automotive industry in Japan to track automobiles in the process of manufacturing. The usage of QR code has been broadly

extended through the years after camera-integrated mobile phones skyrocketed (Chaisatien & Akahori, 2006). Currently, it is rather common for people to see QR code outside of the automotive industry.

Initially, QR code is most frequently used in commercial settings. The barcode could directly link customers to content with detailed introduction on products as well as customer feedback so that customers can make better informed decisions on products before purchasing them. Recently, mobile commerce (M-commerce) has become more popular in modern society based on the expansion of mobile phone usage. As one of the most frequently used applications, users in M-commerce employ QR code for purchasing food or drinks from vending machines, ordering concert tickets, downloading online music, and even making reservations at restaurants (Davis, 2012). There is no doubt that QR code makes commercial activities more convenient.

In addition, QR code can be found in stadiums, concert halls, tourist attractions, and schools to guide audiences, tourists, staffs and students to their destinations. For example, during a musical performance, organizers are able to compress a map of the concert hall and other useful information into a barcode and attach some copies on corners of that hall. The useful information could be an image, audio, or video document. With several different formats of guidance, audiences can find the places they want to go more quickly and easily.

Nowadays, Augmented Reality (AR) supported context-aware mobile learning is popular because of its flexibility, convenience, cost-effective, and user-friendliness (Jones & Jo, 2004). QR code, as a flexible application of AR technologies, has started to garner the attention of educational researchers. Some libraries attach QR code on book covers so that readers can know more about the author and contents of a book. Additionally, researchers integrate QR code in mobile learning to construct a context-aware learning management system (Chaisatien & Akahori, 2006). QR code demonstrates a great potential for being integrated into the curriculum and is expected to bring a refreshing reform to both distant learning and face-to-face instructions.

Curriculum-related Features of QR Code

Bridge Between Online and Offline Media

QR code is defined as a paper-based hyperlink (Sprague, 2010). Distinguished from other Web 2.0 tools which are only used in the online context, QR code can be both printed on paper materials and attached to Websites. With a QR code reader on camera-integrated mobile phones, users will be navigated directly to limitless online resources after the reader decodes these barcodes. Due to the possibilities of bridging online and offline media, QR code could potentially increase students' interest and motivation to engage in instructional activities. For instance, many music instructors have integrated QR code in their curriculums. If a piano instructor wanted to encourage students' self-assessment of their own performance, he/she can embed the link of a YouTube video about standard performance in a QR code and attach the code on students' musical notation. Then students are able to access the video to evaluate how they played 24/7 as long as they have a QR code reader on mobile phones.

Concerning the function of hyperlinks to other information sources, people may argue that there have already been several kinds of online tools, such as online bookmarks. Online bookmarks consist of a series of URLs to users' favorite Websites they collected and saved together. When users are searching information online, online bookmarks avoid the trouble of searching and typing correct links to pages where they want to go. To a certain degree, online bookmarks have already provided people with a lot of convenience. However, comparing QR code with online bookmarks, people will easily find the advantage of bridging the gap between paper and web via QR code.

Online bookmark can help users browse their favorite Websites only on condition that they are accessible to an Internet connection. Nonetheless, QR code can be placed almost everywhere including paper materials and online documents. Taking the aforementioned example of books in the library, QR code can be attached to book covers and navigate users to its online introduction after the barcode is scanned by the digital camera and analyzed by the QR reader. Correspondingly, it is obvious that online bookmarks cannot work without a network access. Because of the connection QR code constructs between the online and offline media, users are able to participate and interact anywhere and anytime as long as they get a code reader on mobile devices or a computer that has a digital camera.

Easy to Generate

In spite of its multiple functions, QR code is easy to generate. There are numerous free QR code generators online, and users may select the proper one to satisfy their demands. If they need to compose a colorful and complicated barcode, a high-level QR code generator (such as QR Stuff and Delivr) would help them out. Most often, a basic level of QR code generator (such as Kaywa) is adequate to produce a satisfying barcode. Users only need to open the generator pages and input required contents in the blank area. Then a QR code will come out within

several seconds. Therefore, it is easy and convenient for users to generate a QR code and get access to the bridge between online and offline media.

Quick Readability

Quick readability means QR code can be easily decoded. QR code reader, a common application for mobile phones or iPod, etc., can decode the code quickly. Although its composition and matrix of arrangement are very complicated, the decoding process is really quick for users. According to Liu, Tan, and Chu (2010), the decoding process requires only around 23 microseconds by a QR code reader. Up to now, numerous specialized QR code readers for various models of mobile phones are available and users can select the appropriate code reader according to their own preference.

On the other hand, quick readability also means users can access the targeted content in a simpler process. The contents embedded in QR codes are no longer only texts and characters but also links to multimedia files, like pictures, audios, and videos. As is often the case, people have to start the computer and open specific programs if they intend to view those multimedia documents. However, all these procedures could be avoided upon the usage of QR code. Without logging into their accounts, QR code readers would directly demonstrate all the contents that users expect after decoding, no matter what the formats are. In other words, the decoding process would be finished once the reader captures the targeted code. Furthermore, QR code could navigate users exactly to where they expect to go, escaping the trouble of inputting a wrong link (Law & So, 2010).

So in teaching practice, the quick readability of QR code provides much convenience and mobility to curriculum. For example, if students are required to submit their assignments in hard copies, they may not be able to clarify certain abstract issues through the use of traditional sentences but need a presentation composed of multimedia files. Therefore, they could attach a QR code linking to animation or video they designed as a supplement to the answer when they submit final works. With QR code, the instructor could view students' answers as soon as he/she takes a photo and decodes QR code via a code reader. On the contrary, if a student only inserts a URL of his/her design in the paper, the instructor has to start his computer, log on the Internet, and may download and view document in the specific program. Compared to latter method, QR code does provide a significantly quicker readability for instructors and students.

Abundant Information Load

One QR code can handle up to 7089 characters of text information (letters, numbers or symbols in the Latin alphabet) so that it becomes possible to pack a ton of information, including a URL, message, text or phone number, into a small space. In fact, the information load of QR code is large enough for teachers to send students reading materials, assignment requirements, and resource links, and then give them an interactive reply. In contrast, one SMS message can contain 160 characters at most and a twitter message can carry up to 140 characters.

Practically, the abundant information load of QR code is really a good assistant for instructors. For example, when an instructor intends to share an essay or certain assignment requirements with students via Twitter or SMS messages, the length of information probably exceed the maximum number of characters. Then the post or message will be divided into several pieces and it can be confused for students to track and read. However, it will be convenient for the instructor to encode reading materials, assignment requirements, and resource links in a QR code and send it to students because the length of most materials fits within the maximum load for QR code. What is more important, students could access various formats of multimedia documents rather than boring word narratives. Consequently, an abundant information load of QR code can make the learning more convenient, engaging, and efficient.

Examples of Integrating QR Code in the Curriculum

Some instructors have already integrated QR code in the teaching practice as discussed in the following sections. To cater to the trend of educational reform on instructional technologies, many instructors rely more on QR code for its features of the bridge built between online and offline media, being easy to generate, quick readability, and an abundant information load.

Language Learning Tool

Based on curriculum-related features, QR code has been widely used as a language-learning tool (Chaisatien & Akahori, 2006). Among all the factors, the success of language learning is limited by the time that students engage in language learning activities outside the classroom and the absence of opportunities and motivation in practical contexts (Liu, Tan, and Chu, 2010). Therefore, researchers expect to construct a context-

aware immersive learning context supported by Augmented Reality (AR) technologies to facilitate language learning. AR is an excellent educational application in terms of its ability to embed digital objects into a real environment (Hughes, Stapleton, Hughes, and Smith, 2005). Liu, et al. (2010) proposed a QR code and AR-supported English learning environment, called Handheld English Language Learning Organization (HELLO). HELLO system relied on the HELLO server and m-Tools and allowed students to acquire context-aware resources with their mobile phones and WLAN. With the detected identification code sent from students' mobile phone when they took pictures to decrypt QR code, the server located students and sent the context-aware contents back to their phones. HELLO system turned out to be rather feasible and promising in Taiwan after a pilot study (Tan, et al. 2010). For example, if an instructor of English Learning Center (ELC) made a QR code of English reading materials and sent it to the server, students could finish their reading tasks even when they were waiting in lines for their food in the cafeteria. In conclusion, QR code turns out to bring more convenience and mobility to the language learning.

Handout Link

QR code increases the interactivity and readability of paper-based materials when it is printed on the handout for students. As is known, instructors are not able to insert videos or audios directly on the paper-based handout except for texts. If there are some hyperlinks to online resources on the handout, students have to type in these links to view those resources on a computer or mobile devices. However, if the instructor embed those resources in a QR code and attach the code to handouts, students can access them right from handouts.

For instance, an instructor of 10^{th} grade wants his/her students to teach themselves to make a ship model according to the handout he/she delivered. Sometimes, texts and images on the handout may not function well in explaining the exact actions to create the model. Hence, students may be confused by the complicated procedure or certain details in the process. If the instructor places a QR code of tutorial videos on the handout, students can access tutorial videos while building the ship model and the whole process will be much more interesting and impressive and potentially make students more absorbed in the project. It tends to prove that QR code can motivate students' interests as well as enhance learning outcomes.

Online Poll

Considering its quick readability, QR code is destined to play a significant role in a student's daily life once it is integrated into education. There are many student associations on campus. To elect the president or chairman for an organization, students usually have to participate in polls to vote for their candidates. These polls are often paper-based, so students are required to be present to complete the electoral procedure. It becomes so inconvenient for students who live off campus, especially those who have to drive a long way to campus in order to vote for candidates. However, if QR code is introduced into the election poll, the procedure might be much simpler. Provided the election poll for president of Instructional Technology Student Association is coming, officers could set up an online poll and insert a QR code linking to the Website on the flyer or in an email to students. Once students could see the QR code either on the flyer or in the email, they can take a picture of the code with their camera-integrated mobile devices which have QR code reader and then the code reader will exactly decode and navigate students to the online poll. Compared with driving a long way to campus, it only takes a student no more than a minute to vote with QR code. Additionally, QR code refrains from the trouble caused by typos in a URL because of its preciseness. Therefore, the quick readability and mobility of QR code ensures it is possible to launch students' activities even off campus, which is very convenient for distant and mobile learning context.

QR Code's Future in the Curriculum

Potentials of QR Code in the Curriculum

As discussed above, QR code has a great potential for being integrated into the curriculum. According to Gary and Deborah (2002), education in America has been reforming concerning the integration of instructional technology since the turn of the century. The trend of educational development is to focus more on student-centered instruction, which contains three basic components, including open-ended learning environments, learning context, and collaborative learning.

The open-ended learning environments concentrate on students by means of enabling them to choose their learning contents. In this way, students are truly endowed with the core position in the curriculum. A learning context that a student can understand really helps him to gain a better understanding of what he learns. So in the teaching practice, instructors usually strive to provide students sufficient information they are familiar with as the learning background. When students can be really involved in the context, it becomes much easier for them to master the content. As its name implies, the collaborative learning emphasizes the cooperation among students and

the interaction between instructors and students. In the era of Web 2.0, Web 2.0 tools and augment reality technologies reasonably bring more interactivity to the learning environment and make the learning process more efficient.

The student-centered instruction is gradually dominant in the area of education. Meanwhile, QR code really accords with the trend of educational development considering its relevant characteristics. QR code can assist in constructing an open-ended learning environment relying on the bridge built between the online and offline media. Due to being easy to generate and the quick responsibility, QR code functions well in the process of collaborative learning. Furthermore, an abundant information load enables QR code to contribute to an appropriate learning context for learners.

In addition, QR code itself is also making progress and improving. The next generation of QR code is expected to handle much more information so that users need not connect to the Internet to view contents QR code represents. Just as the name suggests, users could better achieve a quick response with the Quick Response code. In conclusion, QR code, as one application of AR technologies in the era of Web 2.0, can absolutely show promise for the future in education and facilitate the educational development.

Challenges of Using QR Code in the Curriculum

Despite all features that help ensure QR code of a great potential in education, there are some issues that have to be considered when integrating QR code in the curriculum. In order to make the best use of the QR code, people have to understand how to use it properly.

Privacy. QR code provides a public platform of information exchange for users. Anyone who installs a digital camera and a QR code reader in a computer or mobile devices could view resources any QR code represents without limitations because it is not required to log into the account. However, at the same time, the convenience causes a threat to the user's privacy. The information that is compressed into the barcode is thrown to an open online environment. To protect the user's privacy, people have to come up with efficient ways that can make the information safe but not counteract the convenience.

Content Safety. QR code allows users to access an abundant information resource, including limitless online materials. Hyperlinks embedded in QR code might navigate users to a Website, which is not appropriate for students. Therefore, when instructors are concentrating on enlarging its information load, they should also pay more attention to the safety of contents behind QR code.

Conclusion

QR code has already been widely widespread in education in addition to industry, commercial activities, and entertainment performances. As a paper-based hyperlink, QR code makes it possible to construct a connection between the online and offline media. The quick readability, an abundant information load, and being easy to generate further contribute to its potential for integrated into the curriculum. Because of its abundant information load, QR code enables users to access a variety of multimedia materials which could help students to gain more instructions from paper-based learning materials. At the same time, QR code also brings about much more convenience, mobility, interaction, engagement, and efficiency to the learning context.

Current education is in the process of a reform featured with the use of instructional technology (Gary & Deborah, 2002). Based on its features, QR code jibes with the trend of educational development towards student-centered instruction. Furthermore, QR code itself is also on the approach of improvement. Undoubtedly, QR code has a great potential for being integrated in the curriculum. However, in the meanwhile of its rapid development, some issues and concerns, such as privacy and content safety, should be considered for its further promotion in education. People should concentrate more efforts on research to develop safer and faster ways of QR code usage. Only in this way, people could finally achieve the quick response with Quick Response code in the curriculum.

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Blended Wikis – An Intellectual Training Tool

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Abstract

Currently most city governments are wrestling with downsizing, budget cuts, union disputes, and empty coffers. Existing personnel are now expected to perform job-training functions in addition to their daily job assignments. Many of these employees are not seasoned trainers and they do not possess advanced technological skills, nor the time required to develop training materials and modules. A Ph.D. student who works as a Program Monitor in city government has designed an introductory blended wiki, which trains current and new employees in an efficient and technologically savory manner. Blended wikis require simple technology skills are easy to use and quick to design. An employee with rudimentary technology skills, an Internet connection, and job knowledge can implement this intellectual technology-training tool. The blended wiki poses minimal technology cost to the city government and it serves as a living knowledge base for staff.

Introduction

The concept behind a blended wiki is quite simple: blended learning instructional design plus wiki technology. Blended learning instructional design combines various pedagogical methods, using a mixture of different learning strategies, both with and without technology (Verkroost, Meijerink, Linsten, & Veen, 2008). Blended learning as a job training tool can be defined as, optimizing achievement of learning objectives by applying the "right" skills to the "right" person at the "right" time" (Singh & Reed, 2001). Research supports the fact that blended learning offers a positive learning environment, value-added pedagogy, improved access to knowledge, and enhanced social interaction and collaboration amongst learners (Uzun & Senturk, 2010). The introductory blended wiki included the following three objectives: (1) basic understanding, (2) collaboration activities, and (3) reflections of learning and training. The learning technologies included, social networking sites, video sharing sites, blogs, mashups, and folksonomies just to name a few.

Research Question/Focus

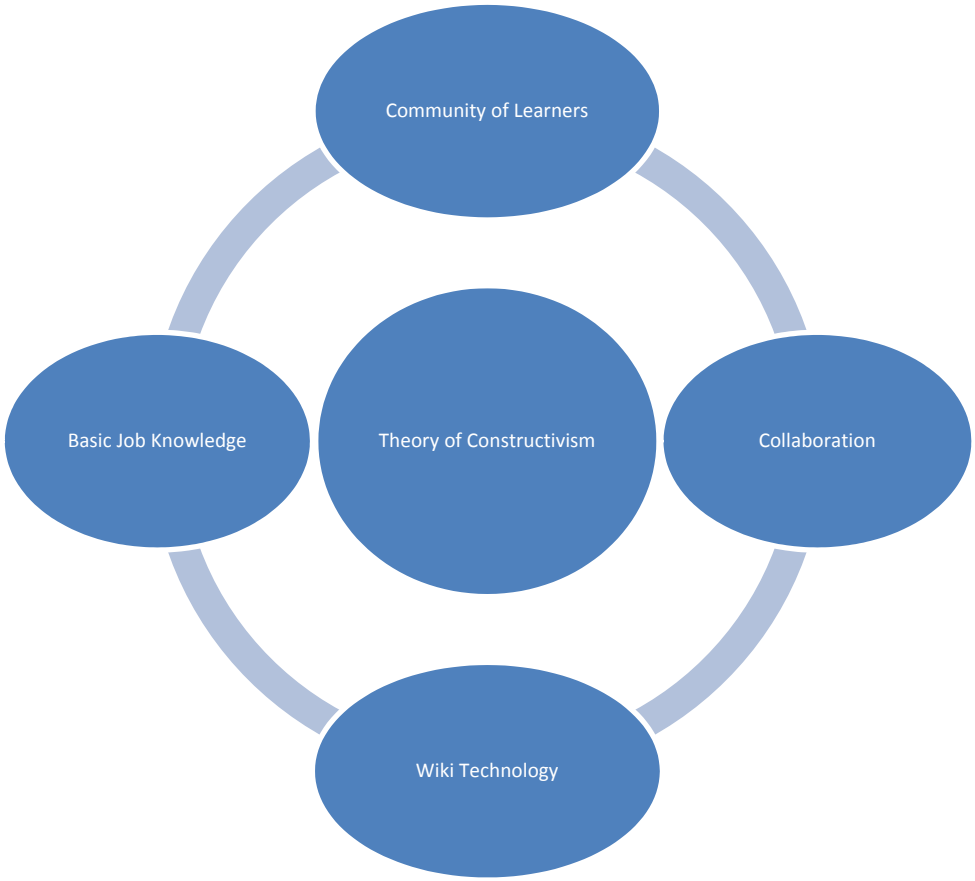
How does city government with limited resources, no training allocation, and basic technology tools and/or expertise devise a blended wiki training tool quickly and efficiently?

Research Foundation/Literature Review

The blended wiki training tool was developed after gleaning literature on constructivism, collaboration, and community of learners (Babb, Stewart, & Johnson, 2010; Kimmerle, Moskaliuk, & Cress, 2011; Lambert & Fisher, 2009; Wake & Modla, 2012; Weingarten & Frost). The theoretical framework of the blended wiki centers on the

theory of constructivism, which contends that learners acutely build their understanding of the world based on integrating new-fangled information with existing knowledge. Collaboration in the work environment involves individuals bringing forth their distinct skills, talents, and abilities to form a strong and cohesive team. Job security, potential promotions, and a steady paycheck are principal incentives for employees to collaborate and form robust and effective teams.

Blended Wiki Training Tool Structure



Research asserts that wikis are a phenonemal tool for group efforts and communication (Wake & Modla, 2012; Weingarten & Frost, n.d.). Throughout the literature, the community of learners is discoursed in the online environment (Lambert & Fisher, 2009; Palloff & Pratt, 2007; Singh & Reed, 2001). Nevertheless, building a community of learners in a blended atmosphere provides learners with a plethora of both face-to-face and virtual experiences. As noted by Palloff and Pratt (2007), "The keys to the creation of a learning community and successful facilitation online are simple, *honesty, responsiveness, relevance, respect, openness,* and *empowerment*" (p. 22), these concepts were also the basis of the blended wiki training tool.

Blended Learning Instructional Design

The term blended learning customarily invokes the notion of traditional face-to-face courses plus the add-on of online technologies. In addition, blended learning design embodies a paradigm shift as suggested by Oliver and Trigwell, which illustrates that a "refocusing is necessary: from teacher to student, from content to experience and from technologies to pedagogies" (De George-Walker & Keeffe, 2010, p. 2). When the focus of learning is student-centered, a pronounced emphasis is placed on flexibility, motivational factors, learner autonomy, current

knowledge and work skills. Once the experiences of the student are considered, a vast array of awareness and real life proficiencies can add flavor and zest to the learning environment. This setting is further enhanced when teachers understand that the student is at the center of their knowledge creation. By considering the various ways students learn, the teacher can design a blended learning environment which is able to offer worthwhile substance as opposed to just tacking on a piece of extraneous technology.

Blended learning instructional design can be used in workplaces to complement job training resources. Many organizations are now forced to do more work with fewer means. To enrich the learning atmosphere, it is essential to consider the knowledge, skills and abilities which workers bring to the workplace. Since the focus of this study is on workplace training, the term "facilitator" will be synomous with a "teacher" and "employee" will be used to replace the term "student". The facilitator's primary purpose is to make the training convenient, relevant, accessible and expandable.

Convenient refers to using readily available technology which will challenge the employee and assist in using skills which are necessary in a technologically knowledge based society. The relevancy of training hinges on tackling the aptitudes and capabilities which the employee must have in order to perform the job duties in an effective and efficient manner. Employees must have Internet access and computer rights to various technologies in order to fully participate in the blended wiki. The expandable portion involves two way communications between the facilitator and the employees and amongst employees themselves. When training embraces expansion, the employees are able to communicate and interconnect by using each other's experiences as a learning tool or a point of reference.

Wiki Technology

Since many municipalities are facing budget shortfalls, using a wiki as a training tool just makes good sense. This quick and cost-effective method can provide employees with relevant training in addition to a living knowledge base. The wikis web-based nature relieves municipalities of the high installation and/or software costs which are normally incurred when using training technologies. It is not necessary for users to be computer gurus since wikis are very user-friendly. A Google search on the word "wikis" will provide various sites where free wikis are readily available for immediate use. As noted in a study by Frydenberg (2008):

> Building a course around the use of a wiki invites students to become involved in the process of creating course content and sharing their knowledge with their classmates. The results of this study suggest that many first year college students only have a cursory knowledge of what wikis are, and incorporating their use in the classroom will add value not only to students' studying and learning, but also to their potential success as future knowledge workers and technology professionals. (p. 180)

An experimental study by Kimmerle, Moskaliuk, and Cress (2011) discusses how the interplay between individual and the group level learning is imperative in the implementation of successful knowledge transfer in wiki construction. Knowledge building and knowledge creation are two necessary constructs vital in the wiki learning environment. The authors state that knowledge building is formed in a community of learners through a socio-cultural process which examines existing knowledge, new information, and experiences of learners. "From this perspective, individual learning is always considered as well, but the main interest is not directed onto this process. Individual learning is, so to speak, rather a by-product of the constructive process of collective knowledge building" (Kimmerle, Moskaliuk, & Cress, 2011, p. 139).

Research Design and Methodology

The researchers used the comparative grounded theory (a phenomenological qualitative method) to derive meanings from events and interactions of the employees, which used the blended wiki training tool. "Pure phenomenological research focuses on describing rather than explaining an event or situation and begins in "silence," free from hypothesis or preconception" (Wake & Modla, 2012, p. 250). The six participants (three males and three females) in this study were all employees of the program monitoring section for the municipality. All of the participants had college degrees, and at least five years of work experience in various industries; three employees were over 50 years of age. The composition of the group included the following: three African

Americans, one European American, one Puerto Rican, and one Lebanese. The three youngest members had recently joined city government and had less than three months of senority.

Due to issues with the department and changes in management, the program monitoring staff had countless projects which needed to be concluded immediately. Several critical reports and proposals were due to the Department of Housing and Urban Development (HUD). The facilitator met with the team, and it was agreed that immediate training was necessary. The following steps were used to develop the tool: (1) establish a pbworks account (www.pbworks.com); (2) design a foundation module (basic understandings); (3) schedule training and activities.

Analysis and Findings

The six participants attended the two hour training session, and collectively participated in the blended wiki course entitled, Community Development Block Grant (CDBG) Training. The course included the following: a description of blended wikis, video presentations on CDBG basics and successful CDBG programs, collaboration activities, and a reflection discussion. The consensus of the group lauded the training as excellent, and as a much needed tool for the department. The training assisted the team in completing the HUD CDBG projects in a timely and thorough manner.

Implications, Limitations, Next Steps

The facilitator has since been asked to design monthly trainings for the department. However, management continues to be hesitant in reference to employees using social networking sites and blogs in the workplace, this is a topic for future research. Management should be educated in the uses and benefits of social networking sites in workplace training. A major next step would entail detailing the costs savings to upper management. In conclusion, any business can follow the blended wiki structure to immediately create innovative and cost-effective educational training courses.

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Facilitating Online Learning through Synchronous Technologies

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Abstract

Effective facilitation of online learning is a big challenge to many online educators and is vital to the success of all online educational technology programs. Synchronous technologies such as Adobe Connect can effectively address many observed online learning problems. This paper reports a case of curriculum and research collaboration between an American university and a Chinese university using Adobe Connect for synchronous online instruction. The paper reports perspectives of students in a graduate course in an educational technology program on Adobe Connect and their comments on this international project. Finally, it also shares with readers suggestions for using Adobe Connect to facilitate online learning.

Key words: Synchronous technology, online learning and instruction, distance learning and education

Introduction

Online learning has flourished in the past decade. Despite all merits, online education has been severely criticized for its lack of synchronous interactions and communications, lack of social and teaching presence, and lack of timely encouragement, feedback and correction (Connolly, MacArthur, Stansfield, & McLellan, 2007; Kim, Kwon, & Cho, 2011; Zhao, Lei, Yan, & Tan, 2005). Synchronous technologies became popular in recent years and have the potential to effectively address many observed online learning problems because they can connect learners and instructors who are geographically apart for online learning and collaboration through text, audio, and video communications in synchronous formats. The results of a case study involving graduate students from an American university and a Chinese university conducted during one semester are used to explore the potential applications of synchronous technology to enrich student online learning. The learning experiences of the pre-service and in-service teaching students from the American university are documented from two distinct perspectives; as a learner and as an instructor. One example of synchronous technology is Adobe Connect, a licensed web-based conferencing technology for synchronous interactions and communications. The present study includes feedback from the course instructors and student instructors who used this synchronous technology across four semesters to provide a set of suggestions for using Adobe Connect for synchronous instruction.

Literature Review

Within the field of computer-mediated communication (CMC) sits the web-conferencing platform, providing educators with synchronous, multimodal communication opportunities through products such as Adobe Connect, Blackboard Collaborate, and Big Blue Button. As an e-learning tool, where e-learning is defined very generally as any learning supported by electronic tools and media in a synchronous or asynchronous situation, web-conferencing platforms have gained in popularity among educators during the past decade due to greater flexibility as a result of web technology and broadband connectivity improvements (Falloon, 2011; Dammers, 2009; Skylar, 2009). Outside of academia, in government and corporate environments, these web-conferencing platforms are commonly referred to as webinar (web-based seminar) technology and have been adopted primarily as a productivity tool to bring together individuals separated by distance into synchronous meetings, but also as an event delivery tool (Wang & Hsu, 2008).

If we adopt Wang and Hsu's (2008) three formats for webinar delivery into the world of e-learning we can group web-conferencing communication according to one of three settings in which synchronous communication occurs. The first involves an instructor with multiple students from one location, the second is an instructor with

multiple students from multiple locations, and the third involves multiple students from multiple locations. Technology such as Adobe Connect (Adobe Systems Inc., 2012) offers desktop or wireless device users this instructor-student and student-student synchronous communication through audio, video, text chat, presentation display, breakout rooms, white board collaboration, polling, desktop/application sharing and meeting recording.

During the past decade researchers have paid attention to web-conferencing as an approach to support the construction of knowledge through synchronized interaction in an online learning environment (e.g. Kear, Chetwynd, Williams, & Donelan, 2012; Wang & Hsu, 2008). Wang and Hsu (2008) categorized learning within their study as being related to either conceptual knowledge or procedural knowledge and give some guidance as to which tools within the web-conferencing platform serve each. Educators have concentrated on analyzing the use of the communication tools of web-conferencing platforms to provide an interactive environment where linear discussion and small group activities can succeed (Morrison, 2011). In this study Morrison reports that the synchronous tools used had limitations, specifically with linear discussions resulting from a lack of nonverbal and visual cues and a limited sense of community among the classmates. In support of this finding Falloon's (2011) study utilized synchronous video for communication which provided the visual cues lacking in a chat or audio only environment. Analyzing the use of web-conferencing platforms to promote collaboration and develop a sense of community has also been a focus of the research (McBrien, Jones, and Cheng, 2009; Tomadaki, Quick & Scott. 2008). Among these studies several researchers looked specifically to the use of synchronous video and its impact on what Moore (1993) refers to as transactional distance (e.g. Hager, 2010; Moody & Wieland, 2010). Stewarta, Harlowa and DeBaccob, (2011) shared an interest in synchronous video usage and reported on the ability of video conferencing to effectively integrate students at a distance into a traditional class.

Another common focus among the studies has been on student satisfaction or perceptions within the online learning environment with regards to the interaction and relationship building afforded by the synchronous technology (Hudson, Knight, & Collins, 2012; Falloon, 2011; King et al., 2010). Implementing a web-conferencing platform in an online course may improve the student's perceptions of the course, and could increase participation and motivation (Hudson et al., 2012). Synchronous communication can also have a positive impact on forming relationships within the course, adding to asynchronous discussions, dissolving barriers in online learning that tend to foster student isolation, and constructing a sense of community as a result of identity building opportunities (Falloon, 2011).

Inherent to learning English as a foreign language (EFL) is the challenge of identifying opportunities to interact with native speakers and become immersed in the native speaking culture (Wu & Mevek, 2009). Chen (2005) suggests that through the use of synchronous CMC tools EFL learners can receive an increase in the exposure to, and in the use of the target language. Considering the ease at which web-conferencing technology can bridge distant countries, it is surprising that very few studies were found to focus on the use of web-conferencing to complete synchronous communication learning tasks involving students residing in different countries (Cunningham, Fägersten & Holmsten, 2010), or students attending different universities in different countries participating in the same learning activity (Jauregi & Banados, 2008).

Limited research was found on assessing the influence of using web-conferencing platforms to enrich EFL learning and among these none examined the impact of utilizing all of the individual synchronous components. Wu and Mevek (2009) explored the use of video conferencing, a single component of web-conferencing, to connect Taiwanese EFL students with native English speakers and suggest that synchronous sessions can increase EFL students' confidence with using English. Wu and Chao (2012) brought Taiwanese EFL students and a native English collaborator from the United States together via video conferencing to study the synchronous activities' impact on enhancing cultural knowledge and critical thinking skills. Banados (2006) studied the impact of conversations with native English speakers on Chilean EFL students using real-time chat where the purpose of the conversations were to engage in discussions on cultural commonalities and differences to develop language skills in the context of culture and cultural awareness. Fernandez (2010) also utilized real-time chat to provide students with an opportunity to practice synchronous speaking in a fully online English language improvement course in Spain.

A common thread throughout the research is the need to provide students and instructors opportunities to become acquainted with the technology in order to achieve some level of success with the use of web-conferencing systems (Hudson, et al., 2012; Falloon, 2011; Morrison, 2011; Vandenberg & Reese, 2011; Cunningham, et al., 2010). Numerous guidelines for web-conferencing practitioners can be extracted from these studies.

A collection of tools is available to educators and their students within the current web-conferencing platforms that provide opportunities for engaging synchronous sessions that are unlike other forms of collaboration. Although much research has been done on synchronous learning since the use of messaging and video-conferencing over a decade ago, the multimodal communication opportunities of current web-conferencing platforms introduce an entirely new set of pedagogical questions that researchers have not fully embraced.

Using Adobe Connect in a Technology Integration Course

This paper reports part of a curriculum and research collaboration between an educational technology program in an American university with an English program in a Chinese university to explore the potential applications of synchronous technology to enrich student learning with suggestions for how to use synchronous technology such as Adobe Connect for learning and instruction.

The American university is a young regional comprehensive state university that has six colleges offering 52 undergraduate degrees, 30 graduate degrees, one specialist program and three doctorate programs to over 12,000 undergraduate students and 1,500 graduate students in the Southeast USA. The Chinese university is a regional university in east China. It is a comprehensive university with 19 academic colleges and schools and 9 research institutes and centers on two campuses. It offers 62 degree programs and has an enrollment of nearly 35,000 undergraduate and graduate students.

For the American university side, the project was implemented in a graduate course of educational technology integration, a required course of educational technology programs at the university. This course prepared pre-service and in-service teachers to evaluate, select, and integrate technology into classroom instruction. The course goes beyond the basic use of computer programs and instead focuses on a systemic process for using technology to enhance learning. Most of the students in this course are pre-service or in-service teachers working in K-12 school environments. The synchronous technology project is a required part of course learning tasks. The instructional goals of this project include (1) to learn how to use Adobe Connect as an e-learning tool for online learning and instruction, (2) to learn how to analyze, design, develop, implement, and evaluate online instruction, and (3) to learn different perspectives of technology uses through communications of multiple channels with the Chinese students.

The project lasted for 10 weeks in Spring, 2012 with 22 American participants and 97 Chinese participants. During the project, American students worked in group of 3-4 students, designing and developing instructional materials for a selected instructional topic and implementing it online in Adobe Connect for two consecutive weeks. Other students in the class were invited to observe the synchronous instruction. Each synchronous instruction lasted approximately one hour, completing the given learning tasks collaboratively in an Adobe Connect meeting. The instruction covered a wide range of contents including language learning, cultural knowledge, and understanding of technology related issues. Each synchronous instruction was recorded and then released to the students for self-assessment to improve their instruction to the Chinese students.

After implementation of synchronous instructions, students were required to complete a project report, reflecting on their instructional experiences with the Chinese students, synthesizing what they learned, and offering suggestions for peers on using Adobe Connect for synchronous instruction. Professors and teaching assistants observed every synchronous instruction in Adobe Connect and then wrote weekly observations and notes commenting on the performance of both the American and Chinese students together with suggestions to improve learning and instruction. The notes were shared with both the American and the Chinese students. Figure 1 is a screen capture of an Adobe Connect meeting.

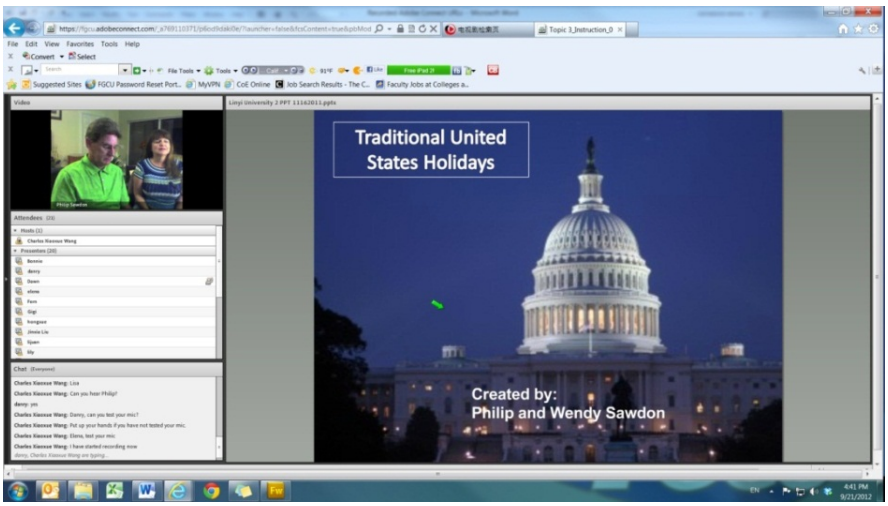

Figure 1: Screen Capture of Adobe Connect Meeting

Discussions

The analysis of reflection papers and project report written by both Chinese students and American student instructors reveals the perspectives of Adobe Connect users (e.g. students and instructors) in this project. Included in this discussion are synthesized ideas merged from the analysis commenting on Adobe Connect as a synchronous instructional tool and commenting on this project of synchronous instruction using Adobe Connect.

Adobe Connect as a Learning Tool

Adobe Connect provides an alternative and more flexible platform than a conventional phone call. Students have found the use of Adobe Connect to be a highly valued learning tool. This technology provides both student and instructor with opportunities to communicate verbally, share visual presentations and have back and forth dialogue that enhances learning in an online class. Although some students felt skeptical at first, they soon found that, in practice, it provided the chance for conversation and the sharing of ideas and presentations. Well-organized Adobe Connect sessions allow the learner in an online class to easily interact with the instructor and classmates, to hear classmates' ideas, participate in discussion and written chats and to collaborate with peers in the class. Overall, they all felt that Adobe Connect is a great learning tool for online learning and it is easy to use. As described by one of the students

> *I have really come to appreciate the synchronous benefits of Adobe Connect as both an instructor and as student. In my opinion, I think Adobe Connect is an outstanding tool for synchronous communication in an online class. The user interface is relatively easy to navigate and employ whether you are a participant or the organizer. A few clicks of the mouse can connect users from all corners of the world.*

As graduate students of technology, they feel necessary to have the authentic synchronous online experiences for both learning and instruction. They feel that to become familiar with and skillful at multi-modal (e.g. text, audio, and video) and multi-channel communications (e.g. chat, white board, icons, and presentations) in online learning, it is crucial for them to serve as both online learners as well as online instructors. The synchronous interactions and communications in this project enhanced social presence of the online course and reinforced the social bonds among students and instructors. This thought was well reflected in the reflection paper:

> *Pursuing a graduate degree in a virtual setting requires a high level of personal discipline as well as synchronous and asynchronous collaboration with classmates. Many of my classmates have lived either across the country or across the world. I enjoy and use the chat feature to ask or answer questions, comment and communicate with other members of the meeting. I have used my microphone to speak to other meeting members and found it particularly enriching to speak with Chinese students on the opposite side of the world. To me, this was an amazing experience that allowed a personal connection beyond other learning experiences from which I had benefited. In a traditional learning situation, the instructor and learner would not be able to make a personal connection at a distance.*

It is important that students have the opportunity to digest information. Adobe Connect allows for synchronous instructions to be recorded. This is not only for convenience. The recorded meetings provide students with opportunities to carefully digest the information that they might have missed during the instruction. As student instructors, the recorded instructions allow them to watch and analyze their own synchronous instructions for improvement. For many pre-service teachers, this is a unique opportunity for learning. It is relevant and meaningful. Commenting on multi-functions afforded by Adobe Connect, Meghan described her use of Adobe Connect after the course:

> *I have also used Adobe Connect to connect with students for assistance on tasks, with classmates for collaboration and as a student to conduct research interviews. Adobe Connect affords a uniquely elevated opportunity to bridge the communication gap and facilitate communication in numerous projects.*

In general, students found Adobe Connect to be a great tool for synchronous online learning and instruction. Some of them extended its uses beyond the requirement of this project.

American student instructors and professors have committed many hours in support of language learning to Chinese students. For American student instructors, this has been a rewarding experience both as a student and as an instructor. The connection between the American students and the Chinese students was incredibly inspirational and enlightening for many American students. The project using synchronous technology allowed them to recognize similarities and likenesses in spite of the many miles between them.

> *I truly feel a connection to the Chinese students as we learn about each other – realizing that we are all very similar. Amazingly, as a participant, I could feel the great pride being expressed by the Chinese students as they shared their Power Point presentations. Watching a video or learning from a website would not have been as powerful or meaningful. Finally, the gratitude students express for the synchronous lessons is a priceless gift.*

Among comments on this project, the real synchronous instructional opportunity for American students was highly appreciated and valued. The real teaching practice affords not only opportunities to interact with the Chinese students but also learning about synchronous technology and relevant pedagogical strategies in a meaningful way.

> *As a student of educational technology, I have been afforded the opportunity to provide real instruction synchronously which has enriched my experience as an instructor. I have learned how to design instruction using such a platform and experienced the benefits and drawbacks. I now understand the need for careful instructional preparation, prompting students to speak and addressing technical difficulties. Through the use of this technology, as students we were able to experience a learning situation that would be impossible without the use of this technology. My personal thoughts on this reflect the need for educators to be willing to stretch and think differently to enable students to have this type of learning event.*

This project also provided the learners with freedom to select the given topics of instruction and lead them to going through a systematic process to complete online synchronous instruction. As many project based learning experiences, this project offered students the authentic opportunity for collaboration among peers, meaningful learning of synchronous technology application, and a complete learning processes of instructional design from analysis to final evaluation and reflection. One student describes it in her reflection as follows.

> *The design of this project reflects specific application of the ADDIE instructional design process through analysis of learners' needs, lesson design which is meaningful and relevant to student interests, development of synchronous learning activities, implementation of the specific tasks and evaluation through reflection. Within this framework, analysis of learner needs provided the foundation for lesson design. Students needed authentic synchronous online experiences for both learning and instruction and opportunities to digest information and practice instruction. Therefore, in the design process, the recording of synchronous sessions was of paramount importance. Development of each lesson was based on the groundwork built through analysis of needs. Student reflection, teacher observation and both student and teacher feedback provided relevant and essential evaluation of this process.*

The use of Adobe Connect for synchronous instruction has demonstrated significant added value from the students' perspective. Student reflections and comments consistently referred to many positive learning experiences, specifically its effectiveness as an instructional and learning tool. It provided the opportunities for relevant, real-life experiences that would not be possible without the use of this technology and greatly enhanced social presence and learning opportunities in an online class.

Suggestions for using Adobe Connect for Synchronous Instruction

After implementing this project for four semesters, we have collected many suggestions and feedback from students. The following lists contain suggestions for both students using Adobe Connect for synchronous instruction (meeting).

Prior to the meeting, instructors should:

- Schedule online office hours to provide students opportunities to practice before a meeting
- Use multiple channels (e.g. email, instant message, course announcement, etc.) to remind participants of meeting date, time, and URL
- Send the meeting directions or agenda to students ahead of time

- Select the best layout for the type of meeting (e.g. class presentation vs. small group discussion)
- Upload presentation material before the meeting start time including poll questions so they are readily available during the meeting
- Practice your meeting before it starts
- Open the meeting at least 15 minutes before the scheduled start time
- Have a Plan B (esp. when having an Internet access problem on the instructor's part).

During the meeting, instructors should

- Use a headset with a built-in microphone to eliminate audio echoing
- If access to a second computer is available, log in as a participant to monitor what they are experiencing
- Have music playing as students enter. This helps students with audio setup.
- Display a set of instructions and meeting agenda that each student will see upon joining the session
  General instructions include:
  - Meeting start time
  - Run audio and video setups
  - Please raise your hand if you hear music playing
  - Mute microphone when not speaking
  - Use emoticons to assist with communication
  - Submit questions through Chat window
- When audio echoing occurs, pause tactfully to wait for echoing to disappear
- To enhance social presence within synchronous instruction, display a picture of yourself when possible
- Always record the meeting to assess your facilitation skills, identify if improvements can be made, and for students to use as review
- If possible, always have a teaching assistant monitoring the meeting because multi-channel communications occur simultaneously

Post meeting, the instructor should

- Require students to provide feedback after each synchronous meeting to identify if improvements can be made
- Invite peers to watch the recorded meeting to provide feedback on instruction
- Always review the recorded meeting to self-assess instruction for improvement

Conclusion

This study explored the potential applications of synchronous technology to enrich student learning by analyzing the feedback from the participating American and Chinese students over a 10 week period. The results of the analysis show that students find value in multi-model synchronous technology as a learning tool provided practice time is available to students that allow them to adapt to the simultaneous availability of the various modes of communication and collaboration during a meeting. Also contributing to the value of this technology as a learning tool is a well-organized synchronous meeting that accommodates an adequate level of student-instructor and student-student interaction that enhances the social presence of both the students and instructor. The feedback also suggests that pre-service and in-service teachers can receive greater benefit in the use of synchronous technology if afforded the opportunity to use the technology in the role of instructor and to assess their meeting facilitation and operating skills by reviewing meeting recordings. Adobe Connect for synchronous communication in an online class is an outstanding learning and teaching tool. It provides unique and important opportunities for both the learner and the instructor. With due diligence to thorough instructional preparation, appropriate application, and contingency planning, synchronous technologies such as Adobe Connect can play a successful role in both the teaching and learning experience.

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Successful Online Students' Perceptions of the Value of a Collaborative Learning Community

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Abstract

This paper shares the perceptions of a group of 11 successful online students regarding the value of the collaborative learning community that developed as part of their participation in the first cohort of the WebIT online Master of Science Degree (M.S.) in Instructional Technology program, at The University of Tennessee at Knoxville during 2008-2010. All 11 students began the program in the Summer semester of 2008 and graduated at the end of the Spring semester, 2010. These students voluntarily completed an electronically-administered Program Completion Survey to provide the WebIT program faculty with information to help improve the design and delivery of the program. The survey consisted of 66 items, 17 of which constituted a subscale that addressed aspects of collaborative learning community. These seventeen items were further grouped into 6 concept clusters that serve to organize the discussion in this paper.

Keywords: Collaborative Learning Community, student collaboration in online programs

Introduction

During the Spring semester of 2008, 25 students were recruited for the first cohort (WebIT1) of the WebIT online M.S. program in Instructional Technology at the University of Tennessee at Knoxville. Of the original 25 students who began the program, 11 graduated at the end of the Spring semester, 2010. The overall attrition rate during WebIT1 was 56%.

The WebIT program was organized using a cohort model in hopes of fostering the development of a Collaborative Learning Community, an academic community of practice, among the students (Browne-Ferrigno & Jensen, 2012; McBride & Fuller, 2007; Patterson, Mallett, & McFadden, 2012; Polin, 2004; Russell, 2010). It was hoped that using a cohort model for the delivery of the curriculum would help to provide the students with a significant sociocultural emphasis during their academic work, thus increasing the students' sense of inter-connectedness with classmates, instructors, and the institution.

During the Spring semester of 2010, these 11 successful students completed an electronic Program Completion Survey designed to provide information regarding their perceptions of the WebIT program, and ways in which it might be improved. The purpose of this paper is to share the perceptions of these 11 successful students regarding their experiences in working together with the other members of their cohort group over the two years of the program.

Method

This study was conducted as part of a larger case study (Stake, 1995) to guide the continuing development and revision of the online M. S. in IT program at the University of Tennessee in Knoxville.

Participants and Context

Of the 25 students who were recruited to the WebIT1 cohort in the Spring semester of 2008, 14 did not complete the program. Twelve dropped out and 2 were removed from the program for academic difficulties. Eleven students successfully completed the WebIT1 curriculum at the end of Spring, 2010. Ten of these students were employed as K-12 teachers and one was employed as a technical support specialist in higher education. These eleven students voluntarily completed an end-of-program electronic survey to share their perceptions of various aspects of the WebIT program.

The details of the WebIT1 curriculum are described in Waugh, Trovinger, and DeMaria (2011). Throughout the program of study, the WebIT faculty and instructors attempted to promote an environment in which social interactions among all participants were encouraged through participation in collaborative activities. The WebIT program began with a three-day face-to-face summer orientation in June prior to the first online course being taught in July. In addition, the WebIT1 students were invited to attend (on a volunteer basis) an annual statewide technology conference, the Tennessee Educational Technology Conference (TETC), sponsored by the Tennessee Department of Education. This was not a curricular requirement but rather a suggested optional experience. The TETC conference was held twice during the two-year curriculum. Approximately 80% of the WebIT1 students attended the conference the first year. Each of the 11 students who successfully completed the WebIT1 curriculum attended the conference both years. During the first year, the WebIT1 students were simply encouraged to attend the TETC conference but during the second year, they were challenged to make a presentation at the TETC conference as a demonstration of their developing skills and abilities. Each of the successful WebIT1 students chose to make a presentation at TETC during the second year.

Throughout each of the WebIT courses, students were encouraged to work together and assist one another in accomplishing common coursework tasks. As part of coursework, students were required to produce individual artifacts or demonstrate individual accomplishment, but students were also encouraged to collaborate among themselves and with faculty, Graduate Teaching Associates, and other data sources (Internet resources and remote experts outside the program context) in gathering ideas and information relevant to completing assigned curricular tasks.

Courses in the WebIT program were organized according to what the individual instructors felt was the best combination of individual and group work so a wide variety of learning contexts and experiences were promoted during the program. This variation in learning strategy was not appreciated by all students (even the successful ones), and some shared a preference for one or another style as they progressed through the curriculum. Individuals were typically assigned to groups rather than being able to form their own groups, but at least one course provided students with the opportunity to work together in self-assigned groups. One other course that was offered during the second year of the curriculum sequence utilized a game format that challenged students to compete with one another as individuals rather than to collaborate, in "winning" the game. This experience provided an "anti-collaborative" contrast to the typical work pattern encouraged in the program. Student perceptions of the value of the game-based approach was highly variable. Many chose activity options that avoided competition with the other members of the cohort. One student shared with the program coordinator that, after developing such strong working relationships with the other students, he/she did not like being put into competition with them.

Data Sources

The primary data sources analyzed as part of this study were the student responses to 17 items out of 66 total items included on the electronically-administered Program Completion Survey. The student responses to these items were grouped and categorized by the nature of the student responses, and this grouping provides the structure for the discussion of the findings shared in this paper. In addition, student comments from other parts of the survey or verbal comments made to the program coordinator, instructors or faculty are included where relevant, in order to elaborate on the data provided by the portion of the survey addressed by this analysis.

Measures

A team of faculty researchers working with the WebIT1 cohort collaborated to produce the WebIT Program Completion Survey. It was administered during the final semester of the program, in Spring, 2010. The survey items addressed issues of interest to the researchers, and issues reported in the literature as factors related to student success in online programs. Other findings from this survey were reported and discussed by Waugh and Su (2011a; 2011b).

Research Design

The following broad research question guided this specific case study analysis. How did the successful WebIT1 students perceive the relationship between the organizational model and instructional approaches used in the first cohort of the WebIT program and their success in completing the program?

Findings and Discussion

The findings and discussion that follow are based on student responses to the collaborative learning community subscale of the WebIT Program Completion Survey (see Table 1) that was electronically administered to the members of the WebIT1 cohort near the end of the Spring semester, 2010. The specific survey questions in Table 1 are formatted as [Number] : [Item]. Multiple-choice-type items are followed by the set of choices provided with the question.

Table 1
Collaborative Learning Community Subscale (Q33-49) of the WebIT Program Completion Survey

33: During your participation as a student in the WebIT cohort, how would you characterize your feelings? (a) I felt comfortable as a member of the WebIT cohort; (b) I felt isolated and unable to fully participate as a member of the WebIT cohort.
34: If you felt isolated in some way, please elaborate. [open response]
35: How satisfied are you with your online learning experience inWebIT? (a) Very Satisfied, (b) Satisfied, (c) Not Sure
36: How would you describe your relationships with your fellow WebIT classmates, the members of your WebIT cohort? [open response]
37: Thinking back to when WebIT first began and comparing that to the situation in your final semester of coursework, how would you describe your interactions with the other members of the WebIT cohort? Has anything changed over time? [open response]
38: During the WebIT program, did you ever meet face-to-face with any members of the WebIT cohort group for any reason? If so, why did you meet and how often did you meet? [open response]
39: Please rank in the order of most frequently used to less frequently used the ways in which you communicated with the other members of your cohort during the WebIT program. (a) E-mail, (b) online chat, (c) text message, (d) online video chat, (e) instant message, (f) online collaboration software (blog, wiki), (g) phone, (h) face-to-face discussion, (i) other
40: Please identify any other means of communication you used to interact with the other members of the Web IT cohort that were not listed in the question above and indicate where in the ranked list (first, second, etc.) it/they would fall. [open response]
41: Do you feel that any of the relationships that you formed with other WebIT students might continue beyond the completion of the WebIT program? Please explain. [open response]
42: How frequently have you communicated with your current WebIT instructors? Has this changed since you first began the WebIT program? Please describe. [open response]
43: How frequently did you communicate with your past WebIT instructors? Has this changed since you first began the WebIT program? Please describe. [open response]
44: What type of communication and interactions do you feel best supported your learning during the WebIT program? [open response]
45: Did the WebIT program provide a learning community to support your personal learning needs? (a) yes, (b) no
46: How might the WebIT program do a better job of building a learning community, or otherwise supporting your learning? [open response]
47: How did the WebIT learning community support your personal learning needs? Please describe and give examples. [open response]
48: The WebIT workshop provided an overview of the campus student services offices and brief tutorials regarding basic student needs such as registration and fee payment. Please indicate which of the following electronic student support services you wanted to know more about (if any) during your participation in the WebIT program? Select any/all that apply. (a) registration, (b) library services, (c) additional technical support, (d) assistance with study skills, (e) career counseling, (f) assistance with students' rights and responsibilities, (g) information about student governance at UT, (h) none of the above, (i) other
49: If you selected “Other” in the question above, please share information about your needs for student support services that the WebIT program did not provide. [open response]

Social Support

This section reports and interprets the responses made by students to questions 33, 34, 35, and 38. Questions 33, 34, and 35 asked students to share their feelings during their participation in the WebIT cohort. Specifically, how did they feel, did they feel isolated in any way, and how satisfied were they with their overall experience? Ten of the 11 respondents reported feeling comfortable as a member of the cohort. Only one student reported feeling isolated. This student provided the following elaborative comment in response to Question 34:

> I felt I did not get to work with everybody, it would have been nice to have had the opportunity to do so - even if that meant pre-assigned group[s] or something... more than once I felt like I was left with the under-performers of the class to try to deal with the projects.

Five of the respondents reported being *very satisfied* with their online learning experience in WebIT. Five others reported being *satisfied* with their experience. One student reported that he/she was *not sure* that he/she was satisfied. Ten students chose to respond to Question 38. All 10 of the respondents agreed that meeting in person during the TETC conferences was a "great" experience. The individual who reported feeling isolated in Question 34 offered this comment in response to Question 38:

> We met for the TETC twice, and it was a great experience to get to talk to them [the other members of the WebIT1 cohort] and hear from them to take some of the online rust out - we figured out we were missing that face to face component, and that live feeling to our discussions and all.

The concept of social presence has been linked to the successful emergence of online community and online collaborative learning environments (Garrison & Cleveland-Innes, 2005). According to Lehman & Conceição (2010)**,** social presence integrated with cognitive presence and teaching presence are essential elements in building an effective online learning community. By contrast, the feeling of social isolation can greatly, negatively influence learners' motivation (Palloff & Pratt, 1999) in online learning environments. While feelings of comfort and satisfaction with academically-focused electronic interactions with other humans do not equate directly to an individual's sense of social presence associated with electronic communication interactions, they can serve to indicate the degree to which those engaged in the electronic interactions perceive that they were part of a successful goal-directed effort with others mediated through electronic communications media, and this perception of the effectiveness of the medium in enabling such interactions is a key component of social presence.

Students' Relationships with Fellow Members of the Cohort Group

This section reports and interprets the responses made by students to questions 36 and 41. Ten students responded to Question 36. All 10 students gave positive responses. Some of the terms used to describe their relationships with the other members of the cohort were "amicable", "amazing", "awesome", "great", "congenial", "supportive", and "friendly". The most common sentiment expressed was positive. One of the most positive comments was the following:

> We've [the members of the WebIT1 cohort] spent a lot of time together and have gotten to know each other better than I expected. Discussions, group projects, and the meetings at the TETC helped bond this group together. As with anything, you get what you put into it. There are members of our cohort that did not participate as much and probably do not feel as close as those that did. I feel like if something pops up after graduation, they are people that I can contact and they will help.

The most negative comment—and it is far from negative—was the following:

> I got to know great people in the cohort, and I value their insight to each class and discussion – I also got to know my instructors, but not the actual faculty members.

This last comment reinforces other comments that were made by a few students in other contexts throughout the program, and the data from Questions 42 and 43 regarding the students' perceptions of how communications between themselves and their instructors changed over the course of the program. Though faculty did interact with students throughout the program, the classes were taught by senior GTAs in Instructional

Technology who were mentored by the IT faculty. It was an intentional element of the WebIT program that the GTAs were established as the instructors of the courses so that the GTAs would be seen by the students as "in charge" and the primary teacher/leaders for the courses. The program was apparently successful in achieving this goal, but an unintended consequence was the perception by students that the faculty were more distant and less-connected than the students felt was desirable. The instructors (GTAs) were often highly praised for their frequent and tireless contributions to the group and the group as a whole felt that the GTAs were highly valuable members of the collaborative learning community. However, the role of the faculty members (the GTA mentors) was not seen as particularly influential in fostering the emergence of the collaborative learning community.

A number of researchers have reported that a critical relationship exists between the emergence of social presence, and a collaborative learning community (e.g., Garrison & Cleveland-Innes, 2005; Lehman & Conceição, 2010; McBride & Fuller, 2007; Palloff & Pratt, 1999). Oestmann and Oestmann (2006) also argue that a significant positive relationship exists between students' online social interactions and their cognitive development. In this specific instance, in their response to Question 41, most of the successful WebIT1 students felt that the members of their cohort group formed a very successful collaborative learning community and that the relationships that developed were likely to extend beyond the academic context in which they formed. However, not all researchers acknowledge the likelihood that virtual relationships can transcend the boundary between real and virtual space. Eastmond (1995) claims that it is unlikely for online students to transfer their virtual relationships into real-world social relationships and to maintain them beyond the context in which they were originally formed.

Cohort Size

This section reports and interprets the responses made by students to questions 36 and 37. In responding to Question 36, one of the WebIT students made the point that "it [our relationships] became better as the group became smaller." In responding to Question 37, another student commented that: "If our group had stayed as large as it was when we started, I don't think the relationships would be as close for me."

These responses are consistent with findings from previous research (Loh & Smyth, 2010; Roberts & McInnerney, 2007) on the correlation between cohort size and online learning outcomes. Several studies have found that student success is enhanced by small cohort size (Hill, Song, & West, 2009; Kreijns, Kischner, & Jochems, 2003). Palloff and Pratt (1999) consider 15-20 students as the ideal cohort size.

Chidambaram & Tung (2005) report that students in larger online classes showed lower motivation than those in smaller online classes. However, Oestmann and Oestmann (2006) report finding that "larger online class sizes support Vygotsky's Socio-Cultural Learning Theory. They found that more opportunities for social interaction resulted in higher measures of learning outcomes" (p. 5). In their study, large online classes were defined as having more than 20 students, while small online classes were defined as having less than 10 students.

Learning Community and Students' Needs

This section reports and interprets the responses made by students to questions 37, 38, 45, 46, and 47. In response to survey question 45, the WebIT group unanimously reported that the WebIT program provided them with a learning community that supported their personal learning needs. Since the student response to Question 45 was unanimous, Question 46 was not presented to the students.

In response to question 37, the students reported a "better and better" learning experience as they progressed through the program. They described their experiences as becoming less "intense", "less isolated" and "more relaxed" over time. One student described being nervous when she started the program, particularly about having to work with other students to achieve certain course goals, but that her concerns were "dissolved by the members in the group as time passed." In terms of specific examples of how the WebIT learning community supported the students' needs, members of the group mentioned: (a) large numbers of student interactions (formal and informal), (b) student sharing of ideas, moral support and solutions to problems, (c) timely feedback from other members of the community, (d) benefits of diverse backgrounds of cohort members working in teams, and (e) benefits of collaboration and teamwork. Eight of the 10 responses to Question 47 specifically mentioned the term "support" or a close synonym. A typical response was the following: "Cohort members were very supportive of one another."

As described earlier (Question 38), this sense of a supportive, collaborative learning community was greatly enhanced by the TETC conference experiences. One respondent expressed a desire to meet face-to-face (f2f) with other members of the cohort more often, but that it was not possible due to their geographic dispersion, because she "live[d] so far away" so they met frequently using Facebook and Twitter.

In spite of their geographical dispersion, the WebIT1 cohort group reported achieving a strong sense of connectedness through virtual interaction, peer assistance, and collaborative teamwork. Further, the respondents expressed their appreciation of the enjoyable information-sharing experiences and the reliable support, both academic and moral, from the whole community including the professors, GTAs, and members of the cohort. Several of the students claimed that "learning from others" was an effective way to "broaden knowledge". One student commented that it would be even better if this virtual collaboration was "more structured" so the learning community could better serve students' needs.

Interestingly, McBride and Fuller (2007) address some particular characteristics of Instructional Technology students (compared to other online learners) that led them [the IT students] to a higher level of comfort concerning building online communities. If this phenomenon is real, then it might mean that additional or different types of efforts would be needed by course designers in order to build effective online communities for other types of students. Several researchers (Brindley, Blaschke & Walti, 2009; McInnerney & Roberts, 2004) have noted that in order to achieve success in building a sense of online community, it is important to create a sense of connectedness (social presence) and meaning-making through communication-interactions (cognitive presence).

Means of Communication

This section reports and interprets the responses made by students to questions 39 and 40. In response to question 39, most students (8 out of 11) identified E-mail as their most frequently used form of communication throughout the duration of the WebIT program. Online chat and text messaging were the second and third most frequently used media reported by the students. One student selected “other” and responded to Question 40 that he/she used social media (Facebook and Twitter) to communicate with other members of the cohort. Two other members of the group indicated that they did not use any other forms of communication [other than those listed in the question] to interact with the other members of the cohort during the WebIT program.

The students reported using a wide range of electronic communication media to collaborate with the other members of their cohort group. E-mail was the most frequently used medium, but the group expressed a distinct preference for using synchronous communication tools (e.g., Wimba), as well.

Curtis and Lawson (2001) propose that a relationship exists between the electronic communication medium used and the nature of the communication that emerges. They conclude that the nature of the communication medium utilized influences the nature of online learners' interactions. According to Curtis and Lawson, learners tend to have a preference for digital tools that provide a relatively consistent interface for users' interactions. This phenomenon may help to explain why the WebIT students reported that E-mail was used more often than other communication media, since E-mail provided a “lowest common denominator” among the largest possible set of program participants. However, the students also communicated a positive view of the value of synchronous communication tools such as Wimba. Each form of computer-mediated communication has distinct advantages and disadvantages, and the preferences shared by the members of the WebIT1 cohort may reflect their appreciation for the advantages of each medium in meeting specific communications-context needs. Motteram and Forester (2005) note that the robust availability of a wide variety of electronic communication tools enable a “constantly available learning environment, which students can utilise at their own convenience” (p. 290).

Academic Support and Learner Skills

This section reports and interprets responses made by students to questions 42, 43, 44, 48, and 49. Question 42 asked about the frequency of student communication with their *current* WebIT instructors. Most of the students indicated that they did not communicate with their current instructors very often but their responses varied from a few times a semester to as much as once per week. Some of the students stated that they would contact their instructors whenever they had any questions or needed any clarification, but that this was a relatively infrequent occurrence. Their responses to Question 43 were very similar. They communicated with *past* WebIT instructors about as frequently as they communicated with their *current* instructors. Though communication with instructors is obviously desirable, and clearly occurred, this pattern of responses indicates that outside of a course communication context (asynchronous or synchronous), the students did not tend to interact much with their instructors, so the instructors were not dominant members in what they experienced as a collaborative learning community.

The most common reported means of communication with instructors during the WebIT program was via E-mail. However, some students indicated that they commonly used Wimba (Wimba Incorporated, 2009) and text chat to communicate with their instructors outside of a formal class meeting. The student responses indicate that

their perception of the frequency of their communication with instructors, while rather low, was relatively consistent throughout the program.

The need for timely instructor support is critical to student success in online programs. Marjanovic (1999) points out that an asynchronous medium like E-mail allows for students and instructors to communicate any time and any place, and this provides a crucial sense of social presence in a nascent online community. Motteram and Forrester (2005) concur yet caution about the potential difficulties that can emerge when student expectations for faculty availability differ from the reality of faculty availability. Should such a mis-match in expectations occur, it seems likely that it might affect a student's sense of the social presence of others in the online community, and this might affect a student's sense of isolation or dis-connectedness related to the community.

The WebIT program employed a wide variety of CMC communication tools to promote intra-group communications. The majority of the students (6 out of 11) reported a preference for the immediacy associated with synchronous communications, through a tool such as Wimba (Wimba Incorporated, 2009). One student response that seemed typical was "The verbal conversations during Wimba in the synchronous meetings were probably the most helpful." However, other students expressed preferences for discussion forums, online chats, and E-mail as means of communication. Still other students felt that the asynchronous means of communication had certain disadvantages that made them less desirable than synchronous communication. The overall pattern of responses from these WebIT students seemed to indicate a group preference for using synchronous communication tools, due to the efficiency and immediacy of this means of electronic communication, but such a preference was not universal.

Student responses to Question 48 provided information about the other kinds of support services they would like to have had available. The largest number (5 out of 11) indicated that they would have preferred having more information about library services. Two students indicated a desire for more information about career counseling. Individual students indicated a desire for wanting more information about each of the following services: (a) Registration, (b) Additional Technical Support, and (c) Assistance with Study Skills. Students who chose "other" in their response to Question 48, were given an opportunity to respond to Question 49. No student chose "other" as a response to Question 48.

Limitations

This case study was based upon a small sample of students and thus any generalization from the findings reported from this context should be made with caution. These findings may be of some value in helping interpret data from related contexts, but they may also be limited to this specific context. These interpretations are shared in hopes that they might be of some value in facilitating the development or evolution of successful online programs.

Summary and Recommendations

The members of the WebIT1 cohort who successfully completed the program reported that a supportive, collaborative learning community arose during their participation in the WebIT MS in IT program. A strong sense of community/group affinity is evident in the students' survey responses. These students reported engaging in a relatively consistent amount of communication with instructors and faculty over time. They also reported that their interactions with members of the cohort increased, across multiple forms of electronic communication, over time.

Formal face-to-face (f2f) meetings with the WebIT1 students were limited to a single pre-program three-day workshop. Two informal, non-required f2f meetings were held at an annual statewide educational computing conference, and each of the 11 students who completed the program voluntarily participated in both of these annual events. Other student-initiated f2f meetings were organized and attended by some of the members of the WebIT1 cohort group. However, these meetings were limited by the geographic dispersion of the members of the cohort. Those students who lived in closer proximity chose to meet outside-of-class to collaborate on course projects. The majority of the successful students in the cohort reported that they believe that their relationships, often described as friendships, with fellow cohort members will continue beyond WebIT program.

Based on student feedback, the WebIT program characteristics that seem to be strongly associated with the emergence of a collaborative learning community among the successful members of the WebIT1 cohort are the following: (a) the pre-program orientation, (b) the WebIT program policy to encourage student collaboration on course projects, (c) the integration of optional group meetings that provide students with an opportunity to demonstrate program-related accomplishments, (d) the utilization of diverse, context specific, instructional strategies that encompass both individual and group-based learning approaches, and (e) the rotation of individuals within collaborative project groups over time. In addition, the successful WebIT1 students indicated a decided preference for a smaller cohort size, expressing the belief that a smaller cohort provided a more familiar and inviting context for

their collaborative learning and mutual support. The successful WebIT1 students also expressed preferences for the use of E-mail and listserv (asynchronous) communications in addition to synchronous communication environments.

The 11 successful WebIT1 students specifically selected an online program as a vehicle for acquiring a Master's degree in Instructional Technology. Despite this, they responded very favorably to the several instances in which f2f involvement with other students was either required or suggested as an optional experience. Some students even sought to organize additional f2f meetings among members of the cohort who were geographically proximal to one another. This indicates the perceived value of these physical interactions held by some students (in WebIT1, the successful students) who elect to pursue online graduate studies. Based on our experience with the successful WebIT1 students, an online program model that incorporates the strategies mentioned in the previous paragraph, and specifically several, periodic physical meetings intended to foster group inter-connectedness and academic program-profession connectedness of some type, may be relatively more successful in fostering the emergence of a collaborative learning community and in meeting the needs of a large proportion of the students who matriculate in online graduate programs.

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Integrating an Open-source Learning Management System (Moodle) In an English Language Program: A Case Study

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Abstract

This mixed-method research evaluation described a case study that assessed the effectiveness of Moodle as the learning management system (LMS) for an English Language Program (ELP). The report addressed the purpose of the evaluation, its audience, and the impact on the decision to implement Moodle as the ELP's learning management system. This paper will detail the process of how to determine the effectiveness of Moodle according to ELP's specific requirements. Findings and recommendations were summarized for ELP to make the decision as to employ this LMS for their program or not.

Keywords: Moodle, learning management system, evaluation

Introduction

An east coast institute will open a new English Language Program (ELP). It will have two campuses located in the same state. An effective learning management system is urgently needed to meet their instructional needs.

At present, they are not using a Learning Management System (LMS). Instead, they used various other technologies offered by the university to generate grade reports and track class attendance. Their current process is time consuming, repetitive, cost ineffective and at various times inconsistent. Another complaint is that students are not able to assess their school performance with real-time teacher feedback. Additionally, in order to comply with immigration laws, international students must adhere to a strict attendance policy. There have been reports of students being counted as absent for a whole day when they may have been only late. This can be very problematic. With increasing enrollment, these issues are becoming more complicated. They desire a system that offers greater grading flexibility, allows for ease of communication and collaboration among teachers and administration, reports and tracks student progress efficiently, and offers methods for course control.

Although many commercial LMSs are available, such as "Blackboard", they are very costly. More and more institutions chose to use open-source systems to take the advantages of cost efficiency and functionality (Wheeler, 2004). Similarly, Moodle was adopted by ELP to solve the problems mentioned above as well as meet the requirements. The word "Moodle" is the short form of *Modular Object-Oriented Dynamic Learning Environment.* It is a free, open source online LMS. There are no associated license fees and the content, and design and tools provided are driven by the needs of Moodle user community (Moodle, 2010).

Description of the study

The English Language Program was offered through the Language and Culture Institute of an east coast university. The primary goal of the ELP is to prepare international students for university admission through a rigorous and progressive series of intensive English courses. They desire a system that enhances communication, collaboration and across the board consistency of processes.

In this mixed-method study, the researchers intended to evaluate the use of Moodle in ELP. A lot of studies have been conducted to explore students' opinions of using Moodle (e.g., Carvalho, Areal, & Silva, 2010; Wood, 2010). We addressed the use of Moodle from a different perspective, that is, from opinions of faculty and administrative staff.

Research Questions

The purpose of this study was to find out what are the perceptions and experiences of teachers and administrators in their use of Moodle and to assess the technological affordances of Moodle. The results were used as part of the decision to determine whether Moodle would be implemented as their learning management system. To be more specifically, this study answered the following questions:

1. What are the ELP instructors' needs in terms of a learning management system?
2. What are the technological affordances of Moodle, particularly in light of ELP instructors' needs?
3. To what extent does Moodle meet the identified learning management system needs of ELP instructors?

Methodology

Data Collection

Data collection methods involved in this study were the formative interview with two ELP representatives, an email interview with a current Moodle user, a survey, a focus group interview with ELP administers and instructors, and a Moodle assessment rubric.

Sample

The ELP consisted of the Director, two Associate Directors (one for each ELP location), one ELP administrator and seven instructors. To obtain a sample that is representative of the entire group, all of them were given the survey and encouraged to fill it out. All key stakeholders (Director and Associate Director of the ELP) were invited to participate in the focus group interview. The formative interview was conducted with the site contact and one of the instructors at the ELP.

Data Analysis

Qualitative data were coded and integrated by three of four researchers in two rounds. The first round was individual coding, and the second round was collaboratively reviewing the codes of each other to reach a consensus. Quantitative data were statistically analyzed by calculating means, frequencies, standard deviation, and correlations.

Results

Results of the formative interview

Two representatives from the ELP program described their current process of administrating students as time-consuming, repetitive, cost-ineffective, and at times inconsistent since they were not using any LMS. Another complaint was that students were not able to assess their school performance with real-time teacher feedback. They expressed that they needed a tool that offered flexibility in grading, allowed for ease of communication and collaboration among instructors and administration, reported and tracked student attendance and progress efficiently, and offered methods for course control.

Results of Formative Interview with a Current Moodle User

The participant had approximately a year of experience with using Moodle. She referred Moodle as a user-friendly learning management system, capable of addressing a variety of instructional needs. She preferred the feature of private grades checking, the capacity to handle large files, and collaborative learning. She also raised some minor concerns. First, the Moodle user must create their own database of students' ID. Second, the instructor would need special training to use it proficiently.

Results of the ELP LMS Selection Survey

The survey (Appendix A) included five parts: basic demographics, basic LMS functionality, advanced LMS functionality, system usability & technical support, and open-ended questions. For part 2 to 4, a Likert scale was used. The Likert scale had five levels; 1 being not important, while 5 is extremely important. The index of mean was used to analyze data.

Part 1: Basic Demographics

8 out of 11 participants filled out the survey and the response rate was 73%. 2 of the respondents were administrators, and the rest 6 were instructors. All of the instructors had at least a graduate education. They all had at

least 3-5 years experience with computing /web. 44% of the respondents had more than 10 years experience with computing/web. In addition, they all had some LMS experience. Half of the respondents felt comfortable with LMS.

Part 2: Basic LMS Functionality

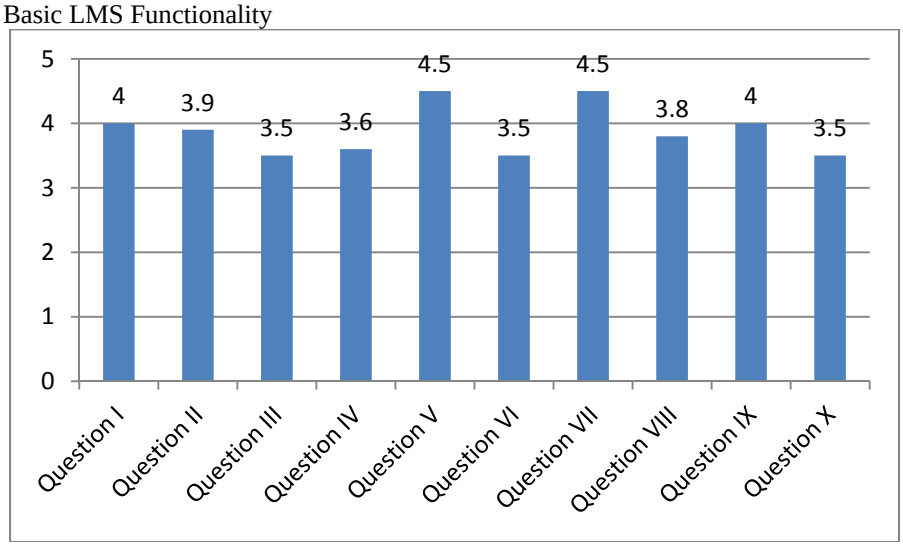

Figure 1. Basic LMS functionality.

Of the 10 survey questions in this part, two questions received the mean score of 4.5 or higher. The mean score for monitoring course progress and effectiveness (Question V) was 4.5. The mean response for providing feedback on assignments (Question VII) was 4.5. The ability to track and facilitate individual participation (Question IX) received a mean response of 4. The results of this part indicated that, in the stakeholders' minds, monitoring course progress, providing feedback on assignment, and tracking individual participants are most important functionalities that a Learning Management System should possess.

Part 3: Advanced LMS Functionality

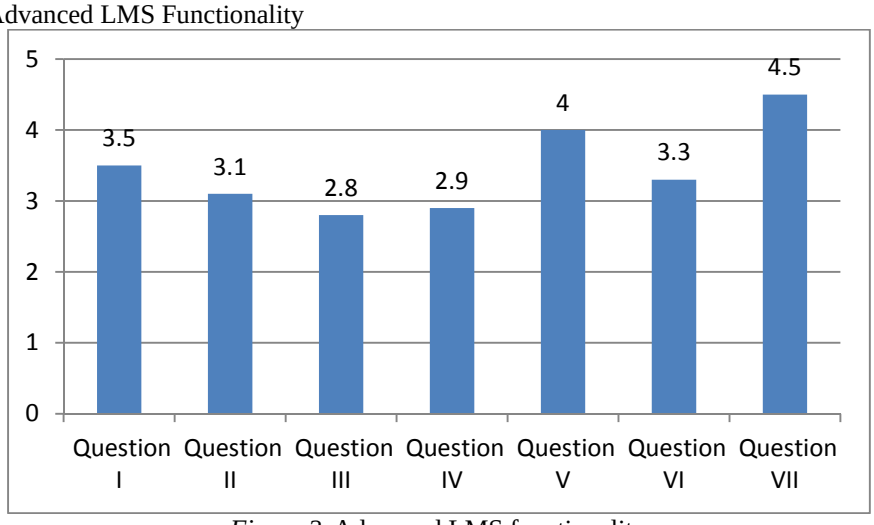

Figure 2. Advanced LMS functionality

(Note: One participant missed Question VI and the results were calculated based on 7 responses).

A mean of 4.5 was the response given for requiring the LMS to have contents that are protected with a password and other security protocols (Question VII), and for allowing the user to update and redesign assessment rubrics received a mean response of 4 (Question V). The results indicated that security protocol is a major concern of using a LMS. Allowing the users to update and redesign assessment rubric is also an important factor of choosing a LMS.

Part 4: System Usability & Technical Support

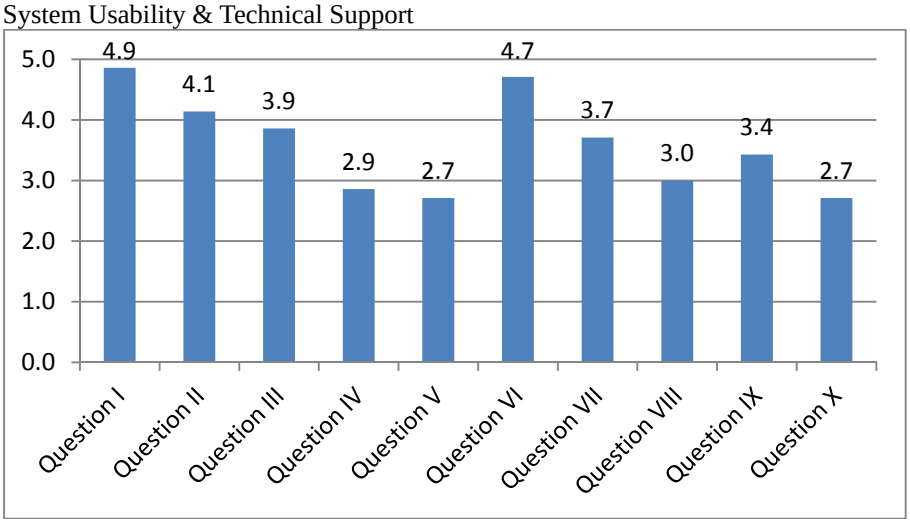

Figure 3. System usability & technical support
(Note: One participant missed this section and the results were calculated based on 7 responses).

Having a LMS that has a simple layout that's relatively easy to navigate (Question I) received a mean response from the participants of 4.9, while providing users with basic online support (Question VI) received the mean score of 4.7. The use of icons and other graphics to provide cues regarding usage (Question II) received a mean response of 4.1, and the mean response for requiring screen contents and labels that can be modified (Question III) was 3.9. The results indicated that a simply layout is an important feature of a LMS, as well, basic online support is important to the client.

Part 5: Open-ended Questions

The participants expressed their needs for a LMS in aspects of document storage capacity, student progress monitor, automatic weighting of grades, students' access to their own grades, low instructor's workload in administration, and ease of instructor/faculty collaboration. Most of them perceived that a LMS would be highly valuable in fulfill their needs mentioned above.

Results of ELP LMS Focus Group Interview

Based on the survey results, the researchers designed the focus group interview protocol. 10 people participated in the interview, yielding the participation rate as 91%. The purpose of the interview was to have the participants agree on the group's most important needs, as well as to get more in-depth information beyond the data collected through survey.

Regarding the question 1, participants were asked to name three most important learning management issues they were struggling as a group. Firstly, they stated that they need a flexible grading system; current they give many tests that require a flexible system. The system should works accurately and can calculate averages, weight grades, keep running calculation of grades, and allows for real-time reporting. Secondly, they indicated that in order to monitor their progresses, students should be able to access to their grades. Thirdly, they needed a way to allow students submit assignments by specific due dates.

Regarding the question 2, participants were asked to list top three most important instructional needs that they would like for Moodle to address. They mentioned that Moodle should be able to backup everything; the evaluators thought this is not a Moodle issue but a server issue. They wanted Moodle to (1) handles large audio and video files, (2) generate student proficiency reports, (3) instructors can track attendance and student is able to access to their attendance.

Regarding the question 3, the group was asked to what extend must Moodle meet their priority needs to be the desired LMS option. They said Moodle should meet their instructional need to 98% degree.

Results of Moodle Assessment Rubric

Based on the survey results, the focus group interview results, and the result of the formative interview with current Moodle user, the evaluators created Moodle assessment rubric (Figure 4). For the purpose of this research, Moodle version 1.9 was assessed.

Sufficient file capacity

Moodle has a basic storage file capacity of 5MB. This can be adjusted to the maximum file upload size capacity of 50 MB. It also accommodates video files.

Allow flexibility of grading

In Moodle, grades can be calculated, aggregated and displayed in a variety of ways. Many settings have been designed to suit the needs of a great variety of organizations.

Electronic communication/collaboration

Moodle has a variety of communication affordances. It has an internal email application as well as a forum for posting messages. It also has a Chat feature which allows for synchronous text interaction and collaboration.

Student Attendance Tracking

Moodle allows attendance to be added as an activity to each course the instructor desires. There are four status features the instructor can select: present, absent, late, and excused. The instructor may prefer to change the descriptions (e.g. change the word Late to Tardy), change the order, or change the way points are counted so as to make appropriate changes here to the names, order, and grades. The instructor can export attendance reports for every day, every week or every month.

Allow posting of assignments

The assignment activity module in Moodle allows teachers to collect work from students, review it and provide feedback including grades. There is also an off-line activity option which can be used to remind students of assignments they need to complete, and to record grades in Moodle for activities that don't have an online component. In addition, Moodle allows re-submission and re-grading of the assignment.

Security protocols

Moodle affords strong security protocols. The system is password protected and the client's designated administrator can set permissions for access.

Grade Reports

Moodle affords instructor the ability to create grade book for each course. The instructor and administrator also can track grade history, as well as import and export grades in spreadsheet or webpage format.

Monitor course progress

In Moodle, there is course-based progress tracking or competency-based progress tracking. In course-based progress tracking, students can check which of their assignments have and have not been completed, and check the grade and feedback they've received for each assignment. Competency-based progress tracking lists all the outcomes with a required level of competency for that outcome. For example, ELP instructors could track the progress of a student's listening ability, and set different levels (e.g. low, intermediate, or high) for that ability. Whenever the leaner logs into the Moodle system, he/she is able to see the progress monitoring block on the course site.

Feedback features

Moodle has an assignment module, which allows teachers to provide feedback to students. The system also records the last modification time of the assignment by the student as well as by the teacher. The system automatically notifies the student via email once the instructor finishes grading, updating or commenting on student assignments.

Layout and navigation

The layout of Moodle is relatively simple and easy to navigate. However, this determination is based on the user's technical experience and computing skills.

Based on the above evidences, the researchers think Moodle is able to fulfill the client's instructional needs (Figure 4).

Areas of Consideration		Don't Meet	Meets	Exceeds	Note
1	Sufficient audio file capacity/storage		**x**		
2	Allow flexibility in grading		**x**		
3	Support for electronic communication/collaboration		**x**		
4	Student Attendance Tracking			**x**	
5	Allow posting of assignments		**x**		
6	Contents are protected with security protocols		**x**		
7	Can Generate Grade Reports		**x**		
8	Monitor course progress			**x**	
9	Provide feedback on assignments		**x**		
10	Layout that is relatively simple to navigate		**x**		

Figure 4. Moodle assessment rubric with results
(Note: Don't Meet – Moodle does not address the needs as specifically request by the client;
Meet – Moodle addresses the needs as specifically request by the client;
Exceed – Moodle address the needs as specifically request by the client and beyond.)

Discussion

Both qualitative and quantitative data revealed positive results in the experience of using Moodle. The results suggested that Moodle meets the requirements of ELP for a LMS that allowed for grading flexibility, ease of communication, teacher collaboration, and attendance tracking. In addition, Moodle was secure, had a large file capacity for audio/video recordings, and allowed for posting assignments and monitoring student progress. More importantly, since the system of Moodle is designed based on a socio-constructivist pedagogical philosophy, it provides a platform for social negotiation in the process of knowledge building (Doolittle, 1999; Zakaria & Daud, 2008). Teachers were able to provide timely formative feedback.

Although Moodle was able to address most of current problems of ELP, like any new application there is a learning curve for its users. A considerable time investment for integrating student information, setting up courses, and orientating new instructors and students to the new LMS must be taken into account.

Conclusion

This study found out that Moodle was able to address most of ELP's needs quite well. Moodle was highly recommended to be adopted as a LMS to the faculty and administrative staff in the ELP program. To maximize its usage, certain types of training and orientation sessions were called.

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Appendix A

Virginia Tech's ELP LMS Selection Survey
In an effort to include all stakeholders' thoughts and perceptions regarding the selection of an appropriate learning management system (LMS) such as WebCT, Blackboard, Sakai, or Moodle for Virginia Tech's ELP, your participation is needed.

We have developed the survey below to capture this information. The questions for the survey are grouped in 5 parts: Demographics, Open-ended, Basic LMS Functionality, Advanced LMS Functionality, and System Usability and Technical Support.

Please spend a few minutes answering the questions developed for the survey. Your input in this endeavor is well-appreciated.

Part 1: Basic Demographics

I. User Category
a) _____Administrator; b) _____ Staff
c) _____Instructor

II. Years of experience with computing / web
a) _____0 - 2; b) _____3 – 5
c) _____6 - 9 d) _____ 10+

III. Your education level
a) _____Pre baccalaureate; b) _____Some Undergraduate
c) _____Post-baccalaureate; d) _____ Some Graduate
e) _____ Graduate and above

IV. LMS Experience
a) _____None; b) _____Beginner
c) _____Comfortable; d) _____ Advanced

V. What, if any, learning management system have you used? (Choose all that applied)
____ Blackboard ___ Moodle ___Scholar
____ WebCT ___ Sakai ___Other: (Please indicate name) _____
Contact information (For clarification and/or follow-up)
E-mail _____; Phone: _____

Part 2: Basic LMS Functionality
1=Not important, 2= Somewhat Important, 3=Important, 4= Very Important, 5= Extremely Important

ITEM		**IMPORTANCE (1 – 5)**
I.	Allow creation/posting of assignments: tests, projects etc online	
II.	Provide criteria and procedures to automatically grade assignments	
III.	Include means to write objectives and learning outcomes	
IV.	Maintain records of communication with other users	
V.	Post / Monitor course progress and effectiveness	
VI.	Track registration records	
VII.	Provide feedback on assignments	
VIII.	Allow chats and asynchronous communications: postings, forum etc.	
IX.	Track and facilitate individual participation	
X.	Support for electronic communications e.g., email, posts…	

Part 3: Advanced LMS Functionality
1=Not important, 2= Somewhat Important, 3=Important, 4= Very Important, 5= Extremely Important

ITEM		IMPORTANCE (1 – 5)
I.	Support use of external resources e.g., web links, podcast	
II.	Can incorporate multimedia resources: Movies, Flash, PowerPoint	
III.	Facilitate collaborative learning tools such as wikis	
IV.	Support virtual community building	
V.	Allow update and redesign of assessment rubrics	
VI.	Provide means to create multiple roles in the system	
VII.	Contents are protected with password and other security protocols	

Part 4: System Usability & Technical Support
1=Not important, 2= Somewhat Important, 3=Important, 4= Very Important, 5= Extremely Important

ITEM		IMPORTANCE (1 – 5)
I.	Has a simple layout that's relatively easy to navigate	
II.	Use of icons and other graphics provide cues regarding usage	
III.	Screen contents and labels can be modified	
IV.	Allow multimedia and visual resources into an online module	
V.	Support moving courses to other categories	
VI.	Provide users with basic online support	
VII.	Provide users with advanced online support	
VIII.	Refer users to other sources for tech support	
IX.	Supports open Source	
X.	Allow use of HTML	

Part 5: Open-ended (Should be at the end of the survey)

List and discuss other items that you think would be important for us to consider in the LMS evaluation.

_____
_____
_____
_____
_____
__

Discuss your thoughts about online learning and use of LMS in general.

_____
_____
_____
_____
_____

Thank you for your input!

Design of Computer Activities to Enhance Career Education in China: An Informal Learning Opportunity

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Abstract

This mixed research presents an innovative approach for the design of asynchronous computer activities to offer an informal learning opportunity in elementary career development. The purpose of this research was to find out how the design of these activities could support career education in elementary school and enhance parents' involvement in this process. The paper also discussed how these activities overcome three main challenges in the current career education, such as the lack of opportunities in early career development stages, the unrecognized roles of parents, and the detachment of career education from traditional academic education. In addition, the study examined parents' perceptions of computer activities usage in elementary career education.

Keywords: career education, informal learning, parents, computer activities

Introduction

Careers can be conceptualized "as self-realization, growing experiences, and context conceptualization" (Chen, 2003, p. 203). Career education is a life-long development process, including career awareness, exploration, planning, and preparation. In elementary years, the curriculum relates reading, writing and arithmetic to skills needed for adults made a living (Marland & Office of Education, 1971). The career education curriculum at this stage is designed to promote students' knowledge of self and others; cultivate an awareness of careers. The second stage-career exploration, which spans from grades 6-9, is the dissemination, assimilation and experiencing of occupational information through the limited use of laboratory activity at the orientation level and the extensive use of laboratory activity at the exploration level (Moullette, 1972). Furthermore in high school, students will be gradually involved in the stage of career planning and preparation. Career planning and preparation is both the learning of most basic employment skills in a selected occupational area to show job-entry capability and the development of skills beyond the most basic performance and knowledge requirements of the occupation (Moullette, 1972).

In this study, the elementary school years have been singled out for particular attention with reference to career awareness.

Literature Review

Informal learning opportunities

To promote the combination of academic and career education, families are called to provide their children with a variety of informal learning opportunities. Informal learning, characterized by people learning from their experience (Sork & Newman, 2004) has the potential to be widely used to promote career education as well as closely connect it with academic education since learning could happen in many different sites.

Families play a significant role in influencing adolescents' career decision-making (Habash & Suurtamm, 2010; Super, 1957, 1963, 1984). Previous studies have suggested the role of family as a contextual factor (Niles & Harris-Bowlsbey, 2005; Vondracek & Kawasaki, 1995; Whiston & Keller, 2004) that had considerable potential for influencing an individual's career path (Lopez & Andrews, 1987; Super, 1984). Bratcher's (1982) family systems theory was applied to examine how various psychological boundaries, beliefs, values and traditions from the family affect career decision making. For young people, learning and earning are usually mirrored in the lives of older people they know (Solomon, Boud, & Rooney, 2006). It is also common that some young people have already formed limited career aspirations or false career beliefs by the time they reach middle school. For example, many people have sex-stereotypes views of occupations such as nurses, engineers, and so on. Families should help students learn about career choices and support their efforts to prepare for a career (Schwartz & Eric Clearinghouse

on Urban Education, 1996). Career educational can be intentionally started early in preschools and ongoing during schools by parents. They can assist children recognize their strengths and talents as well as advise them about postsecondary planning and decision-making in a way that school counselors are not able to. The importance of parent involvement has been strengthened more and more in today's climate and their influences on the vocational choice of children are more significant than any other adults (Brown, 2003). Their guidance is critical in the process of decision making when their children are exposed to a variety of choices along the career pathway (Whiston & Keller, 2004). They play a particularly important role in early stages of development (Reynolds, Ou, & Topitzes, 2004). Their influence is greater than "any other adults on the educational and vocational choice of children" (p.332).

Computer activities as a way of informal learning

The demand for immediate access to information accelerated the adoption of informal learning (Galagan, 2010). With the advancement of computer and web development, the application of technology-integrated instructions has become an inevitable trend. Learning is no longer confined to traditional classrooms. Career researchers have shown a strong agreement on the need to begin career education as early as preschool (Hartung, Profeli, & Vondracek, 2005). With regard to the increasingly savvy younger population, a strategy to involve parents in the early process of child career development is the use of asynchronous computer activities.

Need for Study

There are three major problems in the current career education system in China. First, traditional career development programs are school-based, which typically focus on student knowledge and attitudes. They simply guide students based on perceived/identified market needs (Grubb & Lazerson, 2004) or college admission requirements (Schneider & Stevenson, 1999). However, more recently, career researchers have shown a strong agreement on the need to begin career education as early as preschool or elementary school (Hartung et al., 2005). Career education is perceived as a life-long development process, including career awareness, exploration, planning, and preparation (Marland & Office of Education, 1971). Regretfully, what has been neglected for a long time is the cultivation of students for a sense of career awareness and motivation of career exploration at early stages, such as pre-school, elementary school, and middle school.

Second, families play a significant role in influencing adolescents' career decision-making (Habash & Suurtamm, 2010; Super, 1984). For young people, learning and earning are usually mirrored in the lives of older people they know (Solomon & Rooney, 2006). It is also common that some young people have already formed limited career aspirations or false career beliefs by the time they reach middle school or high school. Therefore, roles of parents are critical in early stages of career development (Reynolds et al., 2004). Unfortunately, the role of parents has been largely unrecognized by teachers and school administrators (Habash & Suurtamm, 2010).

Third, career education is not a stand-alone educational system. It is neither a substitute of vocational education (Marland & Office of Education, 1971) nor an add-on to traditional academic education (O'Brien, K. M., Dukstein, R. D., Jackson, S. L., Tomlinson, M. J., & Kamatuka, 1999). There is a strong need to reorganize the education around a career development theme.

It will be greatly helpful if the instructional designer could devise a context where parents are involved and orchestrated in directing children's career development, as well as where traditional education and career education are integrated. One strategy that meets both of the requirements is the design of asynchronous computer-based career preparing activities that can be easily conducted at home.

Description of the Study

This project wass intended to address the problems of career education in elementary school mentioned above. The demand for immediate access to information accelerates the adoption of informal learning (Galagan, 2010). Learning is no longer confined to traditional classrooms. This project converted the existing instructor-led paper-based class activities into asynchronous computer activities that can be used outside of classes.

In the first place, outside class activities is a way to involve parents in the early development of career education. Students could play on themselves or with their parents at home. Parents can assist children to recognize their strengths and talents as well as advise them about postsecondary planning and decision-making in a way that school teachers are not able to. The mode of computer-based activities is more interactive, and thus more attractive. These activities can be accessed unlimitedly from the researcher's website.

Moreover, all the computer activities have been developed on the basis of existing paper activities which are complied with specific state educational standards. Students employed a variety of career clusters by using their

knowledge of math, English, arts, and other subjects that were demanded in the traditional academic education. Therefore, career education is blended into the traditional curriculum as an integrated element.

Research Questions

The purpose of this research was to find out how the design of computer activities could support career education in elementary school and enhance parents' involvement in this process. For this purpose, the researchers specifically asked the following research questions:

1. What are the perceptions of parents in regard to career education in the elementary school?
2. What are the perceptions of parents in regard to the adoption of computer activities as an informal learning opportunity to support career education?
3. What aspects work well in this project?

Methodology

This study employed a mixed-method approach using a survey with open-ended questions to report characteristics of specific individuals from a common physical environment (Fraenkel & Wallen, 2006) and to elaborate participants' opinions. A cross-sectional method was adopted which means that the data were collected at one time (Creswell, 2003). Questionnaires were distributed via paper to participants.

Participants

The study sample was parents of students at grade 4-6 from two elementary schools in China who anonymously volunteered to participate. The sample size was 12.

Data Collection

A four-section questionnaire (Appendix A) was developed by the researchers for this project. The first section included demographic information about the sample. The following two sections asked questions about parents' opinions on elementary career education and the use of asynchronous computer-based activities, respectively. All these fifteen questions utilized a 5-point Liker scale (5=Strongly agree, 4= Agree, 3=Neutral, 2= Disagree, 1= Strongly Disagree). The last section is an open-ended question used to collect and elaborate any thoughts from participants that may be missed in the previous sections.

Results

The sample consists of 12 adults from two elementary schools in China. Of all the participants, 6 were male and 6 were female. Their ages ranged from 26-35 years old to 46-55 years old. 3of them graduated from middle school, 2 of them graduated from high school, 4 of them had a bachelor degree, and 3 of them had a master degree or higher. None of their children was enrolled in a career education program. Their children were in grade 4-6 (Table 1). Questions on career education and the use of computer activities were divided into 15 questions in part II and III. Statistical Package for the Social Sciences (SPSS) was employed for quantitative data analysis (survey-items) and collaborative coding was employed for qualitative data analysis (open-ended questions).

Table 1

			Number in the sample	Valid Percent
Parent	Gender	Male	6	50
Participants		Female	6	50
Information	Age	26-35 years	6	50
		36-45 years	4	33
		46-55 years	2	17
	Educational Level	Middle School	3	25
		High School	2	17
		Bachelor	4	33
		Master	2	17
		Doctor	1	8
Children	Gender	Male	7	58
Information		Female	5	42
	Educational level	Grade 4	3	25
		Grade 5	5	42
		Grade 6	4	33
	career education program	No	12	100

Perceptions of career education

Question 1 to 5 in the Part II of the survey asked question about parents' opinions of career education in elementary school. The majority of participants agreed on the importance of career education. Meanwhile, they also felt that it should be started as early as in elementary school. Almost all the parents thought that they had great influence in their children's career choice. They admitted that their children were not exposed to early career development. Therefore, they would like to have these opportunities in future (Table 2).

Table 2

	N	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
1. I feel that career education is important.	12	1	5	3.92	.336	1.165
2. I feel that it is important to assist child in making career planning.	12	2	5	3.67	.256	.888
3. Parents have great influence in children's career choice.	12	3	5	4.00	.174	.603
4. I want my child receive more career guidance in the future.	12	3	5	3.67	.188	.651
5. I feel that my child lacks learning opportunities in early career development stages.	12	3	5	4.08	.193	.669
Valid N (listwise)	12					

Perceptions of using computer activities

Questions 6 to 15 in the Part III of the survey asked questions about parents' opinions of using computer activities as informal learning opportunities to support career education. The majority of participants were positive about these activities in most aspects. However, the points in question 7 (Activities help children achieve their career goals) and question 15 (I feel these activities meet my expectations) were relatively low, but still positive (Table 3).

Table 3

	N	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
6. In your opinion, these activities help children career preparation.	12	2	5	3.67	.256	.888
7. Activities help children achieve their career goals.	12	2	5	3.50	.230	.798
8. I felt these activities are an effective way to motivate children's career exploration at early stages.	12	3	5	3.92	.193	.669
9. Activities help children acquire skills and knowledge needed to perform jobs.	12	2	5	3.67	.284	.985
10. Activities assist me to recognize my child's strength and preference.	12	4	5	4.25	.131	.452
11. Activities help me give advice to my child about career decision making.	12	3	5	4.00	.246	.853
12. Activities help children find out the interest towards their career path.	12	2	5	4.08	.260	.900
13. The difficulty level of activities is suitable.	12	3	5	3.83	.167	.577
14. These activities provide sufficient opportunities for parental involvement.	12	3	4	3.67	.142	.492
15. I feel these activities meet my expectations.	12	2	5	3.58	.229	. 793
Valid N (listwise)	12					

Perceptions of this project

Overall, the participants were satisfied with this project. Parents expressed their likeness in the following aspects. First, they were able to play with their children together and their children can get feedback from parents immediately. Second, through such communication, they were able to form a better idea about their children's preferences and strengths. Thirdly, they felt that their children showed more interests in learning knowledge and skills in such activities than from the book or classroom because the interface of these activities were vivid, interactive, and interesting. Fourth, children like technologies. Now, the computer is not sole for playing games, but for learning from the games. Therefore, the children were more motivated. Fifth, parents liked the way that academic skills from many areas (such as math, history, and physics) were integrated and applied in a real-world setting.

Discussion

The purpose of this study was to find out how the design of computer activities could support career education in elementary school and enhance parents' involvement in this process. The researchers wanted to know the perceptions of parents in regard to career education in the elementary school and the perceptions of parents in

regard to the adoption of computer activities as an informal learning opportunity to support career education. The researchers were also curious about how this project worked out.

In regard to participants' perceptions of career education in the elementary school, it was interesting to note that participants valued all five items pretty high (all above 3.5 points). It indicated that although none of their children were enrolled in any career education program, they perceive such education important, and they were willing to have more opportunities like this in future.

In regard to participants' perceptions of using computer activities, 8 out of 10 questions were highly rated (the scores were above 3.5 and close to 4.0 points). Therefore, the researchers believed that the design of computer activities was a promising approach in facilitating the development of career education in elementary schools in many ways. It was also noted that question 7 (Activities help children achieve their career goals) and question 15 (I feel these activities meet my expectations) received relatively low scores (around 3.5 points). For question 7, it was quite reasonable since none of their children have received career education in a systematic way. So it is too difficult or too early for them to tell their career goals. The primary goal for early career education is to develop a sense of career awareness, not planning the specific career goals. For questions 15, the low score was partially due to the variation in a sample that was randomly selected. The participants were diverse in their ages, education levels, and probably occupations. Therefore, they might have various expectations about this project.

In regard to participants' perceptions of this project, the parent described a list of advantages in five main categories: involvement of parents, awareness of children's preferences and strengths, enhanced interests and motivation, technology-based, and integration of academic skills with essential career skill in practice. It is glad to note that these advantages matched the need we faced in current career education, and had the high potential to remedy the shortcomings of career education, such as the lack of opportunities in early career development stages, the unrecognized roles of parents, and the detachment of career education from traditional academic education.

Conclusion

The results of this study provided important information about career education in elementary school from the perspective of parents. Findings of the study indicated that career education was crucial for children at early stages. More learning opportunities and guidance should be provided to students. Since the results showed that parents had highly positive perceptions of computer activities, such activities could be used as an informal approach to address the many problems we had in the development of career education. Findings of this study encourage further investigation in the design of computer activities that make career education more accessible in the early stages.

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Appendix A

This questionnaire has four sections. In the first section, you will be asked general questions regarding your and your child's information. The questionnaire in the second section will ask you about your perceptions of career education in elementary school. In the third section, you will be asked questions about the experience of using these computer activities. In the last section, please write down any of your thoughts about this project.

Please circle the box that best matches your information.

Part I

1. Your gender:
   ☐Male, ☐Female
2. Your age:
   ☐26-35 years, ☐36-45 years, ☐46-55 years, ☐56 or older
3. Your level of education:
   ☐ Elementary School ☐Middle School, ☐High School ☐Bachelor, ☐Master, ☐Doctor
4. What is the gender of your child?
   ☐Boy, ☐Girl
5. What level is your child in at a school?
   ☐Grade 4, ☐Grade 5, ☐Grade 6
6. Is your child currently attending or enrolled a career education program?
   ☐Yes, ☐No

Please circle the box corresponding to the extent you agree or disagree with each of the following questions.

Part II

1. I feel that career education is important.
   ☐Strongly agree, ☐Agree, ☐Neutral, ☐Disagree, ☐Strongly disagree
2. I feel that it is important to cultivate children's career awareness in elementary studies.
   ☐Strongly agree, ☐Agree, ☐Neutral, ☐Disagree, ☐Strongly disagree
3. Parents have great influence in children's career choice.
   ☐Strongly agree, ☐Agree, ☐Neutral, ☐Disagree, ☐Strongly disagree
4. I feel that my child lacks learning opportunities in early career development stages.
   ☐Strongly agree, ☐Agree, ☐Neutral, ☐Disagree, ☐Strongly disagree
5. I want my child receive more career guidance in the future.
   ☐Strongly agree, ☐Agree, ☐Neutral, ☐Disagree, ☐Strongly disagree

Part III

1. In your opinion, these activities help children develop career awareness.
   ☐Strongly agree, ☐Agree, ☐Neutral, ☐Disagree, ☐Strongly disagree
2. Activities help children achieve their career goals.
   ☐Strongly agree, ☐Agree, ☐Neutral, ☐Disagree, ☐Strongly disagree
3. I feel these activities are an effective way to motivate children to learn careers at early stages.
   ☐Strongly agree, ☐Agree, ☐Neutral, ☐Disagree, ☐Strongly disagree

4. Activities help children acquire necessary skills and knowledge needed in future jobs.
   ☐Strongly agree, ☐Agree, ☐Neutral, ☐Disagree, ☐Strongly disagree
5. Activities help children find out the interest towards their career path.
   ☐Strongly agree, ☐Agree, ☐Neutral, ☐Disagree, ☐Strongly disagree
6. Activities assist me to recognize my child's strength and preference in selecting a career.
   ☐Strongly agree, ☐Agree, ☐Neutral, ☐Disagree, ☐Strongly disagree
7. Activities help me to advise my children in future career decision making.
   ☐Strongly agree, ☐Agree, ☐Neutral, ☐Disagree, ☐Strongly disagree
8. The difficulty levels of these activities are suitable for children at this age.
   ☐Strongly agree, ☐Agree, ☐Neutral, ☐Disagree, ☐Strongly disagree
9. These activities provide sufficient opportunities for parental involvement.
   ☐Strongly agree, ☐Agree, ☐Neutral, ☐Disagree, ☐Strongly disagree
10. I feel these activities meet my expectations.
    ☐Strongly agree, ☐Agree, ☐Neutral, ☐Disagree, ☐Strongly disagree

Part IV

Please describe three things you think work best in using these computer activities to support elementary career education.

1. _____
2. _____
3. _____

How digital scaffolds in language video games affect motivation and learning

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Descriptors: digital scaffolds, educational video games

Abstract

The purpose of this study was to examine which type of scaffolds could be most effective for basic language learning. The Japanese language game *Kana Groove* was developed to help players learn the basic Japanese characters known as hiragana. Two versions of the game were created. One version contained more direct and comprehensive scaffolds (called "primary scaffolds" in the paper), and a second version contained relatively indirect and limited scaffolds (called "secondary scaffolds" in the paper). 47 undergraduates were randomly divided into two groups, with each group playing one version of the game. Quantitative and qualitative data were collected through pre- and post- motivational survey, pre- and post- knowledge tests and one open-ended question in the survey. Two-way ANOVA was employed to make comparison of the pre- and post- motivation and learning. The results showed that although the primary scaffolds and second scaffolds were not significantly different from each other in affecting learners' motivation and learning outcome, the group using secondary scaffolds had slightly higher motivational score and posttest score than the group using primary scaffolds, and the secondary scaffolds did a better job in helping learners to relate the content to their prior knowledge.

1. Introduction

Digital games could be used for instruction in schools since they promote student motivation (Gee, 2003; Prensky, 2001; Rieber, 1996). Most teachers think that games can motivate students to learn, and recognize that playing games can support the development of a variety of skills (Can & Cagiltay, 2006; Koh, Kin, Wadhwa & Lim, 2011; Sandford, Ulicsak, Facer, & Rudd, 2006; Wastiau, Kearney & den Berghe, 2009).

Multimedia with embedded scaffolds helps provide a more realistic learning environment which increases students' interest, shows students alternative perspectives, and makes knowledge more accessible for application (Brush & Saye, 2000; Saye & Brush, 1999). Although there is much research on the design and use of computer-based scaffolds in multimedia-supported learning environments (Azevedo & Hadwin, 2005; Brush & Saye, 2002; Quintana, Krajcik, & Soloway, 2002; Sharma & Hannafin, 2007; Simons & Klein, 2007; Yelland & Masters, 2007), there are few studies which address the application of digital scaffolds in educational digital games (Charsky & Ressler, 2011; Fisch, 2005; Sun, Wang, & Chan, 2011).

Charsky and Ressler (2011) and Sun et al. (2011) evaluated the strengths and weaknesses of providing scaffolds with respect to learners' motivation and performance when learners play educational video games. Charsky and Ressler (2011) argued that providing scaffolding too early and with too much detail could weaken "the curiosity and discovery inherent in play" and thus the "potential pedagogical power of playing the game" (p.613). This idea sparked our interest in comparing the effectiveness between more direct and comprehensive scaffolds and relatively indirect and limited scaffolds on learners' motivation and learning outcomes. Additionally, in the two existing studies, the participants had different levels of prior knowledge of the topics, which could affect the effects of the scaffolds. In our study, we used domain novice participants, which could help control this factor. Furthermore, our game was designed to teach basic Japanese characters. Digital game-based learning (DGBL) is applied most widely in language and math education (Razak et al. 2012; Wastiau et al. 2009) but there is little research on the use of video games in language acquisition. Through our study, we hope to find out which type of scaffolds could be most effective for basic language learning. The study will have implications for the design of digital scaffolds in educational video games. Our research question is:

With digital game-based learning, how do learning outcomes and motivation compare between learners who play an educational video game with more direct and comprehensive scaffolds and those who play the game with relatively indirect and limited scaffolds?

2. Literature review

2.1 Computer-based scaffolds

Vygotsky (1962) identified the zone of proximal development as the gap between a child's actual developmental level and the potential developmental level achievable with adult guidance or collaboration with more advanced peers. Based on Vygotsky's theory, Wood, Bruner and Ross (1976) developed the concept of scaffolding and defined it as support from teachers, peers, or other resources which enables students to complete tasks that they cannot perform by themselves. According to Schnotz and Heiß (2009), scaffolds do not directly improve learning, but rather "they trigger learning-relevant cognitive activities, which finally result in higher learning under specific conditions" (p.372). Therefore, scaffolds should lead learners to find the correct answers rather than simply revealing them (Quintana, Krajcik, & Soloway, 2002; Fisch, 2005).

"Soft scaffolding" is characterized by an analysis of learners at the time of instruction that helps instructors decide how to provide personalized support (Brush & Saye, 2002, p.2). However, there are challenges in developing dynamic computer-based scaffolds that continuously adjust themselves to students' learning. Therefore, in most situations, computer-based scaffolds are "hard scaffolds"–"static supports that can be anticipated and planned in advance based upon typical student difficulties with a task" (Brush & Saye, 2002, p.1). Due to their inflexibility, computer-based scaffolds may be more suitable for older learners (Wood et al., 1976).

Computer-based scaffolds have been integrated into learning software, simulations, and games, and studies have shown that some digital scaffolds can raise students' engagement with the topic and promote better performance in specific tasks (Brush & Saye, 2002; Jackson, Stratford, Krajcik, & Soloway, 1996; Simons & Klein, 2007; Yelland & Masters, 2007).

2.2 The effects of in-game scaffolds on learners' motivation and learning outcome

There is very limited research on how in-game scaffolds affect players' motivation and learning. The study by Charsky and Ressler (2011) indicated that students' motivation may be weakened by in-game scaffolds which provide too much detail and are presented too early. With concept maps as scaffolds, they used the commercial-off-the-shelf game *Civilization* to teach students global history. One group used a researcher-generated concept map, the second group used a concept map generated by themselves, and the control group did not use any concept map. The two treatment groups used concepts maps from the beginning. It turned out that the control group using no scaffolds had higher motivation playing the game than they did in conventional class while the other two groups displayed lower motivation than in conventional class. Sun et al. (2011) studied three kinds of scaffolds in a computer game named *Professor Sudoku*: critical features which give visual hints, frustration control which provides strategy hints, and demonstration which provides direct guidance. They compared three groups of participants: two groups using versions of the game with scaffolding and one group using a version without scaffolding. They found that the scaffolds improved players' gaming performances and decreased their frustration, but increased their reliance on scaffolds and reduced their independent thinking. The two studies suggest that whether scaffolds make learning engaging and effective depends on how they are used, and that scaffolds have both positive and negative effects.

2.3 Design of scaffolds in games

In the earliest study on scaffolding, the scaffolding tutor's responsibilities include recruitment, reduction in degrees of freedom, direction maintenance, marking critical features, frustration control, and demonstration (Wood et al., 1976). Sun et al. (2011) found that the demonstration scaffolds which suggested solutions helped players infer game rules and improve their problem-solving ability. In self-directed hypermedia learning environment, learners generally prefer scaffolds presented as an option. Learners with low prior knowledge also have better performance when scaffolds are presented as optional rather than obligatory. Scaffolds in an optional mode could help designers avoid providing too much or too little scaffolding, and could let learners decide how much to use them (Schnotz & Heiß, 2009). Consistent with that idea, Charsky and Ressler (2011) argue that "a scaffold, properly used, should allow students more rather than fewer choices and reduce rather than add to task and informational overload" (p. 614). In our game, we presented the scaffolds as options to enable learners to decide on the scaffolds they wanted to

use, but both versions of the game kept a record of which scaffolds they used. Furthermore, Quintana et al. (2002) summarized four guidelines for designing scaffolding for learner-centered software environments: scaffolds should be seen easily; they must be used; multiple scaffolds appear together; and they are usable but do not make the tasks too easy. We referred to these guidelines while designing the game and the scaffolds.

3. Material and methods

This study used the combination of quantitative instruments and open-ended questions to collect data. The quantitative instruments allowed the researchers to compare the effects of the two levels of scaffolds on the students' learning outcomes and motivation for learning Japanese characters. The questions helped the researchers explore the cause of the scaffolds' effects.

3.1 Material

3.1.1 Game

One researcher developed the Japanese language game *Kana Groove* to help players learn the basic Japanese characters known as hiragana. *Kana Groove* is a card game using a deck of cards with hiragana characters. The goal of the game was to make different kinds of matches by choosing three cards from a selection of cards on the table.

Two versions of the game were created. One version contained more direct and comprehensive scaffolds (the scaffolds were called "Helpers" in the game): Romaji on Cards, Hover Hints, and a Recommend Match button. Romaji on Cards showed the English letters underneath each character so that learners could make matches based on them. When the Hover Hints option was enabled, the English letters for a character appeared when the player moved the mouse over the character. The Recommend Match button highlighted the three cards on the table which made the best match.

A second version of the game contained relatively indirect and limited scaffolds: Color Hints, a Hiragana Table button, and a Recommended Match button (the same as in the other version). Color Hints function marked cards which had the same vowel sound with the same color. The Hiragana Table button allowed learners to view the Hiragana Table screen showing each character and its English representation.

Romaji on Cards

Color Hints

Hiragana Table

	A	I	U	E	O
-	あ a	い i	う u	え e	お o
K	か ka	き ki	く ku	け ke	こ ko
S	さ sa	し shi	す su	せ se	そ so
T	た ta	ち chi	つ tsu	て te	と to
N	な na	に ni	ぬ nu	ね ne	の no
H	は ha	ひ hi	ふ hu	へ he	ほ ho
M	ま ma	み mi	む mu	め me	も mo
Y	や ya		ゆ yu		よ yo
R	ら ra	り ri	る ru	れ re	ろ ro
W	わ wa				を wo
	ん n				

Hiragana Table

Only Hiragana Table enabled

3.1.2 Measures

The motivational measure used in this study was adapted from John Keller's Instructional Materials Motivation Scale (IMMS) (Keller, 2010). Keller based the survey on the ARCS model of motivation: Attention, Relevance, Confidence, and Satisfaction. The IMMS has four subscales corresponding to each component of the ARCS model.

The IMMS has thirty-six items which address the four components of the ARCS model. For our study, the original IMMS was shortened to contain eight items, with 2 items for each ARCS component. The items were reworded to fit our study materials.

3.2 Participants

The participants were 47 undergraduates majoring in education who were attending a university located in the midwest of the United States, with 32 females and 15 males. They were randomly divided into two groups, with 24 participants playing the game with one level of scaffolds and 23 participants playing the game with the other level of scaffolds. They were not informed that there were two versions of the game, though some of them noticed that other participants were playing a different version.

3.3 Procedures

After the participants were told that they were going to play a Japanese language learning game, they filled in a pretest on their prior knowledge of Japanese and a pre-survey on their motivation to play this game. The pretest showed that only one of them had any prior knowledge of Japanese—later we excluded this participant in our data analysis. After the pretest and pre-survey were collected, one researcher gave a tutorial on how to play the game in the front of the computer lab. Participants were asked to create an individual profile using a three-digit number on their pretest and pre-survey, and log in the game with that profile. Participants were shown where the scaffolding options could be found, but not shown the options directly so as not to reveal that there were two different versions of the game. After that, the participants were asked to play the game for forty minutes. The researcher who gave the tutorial began to play the game as well (with all the scaffolds disabled) which was projected on the big screen. As

the participants began to play the game, the other researcher walked around the lab and found some participants who did not know where the scaffolds were and how they functioned, and then came over to help them. When the students had played the game for twenty minutes, the researcher suggested that students might disable one of the scaffolds or switch to the intermediate difficulty mode, but this was presented only as an option. After the students played the game for forty minutes, they were asked to fill out a post-survey on their motivation for playing this game and a posttest on their knowledge of Japanese.

4. Results

4.1 Quantitative results

Two-way ANOVA, with Time (pre and post) and Scaffold (Limited and Full) as factors, was employed on the overall IMMS scores and knowledge test scores prior to and after playing the game in order to make comparison of the pre- and post- motivation and learning. The t-tests indicated no significant pre-existing differences between the two groups with respect to their motivation to play this game and their prior knowledge of Japanese.

4.1.1 Motivation

Both groups' motivation decreased after playing the game. There were no significant differences between the two groups in their post-motivation, with the group using limited scaffold having slightly higher motivation than the group using comprehensive scaffold. Additionally, the group using limited scaffolds considered the game more relevant to them than the group using comprehensive scaffolds.

4.1.2 Learning outcome

Both groups' knowledge test scores significantly increased from pre- to post-test, with $F(1, 91) = 4.21$, $p < 0.05$. However, there were no significant differences between the two groups in their post- knowledge test scores, with the group using limited scaffolds having a slightly higher mean score than the group using comprehensive scaffolds.

4.2 Qualitative results

Comments to open-ended question: no prior knowledge of Japanese was a big barrier to learning; students depended on the scaffolds to win rather than learn; the scaffolds were helpful.

5. Discussion

Our results suggested that full scaffolds and limited scaffolds in the educational game were not significantly different from each other in affecting learners' motivation and learning outcomes. Although the participants learned something through playing the game, their gain was limited due to their lack of prior knowledge.

The results also showed that the two types of scaffolds were not significantly different from each other in affecting three subscales of motivation (attention, confidence, and satisfaction) but they were marginally different in affecting the subscale of relevance. The group using limited scaffolds considered the game more relevant to them than the group using full scaffolds. The Hiragana Table option in the game version with limited scaffolds might account for that. The table gave an overview of the characters. As one student mentioned in response to an open-ended question: "The helpers options helped me tremendously, especially the table of characters."

The participants relied heavily on the scaffolds and their motivation decreased after they finished playing the game. To a large extent lack of prior knowledge of the Japanese characters accounted for this. Huang, Huang and Tschopp (2010) investigated the relationship among the four subscales of Keller's ARCS model in DGBL. They perceived attention, relevance and confidence as motivational factors, and satisfaction as the result of the learning and performance outcomes which sustain learners' motivation for the game. They indicated that relevance strongly and directly affects satisfaction while attention and confidence only have a weak influence. The study by Sun et al. (2011) study suggested that learners rely heavily on assistance when they are learning something new, and tend to use scaffolds as learning tools like dictionaries or calculators in tests rather than controlling their use of the scaffolds and enjoying the fun of exploring the game. One participant in our study wrote: "The game was fun but I think it would be helpful to get familiar with the letters first because for the most part I was either confused or I was guessing." Another participant wrote: "I still do not completely understand all of the matches, which confuses me

while playing." In our experiment, one participant had learned Japanese for two years long before playing the game and the scaffolds helped him refresh his knowledge. His motivational score increased from 3.625 prior to playing the game to 4 after he played the game. This makes us consider that scaffolds might be effective in increasing learners' motivation for learning a language if learners already have a certain amount of prior knowledge. Kiili (2005) points out that the challenges in a game should match the player's skills. If the level of challenge fits the player's skill level, the player is more likely to be engaged with the game, and guidance and support provided to the player can also help increase the player's interest.

The system tracking the scaffolds that the participants used in each round showed that the participants depended heavily on the scaffolds and only a minority of them tried to use the scaffolds to learn. For the group using limited scaffolds, the majority of the participants turned on all three scaffolds throughout the playing time. Only a few participants tried turning off scaffolds in some rounds, but later most of them turned the scaffolds back on again. For the group using full scaffolds, some participants turned on the more direct scaffolding technique "Romaji on Cards" all the time, while other participants switched from "Romaji on Cards" to "Hover Hints", which indicates that these participants tried to learn something by depending on their memory. As mentioned by one participant: "The helpers became a crutch for me. When I turned off full Romaji, I used the hovers to get consonant matches."

Although the participants' post-test scores increased significantly, some participants expressed the view that they did not really learn anything. A participant whose post-test score was above the average said: "The helpers allowed me to play the game without worrying about what the symbols looked like. It didn't force me to learn." A participant with a low posttest score wrote: "Really enjoyed the game! Good concept. I felt like I was only reading the helps and not actually learning anything about the language." Another participant said: "The scaffolding is good but doesn't seem to help the players really learn the material." Therefore, the participants might have simply depended on their short-term memory to get some answers correct on the posttest. Additionally, the participants' learning outcomes were not in proportion with the percentage of rounds they won relative to the number of rounds they played. Some participants won many rounds but had a low post-test score. As one participant commented: "As a player I was more worried about my score than learning the symbols." However, some participants won few rounds but achieved a good post-test score. This pattern is consistent with Schnotz and Heiß's (2009) idea that besides learners' prior knowledge, the effectiveness of scaffolds is influenced by individual preferences or learning strategies and the way those scaffolds are delivered.

6. Conclusion

Our findings suggest that digital scaffolds in games are helpful to learners, but for language acquisition scaffolds would work much better when learners have some prior knowledge of the language.

The limitation of the study lies in the design of the two types of scaffolds. When designing the scaffolds, we considered providing both groups with adequate scaffolds since learners had no prior knowledge. Although they represented different scaffolding techniques, they basically provided learners the same amount of information, which led to no significantly different effects. In our future work, if we plan to continue to use this language acquisition game, we need to revise the design of the scaffolds according to the scaffolding techniques for language learning, and recruit participants with a certain amount of prior knowledge.

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Social Media Networks in the Workplace

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Introduction

The technological networked environment in developed nations allows for access to information and people in ways previously unknown to mankind. We live in what has been dubbed the social era (Merchant, 2012). Just as the industrial revolution enabled us to view work in new ways, the social media revolution allows us to change how we interact to accomplish workplace goals.

In the industrial revolution, humans became more productive through the use of machines in the workplace. Today, social media has almost become the *deus ex machina* that can help companies be more productive and advance their collective knowledge base by leveraging this powerful tool set in appropriate ways.

The very meaning of the word corporation, from the Latin *corpus*, implies that working together is more effective than working alone. Social media helps people to interact with each other in new and unique ways. Horton recognizes this in *E-Learning by Design* as he states: "learning is not just putting information into the brain for later recall, but adding capabilities made possible through social interaction" (2011). Being competitive in today's marketplace requires companies to produce creative products and solve problems that may not be well defined. Lou, Amabri, & d'Appollonia (2001) found that collaboration helps meet these challenges. This research team concluded that a group is more effective at problem solving than an individual because a group can better interpret a problem and correct misconceptions, form a holistic view of the problem, and compare alternative solutions. Clark and Mayer (2011) expound upon this idea as they propose that virtual collaboration is even more effective than face-to-face interaction for group problem solving. Virtual collaboration enables better results because it allows a broader range of idea sharing and greater reflection (Clark & Mayer, 2011).

It is the sharing of ideas and reflection that is relevant to continuous learning in the workplace. David Kolb's (1984) experiential learning theory posits that knowledge is gained in cycles. These cycles involve concrete experience, reflective observation, abstract conceptualization, and active experimentation. As each cycle is completed, the learner's knowledge continuously builds upon itself. Social media can be leveraged to shorten this knowledge cycle (Silvers 2012). Shortening the knowledge cycle saves time, and it is the combination of improved results and time saving that has a positive impact on an organization's ROI.

Social Media Knowledge Characterization

Both organizational and individual employee learning are not only important, but essential to the success of an organization (Clifford & Thorpe, 2007). Learning and development professionals must understand the relationship between social media learning strategies and the learning that takes place within an organization. Specifically they need to know what impact social media networks can have on an organization's ability to increase

its knowledge base. Mallon proposes that the knowledge shared in social media networks is informal, that it occurs in an ad-hoc, unplanned way as opposed to occurring as the result of a prescribed training program with specific objectives (2012). Kim and Benbassat (2012) support this popular view with research. They have examined the placement of social media networks in a Knowledge-Based View (KBV) framework. KBV aligns with the Kolb model and with Silver's suggestion that learning occurs in cycles that amplify the knowledge gained. Kim and Benbassat (2012) also assert that "for successful Knowledge Management (KM), an organization needs to encourage its employees to share their knowledge through two complementary modes of organizational learning: knowledge exploration and exploitation" (p. 3848). Knowledge exploitation helps workers perform current tasks more efficiently and effectively. Knowledge exploration aids workers in adapting to new tasks and situations. While exploitation will sustain the status quo, exploration will prepare a workforce to meet challenges of a constantly fluid world environment (Kim & Benbasset, 2012).

Kim and Benbassat (2012) suggest that social media networks are part of a larger framework of social media learning strategies that support knowledge management. Table 1 below summarizes their representation of how knowledge is characterized, or embedded, within organizations based on the knowledge type and source. Table 1 shows that corporate social media networks are both internal (they are contained within the organization), and informal.

Classification	Formally Externalized Embeddedness	Formally Internalized Embeddedness	Informally Externalized Embeddedness	Informally Internalized Embeddedness
Scope of Sources	External Knowledge Sources	Internal Knowledge Sources	External Knowledge Sources	Internal Knowledge Sources
Ties to Sources	Formal Social Media	Formal Social Media	Informal Social Media	Informal Social Media
Knowledge Seeking Approach	One-Way Need-to-Know Approach beyond Organizational Boundaries	One-Way Need-to-Know Approach within Organizational Boundaries	Two-Way Need-to-Share Approach beyond Organizational Boundaries	Two-Way Need-to-Share Approach within Organizational Boundaries
Personal Goal of Embeddedness	Utilitarian Value by Leaning from External Experts	Utilitarian Value by Learning from Internal Experts	Hedonic Value through Friendship/Sharing Interest	Hedonic Value through Organizational Membership
Feature of Contents	Structured Contents	Structured Contents	Unstructured Contents	Unstructured Contents
Networking Technologies	Public Internet-Based Services	Corporate Participatory KM Systems/Technologies	Public Social Networking Services	Enterprise 2.0 with EMB Platforms/ECM Systems
Examples	Public Portal Sites, Public Weblogs, and Web Sites for Collective Intelligence, such as Google, Yahoo!, Wikipedia, and Others	Intranet-Based Information Systems, such as Corporate Wikis, Corporate Blogs, Knowledge Bases, Groupware, and Others	Public Social Networking Sites and Public Micro-Blogs, such as Twitter, Facebook, Google+, LinkedIn, and Others	Corporate Social Networking Sites and Corporate Micro-Blogs, such as MOSS, Yammer, Socialtext, CubeTree, and Others

Table 1. Summary of individual embeddedness in knowledge networks (Kim & Benbasset, 2012).

Kim and Benbassat (2012) also relate the knowledge embeddedness to tasks, situations, exploration and exploitation. Social media networking promotes both knowledge exploration and exploitation in the KM model, as shown in Figure 1. Internal social media networks promote knowledge exploitation.

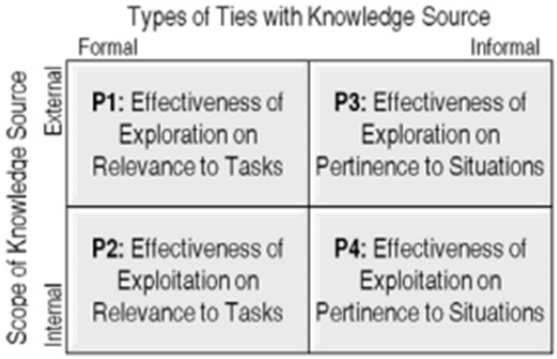

Figure 1. A contingency framework of individual embeddedness in knowledge networks (Kim & Benbasset, 2012).

This classification can be compared to Rosenburg's (2012) descriptors of tacit and explicit knowledge. Rosenburg states that explicit knowledge, such as the type of knowledge that could appear on a website, can be codified. Tacit knowledge, which, according to Rosenburg, is more prevalent and valuable than explicit knowledge to an organization, but more difficult to identify and manage. (2012). We can infer that this is the type of knowledge that is traditionally shared in "water cooler" conversations, and one type of knowledge that internal social media networks hope to capture. We could also propose that undiscovered knowledge, described by Rosenburg (2012) as "the greatest challenge to any business"(p. 159) could also be uncovered via social media.

As discussed, social media networks are internally embedded and by nature informal. Little empirical research exists regarding the impact of social media networks on an organization. However, as we consider their implementation, we can look to current practices and to research that examines the implementation of corporate intranets, which according to Kim and Benbassat's Table 1 (2012), have formally internalized knowledge embeddedness.

A Comparison: Social Media Networks and Intranets

Upon closer examination of intranets, we can infer that they actually can either have formally or informally internalized knowledge embeddedness. By examining the research regarding how communication occurs in corporate intranets, we can logically hypothesize that when collaborative sharing of information occurs, which is a benefit of virtual collaboration, the knowledge embeddedness is informal. In contrast, corporate environments that have closed communication via intranets have formal knowledge embeddedness. Baptista and Galliers (2012) conducted a study in which they compared data from eight corporations and sorted the corporations into two categories according to the type of social communication they allowed in their intranet environments – either closed (formal) or open (informal). This team of researchers found that five of these companies used corporate intranets to promote corporate rhetoric in a closed and controlled way to promote the ideas and priorities of senior management. However, three of the companies adopted a more open or informal approach to communication. These three companies allowed interactive participation in blogs, and users could post anonymously. While the risk for this type of strategy is greater, it facilitates corporate continuous learning because "adopting a more relaxed stance towards open communications enabled free participation from employees fostering internal sharing of ideas and information" (Baptista & Galliers, 2012).

Shared Knowledge and Organizational Effectiveness

Baptista and Galliers (2012) also assert that the use of social media, including social media networks, that includes open communication requires internal ambidexterity – the ability to allow open communication and manage the risks naturally associated with less control. The use of social media networks for learning can create the potential for a shift in power within an organization. In a knowledge-based economy, this shift could have long-term consequences. It is essentially a "paradigm shift … in epistemic emphasis from the individual to the collective in that it changes the constitution of 'knowers' and what it means to 'know'" (Eijkman, 2011).

If an organization does allow both closed and open communication, it can achieve ambidexterity. Although this approach has risks, internal ambidexterity is necessary for a learning organization to be successful (DuFour, DuFour, Eaker & Many, 2006). Ineffective organizations could not operate with two seemingly contradictory forces at the same time. A visionary company, however, does not seek balance, but seeks to be both extremes at the same time (Collins and Porras,1997).

Traditionally, learning and development professionals within corporations may have been impeded by the closed approach to internal communications. However, social media networks can facilitate the openness required for idea sharing. Social media networks have the potential to help a corporation increase learning, knowledge sharing, and ideally, effectiveness.

Telus Corporation, a company with over 12 million customers in Canada, has embraced this open sharing philosophy with great success. As CEO Darren Entwistle touts, "social media has complete irreverence for the management hierarchy. As great as a culture may be, there are always filter brushes in the management hierarchy that sanitize raw data before it reaches the ears of leaders. Real time, unfiltered data has tremendous value" (Bingham & Galagan, 2012). Entwistle goes on to describe how social media supports continuous learning and overcomes geographic and organizational barriers so that the company's "intellectual property, peer-to-peer learning, skills, experience, and creativity flow across the organization at speeds that ignore time and distance and organizational boundaries" (Bingham & Galagan, 2012).

Considerations for Social Media Network Implementation

Social media networks can be beneficial to organizations because of the open communication they foster. As they are implemented, some specific factors must be taken into account. These factors include trust, knowledge identification, implementation strategies, learner characteristics, platform specifications, and security.

Trust

One of the key factors required for successful implementation of a social media network is trust. This requires trust on the part of both the organization and the employees. Trust can be defined as the "willingness of a party to be vulnerable to the actions of another party, based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability of the trustor to monitor or control the other party." (Sarker, Ahuja, Sarker & Kirkeby, 2011).

Since social software "changes the role of knowledge management from 'command and control' to 'facilitate and aggregate' (Cook, 2012), management must trust employees to engage in open and constructive communications. When open online communication becomes the norm, employees expect senior managers to use these channels to interact effectively within the organization (Baptista & Galliers, 2012).

Some organizations have fostered open communication by holding online forums about particular strategies, products or policies. Managers are often tasked with hosting the forums, responding to comments, and providing answers when appropriate. Question and answer sessions and online chats that are moderated by senior managers can also promote constructive dialogue (Baptista & Galliers, 2012). Telus Corporation promotes this type of trusted communication through its "Fair Process"--a learning organization tool that involves engagement, exploration and explanation. This innovative company even uses social media to streamline the process, which positively impacts engagement. (Bingham & Galagan, 2012).

As can be noted from the Telus example, when managers engage in open communication, their communication and trust centrality increases. Sarker, et al. point out that trust and communication interconnect to impact performance of virtual teams. It is important that a team member is perceived as both trustworthy and communicative to also be perceived as high performing (2011). Since managers often lead virtual teams, their open communication could also impact their perceived performance by the organization as a whole.

Just as managers must become vulnerable in an open communication setting, so must employees. Employees may be fearful of repercussions for open communication. (Baptista & Galliers, 2012). Baptista and Galliers stated that some organizations allow anonymous participation in some forums (2012). While this may contribute to greater participation, it would not increase an employee's trust factor or willingness to communicate openly. However, actual use of social media by employees has been shown to increase trust in the workplace as it affects both implicit and explicit knowledge transfer that are related to task performance. (Cao, Vogel, Guo, Liu, and Gu, 2012). In addition, these researchers found that trust was a mediating factor in knowledge transfer. This coincides with the research of Sarker et al., who also found that trust was a mediator in the relationship between social media and task performance (2012).

Knowledge Identification

In order for knowledge to be harnessed and shared, it must be identified. Through identification, tacit knowledge becomes explicit knowledge, and undiscovered knowledge becomes known (Rosenburg, 2012). Thus, an important goal of social media network implementation is knowledge identification. This is alos related to ambidexterity because knowledge may be identified in all areas of a corporate entity.

Electronic Arts is one company that has used a SharePoint-based social media network to facilitate knowledge identification. Their network facilitates access to corporate experts and features self-identification according to skill. This company also uses their social media network for new hire assimilation and best practice dissemination. (Microsoft, 2009)

Skillsoft's Pam Boiros also promotes using social media networks as a vehicle for expert identification (2011). Boiros emphasizes using a social media network to highlight important knowledge within an organization's monolithic knowledge base. The ability to "like" certain assets can help pinpoint relevant knowledge, and the ability to comment on knowledge sources can amplify relevant knowledge as well (Boiros, 2011).

Antin and Churchill (2012) point out that badging can be used to identify experts and assess an online community member's reputation:

> "Badges provide information on the basis of which reputation assessments can be made. Badges are a valuable encapsulation of a user's interests, expertise and past interactions, and can thus substitute for direct experience [7]. Badges assist reputation assessments at several levels. At a general level, examining another user's badges can provide a summary of interests and engagement levels, for example by indicating whether a user is a casual or fanatical community member. Like Boy Scout merit badges, in social media contexts badges can also provide information about a user's skill-set and expertise. By providing an encapsulated assessment of engagement, experience, and expertise, badges can be an invaluable tool for determining the trustworthiness of other people or the reliability of content" (Antin & Churchill, 2012).

Social learning analytics can also be used to capitalize upon knowledge identification. This specialized type of analytics has positive implications for corporate continuous learning as it "makes use of data generated by learners' online activity in order to identify behaviors and patterns within the learning environment that signify effective process. The intention is to make these visible to learners, to learning groups and to teachers, together with recommendations that spark and support learning" (Shum & Ferguson, 2012). Shum and Ferguson characterize engagement as either indirect, through the use of badges and ratings, or direct through dialogue. They also make a distinction between social media and social media for learning, as noted in the Figure 2 below.

Figure 2. Dimensions of the social learning design space. (Shum & Ferguson, 2012).

It is this new social learning design space that can contribute to corporate continuous learning as organizations employ internal social media networks. As social learning analytics are employed, and the way that learners interact and construct knowledge is captured, the organization as a whole may benefit.

Planned and Emergent Implementation

Since organizational ambidexterity implies that an organization be "loose and tight at the same time" (Le Four et al., 2009), the implementation of a social media network for learning should be planned, but should also allow for emergence. A social media network is only as effective as the participation in it (Riordan, 2012). Boiros described effective social media implementation as consisting of three elements: a technology platform, a vibrant community, and great content.

We have seen that companies push content in formal social media contexts (Sarker, Ahuja, Sarker & Kirkeby 2011). In informal contexts, content can still be highlighted, but with a more fluid presentation. An organization can decide what knowledge is important and begin the conversation at that point. For example, one way Electronic Arts uses social media networking is for best practice dissemination (Microsoft, 2009). Once the content of best practices has been identified, the conversation around the best practices can emerge. One of the stakeholders in Saker et al.'s research described this type of implementation dichotomy:

> "On O2 one of the stakeholders explained the purpose of a section of the intranet called "Your Views" and how senior management had a much more relaxed approach to enforcing points of view. O2: "Your Views" is an online forum. It features a new topic every week related to [name of company] strategy, product or policy. A specific manager sponsors it. Sometimes this manager comes back and challenges or provides answers" (2012).

Social networking implementation can help pre- and post formal training conversations emerge and continue. They can be used as a forum for posting class agendas and objectives in a pre-training situations. They can also support reflection on learning that has taken place (Clark and Mayer, 2012). Of course, specific content would be provided in these types of situations, but once again the conversation would emerge surrounding the content.

The breadth and depth of content should also be considered. Horton (2011) emphasizes the importance of choosing when to implement social media as a learning tool. Its implementation can make learning more enjoyable and may help in teaching difficult subjects, but it may not be the best choice for all objectives. Social learning does not help learners learn large amounts of information. In addition, in order to effectively interact with identified experts, learners must have a basic knowledge of the expert's field, including the vocabulary and structure of the field (Horton, 2011).

Learning organizations may seek guidance and expertise from marketing departments as they implement social media networks for corporate continuous learning. The end-user is in essence a customer. When the user interacts with the social media network, he or she is looking for a benefit. Porter, Donthu, MacElroy and Wydra (2012) identified the following needs that participants of virtual communities sought to fulfill by their involvement. These included information; relationship-building; social identity and self expression; helping others; enjoyment; belongingness; and, status or influence. In addition, the ability to create content also fosters social media network adoption by end users, as mentioned in a three-stage process for promoting involvement in virtual communities that was supported by data these researchers collected over several years. Stage 1 of this framework involves understanding consumer needs and motivations. Stage 2 involves promoting participation in the community through content creation, cultivating connections and creating enjoyable experiences. Stage 3 focuses on motivating cooperation by mobilizing member-leaders, inspiring ideas and polling panels (Porter, Donthu, MacElroy and Wydra, 2012).

Audience Characteristics

Particular audience characteristics may also be considered as a social network is implemented. Large corporations should consider and plan for the characteristics of adult and culturally diverse learners. Social networks should appeal to some characteristics of adult learners. Adults do like to be involved in the decision-making process and prefer facilitation (which informal social media supports) (Salker et al. 2012), over authoritarian styles of communication (Morrison et al., 2010). Adult learners should appreciate the time saving that a social media network will allow, and since they expect material to be relevant (Morrison et al., 2010) they should appreciate features such as badging and other information highlighting tools that will make relevant content apparent. However, while some adult learners may prefer to cooperate in groups and socialize together, adults are also less

flexible than younger learners (Morrison et al., 2010). Boiros (2011) suggested that one way to compensate for this was to encourage reverse mentoring to help older learners adapt to new tools.

Social media networks are an appropriate choice for communication with culturally diverse learners. They can be used in virtual collaboration and to build virtual teams. They promote joint productive activity in which the teacher (i.e., expert) and students (i.e., novices) work closely together to accomplish joint projects. This is appealing to culturally diverse learners (Morrison et al., 2010). A social media network can also be an effective tool for teaching difficult subjects (Horton, 2012).

Platform Specifications

In addition to the content and learner characteristics, one must also consider the platform for a social media network. Boiros (2011) asserts that the technology should be easy to use, and should mimic current popular social networking tools, such as Facebook. The platform should also be easy for a user to set up in order for it to be adopted quickly.

The ease of use and similarity to popular social media networks is seen in the various platforms available today. SkillSoft has its own proprietary platform with features similar to Facebook. (Boiros, 2011). Phizer has even dubbed its internal social media network "Pfacebook." NASA has "Spacebook" (Chomik, 2011), and Electronic Arts and other companies use customized versions of SharePoint that are similar to Facebook in look and feel (Microsoft, 2009). Yammer is another popular social media platform used by many companies, including Pitney-Bowes.

Security

The balance of planned and emergent implementation is also important because it can allow for knowledge sharing without losing sight of an organization's mission. This leads to another factor to consider when attempting to achieve ambidexterity through social media--security. One reason NASA created an internal social media network was to safeguard data, because cyber-terrorism is considered one of the greatest threats to national security (Chomick, 2011). When knowledge is shared informally and internally, is the risk of that knowledge being accessed illigitimately greater? What guidelines can be put in place for secure information sharing while maintaining an atmosphere of fluidity? These are questions for further research.

Summary

In summary, Chomick (2012) cites an article produced in McKinsey Quarterly by leading management consultancy firm McKinsey & Company, Eric Lui, Andy Miller, and Roger P. Roberts (2009) that identified six factors for successful adoption of Web 2.0 technology in large organizations:

- bottom-up "grassroots" use of the technology (with "champions" of the technology at the top of the organizational hierarchy)
- acceptance of natural use in these technologies (that is, letting users define what works and what doesn't)
- these tools must be in the business workflow; participation must be made mandatory so as to reduce duplicating work
- appeal to the participants needs; reward and recognize contributors for their content
- target heavy users for pushing the technology; certain users need to serve as
- motivation for others to participate
- balance risk and freedom; organizations need to find a balance between risk management over the content posted and the ability for users to post without fear of reprisal

Conclusion

In conclusion, we have seen that social media network implementation in an organization can create new opportunities for learning and employee engagement. Although this type of endeavor can be risky, the rewards (knowledge sharing, learning, productivity, etc.) have the potential to outweigh the risks, and the cost of ignoring this valuable tool could be significant.

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Video Games as Social Tools for Teaching and Learning

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Abstract

In social, action and adventure computer games, images and action tend to be more important than words. This shift increases the development of representational skills from the verbal to iconic, with players now manipulating images to create action in the game mechanics and conventions to achieve specific goals. In this manner, players develop the spatial awareness and the cognitive skills which are crucial to many computer applications and real world scenarios. As Delvin (2011) stated, "for over 2000 years, the only way to provide mathematics education to everyone was through the written words-textbooks" (p. 2). E-learning has taken the place of the written word. While reading is one of the components of multimodalities of learning, video games foster strategic thinking, multitasking, trial and error, and social competence-valued skills in the workforce. With innovation in social media and research into video games, educators are ready for innovative practices.

Introduction

Learners growing up with social media and mobile technology (digital natives) are far more experienced and able to process information rapidly than were their predecessors (digital immigrants). Turkle (2005) emphasizes the tenacious nature of attitudes about electronic social media and cyber tools, when she stated "parents want their children to have every advantage, but this new expertise estranges them. It (technology) seems to threaten a new kind of generation gap that feels deep and difficult to bridge" (p. 66). Teachers can increase their additional pedagogical options by looking at the modeling of actions and strategies within games as well as the types of learning required for students in this new era of experiential trial and error learning. What delineates the difference between traditional learning and video games is the instant feedback and trial and error concept found in video games allows students to stay focused, bolstering participation. Furthermore, what compels people to play video games is that video games can be used differently by different people who may have multiples ways of approaching to problem-solving. According to online (Game Developer Conference , 2012) social games such *Bejeweled Blitz* for "Smartphone and tablet platforms, including the iPhones, iPad, and Android OS phones, customize the abundances of new apps of similar to new handheld devices" provide an insight on the significance use of mobile apps with ease of access to meet the needs of younger generation. According to Georgoulis (2011) Social gaming genres such *Virtual Village*, *Green Patch*, *Farm Town*, *FarmVille*, *Petsociety*, *Yoville*, *Cityville*, " operate on the ideas of creating a presence in a defined area, managing resources, completing tasks, oversee the development of city as a mayor, and social networking" (pp. 53-56) which create generation of experiential learner rather than learning the theoretical concept and memorization.

Clearly, videogames can provide "communities of practice" where groups of people share expertise and passion within socially constructed learning (Lave & Wenger, 1991). Game players, as a community, interact with

each other and improve their abilities through collaboration and teamwork. In the meanwhile the balance between traditional learning activities and video games differ in terms of grading and feedback. As Sheldon (2012) stated "mistakes are most often punished, and busy teachers do not always have time to mark the correct answer on an exam or paper" (p. xv). How can video games support meaningful learning and bridge the gap between teachers and students?

Situated Learning and Instant Feedback

Commercial-Off-The-Shelf (COTS), social video games, smart phones, and mobile apps may hold the secret to real instruction for younger generation when content is naturally embedded in the COTS games, literacy practice occurs as a leisure activity through instant feedback and social networking. Video games must be carefully selected prior to integration. According to Ziaeehezarjeribi, Graves, and Gentry (2010), seven critical conditions for integrating games into learning environments must first be examined,

1. Opportunities for Applicable Learning
2. Full Participation
3. Multiple Avenues for Learning
4. Compelling Story Line
5. Propel Students Toward Inquiry and Discovery
6. Provide Appropriate Levels of Challenge
7. Support Student's General Learning

Similarly, Gee (2007) emphasizes that " Good video games don't just support situated meanings for the written materials associated with them in manual and on fan websites...The meaning of such language is always associated with actions, experiences, images, and dialogue" (p. 116). While experiencing the defiant challenges of the baby-boomer's traditional methods of teaching, COTS games will bridge "generation gap" which is challenging to "gauge literacy" success in traditional learning linked into video games. Teachers and researcher alike to further investigate what works and establish a foundation to improve the way students engaged in a trajectory form of learning. while, talking or texting with mobile phones, virtual spaces in a traditional learning environment are still seen as a form of leisure and not meaningful learning to support learning in the classroom. We predict, as paradigms on learning spaces shift, "social mobile learning" will no longer be a foreign concept (Ziaeehezarjeribi, Graves, & Gentry, 2010). For example the mathematics game called *Timez Attack* (Figure 1) a video game designed to teach mathematical equations for keeping students engaged, and yet is fun and scaffold in ways requires student's active participation through symbolic representation and animation.

*Figure 1.*Timez Attack and Dimension M by Big Brainz.

The Phenomenon of Mobile Apps and Social Networks

While video games are well established among hardcore gamers, just-in-time access to information, and learner control via mobile apps and the instant one-on-one connection opened up a new era of individualized learning and collaboration while skeptics are in a wait and see mentality (Ziaeehezarjeribi, 2010). Mobile Apps allow players the opportunity to experience for acquiring instant feedback, access to information, and communication with their peers through the use of Smartphones anywhere at any time, make the mobile technology an indispensable portable library, highly interactive and can easily replace a big and bulky computer.

According to edweb (2009), "Social Networking sites are being used widely by the parents and students of our school community. It is our responsibility to educate the students of our school about the ethical and security issues associated with using online services and social media" (p.35). In that same study, of the 61% of educators who reported that they had joined a social networking website, Facebook was the most popular (85%) with MySpace (20%) and LinkedIn (14%) trailing far behind. Respondents used social networking to connect with family and friends but were "positive about the value of this (social networking) technology for education." The respondents perceived that learning a new technology "takes time." In addition to the time it takes to learn a new technology, participants also noted that "schools and districts often block access to sites, and educators are frustrated by this."

Influence of Gender

Gender has little influence over whether In recent studies conducted in United Kingdom, Social Gaming Research (2010, p. 5). More females in both United States and United Kingdom play social video games than their males counterpart.

Table 1. Profile of Social Games-Gender.

	United States	United Kingdom
Males	46%	42%
Females	54%	58%

With the infusion of video gaming technology into society, more and more participants begin to view practice or "failure" as a normal consequence of learning within a new venue. The difference between learning in cyberspace and learning in the traditional classroom is that social video games provided learners with the knowledge to strategically apply the gaming concept by "leveling up" through collaboration and engagement. Curriculum and instruction theories should consider the paradigm shift which has begun and to understand the significance of the just in time learning which occurs within social networking. Within the paradigm of instant feedback, learners may be able to employ their experience and skills with gaming, mobile apps, and instant access to information. Education should consider the need to enhance classroom activities and make learning experiences more interactive. This form of experiential learning and training offers similar experience students had with the lab computers with limited access to internet and teacher-controlled environment.

Asking the question, Can video games bridge the gap and form consensus building between students and teachers? We moved to the research on personal learning networks. As Kharbach (n.d.) described,

> A Personal Learning Network (PLN) is a way, a process, a network of interrelated connections you make for the purposes of discovering, collaborating and sharing ideas and resources. These connections are created based on your learning needs and can be made with like-minded people from all around the world. There are several web technologies and platforms that facilitate and nurture these connections, ….(Para. 4).

Student's instant access to information gives them more confidence and flexibility retrieving information through mobile apps in classrooms, a direct consequence of the learner's ability to apply previous knowledge toward a current task. As Squire (2011) stated, "Many of the walls that have defined education (particularly to keep

information or people out) are now removed. Educators have only begun to pay attention to mobile devices, and mostly it's with the intent to ban them" (pp. 225-226).

The Conflict and Paradigm Shift in Educational Technology

Ziaeehezarjeribi (2010) stated "while video games themselves may not provide all the solutions in the learning process, video games have become a tool to enhance and develop learners' ability to interact cooperatively, improve analytical skills, and provide solutions to problems. With this increasing need for performance improvement of occupational skills utilizing simple game design, educators and the gaming industry have shifted their focus to more interactive and multimodal delivery solutions. However, current solutions are based more on game-play and less on how learning takes place. The need to refocus studies on gaming may need to begin with a close examination of what learning is happening during a game and which factors motivate students to return again and again despite repeated failure. The culture of gaming creates an environment where, while mistakes are a necessary component of learning, success tends to have immediate consequences. Gee (2007) stated "educators recruit games for learning in areas like science or social science the role of models and modeling will be critical aspect….video games can give players rich experiences, allow them to interpret and reflect on these experiences" (p. 164). The acceptance of innovation varies according to age as well.

Social media among Millennials and baby boomers varies based on their positioning as pre and post digital natives,

> Educators who have not grown up as "digital natives" feel overwhelmed by technology and feel it takes a lot of time that they don't have.
>
> Educators see students using collaborative technology every day, mostly outside of school, and understand the need to address and incorporate it into teaching and learning.
>
> As more educators join social networks, and as younger people enter the education workforce, the adoption of this technology will continue to increase.
>
> There are serious concerns about privacy and liability, and educators express a need to keep their personal and professional lives separate.
>
> Many educators understand the need for some restrictions, but feel that schools/districts are overly restrictive in blocking access to websites.
>
> Educators would like more training, professional development, and direction on using social networking and other technology from school/district leaders. (edWeb, 2009, p. 6)

Furthermore, video games have shown to provide learners with control, or the ability to make choices in the game, allow students the opportunity for an individualized experience with the content and interaction with the game conventions. The familiarity of learning within a video game provides players with the ability to make mistakes as a normal trajectory of learning. As Turkle (2005) stated,

> There is nothing mindless about mastering a video game. The games demand skills that are complex and differentiated. Some of them begin to constitute a socialization into the computer culture; you interact with a program, you learn how to learn what it can do, you get used to assimilating a large amount of information about structure and strategy by interacting with a dynamic screen display (p. 67).

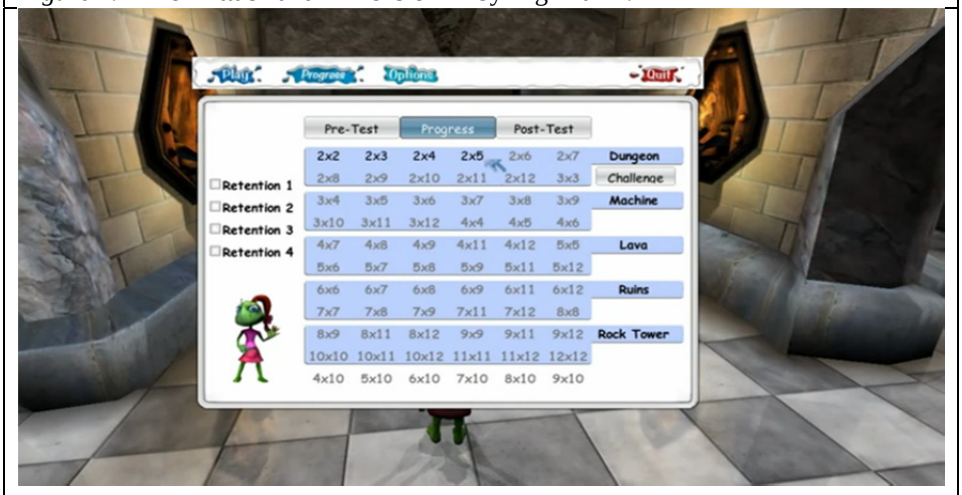
According to Pew's (2010) research survey, among Millennials, the only significant difference, according to age, is the number of postings to an online profile;

- More Millennials posted to an online profile in the previous 24 hours (37% vs. 26%).

- More young men than women played video games (37% vs. 18%) and watched a video online (39% vs. 26%) in the 24 hours prior to the survey
- More women posted a message to someone's online profile (37% vs. 28%)
- There were very few differences by race and ethnicity; however, more white Millennials (61%) sent or received an email in the previous 24 hours than did blacks (47%) or Hispanics (45%). (p. 36).

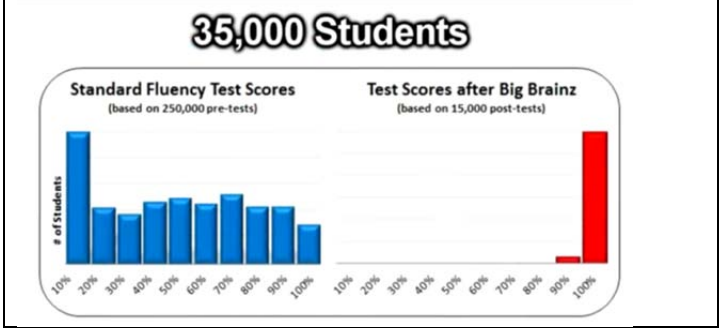
Consider for a moment that more than a third of all video gaming software purchased in 2006 was intended for adults and half of the members in massively multiplayer online games are now women (Simpson, 2005). Research is beginning to establish the cognitive complexity of learning to become members of a gaming community. As Bielaczyc and Collins (1999) state, learning communities develop more than just "content knowledge and skills" and deliver learning process in different ways that have all the components of plans, goals, and assumptions.

Figure 2. Timez Attack and Dimension M by Big Brainz.



While the understanding among most in the gaming industry is that not all games are suited for the classroom (Aldrich, 2005), educators are now beginning to take note of the important elements of traditionally identified leisure video games which hold the potential to be carefully embedded in the classroom curriculum. *Timez Attack* and Dimension M by Big Brainz (Figure 2). According to Big Brainz (2012), standard fluency test scores show that the average posttest score increased by 95% (Figure 3). Even remedial students showed significant increase in test score by playing *Timez Attack.*

Figure 3. Results of Timez Attach Study (Big Brainz, 2012)



Sheldon (2012) noted the importance of serious learning when he emphasized that

> Lectures become rote. Tests are standardized. Measurements become more important than knowledge. Failure is penalized with a big "F." But what are we measuring exactly? A child's ability to learn? Our ability to educate? They [students] were doing just fine before we decided to turn them into miniature adults like those disturbing children in seventh and eighteenth century portraits (pp. 13-14).

Cellcraft employs an interactive science lesson in Biology (Figure 4) and "the game leads [learner] through an investigation of cell structure, function, and energy use" (ScienceGeek, 2012).

Figure 4. Cellcraft Interactive Graphics

In many video games player interface characteristics such as graphic and cinematic realism, imagination, interactivity, challenge, conflict, creativity, abstraction, music, language, reading, critical thinking, social networking, collaborating, information sharing, and within-game structure contribute to player's engagement. Social, fictional and nonfictional games have similarities. In order to create engaging learning environments for students, players must immerse and become involved in the game quests and feel the experience which can intensify their curiosity. Educators and game designers must be able to rethink and allow new paradigms of knowledge construction to emerge from experiential learning within these future games and simulations. We believe this paradigm shift will come as "creative endeavor" to push the boundaries of what constitutes learning within K-12 settings.

Conclusion

We believe video games and mobile apps hold strong potential to bridge the gap and form consensus building between students and teachers about a new paradigm of learning. Studies have shown that many educators are ready to integrate "new literacies" into instructional practices. The "laggards" (Rogers, 2003) in the adoption of the "innovation" of interactive media are now outnumbered by the majority of educators who see potential benefit in the integration of video games and interactive websites. When educators take into account the "seven critical conditions" for integration of games into the classroom student learning has the potential to increase. Security is still holding the innovation back. The next step is to find a solution to the security issues which still linger.

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