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ANY TIME, ANY PLACE, ANY PACE-REALLY? EXAMINING MOBILE LEARNING IN A VIRTUAL SCHOOL ENVIRONMENT

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ABSTRACT

Over the past decade, the number of K-12 students engaged in online learning has increased from between 40,000 and 50,000 to more than two million. Students have also gained increased access to mobile devices throughout recent years, and educators have actively looked for ways to capitalize on this trend.

A case study of students enrolled in an Advanced Placement European History course, offered by a statewide, supplemental virtual school in the Midwest. The students were studied over the course of four weeks, using *Mobi21*, an app that works on mobile devices, and offers an emulated version that runs on a computer.

The results showed that despite the fact that existing literature indicated students' perceptions were positive toward mobile technologies; these students' perceptions were negative. The isolated implementation of the project may have affected these perceptions. However, students' access to mobile devices limited the project implementation.

Keywords: K-12 online learning, m-learning, mobile learning, virtual school, virtual schooling.

INTRODUCTION

Learning through the use of mobile devices has proliferated considerably across the educational enterprise and is still emerging (Traxler, 2009; Pachler, 2010), especially due to the ubiquitous nature of these technologies in students' lives.

The inherent value of mobile technology in motivating and engaging students inspires educators to explore how these tools can be successfully integrated into the pedagogical process (Bradley, Haynes, Cook, Boyle, & Smith, 2009). The literature reflects a positive view from students who have the opportunity to learn through the use of mobile devices.

At the same time the growth of virtual schooling – or the use of the Internet to provide online or web-based forms of distance education at the K-12 level-also continues to increase. Clark (2001) estimated there were approximately 40,000 to 50,000 students engaged in K-12 online learning opportunity. Just more than a decade later, Watson, Murrin, Vashaw, Gemin, and Rapp (2012) indicated there were more than 2 million students enrolled in K-12 online learning opportunities. However, there has been little focus by virtual schools on using mobile learning (m-learning) as a part of their course delivery model. In fact, the only systematic efforts to use m-learning by virtual schools has been from the Florida Virtual School (see <http://www.flvs.net/myFLVS/study-tools/mobilelearning/Pages/default.aspx>) and K12, Inc. (see <http://www.k12.com/mobile-apps>); who have designed a series of m-learning applications. To date, these applications have been limited to knowledge and comprehension review activities or test preparation applications.

This lack of use of m-learning has the potential to change in rapid ways as applications are specifically developed to delivery content to mobile devices. At present, the majority of learning management systems (LMS) developed for mobile environments simply convert web-based or online content to be viewable on a mobile device (e.g., Blackboard, Desire2Learn, etc.). One of the first LMS specifically designed to deliver content on a mobile device is *Mobl21* (see <http://www.mobl21.com/>). Given the exponential increase in virtual schooling at the K-12 level, along with the growing ubiquity of mobile devices among today's youth, it is important to begin to explore how to use these devices to provide m-learning opportunities. As such, the purpose of this study was to explore the potential use of m-learning in a virtual school environment.

LITERATURE REVIEW

While the use of mobile devices has proliferated in society, the amount of research into their use in various learning environments is limited. For example, Pollara & Broussard (2011) reviewed 18 studies from 2005-2010 investigating K-12, undergraduate, and graduate student perceptions of m-learning. They found student opinions to be largely positive although a recommendation was that further research focus on the use of personal mobile devices, owned by the student instead of those provided by the school, since costs appear to be prohibitive in many cases. Humble-Thaden (2011) investigated how high school students viewed the use of cell phone technology for learning. She surveyed 166 college students, asking them to reflect on their experience in high school. The results showed an overall positive perception in using cell phones for learning. Looi, Zhang, Chen, Seow, Chia, Norris, and Soloway (2011) researched how mobile technology could be used in third grade science activities. They found students developed positive attitudes toward using these devices for learning. Eighty percent of the 39 students reported that they felt the technology helped them learn in and out of class. Brown (2008) expressed in her study on students using mobile phones for vocabulary comprehension, that although there was no significant difference between those using mobile phones and those adhering to a non-digital method, students' motivation did increase. Kiboss (2012) conducted research to find if achievement and student perception of hearing impaired learners in basic geometry was influenced by mobile technology.

He found both achievement and student perception had increased by a classroom environment utilizing mobile technology. Rau, Gao, and Wu (2008) studied student-teacher communication in high school students and found interaction using mobile communications technology to be motivating to the learner. Additionally, they revealed that combining mobile communication with Internet based protocols could be positive; although, caution should be used when requiring public expression compared to individual communication with the instructor (Rau, Gao, & Wu, 2008).

A barrier to the use of mobile technology for learning has been the presence of school policies prohibiting their use; however, the momentum of this trend appears to be turning (Druin, 2009; Pachler, 2010). Alobiedat (2012) studied the perception of m-learning from a policy standpoint and found students agree on the appropriate use of mobile phones in the classroom and disagree on inappropriate use of phones. The literature seems to indicate the classroom is "one of the least acceptable places for mobile phone use" and people are much more tolerant of mobile phone use in other public places (Alobiedat, 2012, p. 13). Personal privacy involving mobile devices in the classroom poses another challenge (Druin, 2009; Pachler, 2010). Wang and Heffernan (2010) explored the perceptions of computer-assisted language learners using computers and mobile phones to interact with software. Students responded positively toward personal data collection by their teachers for pedagogical purposes but were moderately concerned with the aspect of uploading personal photos, addresses, and phone numbers. Yang (2012), in another study involving language learning, found students were motivated by mobile technology in an educational setting and viewed it as positive. Messinger (2011), in his doctoral dissertation exploring student and teacher attitudes and perceptions of m-learning, found that despite the reluctance of schools to adopt the use of mobile devices for educational purposes, students and teachers are open to capitalizing on the positive aspects of mobile technology, especially its motivational influence. Nelson (2012) found comparable results in a doctoral study on the learning experiences of high school students in Illinois. Although the technology did prove a distraction to some students, both teachers and students acknowledged the value of mobile devices for learning. At the same time, they did rely heavily on tablet or laptop computers.

Finally, Ting (2012) contemplates some of the inherent challenges of using mobile technology and provides suggestions for overcoming them to provide a meaningful and engaging experience for students. She acknowledges how reading text on mobile devices can be problematic, viewing complex graphics, especially large in size, can be difficult, and interactivity with an absence of a mouse or keyboard can be troublesome, especially with such a small screen. Ting maintains, however, that contextualizing the use of mobile devices improves usability and student perception of the pedagogy while neutralizing the compromising effects of the mobile technology architecture.

In short, despite the challenges of restrictive school policies, student distractions, and economic pressures in acquiring technology to support m-learning, it is indisputable that mobile devices have become an intimate part of modern society and capitalizing on these capabilities has the potential to transform learning from "just-in-case" to "just-in-time, just enough, and just-for-me" (Traxler, 2009, p. 14). A review of the latest Pew Internet findings on the role of smartphones and texting in the lives of teen reveals convincing evidence that mobile technology is pervasive and most learners feel comfortable in using it to communicate and access information (Lenhart, 2012). It is clear today's students perceive m-learning as a natural part of their daily routine.

METHODOLOGY

The purpose of this study was to explore the use of m-learning in a virtual school environment. The specific aims for the study were to design one or two units of content for delivery using a m-learning application (i.e., the *Mob/21* app), and then to examine student perceptions of learning in that environment. To address these aims, the following research questions were asked:

- What are student perceptions of a m-learning experience?
- How do students perceive their m-learning experience in relation to larger virtual schooling experience?

To answer these research questions, a case study methodology was selected (Stake, 1995). The planned data collection methods included surveys and interviews. After concluding the two units of content using *Mob/21* during the Winter 2011 semester, six of the eleven students completed the survey about their experiences (see Appendix A for a copy of the survey). Unfortunately, none of the students volunteered to be interviewed. The majority of the survey data was analyzed using descriptive statistics, while the open-ended responses were thematically analyzed using a process that involves reducing data, displaying data, and drawing and verifying conclusions. (Miles & Huberman, 1984).

THE CASE

The case was an Advanced Placement (AP) European History course, offered by a statewide, supplemental virtual school in the Midwest. At the time of this study, this particular statewide virtual school was more than a decade old (created as a part of the initial wave that accompanied various state and federal funding initiatives designed to increase K-12 online learning opportunities [Clark, 2013]).

Approximately three years prior to this study, as the state expanded this virtual school's mission to include middle and elementary grades, the school was re-brand with a new authorizing agency and a majority of new administrators (although the majority of the teaching staff remained consistent). The instructional model used by this virtual school, like most, was primarily asynchronous through the LMS; with some instructors incorporating individual or optional class synchronous sessions (using *Skype* or a virtual classroom environment).

The yearlong AP European History course consisted of 26 content units delivered using *Desire2Learn*, with students completing each content unit in a single week. The AP program is designed to provide high school students with access to college-level courses, and students can actually challenge for college credit by taking a standardized multiple-choice and long answer exam in May.

The content of the AP European History course began with the late Middle Ages and continued to the present. The same teacher had taught the AP European History course for more than a decade (i.e., since the virtual school began operating), and this teacher had also been a member of the two-teacher team that originally developed the course. The 11 students enrolled in this course were in grades 10 through 12, and lived primarily in rural areas. As a supplemental virtual school, it is safe to assume that most of the high school students enrolled in this college-level course possessed characteristics similar to those described in the literature.

For example, Haughey and Muirhead (1999) described supplemental virtual school students as being highly motivated, self-directed, self-disciplined, independent learner who could read and write well, and whom also had a strong interest in or ability with technology.

Also consistent with most supplemental online learning programs, the students were provided with a slot in their daily school schedule for their online course and a space in their school with computer access to engage in their online course.

The students in the course complete two units or approximately four weeks using *Mobi21* as a m-learning environment (i.e., the topics of World War II and the beginning of the Cold War). *Mobi21* is an app that works on iOS, Android, and Blackberry devices, as well as an emulated version that will run on any desktop or laptop computer.

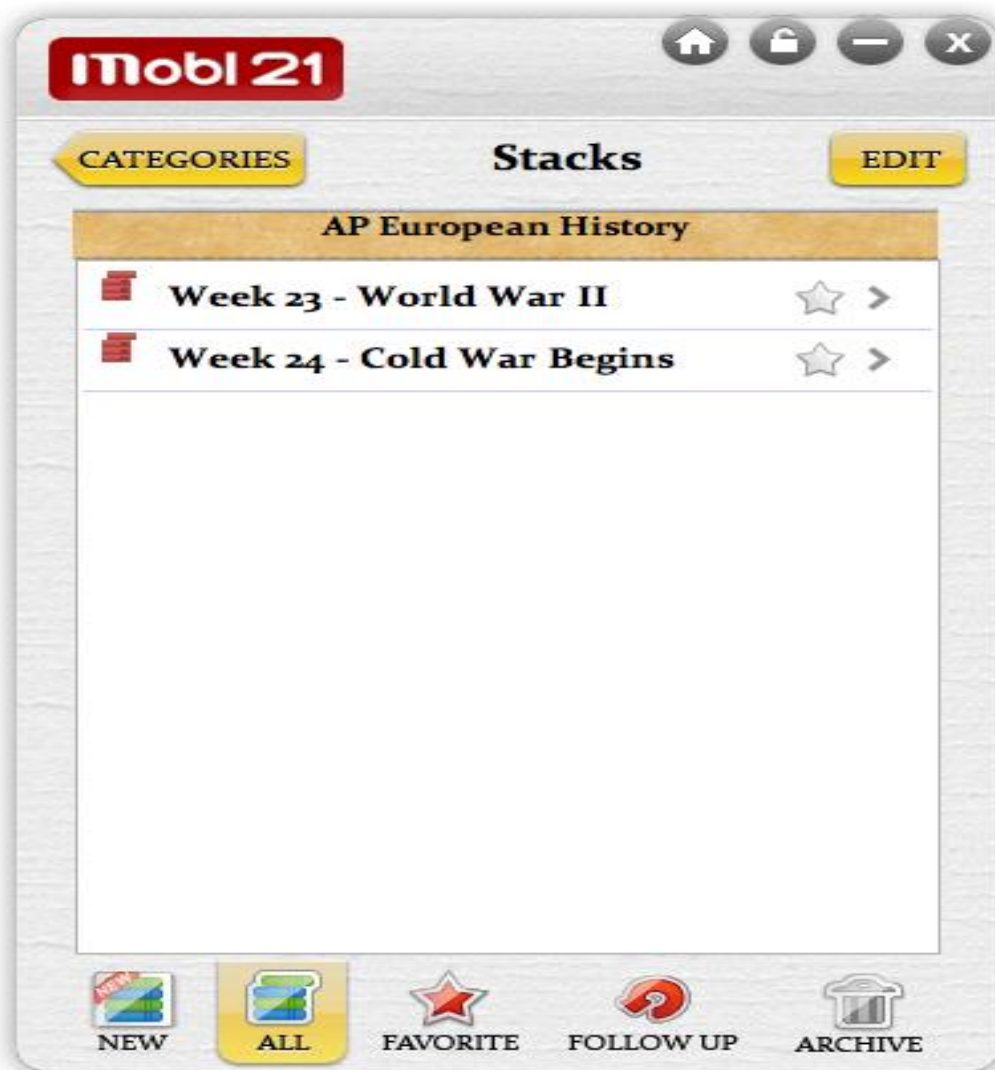


Figure: 1
Mobi21 mobile learning management system environment for AP European History

As a learning management system, *Mobl21* was quite limited compared to *Desire2Learn* platform that the students were accustomed to (e.g., there was no discussion board feature or mechanism to upload assignments) – a fact that may have influenced the student perceptions of their experience.

RESULTS

One of the most interesting findings from the data was the fact that while five of the six students had cell phones, only two of those five students indicated that their cell phone was capable of accessing the Internet (i.e., only two of the five cell phone users owned a smart phone). Further, only one of those two students accessed the *Mobl21* app on their smart phone.

This meant that five of the six students only accessed *Mobl21* using a desktop or laptop computer – four from their home computer and one from a computer at school. Based on the response received to the open-ended questions, it appears that the nature of the *Mobl21* tool - at least at the time of this study – could "only be accessed from one device," so "once [you] logged onto it at home, [you] couldn't log on anywhere else."

The fact that the vast majority of students enrolled in this AP European History course used *Mobl21* on a computer, and that technical issues meant that they were only able to use it on a single computer, the students had a strong negative reaction to *Mobl21* in general. For example, when asked if *Mobl21* was easy to download, five of the six students selected neutral or negative responses. Three students disagreed with the statement "the *Mobl21* application is easy to use," while five students disagreed or strongly disagreed with the statement "*Mobl21* allowed me to convert any wait (dead) time into productive time."

Finally, five students disagreed or strongly disagreed with the statement "*Mobl21* was an effective method to receive course content."

The students' general negative reaction to *Mobl21* likely impacted their actual usage of the tool. For example, when asked whether they accessed the content using *Mobl21* more than they did the other units that were delivered using their regular LMS, all six students disagreed or strongly disagreed. Similarly, all six students responded neutrally or negatively to the statement "*Mobl21* allowed convenient access to course materials." Further, all six students were negatively disposed to *Mobl21* being used as a supplemental tool to their regular online learning, while five students were against *Mobl21* being used to replace any of the content from the LMS. In terms of the students' opinions of the actual content that was presented in *Mobl21*, students were generally positive about the quality of the text presented by this mobile tool. However, this was the only positive rating the students provided *Mobl21*, with four of the students questioning the ability of *Mobl21* to display media such as images, video, and multimedia.

Even more interesting was that while the content provided in *Mobl21* was the exact same as would have been provided in the regular LMS, five students questioned whether the course content delivered by *Mobl21* was "high quality."

All six students indicated that learning using *Mobl21* was equally or more difficult than using their regular LMS. All six students were less or a lot less satisfied with their learning experience through *Mobl21* than their regular LMS.

This dissatisfaction likely contributed to the fact that four students indicated they accessed their courses content less or a lot less when they used *Mobl21* compared to when they were using their regular LMS, and the remaining two students only accessed the content using *Mobl21* an equal amount of time. None of the students accessed the content more using *Mobl21*, which was one of the intentions when the content was converted to a more mobile-friendly format.

Based on the responses to the open-ended questions, some students did see the potential of this m-learning tool. For example, one student commented that, "you were able to go on to different websites that gave you an in-depth look at one subject during the time period of study." Another student remarked that, "the layout of the content was very nice," while another said, "the content was grouped so that it was easy to browse through." Finally, one student suggested that, "it was slightly less cluttered than the regular IVS website [i.e., the students' regular LMS]. Perhaps it was better on a mobile phone." However, two students still felt that "it was really better" or that when it came to potential benefits, "there was none." One of the four students who saw some potential benefits of *Mobl21* even indicated that "there were no other benefits to using it [i.e., *Mobl21*] on the computer vs. the regular IVS website [i.e., the students' regular LMS]."

In terms of the challenges that the students experienced, there were two main themes. The first focused on the technical difficulties that students experienced. These difficulties ranged from "it was hard to download" to "it said it sent my [quiz] score, but my teacher never received it" to "it could only be accessed from one device" or "once I logged in at home, I couldn't log on anywhere else." In fact, three of the six students reported difficulties with only being able to access either the *Mobl21* or the content housed in *Mobl21* from a single device. The second challenge that students experienced was the fact that *Mobl21* did not have a feature that would allow the students to upload their assignments (e.g., Dropbox). This meant students still had to access their regular LMS or e-mail their teacher to submit their completed work. This was the sole suggestion from four of the six students when asked, "what features do you wish you were able to do in *Mobl21*?" Overall the students had a fairly negative response to learning through *Mobl21*, and the potential of m-learning in general. When asked what they liked best, one student responded "absolutely nothing," while another remarked "I didn't." A third student, responding to a question about how they used *Mobl21* indicated, "I did my assignments and got off of it as soon as possible because I hated the interface so much." In fact, in the responses to the open-ended questions there was no a single student comment that could be characterized as overwhelming positive (in contrast to the overwhelmingly negative responses quoted above).

DISCUSSION

While the literature indicated students generally perceive m-learning positively (Humble-Thaden, 2011), the students in this study indicated overall negative perceptions during the study. However, this may be due more to the limitations of this case study than the students' actual perceptions of m-learning.

The purpose of this study was to explore virtual school students' perceptions of m-learning through the use of a mobile LMS (i.e., *Mobl21*). While *Mobl21* did have a desktop version, it was hoped that students would access the content housed in *Mobl21* using a mobile device. With the exception of one student who accessed the content on their Android device, the remaining five students accessed the content through the desktop application.

What this essentially meant was that for the majority of students, they were simply replacing one LMS (i.e., *Desire2Learn*) they had been accessing on their desktops for the previous five months with a new LMS (i.e., *Mobl21*) that they would only need to access on their desktops for a two week period, before completing the remaining three months of the course on their original LMS (i.e., *Desire2Learn*).

This mid-year, temporary change of LMS may have been the biggest factor contributing to the overwhelming and pervasive negative attitude towards *Mobl21* and m-learning in general. Rogers (2003) suggested that individuals have a greater likelihood to adopt a potential innovation or change based on its perceived attributes, one of which is the potential benefit(s) that the change may bring. In this instance, the students did not see any benefit of *Mobl21* over their regular LMS.

Further, this study did not provide students with mobile devices; rather it depended on students using their own. While this approach aligned with the recommendation from Pollara and Broussard (2011) that personal devices be used, the students studied here did not have equal access to the kinds of mobile devices that could access the Internet (and thus the m-learning content). As mentioned, this left most students with only a computer for content access. Their access using these computers still simulated mobile access, in that the web-based application specifically emulated the mobile environment.

However, the times students were able to access the application were still limited to the times they were within reach of the individual computer where the application was downloaded. Furthermore, while most learners in the literature were comfortable using mobile devices to aid in their learning (Lenhart, 2012), the students in this study did not have easy access to such technologies and therefore lacked that immediate comfort level. Similar to Nelson's (2012) findings, these students continued to rely heavily on their computers to access information. It is possible that had the students benefited from increased mobile accessibility (including access to smart phones) or exhibited more positive perceptions of *Mobl21*, they may not have relied so much on the computer version of the application.

While the literature suggested motivation increases with mobile device usage during learning (Yang, 2012), this group did not exhibit such an increase. As mentioned, students indicated they did not use *Mobl21* as much as their regular LMS (likely a result of their lack of mobile devices capable of accessing the content). Alternatively, it may also have been due to the low, perceived usability of *Mobl21*. Most notably, to Nelson's (2012) point that mobile technology can be a distraction, this study showed that the technical challenges of only being able to access *Mobl21* from only one computer as well as the usefulness of it impacted students to the point that they limited their use of the tool, compared to when using their previous LMS.

CONCLUSIONS AND IMPLICATIONS

This study sought to uncover student perceptions while using a mobile application as part of a class delivered through a virtual learning environment. The majority of students accessed the learning material through the web application that emulated a mobile environment, rather than the mobile app itself. Throughout the four-week study, students were challenged by access issues, and found the application less useful than their previous tool. As a result, perceptions of the tool were predominantly negative, which differed greatly from previous studies.

The results of this study indicate perceptions of mobile technologies may be impacted by the usability of the tool. Students may access tools more readily and often when the mobile app and its supporting website are user friendly.

The results also indicated that practitioners who wish to implement mobile technologies should work to ensure equal access to supporting devices. Upon provision of such devices, practitioners might also consider vetting the app's usefulness from both a mobile and web perspective before fully implementing.

As in this study, students may quickly uncover gaps in the application. Practitioners should also give consideration to using the mobile technologies as a supplement to the systems that the students are more familiar with, or choosing to use the mobile technologies throughout the entire course process. Future research in this realm might further uncover ways in which educators could capitalize on the use of mobile technologies.

It may be useful to study a group of students who have previously experience utilizing mobile applications and who have better access to mobile devices. It may also be useful to study students who are provided mobile devices with which they do not regularly use. Comparing these two studies might further identify motivating factors and measure perceptions of the disparate groups.

Finally, a replication of this study – with students that can access the content through their mobile devices and as an integrated part of the overall course – would be worthwhile.

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Appendix A

1. How did you access the Mobil21 learning environment (check all that apply)?

- iTouch
- iPhone
- iPad
- Andriod
- Blackberry
- Desktop/Laptop/Netbook Computer

2. Were you satisfied with your experiences using the Mobil21 learning environment?

very dissatisfied	dissatisfied	neither dissatisfied or satisfied	satisfied	very satisfied
1	2	3	4	5

3. How difficult was the Mobil21 learning environment compared to your regular Illinois Virtual School learning environment?

less difficult		equally difficult		more difficult
1	2	3	4	5

4. Are you satisfied with your experience in the Mobil21 learning environment compared to your regular Illinois Virtual School learning environment?

less satisfied		equally satisfied		more satisfied
1	2	3	4	5

5. How often did you access the Mobil21 learning environment compared to your regular Illinois Virtual School learning environment?

less often		equally often		more often
1	2	3	4	5

6. How much time did you spend using the Mobil21 learning environment compared to your regular Illinois Virtual School learning environment?

less time		equal time		more time
1	2	3	4	5

7. What was the best thing about the Mobil21 learning environment compared to your regular Illinois Virtual School learning environment?

8. What was the worst thing about the Mobil21 learning environment compared to your regular Illinois Virtual School learning environment?

9. What did you like best about being able to take your AP European History course on your mobile device?

10. What did you like the least about being able to take your AP European History course on your mobile device?

11. Overall, I am satisfied with taking web-based courses.

- Yes
 No

12. What is your gender?

- Female
 Male

13. What is your grade?

- Grade 9
 Grade 10
 Grade 11
 Grade 12

14. What is your age?

- 15
 16
 17
 18

15. Are you willing to participate in a follow-up interview or focus group?

- Yes (please provide your name and e-mail address below).
 No

Name: _____

E-mail: _____