

# **The Impact of Mobile Access on Motivation: Distance Education Student Perceptions**

Linas Mockus, M.A.  
Instructional Designer  
The Pennsylvania State University

Heather Dawson, M.S.  
Instructional Designer  
The Pennsylvania State University

Stephanie Edel-Malizia, D.Ed.  
Instructional Designer  
The Pennsylvania State University

Dean Shaffer, M.S.  
Instructional Designer  
The Pennsylvania State University

Jin Sung An, M.Ed. Candidate  
Multimedia Specialist  
The Pennsylvania State University

Alicia Swaggerty, M.S.  
Instructional Designer  
The Pennsylvania State University

Learning Design at Penn State's World Campus

Copyright 2011

# Acknowledgements

Rick Shearer, D.Ed.  
Director, World Campus Learning Design

John Buckwalter, A.A.  
Instructional Production Specialist, World Campus Learning Design

Chulapol Thanomsing, M.A.  
Doctoral Candidate in Instructional Systems, The Pennsylvania State University

Kent Matsueda, M.S.  
Instructional Designer, World Campus Learning Design

Laura Scott  
Technical Communications Specialist, World Campus Learning Design

# Table of Contents

[Table of Contents](#)

[Introduction](#)

[Literature Review](#)

[Definition of mLearning](#)

[Mobile Devices](#)

[Learning Styles](#)

[mLearning Global Comparisons](#)

[World Campus mLearning Motivation Study](#)

[Methodology Summary](#)

[Course Pilot: Incorporating mLearning Activities](#)

[Pilot Results](#)

[Demographic Findings](#)

[Mobile Device Findings](#)

[Motivation Findings](#)

[Mobile Site Analytics](#)

[Discussion](#)

[Results](#)

[Implication/Impact](#)

[Next Steps](#)

[Conclusion](#)

[Acknowledgements](#)

[References](#)

[Appendix A](#)

[World Campus Mobile Learning Research Survey](#)

[Appendix B](#)

# Introduction

In the last few years, the telecommunications field has experienced an exponential growth in network coverage, speed, and technological innovation in the United States and around the world. The variety of new products such as smartphones and tablets has allowed students at a distance to choose how they interact with course content and with their classmates. Until recently, students were only able to access their online course resources through their computers and laptops. Being tied to a desktop or laptop computer restricted their ability to learn and share knowledge while traveling or when in areas without good Internet connectivity. Instructional designers and faculty involved in Distance Education are constantly seeking new ways to engage the online learner, and the implementation of mobile learning tools in their online courses may enable students to access course information on handheld devices from anywhere, anytime.

This research study, conducted by members of the Penn State World Campus Learning Design (LD) team, explored how mobile devices could be utilized to provide instructional options for adult learners. Key goals of the research study were to assess the current state of mobile learning (mLearning), determine the kinds of educational content and information students are interested in receiving on their mobile devices, and to determine how course content and information delivery on mobile devices impact the students' motivation to learn. One challenge within the study was the creation of a mobile course site that was accessible via many different mobile devices and platforms in order to reach as many learners as possible. In addition to the mobile site, the researchers wanted to deliver content that was relevant and useful to adult learners.

## Literature Review

### Definition of mLearning

As technology and learner needs have changed, flexible learning delivery has evolved. As referenced in Figure 1, distance learning opened the door to learners through correspondence study and eventually through eLearning. Also, the pedagogical focus shifted from the teacher to the individual learner. As the constructivist learning approach is embraced more in course design, online learning continues to flourish. The Internet provided learners the key to successfully accessing richer Distance Education learning environments without entering a traditional classroom. Now with mobile networks, mLearning provides greater flexibility for the

learner to access course material, engage with the course activities, and interact with the instructor and classmates anywhere, anytime, and on-demand on a mobile device.

## Flexible Learning

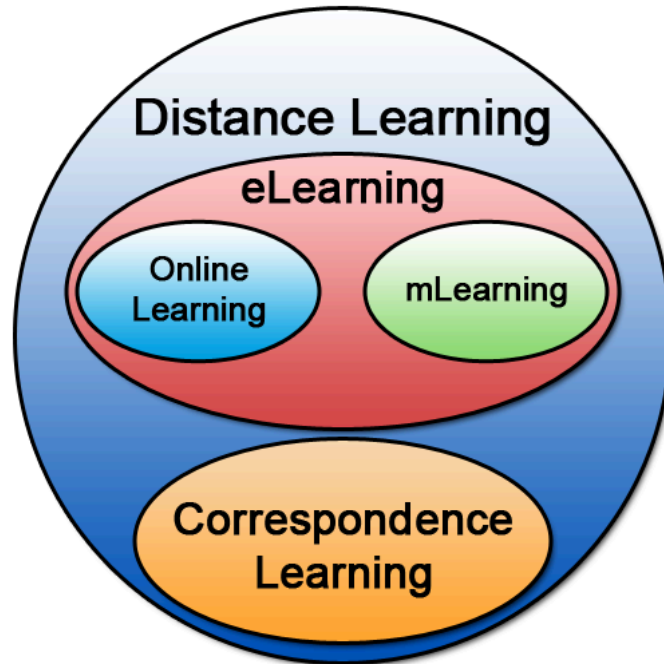


Figure 1. The Subsets of Flexible Learning

Adapted from Brown, T.H. (2003). *The role of m-learning in the future of e-learning in Africa?*

In defining mLearning, there are two distinct and powerful words: mobile and learning. Let's look at the "m" first. "M," short for "mobile," means "on the move." The World Campus mobile research study included devices that are portable, always on, and can access the web whenever and wherever the student is away from a laptop or desktop. "At a broad level, one could view laptop computers as the ultimate mobile device and ubiquitous among working adult learners who travel. However, the idea of mobile learning is probably narrower and more focused on the idea of smartphones or the new tablet devices like the iPad. Taking this narrower view allows us to focus on what we can provide learners in a just-in-time type of experience to supplement their courses" (Shearer, 2010).

When the word "learning" is added to the definition, it now becomes "knowledge on the move." mLearning means decentralization of information handling because an m-learner can work with his or her mobile technologies anywhere and anytime (Tella, 2003). For example, mobile learning could encompass gaining knowledge while doing something else, such as commuting on public transit, waiting in an airport or at a doctor's office, or sitting at a child's soccer or dance practice, etc. When the two words--mobile and learning--are blended together, it is easy to recognize how this method of course delivery and interaction is able to more easily fit into the active lifestyles of adult learners and provide further flexibility for their busy schedules.

## Mobile Devices

The mLearning ecosystem is made up of a wide variety of devices connected to different kinds of networks. The most common mobile devices are mobile phones, smartphones, personal digital assistants (PDAs), netbooks, tablets, e-readers, digital cameras, portable media players, and gaming devices.

The largest category of devices for mobile learning is “feature phones” (Woodill, 2011). These devices make phone calls, send and receive text messages (SMS), and take pictures (New Media Consortium; EDUCAUSE Learning Initiative, 2011). Another rapidly growing category comprises of “smartphones” which run mobile device operating systems such as iOS, Android, Windows Mobile, Blackberry, Symbian, etc. Smartphones, in many ways, offer the same functionality as laptop computers, allowing access to the web, e-mail, documents, office productivity tools, and are currently seen as the most suitable platform for mobile learning purposes (Woodill, 2011).

Over the years, definitions of mLearning have centered on devices: personal digital assistants (PDAs), smartphones, and now devices like the Apple iPad (Rosenberg, 2010). While the iPad works as a smartphone (i.e., iPhone) it has a bigger screen, which opens new possibilities for content and access. Smartphones and the new tablets (iPad) also have one of the post-PC era features: “always on” or “always connected.” Users no longer have to wait for the system to load, so access to the Internet and all applications is instant (Rosenberg, 2010). Just like a smartphone, devices like the iPad have access to endless applications from the App Stores and cloud computing. For education, these applications can vary from interactive lessons to study aids and productivity tools (Apple.com, 2011).

Currently, the biggest issue with mobile learning is the lack of industry standards and the need to develop applications for multiple operating systems. For example, there are currently two major smartphone application stores, Android Market, and iOS App Store, competing for the majority of consumer market-share in the United States. While both have thousands of applications, they are not interchangeable; iOS applications cannot be used in Android devices, and vice versa.

Another category of mobile devices supporting mobile learning includes e-readers such as the Kindle, Nook, and Sony Reader. Recent reports show that more eBooks are now being purchased than printed books.

In the past few years, several pilot programs on e-readers were conducted at colleges around the United States. The study at Northwest Missouri State University tested the Sony Reader during the 2008-2009 school year while Princeton University and Arizona State University (ASU) tested the Kindle DX. Other universities also tested the Kindle DX over the course of the

2009-2010 school year (Demski, 2010). Their question was: Do these devices designed for the consumer book market match up against the rigors of academic reading? The e-reader pilots concluded that the best features include the easy-to-read “E Ink” screen as well as the size, weight, durability of the devices, and long battery life. One Princeton pilot participant wrote “this is the future, but we’re not quite there yet.” After several complaints from visually impaired students, it was clear that e-readers lacked some accessibility standards and must be improved to comply with the Disabilities Act.

Sanier from ASU claims that, instead of e-readers, devices like the iPad would end up being winners and meet the students’ needs better because of portability, Internet access, color screens, interactivity, and video usage (Demski, 2010).

## Learning Styles

For nearly a decade, institutions of higher education have been searching for ways to put cell phones to good use in the learning process. “The question is, how are the wireless, mobile technologies affecting pedagogy?” (Alexander, 2004) As the sheer volume of cell phone users in the United States transitions to a majority of smartphone users, the potential for use of mobile learning in conjunction with eLearning becomes more of a reality. Thus, from a pedagogical aspect, new opportunities exist to revisit the integration of research-based indicators of student engagement, such as social, emotional, and cognitive engagement, into courses and assignments in order to evaluate the level of student engagement as it relates to motivation.

With the world at their doorstep, there are many educational options available to online students; our institutions cannot compete solely on technical innovation. Yet, educational providers want to attract learners by delivering a better quality learning experience than the competition. By utilizing mLearning, educators can more easily personalize education and allow students to choose their preferred learning style and access to content based on their time and location of choice.

Learning style is the concept that all students learn best through different types of interactions with the information or skill to be learned. People are prone to being motivated or engaged differently, depending on their learning style. Learning style can be described as the ways in which information is most easily absorbed, processed, applied, and retained by an individual. There are three basic types of learning styles: auditory, which includes listening and speaking; visual, which includes seeing and reading; and kinesthetic, which incorporates some aspect of “doing” in the teaching and learning process (Terrell, 2005). eLearning that is designed to incorporate optional activities for students to choose, based on their personal learning style, adds to student motivation, engagement, and learning success. Using mLearning as a mechanism for incorporating those optional activities also adds to the flexibility and convenience valued by most learners. For adult learners who are more autonomous and independent by nature, mLearning adds further value to the learning process. The portability and immediate

communication properties of mobile devices influence the learning processes in interacting with peers, accessing resources, and transferring data (Chen, Chang, & Wang, 2006).

## mLearning Global Comparisons

Around the globe, mobile learning is emerging as a new way to reach and connect with students. The trend toward mobile learning is a common thread, with different areas of the world adopting this method of teaching and learning at different paces, and for different reasons.

When comparing mobile learning implementation in the United States with other countries, two obvious issues dominate. First, use of mobile learning in the United States seems to be lagging behind implementation internationally. Second, growth of mobile learning in the United States is largely tied to the growth of online learning.

According to a 2008 article by Judy Brown and David Metcalf at The MASIE Center & The Learning Consortium, “Certainly the [US] is behind much of Europe especially Scandinavia, Japan and other geographies that have had a single standard in place longer and have been able to develop in a core, single and unified path.” Basically, the United State has historically been a late adopter of mobile phone technology in general compared to other counties around the world. Both developed and underdeveloped countries have migrated sooner to the use of mobile phones for a variety of reasons. By sheer virtue of being familiar with using mobile technology, learners have started using their devices to support their course work. Universities have put that connectivity to good use for learners in those counties where mobile phones are more likely to be available than landlines.

In the United States, more and more students are attracted to online learning as an option for higher education. According to *Class Differences: Online Education in the United States, 2010* from the eighth annual Sloan Survey of Online Learning, online course enrollment in the United States grew by nearly one million students over a year ago (Allen & Seaman, 2010). The report finds approximately 5.6 million students were enrolled in at least one online course in Fall 2009. As online instruction grows, so does the use of mobile learning. Online and blended instruction, both using technology for teaching and learning, are shifting from a model working only with eLearning to encompassing mLearning (Caudill, 2007). Basically, the only difference between online learning and mobile learning is the technologies used, and ultimately, the accessibility of an educational experience in which the learner is engaged. Research shows that convenience and flexibility are major contributing factors in the growth of online learning. When mobile learning is incorporated as a component of online learning, convenience and flexibility for the learner reach optimal levels. Thus, teaching and learning, like modern media, is becoming more readily available.

While growth of mobile learning is largely tied to the growth of online learning in the United States and other parts of the Western world, e.g., Europe, that is not the case in developing



countries. The growth of mobile learning is largely tied to the need for distance education that is not dependent on an Internet connection.

Mobile education is being recommended as the path to follow in distance education for developing nations and areas such as South Korea, China, other parts of Asia, and Africa (Motlik 2008). Internet-based distance education, as Motlik suggests, is not as good of a fit for many developing nations as a mobile distance education model. While mobile telephony is more common and accessible, the Internet is not as widely available, especially in those countries that find the majority of their populations in rural areas. The infrastructure of mobile telephony exceeds the penetration of Internet connections. That, coupled with mobile tariff rates being held low due to competition and the availability of low-cost handsets, makes mobile learning affordable for even the financially constrained groups (Gronlund & Islam, 2010).

In developing nations such as Bangladesh, Malaysia, the Philippines, Mongolia, and parts of Africa, the most common form of mobile learning is the use of Short Message Service (SMS). Students are able to send and receive messages almost instantaneously. Research at the University of Pretoria in South Africa found that using SMS was cheaper than the traditional postal service. In this case, the delivery response was almost immediate, rather than dealing with a wait of 3 to 18 days for the information to reach all students (Brown, 2005).

In Europe, the use of mobile learning has a different face. According to a Norwegian Knowledge Institute (NKI) study, there are three main approaches to mobile solutions in education in Europe. The first is to increase flexibility of teaching by providing mobile resources and developing the learning management system to handle the mobile content. The second is to increase the quality of the learning experience. This approach provides students with quizzes and study materials via their mobile device. The third is for administration purposes (Keegan, Kismihok, Mileva, & Rekkedal, 2006).

In developing nations, the growth of mobile learning is a direct response to a need for distance education that serves dispersed populations, often characterized by low incomes and the inability to afford expensive PCs and/or Internet access. In contrast, the growth of mLearning in the Western world is more of a complement to an already robust use of online distance education.

# World Campus mLearning Motivation Study

## Methodology Summary

The results and conclusions regarding learner perceptions and motivation in using mobile course resources were arrived at using attitudinal surveys in the World Campus courses. In total, 10 courses in the Adult Education, Special Education, Introductory Accounting, Library Studies, and Engineering disciplines were selected for the pilot, which ran for the first five weeks of the Spring 2011 semester. Approximately 400 students were invited to participate in the mobile learning study. Students were offered several mLearning activities including mobile sites, mobile flashcards, and audio podcasts. Learners were asked to try out the activities and complete a 27-question survey (see Appendix A) that was designed to gather demographic and device usage data, in addition to motivational and attitudinal data related to their use of the mobile course resources.

## Course Pilot: Incorporating mLearning Activities

The research team piloted several learning activities in various courses including mobile course sites, flashcards, and podcasts.

One portion of the mobile pilot used a mobile website. The content on the course mobile website was designed to be a duplicate of content that was already in the courses, such as the syllabus, semester schedule, and course announcements, and using the site was purely optional for the students. The mobile site used a JavaScript library called jQuery mobile and it was hosted on existing World Campus servers. The technologies that were used are widely adopted and available, such as HTML and JavaScript, which are compatible with iOS, Android, and other platforms. In one of the pilot courses, the main learning activity was blogging, so a link to the aggregated blog entries was provided on the mobile site. The following QR code can be used to access a sample World Campus mobile site:



Figure 2. QR code for <https://courses.worldcampus.psu.edu/public/mobileexample/index.html>

Another component of the study was a mobile flashcard study tool. The flashcards were presented to students via three options: web-based, mobile, Mac, and PC. The basic feature of the learning activity mimics traditional two-sided question-answer flashcards, which can be flipped front-to-back to review definitions and concepts. Course-related flashcards were populated on the [flashcardexchange.com](http://flashcardexchange.com) website and made available for download onto the mobile devices. The pilot used an iOS application called “Mental Case” and an Android application called “Kaka flashcards.”

The third component incorporated audio podcasts into a course and offered students the ability to download to a mobile device and listen to the podcast at the learner’s convenience.

Learners in the courses were notified of the study, learning activities, and the survey via course announcements during the first few weeks of the semester. The survey was also designed to obtain demographic data in addition to motivational and attitudinal data related to using the mobile site, flashcards, and podcasts.

The survey questions were categorized into demographic, mobile devices, and motivation sections.

## **Pilot Results**

### ***Demographic Findings***

The survey included several questions to gather demographic data which helped characterize the sample audience.

In total, 13 students (~3.25% response rate) responded to the mobile learning study survey and all participants were World Campus graduate students. The majority of respondents (10) were

between the ages of 22 and 40 years old. Only one respondent was 41-50 years old, and another one between 51 and 60 years old.

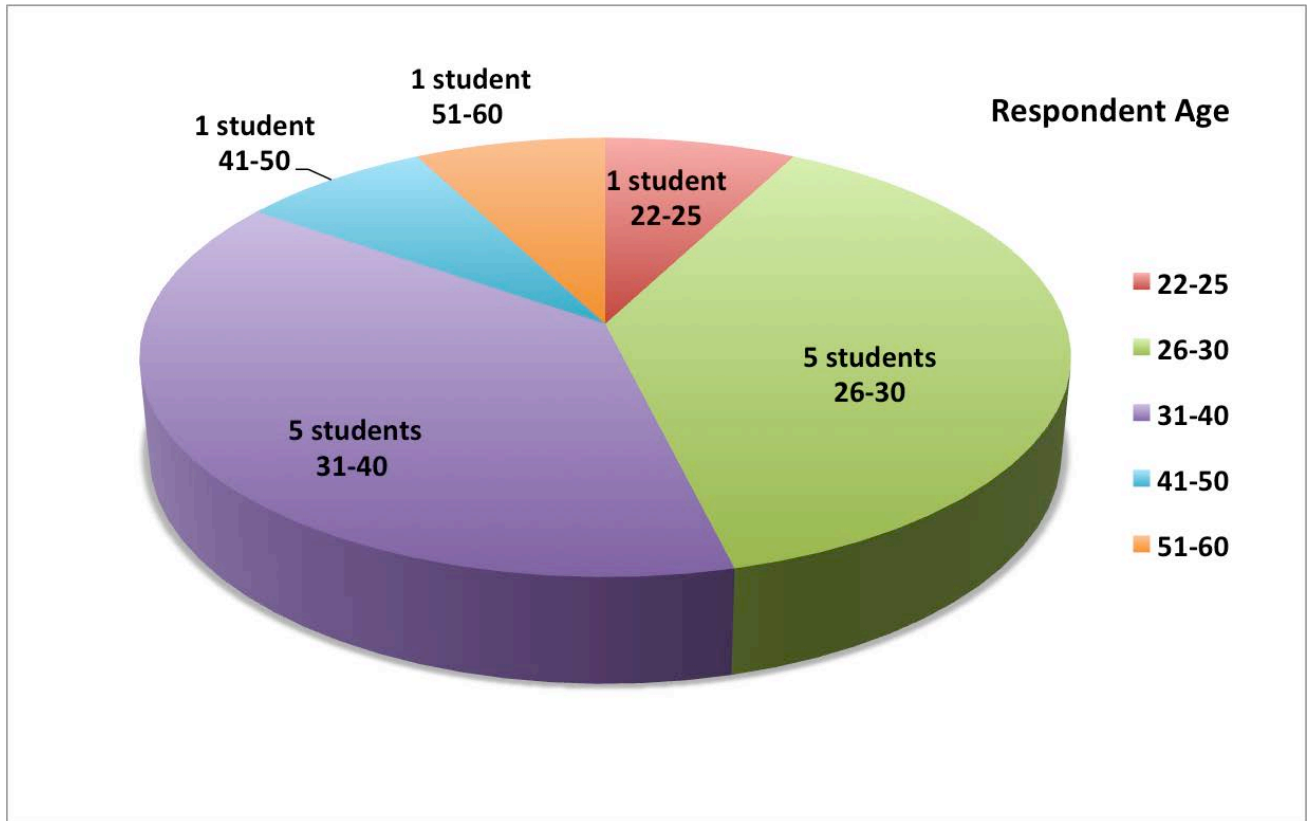


Figure 3: Study Respondent Ages

All respondents were adult learners and the demographic questions indicated that four students had school age children. Nine respondents were working full time and commuting to work every day. Five said they were travelling for business on a regular basis.

### ***Mobile Device Findings***

The survey also included questions related to the students' mobile devices and how they were used. These questions were designed to determine the most popular devices being used by our learners, and what those devices were used for.

Students were able to select multiple devices if they owned more than one. Nearly all respondents (11) said they were using smartphones, three had basic phones, six had MP3 players and digital cameras, two had iPads, and one had an e-reader (see Figure 4). Five students said they could not live without their smartphone and that it has become an integral part of their life.

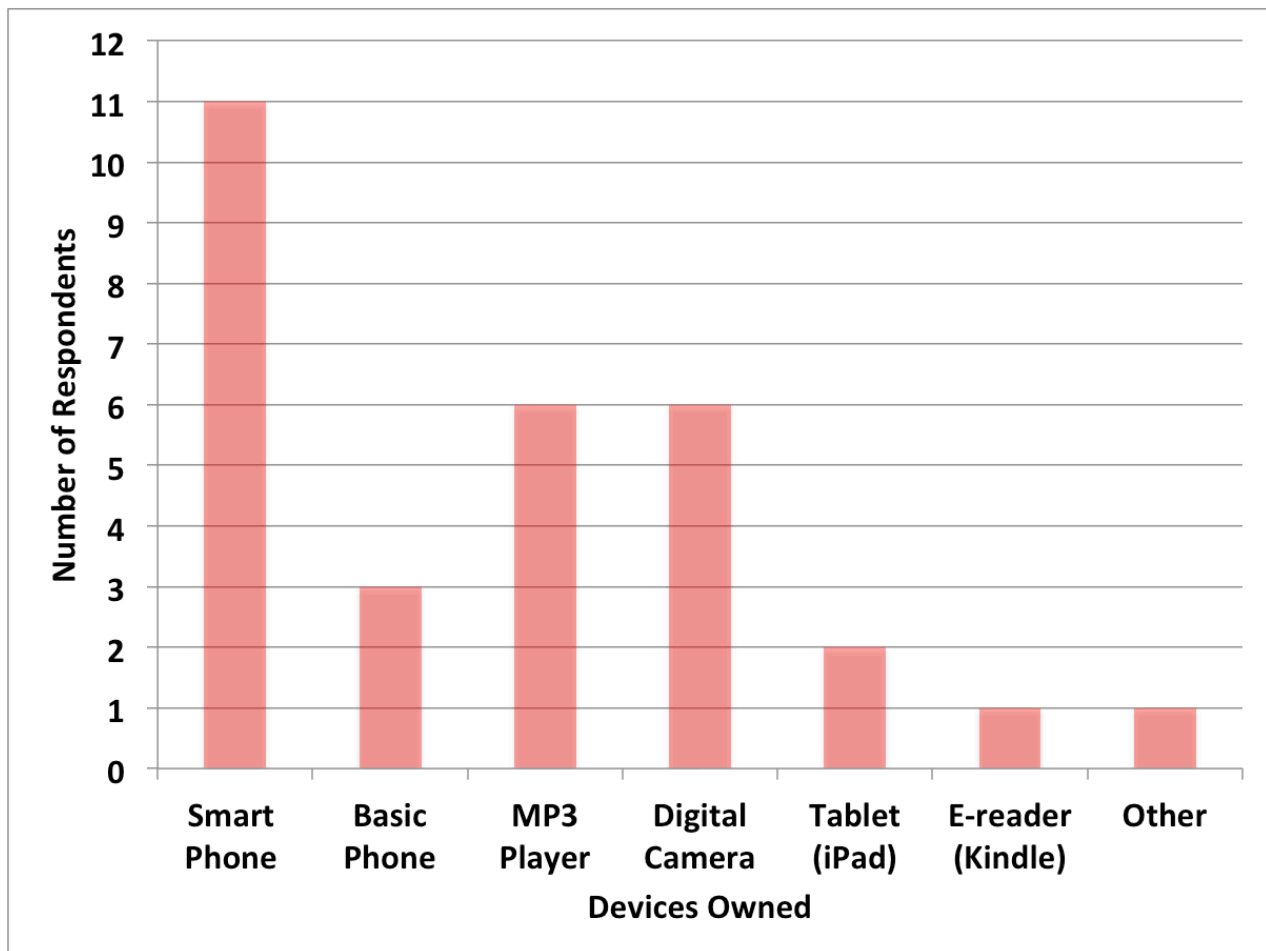


Figure 4: Mobile Devices Owned by Survey Respondents

The researchers were also interested in finding out how much time each day the respondents spent using their smartphones. Three said they spend less than an hour using the device; two students used it for one to two hours and six respondents for two to three hours. All 11 students claimed they were very comfortable or somewhat comfortable using their mobile device(s). Half of the respondents had their smartphone for less than a year, the other half, one year or more.

It is notable that three students felt that novelty does not play a role in their mobile device use. Of all the respondents, the majority (eight) said that the device must be useful for them to buy it, not the fact that it's new or popular among others.

Figure 5 below shows that the pilot respondents use their mobile device(s) mostly for making phone calls; text messaging; taking, sending, or viewing pictures or videos; calendar access; and reading articles, books, or online content.

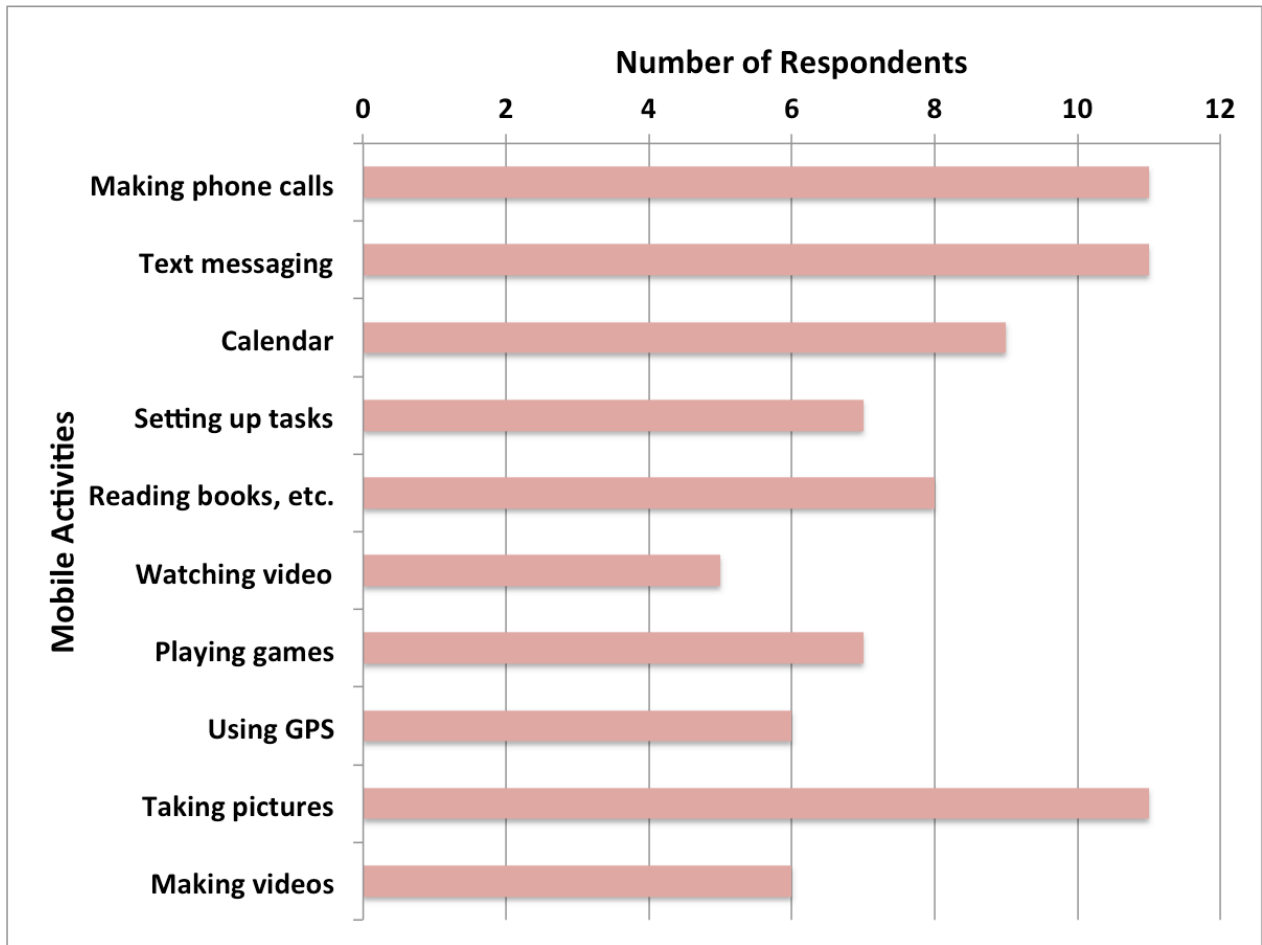


Figure 5: Mobile Device Use by Survey Respondents

Less common mobile activities among the respondents are recording or watching video, playing games, using GPS, and daily task setup (to-do list).

According to Figure 6, eight students said they were spending less than one hour online on their mobile device per day. The other five respondents were accessing the Internet for one or more hours.

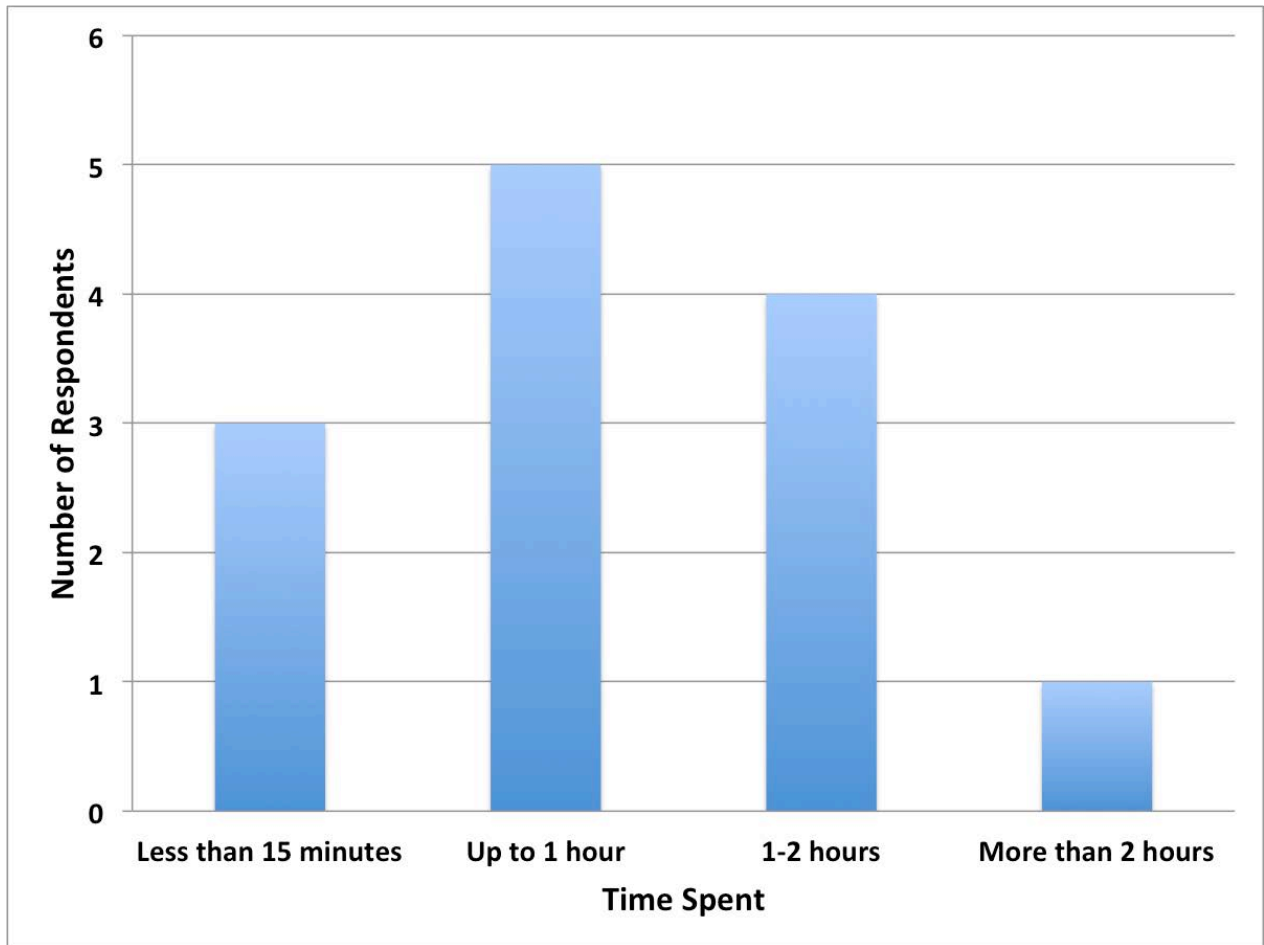


Figure 6: Respondent Time Spent Online with Mobile Devices

The results of this research study were compared to Pew Mobile Access 2010 data (Pew Internet & American Life Project, 2010). Among the matching activities of text messaging, playing games, taking pictures or recording videos on their mobile devices, the results of our study reflected proportions similar to the Pew data (see Figure 7).

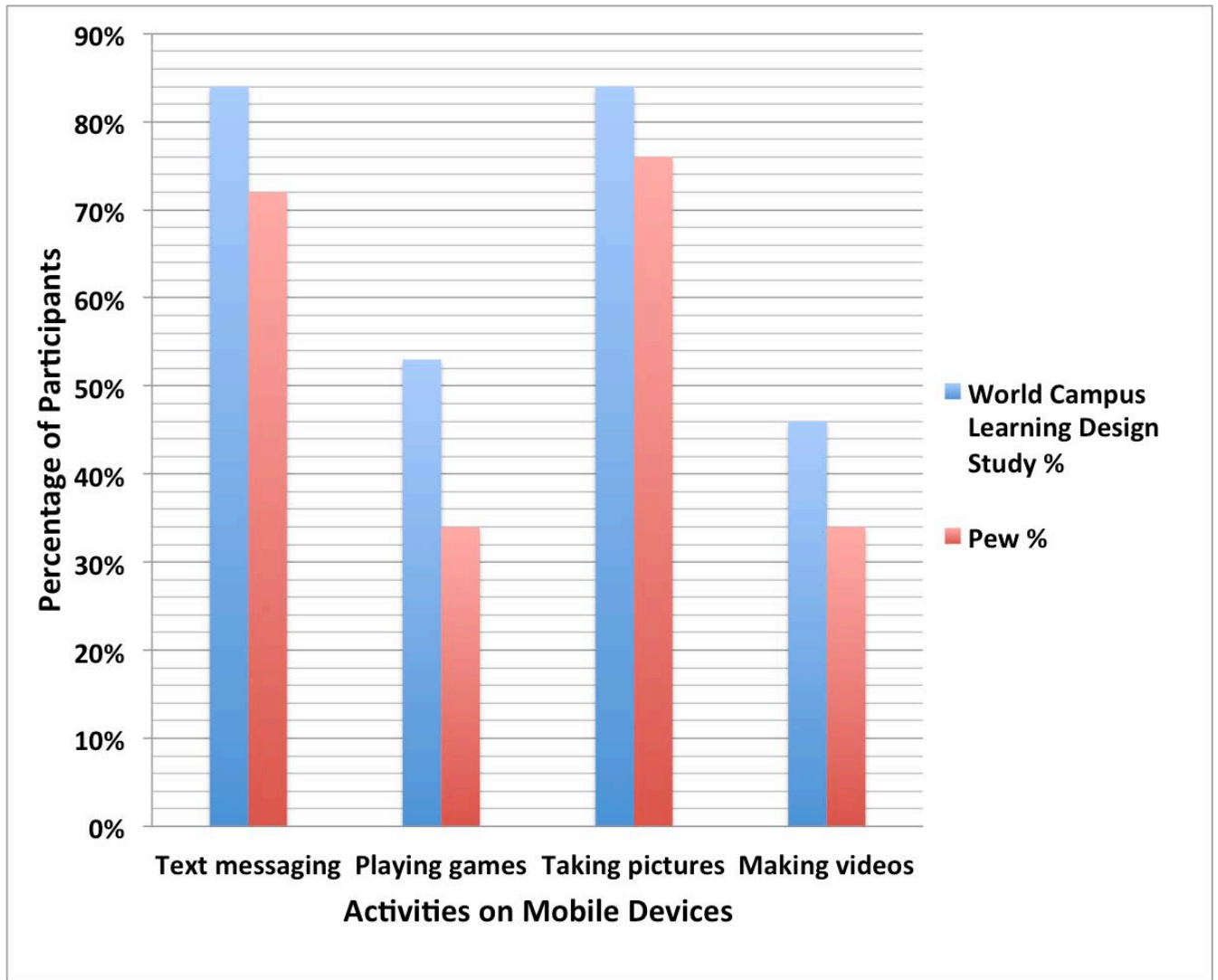


Figure 7: Pew - World Campus Learning Design Study Comparison

## ***Motivation Findings***

The last section of the survey focused on learners' motivation to engage in mLearning. The questions were designed to gauge the learners' attitudes and motivation for learning via mobile resources. To devise the motivation questions, the Learning Design research team utilized the Website Motivational Analysis Checklist (WebMAC) (Small, 1997). The WebMAC is an instrument used for designing and assessing the motivational quality of websites and is based, in part, on Keller's Attention Relevance Confidence Satisfaction (ARCS) Model of Motivational Design. WebMAC is structured around four characteristics: engaging, meaningful, organized, and enjoyable.



The survey questions posed on the “engaging” criterion revealed that three students found the course material delivered on their mobile devices to be very engaging. Two students answered somewhat engaging, while three students found the course material not to be engaging.

As Figure 8 shows, five students responded that they would prefer a blend of mobile content and traditional online content, while five students said they would not prefer mobile content and two would prefer mobile content over traditional online content.

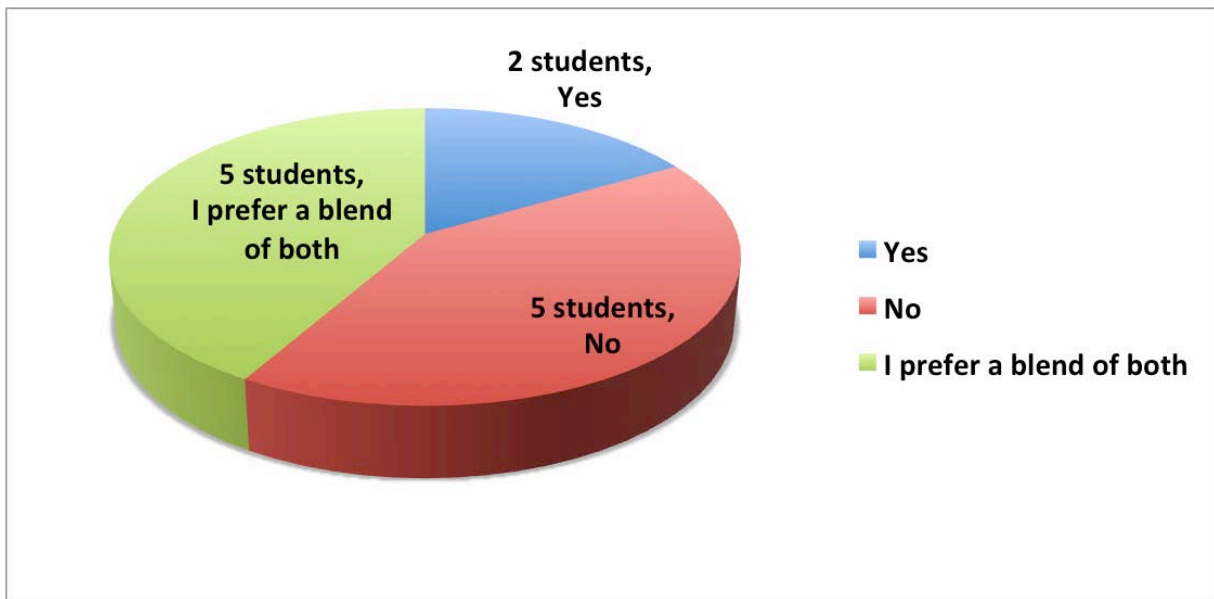


Figure 8: Student preference: mobile content over traditional online content

Further results revealed four students felt that having access to course material delivered on their mobile device enabled them to learn the material better than the same content presented in the traditional online format, where eight students did not. The students who felt that course material delivered on their mobile device improved their learning experience offered the following comments:



The survey's "meaningful" criterion covered questions about the importance of student grades and factors influencing their motivation to learn. All respondents said that grades were very important to them and nine claimed that they would seek out future courses with integrated mobile learning. Finally, the students were asked if more content delivered on the mobile device would motivate them to learn (see Figure 9). The respondents were evenly split with five reporting that they would be more motivated to learn, and five reporting their motivation would be about the same.

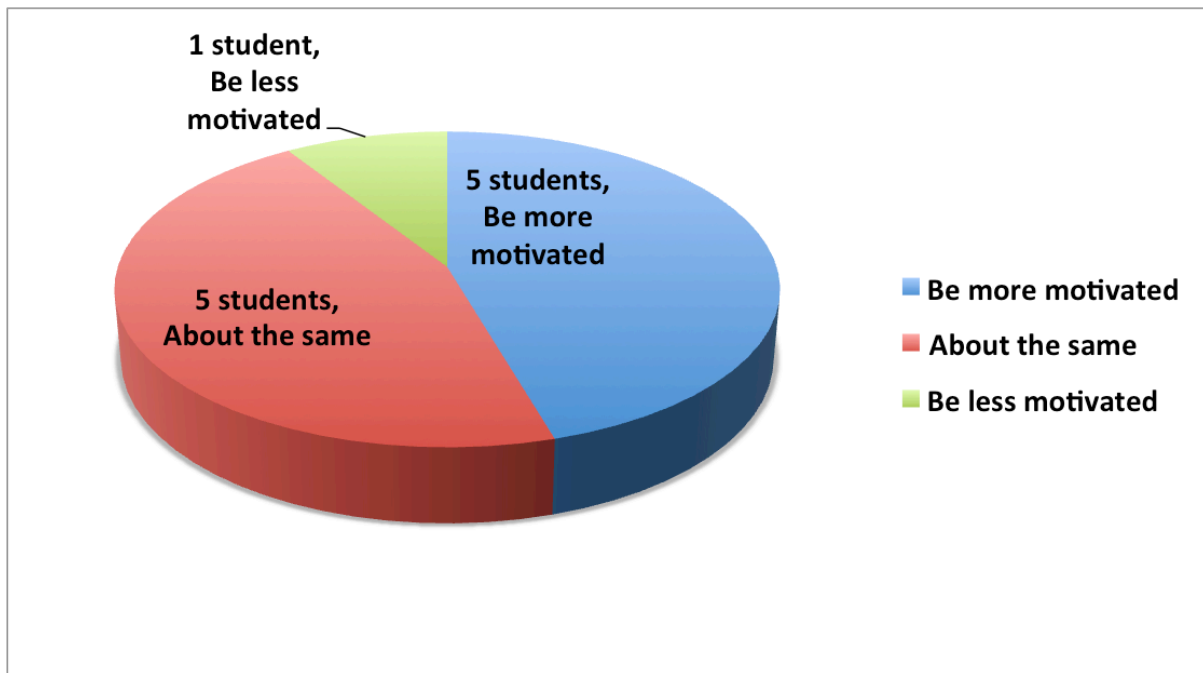


Figure 9: Mobile content effect on student motivation

The "organized" criterion questions asked why the students use their mobile devices and what they use their mobile devices for.

Six students responded that they want to keep up with technology. Seven do not want to miss anything while they are away from their laptop/desktop. Ten enjoy the anytime, anywhere flexibility in their schedules. Nine like having a computer that fits into a pocket.

Respondents were asked which course-related activities they would be most likely to use on their mobile device. As Figure 10 shows, the most common activities would be checking the course calendar, syllabus, schedule, or contact information; reading course content; and asking questions or getting advice.

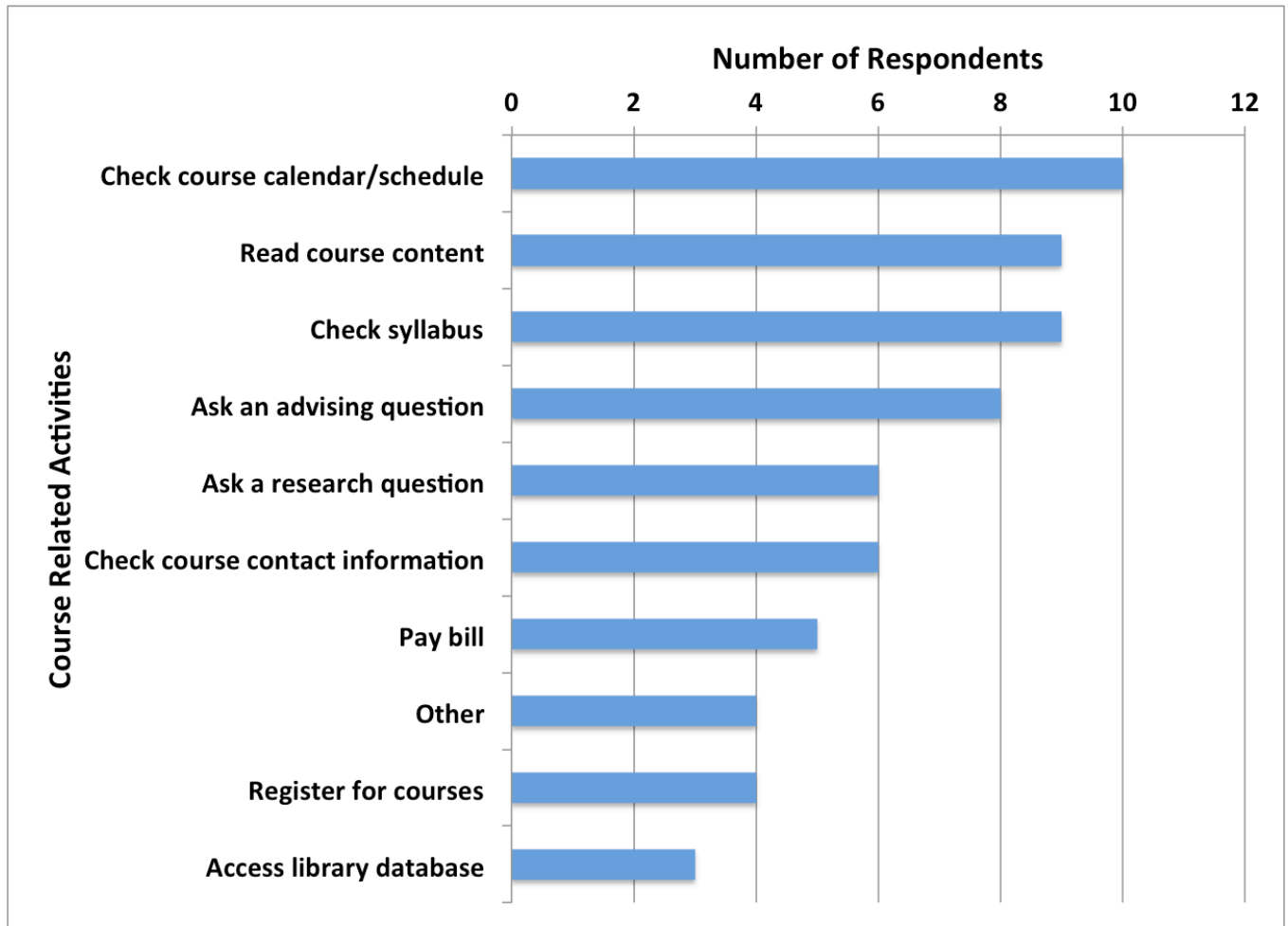


Figure 10: Course-related activities on mobile devices

The “enjoyable” criterion covered questions about the student’s experience interacting with the mobile course activities. Seven students responded that they found learning on their mobile device enjoyable. Four other students found it somewhat enjoyable and one student claimed no enjoyment. Figure 11 shows seven students also responded that they plan to continue using their mobile device to receive educational content. Four students were undecided and one has no plans at this time.

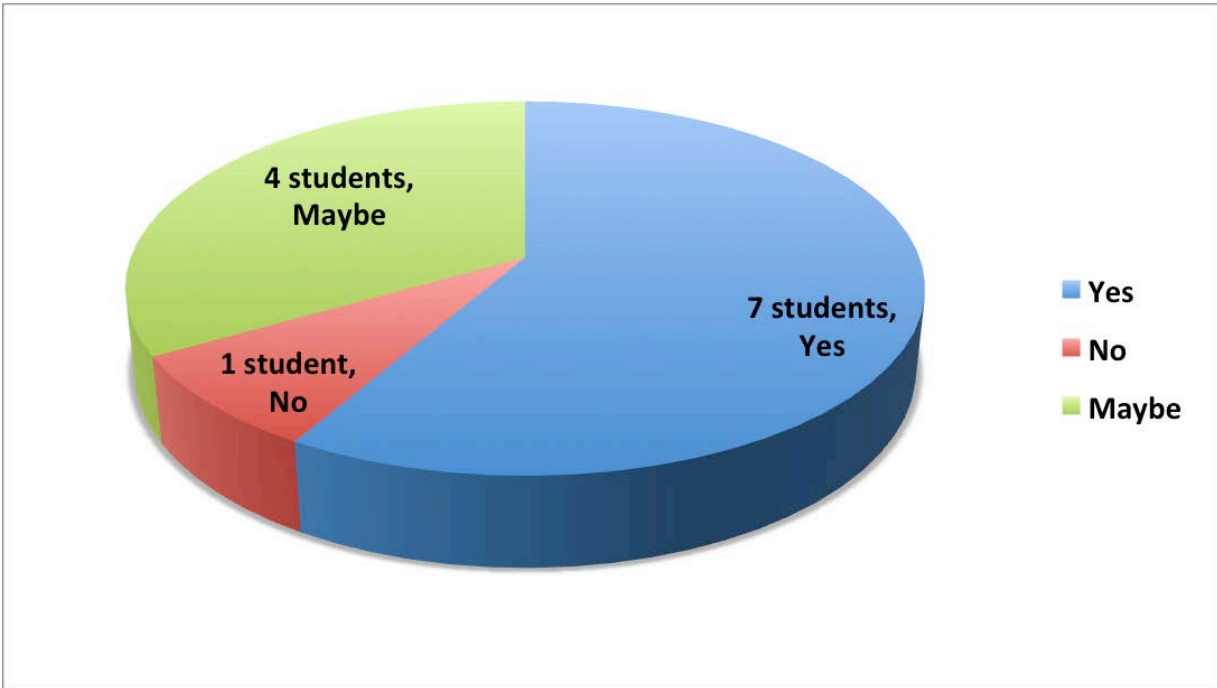


Figure 11: Participants using mobile devices for educational content

Students also had the opportunity to express what they liked or disliked about their mobile learning experience. Most of their responses were positive. Students mentioned that they always have access to their smartphone, so course materials were handy and always available. They felt that accessing course material on their mobile device added flexibility and efficiency to their study time, and made it easier to fit studying into busy schedules. One student mentioned that the phone was more convenient because it was smaller and lighter than books and notebooks.

Other students had mixed feelings about their mLearning experience. One student felt that the mLearning option was a good supplement to learning, but it didn't replace traditional online content. Others felt that accessing content in mobile form was similar to accessing it online. The flash card application specifically elicited responses: one student found it difficult to follow, and some commented that it didn't work on all mobile platforms.

Students felt that the mobile site was a good idea, but the limited content and inability to use all of the features of the course management system (for example, the discussion forums) left them wanting more functionality. Some applications were not accessible on certain mobile platforms and the content was not always formatted properly for good viewing and navigation.

As one student explained, "I envision mLearning to be a big part of distance education in the very near future." As the technology becomes more integrated with existing educational applications, mobile learning will no doubt grow in acceptance, popularity, and sophistication.

## Mobile Site Analytics

In addition to the survey responses, the researchers gained insights about the technology students are using and their usage behaviors from the traffic to the mobile sites using Google Analytics.

The average time per visit was about five minutes. In addition, users, on average, viewed more than five pages per visit (see Figure 12). Over three quarters of the traffic was from repeat visitors. It is also worth noting that a “new visitor,” for this pilot’s purposes, also means a one-time visitor. Thus, 22 students visited once and did not return to the mobile site (Figure 13). The researchers observed a spike in site visits during the beginning of the semesters when the mobile study was announced. After the initial spike, the number of visits was steady.

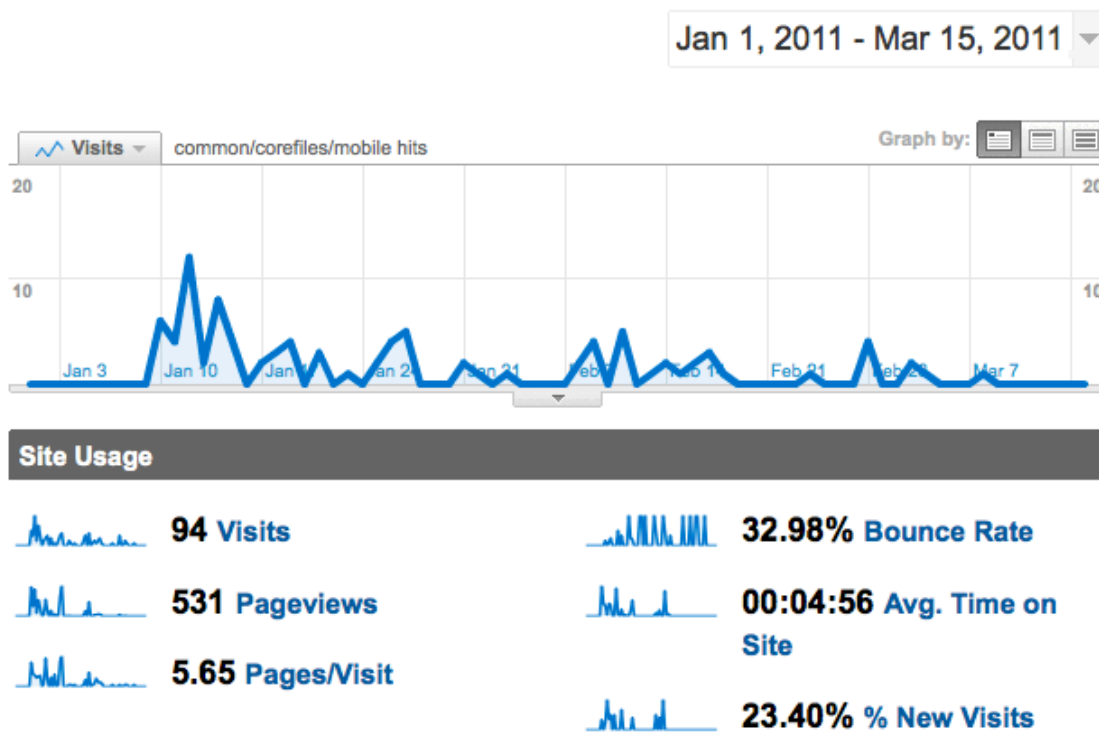


Figure 12: Google Analytics Mobile Web Site Traffic Summary

Visitor Type	Visits	Visits
Returning Visitor	72	76.60%
New Visitor	22	23.40%
Total Visitors	94	100%

Figure 13: Amount of Mobile Site Visitors

The top three devices used to access the mobile websites were Apple iOS devices - iPad, iPhone, and iPod, respectively (see Figure 14). Another significant portion of the traffic was from Google Android devices. Finally, the rest of the visitors used Research in Motion (RIM) Blackberries, desktop computers, laptop computers, and other devices.

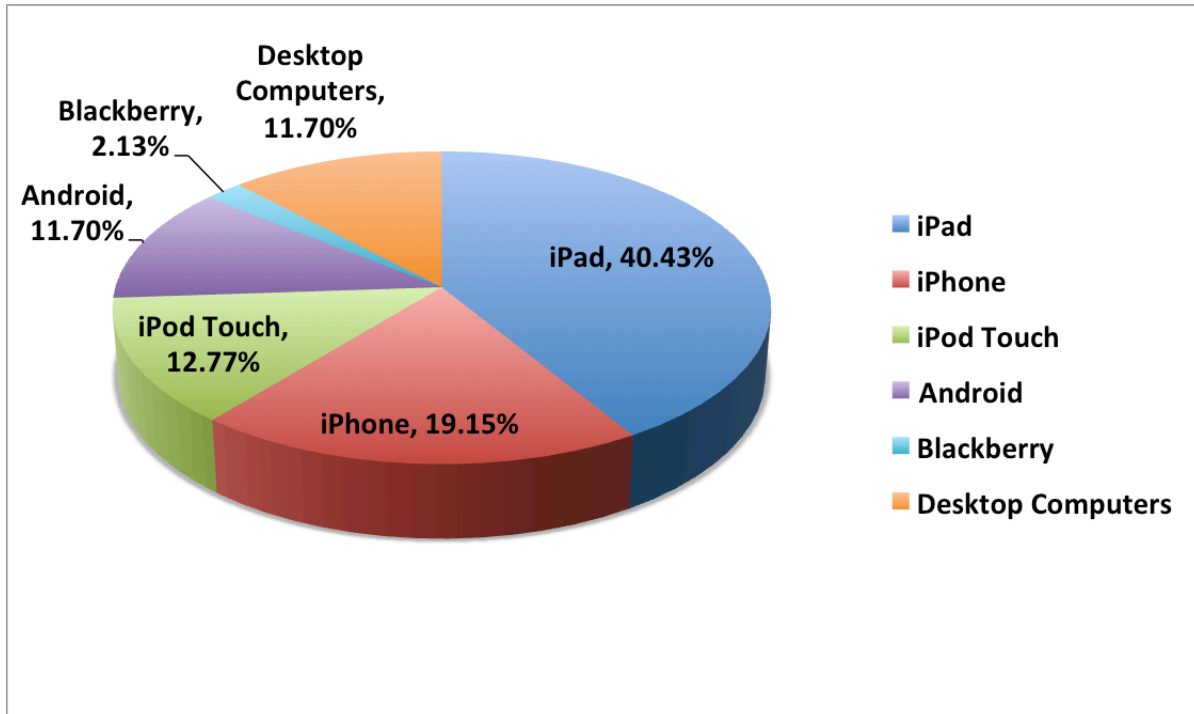


Figure 14: Visitors' Devices Used to Access the Website

## Discussion

### Purpose

The purpose of this study was to gather student perceptions on motivation, usefulness, engagement, and value of mobile resources. In order to measure learner motivation and satisfaction, students were given access to course resources via their mobile device. This study also explored how mobile devices can be utilized to provide instructional options for the World Campus students. The research team considered possible applications that would be easy to implement, yet provide value and relevance to students.

## Results

The researchers gained much knowledge by looking at the motivation survey results and the mobile site analytics. While no sweeping conclusions can be made based on the survey results due to low response rate alone, it is worth paying attention to the trends in learners' attitudes and to emphasize the importance of mLearning as evidenced by the mobile site traffic. Although only 13 students (3.25%) responded to the survey, 94 students (23.5%) accessed the mobile site, and 72 students (18%) returned to the site multiple times.

Several factors must be taken into account when considering the response rate in this study. Generally, response rates for satisfaction surveys are about 25-30% (Cook, Heath, & Thompson, 2000). Because the study was limited to students with smartphones or tablets, and the researchers relied on students' willingness to complete surveys, the 3.25% response rate was considered to be acceptable as a way to gain insight into mLearning. While this population is not representative, it is indicative of the perceptions the researchers were trying to evaluate.

The survey feedback showed that content delivered on the mobile devices can motivate students to learn, but it needs to be engaging, meaningful, organized, and enjoyable. According to the respondents, they want to be able to access all important course resources and be able to perform a wide variety of administrative tasks on their mobile devices. If learning activities are delivered on their mobile devices, they need to be tightly connected to the subject matter. Finally, the mobile content can be engaging, but it needs more interactive elements built-in so the students are a part of an active learning process.

One intriguing finding came from the mobile site analytics. While many researchers in the field do not classify iPads as mobile devices, the World Campus team found that students are using iPads more frequently than previously thought and consider them to be "mobile." It is now clear that iPad-like tablet devices are becoming very effective learning tools because of their portability, accessibility, interactivity, and always-on feature. In addition, compared to smartphones, the larger screen sizes allow students to engage in more activities that were traditionally limited to computers.

Perhaps the most important finding of this mobile learning study was that nearly half of respondents claimed that content delivered on their mobile devices would motivate them to learn. They said that learning on the mobile device was enjoyable and that they would look for future courses with integrated mLearning. Lastly, the students indicated that mobile content was useful and meaningful to them.

## Implication/Impact

Since the field of mLearning has so many facets, this study was designed to reach as many students as possible with a variety of different content types delivered on multiple mobile platforms. The study focused on smartphones and tablets, but all the pilot activities were designed to also be accessible through “traditional” computers, since this form of online learning is still favored by many students. In general, mobile design is good design, since mobile design focuses on stripping out superfluous components and puts the critical information the users need right on the screen. If designers shift their focus toward mobile design for all devices and screen sizes, students will benefit as a result.

Since the technology and capabilities of mobile devices continues to expand at a phenomenal pace, it is difficult to gauge the future capabilities of mobile, thus it is difficult to design specifically for technology enhancements that may be just over the horizon. The key to successfully designing for mobile devices is to create content and applications that are appropriate for those devices, but the challenge is that the target is constantly moving.

This study also points to a trend toward the desire for personalized learning--students want to decide where, when, and how they interact with the content and the learning experience. In order to meet these learner-centric demands, education will need to be accessible through a wide range of technologies and devices. Learning is also becoming more personalized, and the learners want to be able to choose their preferred devices with the expectation that the materials will be accessible. Educators and designers should work to increase motivation by utilizing the strength and power of personalized learning that mobile delivery provides.

As the speed of data delivery for mobile devices accelerates, the boundaries between various devices will blur. The speed of 4G networks (fourth generation cellular wireless standard) is starting to level the playing field as far as what devices can be considered mobile. The better and faster the networks, the more likely it is that students will be accessing their course resources on mobile devices.

We do not foresee mLearning completely replacing “traditional” online learning, however, technology delineations are blurring as the differences in capabilities between computers, tablets, and smartphones continue to shrink. Mobile devices are becoming more like tablet computers and laptops. Educators and designers will need to consider the capacities of these devices as they design educational content and resources that take advantage of the power of mLearning. They will also need to try to anticipate the best uses of improved technologies to improve the experiences of learners.

A variety of questions were evoked by this study. For example, what is considered a mobile device? What exactly is the definition of mLearning? Do mLearning devices include laptops, tablets, phones, cameras, or portable gaming systems? How would one design educational



content for a wide variety of mobile devices if the definitions and capabilities are constantly changing?

## Next Steps

Though it is imperative to continue to explore how to reach many students and distance educators through technology, it is even more important to be cognizant that it is impossible to constantly use the latest technology. As this study indicates, students want more mobile content, and higher education institutions would benefit greatly by moving ahead and starting to produce courses and content that are mobile-friendly, rather than waiting for the technology to mature. There is no question that technology will continue to move forward, and mobile devices may not look and function in the same way. Therefore, the focus in mobile content development needs to shift toward the devices' capabilities to enhance learning, rather than the devices themselves. Thus, a greater effort and emphasis should be placed on rethinking how courses and learning objects are designed for mobile devices in order to make use of their unique features.

In the short term, the research team proposes that World Campus Learning Design continue to focus energy and effort in developing learning objects that students can access on mobile devices. This will allow for further research to better determine the amount of resources that should be planned for mobile design. The research team recognizes that mLearning pedagogy is constantly changing, so the ongoing mobile research could benefit from gathering further data. Due to low response rate of this mobile research study, it is recommended that a future study hold a focus group and register students for the study in advance so the number of responses can be gauged more effectively.

Based on the current trends and the results of this study, the research team anticipates that in the future entire courses and even degree programs will be mobile friendly. Although some may advise against putting all content into mobile friendly format or "miniaturizing" an entire course, the students could make the choice that best fits their own technology and lifestyle. As course design continues to be more and more learner-centric, the student should be able to complete the majority of his or her course in a mobile device such as a phone or tablet, if they so choose. It is not an either or scenario, but one that provides for learner preference.

An ambitious push towards an entire course that is mobile friendly would mean that content, activities, and communication should all be accessible through mobile devices. A large portion of these features are handled by learning management systems (LMS) such as ANGEL or Blackboard. One of the main features of a new Learning Management System (LMS) should be the ability to easily incorporate a mobile element so that mLearning is facilitated and supported.

Finally, as 4G networks become more widespread, the technical requirement for World Campus students will need to shift to take mLearning into account. Currently, mLearning activities are optional and supplement traditional online content. In the future, however, if learning activities

are designed to leverage features that are unique to mobile devices, then smartphones and mobile broadband connections should become required tools for the World Campus learners who prefer this mode of interacting with the course environment.

## **Conclusion**

While mobile content does not currently replace traditional content, it can supplement it. Education has become more learner-centric as students are given a choice of what device to use and how they want to use it. It is clear from this study that the adult learners value anytime, anywhere, and on-demand flexibility. Mobile access to course resources enables them to stay on top of things, get the most of their time, and be more motivated to learn. Educators need to continue to look for new ways to motivate students in order to maximize their learning, and one way to accomplish this objective may be by delivering the content on devices of their choice.

# References

- Alexander, B. (2004). Going nomadic: Mobile learning in higher education. *EDUCAUSE Review*, 39(5), 28-35.
- Allen, I. E., & Seaman, J. (2010). *Class differences: Online education in the United States, 2010*. Babson Survey Research Group and The Sloan Consortium. Retrieved from [http://sloanconsortium.org/sites/default/files/class\\_differences.pdf](http://sloanconsortium.org/sites/default/files/class_differences.pdf)
- Apple - Education - iPad makes the perfect learning companion. (n.d.). Retrieved from <http://www.apple.com/education/ipad/>
- Brown, J., Metcalf, D., & Christian, R. (2008). *Mobile learning update*. Elliott Masie's Learning Consortium Perspectives. Retrieved from <http://masieweb.com/p7/MobileLearningUpdate.pdf>
- Brown, M. B., & Diaz, V. (2010). *Mobile learning: Context and prospects*. EDUCAUSE: Mobile Learning. Retrieved from <http://www.educause.edu/Resources/MobileLearningContextandProspe/204894>
- Brown, T. H. (2003, June). *The role of m-learning in the future of e-learning in Africa?* Presented at the 21st ICDE World Conference, Hong Kong, China. Retrieved from <http://www.tml.tkk.fi/Opinnot/T-110.556/2004/Materiaali/brown03.pdf>
- Brown, T. H. (2005). Towards a model for m-learning in Africa. *International Journal for E-Learning*, 4(3), 299-315.
- Caudill, J. G. (2007). The growth of m-learning and the growth of mobile computing: Parallel developments. *The International Review of Research in Open and Distance Learning*, 8(2). Retrieved from <http://www.irrodl.org/index.php/irrodl/article/view/348/873>
- Chen, G. D., Chang, C. K., & Wang, C. Y. (2006). Ubiquitous learning website: Scaffold learners by mobile devices with information-aware techniques. *Computers and Education*, 50(2008), 77-90. Retrieved from <http://www.sciencedirect.com>
- Cook, C., Heath, F., & Thompson, R. L. (2000). A meta-analysis of response rates in web- or Internet-based surveys. *Educational and Psychological Measurement*, 60(6), 821-836. doi:10.1177/00131640021970934
- Demski, J. (2010, May 1). The device versus the book. *Campus Technology*. Retrieved from <http://campustechnology.com/Articles/2010/05/01/The-Device-Versus-the-Book.aspx>
- Flashcards: The world's largest online library of printable flash cards. (n.d.). Retrieved from <http://www.flashcardexchange.com/>
- Freysen, J. B. (2005). M-learning: an educational perspective. *Mobile Learning Anytime Everywhere* 2, 73-76. Presented at the MLEARN 2004, Bracciano, Italy: Learning and Skills Development Agency. Retrieved from [http://elearning.typepad.com/thelearnedman/mobile\\_learning/reports/mLearn04\\_papers.pdf](http://elearning.typepad.com/thelearnedman/mobile_learning/reports/mLearn04_papers.pdf)

- Frohberg, D. (2006). *Mobile learning is coming of age: What we have and what we still miss*. Presented at the e-Learning Fachtagung Informatik, Darmstadt, Germany. Retrieved from [http://www.ifi.unizh.ch/im/fileadmin/user\\_upload/personen\\_downloads/2006\\_DELFI\\_Darmstadt\\_MLearn\\_Framework](http://www.ifi.unizh.ch/im/fileadmin/user_upload/personen_downloads/2006_DELFI_Darmstadt_MLearn_Framework)
- Gronlund, Å., & Islam, Y. (2010). A mobile e-learning environment for developing countries: The Bangladesh virtual interactive classroom. *Information Technology for Development*, 16(4), 244-259. doi:10.1080/02681101003746490
- jQuery mobile: Demos and documentation. (n.d.). Retrieved from <http://jquerymobile.com/demos/1.0a3/#docs/about/platforms.html>
- jQuery usage statistics. (n.d.). Retrieved from <http://trends.builtwith.com/javascript/JQuery>
- Keegan, D. (2005). *The incorporation of mobile learning into mainstream education and training*. Presented at the mLearn 2005: 4th World Conference on mLearning, Cape Town, South Africa. Retrieved from <http://www.iamlearn.org/public/mlearn2005/www.mlearn.org.za/CD/papers/keegan1.pdf>
- Keegan, D., Kismihok, G., Mileva, N., & Rekkedal, T. (2006). *The role of mobile learning in European education* (Workpackage 4). Retrieved from Ericsson website: [http://www.ericsson.com/ericsson/corpinfo/programs/the\\_role\\_of\\_mobile\\_learning\\_in\\_european\\_education/products/workpackage4.shtml](http://www.ericsson.com/ericsson/corpinfo/programs/the_role_of_mobile_learning_in_european_education/products/workpackage4.shtml)
- Kossuth, J., & Levine, A. (2011). *Mobile computing: A five-day sprint April 25-29, 2011*. Monday: The Future of Mobile Computing EDUCAUSE. Retrieved from <http://www.educause.edu/Mobile%2BSprint/MobileComputingA5DaySprint/MondayTheFutureofMobileComputi/227375>
- Laouris, Y., & Eteokleous, N. (2005). *We need an educationally relevant definition of mobile learning*. Presented at the 4th World Conference on Mobile Learning, Cape Town, South Africa. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.106.9650>
- Mental Case App: Flashcards for Mac, iPad and iPhone. (n.d.). Retrieved from <http://www.mentalcaseapp.com/>
- Motlik, S. (2008). Mobile learning in developing nations, Technical Evaluation Report. *The International Review of Research in Open and Distance Learning*, 63, 9(2). Retrieved from <http://www.irrodl.org/index.php/irrodl/article/viewArticle/564/1039>
- New Media Consortium, EDUCAUSE (Association). (2011). *The horizon report, 2011 ed*. Austin, TX; Boulder, CO: The New Media Consortium, EDUCAUSE Learning Initiative.
- Rosenberg, M. J. (2010, June 15). Marc my words: Thinking about mobile learning in the age of iPad. *Learning Solutions Magazine*. Retrieved from <http://www.learningsolutionsmag.com/articles/477/marc-my-words-thinking-about-mobile-learning-in-the-age-of-ipad>
- Shearer, R. L. (2010). *Philosophies and theories at the basis of student-centered educational models: Where theory and practice meet in instructional design for distance education*. XV International Congress on Technology and Distance Education.
- Small, R. V. (1997a). *Assessing the motivational quality of World Wide Websites* (No. ED407930). Retrieved from <http://www.ils.unc.edu/daniel/214/MotivationSmall.html>

- Small, R. V. (1997b). *Motivation in instructional design*. Retrieved from ERIC Digest website: <http://www.ericdigests.org/1998-1/motivation.htm>
- Smith, A. (2010). *Mobile Access 2010 Pew Internet & American Life Project*. Retrieved from <http://www.pewinternet.org/Reports/2010/Mobile-Access-2010/Summary-of-Findings.aspx>
- Tavangarian, D., Leypold, M., Nölting, K., Röser, M., & Voigt, D. (2004). Is e-learning the solution for individual learning? *Electronic Journal of e-Learning*, 2(2). Retrieved from <http://www.ejel.org/volume-2/vol2-issue2/v2-i2-art4-abstract.htm>
- Tella, S. (2003). M-learning—Cybertextual traveling or a herald of Post-Modern education? In H. Kynäslähti & P. Seppälä (Eds.), *Professional mobile learning* (pp. 7-21). Helsinki: IT Press. Retrieved from <http://www.helsinki.fi/~tella/mlearningtella.pdf>
- Terrell, S. (2005). Supporting different learning styles in an online learning environment. *Online Journal of Distance Learning Administration*, VIII(II). Retrieved from <http://www.westga.edu/~distance/ojdla/summer82/terrell82.htm>
- Woodill, G. (2011). *The mobile learning edge: Tools and technologies for developing your teams*. New York: McGraw-Hill Professional.

## Appendix A

### World Campus Mobile Learning Research Survey

#### Demographic Questions

1. How old are you?

- A) 18-21
- B) 22-25
- C) 26-30
- D) 31-40
- E) 41-50
- F) 51-60
- G) 61 or over

2. I am a \_\_\_\_\_ student.

- A) University Park
- B) Other PSU Campus
- C) World Campus
- D) International

3. I am a \_\_\_\_\_ .

- A) Freshman
- B) Sophomore
- C) Junior
- D) Senior
- E) Graduate student

4. Do you have school age kids?

- A) Yes
- B) No

5. Do you work full time?

- A) Yes
- B) I work part-time
- C) I am self-employed
- D) I am unemployed

6. Do you commute (to work, classes, etc.)?

- A) Yes
- B) No

7. Do you travel for business?

- A) Yes
- B) No

### **Mobile Device Questions**

8. What mobile devices do you have? Check all that apply.

- A) Smart-phone
- B) Basic-phone
- C) MP3 player
- D) Digital camera
- E) Tablet (iPad, Galaxy, etc.)
- F) E-reader (Kindle, Nook, etc.)
- G) Other

9. If you have a smart-phone can you live without it?

- A) Yes
- B) No

10. How many hours a day do you use your smart phone?

- A) Less than 1 hour
- B) 1-2 hours
- C) 2-3 hours
- D) 3 hours or more

11. How comfortable are you using your mobile device(s)?

- A) Very comfortable
- B) Somewhat comfortable
- C) It is too complicated

12. How long have you used your smart phone?

- A) Less than 1 year
- B) 1-2 years
- C) 2-3 years
- D) More than 3 years

13. What role does novelty play in your mobile device use?

- A) I always chase the newest gadgets
- B) If it's a popular device I'll buy it
- C) If it's a useful device I'll buy it
- D) Novelty does not play a role

14. What do you use your mobile device for? Check all that apply.

- A) Making phone calls
- B) Text messaging
- C) Calendar
- D) Setting up tasks (to-do lists)
- E) Reading articles, books, articles, online content
- F) Watching video
- G) Playing games
- H) Using GPS
- I) Taking, sending or viewing pictures
- J) Taking, uploading or watching videos

15. If you access the internet on your mobile device, how much time (per day) do you spend online?

- A) Less than 15 minutes
- B) Up to 1 hour
- C) 1-2 hours
- D) More than 2 hours

### **Motivation Questions**

Did you use any of the following mobile learning activities in this course?

- Mobile course site
- Mobile course announcement
- Mobile audio/video files (podcasts)
- Mobile flashcards

If you used any of these please complete the following motivation questions.

16. Did you find the course material delivered on your mobile device to be engaging?

- A) Very engaging
- B) Somewhat engaging

C) Not engaging

**17.** Do you prefer mobile content over traditional online content?

- A) Yes
- B) No
- C) I prefer a blend of both

**18.** Do you feel that having access to course material delivered on your mobile device has enabled you to learn the material better than the same content presented in traditional online formats?

- A) Yes
- B) No

**19.** If you answered yes to the previous question, do you feel your improved learning is due to availability or was it presented in a way that made it easier for you to learn? Please explain.

**20.** Now that you have experienced mobile learning in your course would you seek future courses with integrated mobile learning?

- A) Yes
- B) No

**21.** How important are grades to you?

- A) Very important
- B) I just want to pass
- C) I just want to get reimbursed

**22.** If you had more content delivered on your mobile device would you be more motivated to learn?

- A) Be more motivated
- B) About the same
- C) Be less motivated

**23.** Why do you use your mobile device? Check all that apply.

- A) I want to keep up with technology
- B) I don't want to miss anything while I'm away from my laptop/desktop
- C) I enjoy the anytime, anywhere flexibility in my schedule
- D) I like having a computer that fits in my pocket

**24.** Which of the following online activities would you be most likely to do on a mobile device? Check all that apply.

- A) Check course calendar/schedule
- B) Check course contact information
- C) Check syllabus
- D) Read course content
- E) Ask an advising question
- F) Ask a research question or get help
- G) Access library account
- H) Access library database
- I) Register for courses
- J) Pay bill
- K) Other



25. Do you find learning on your mobile device enjoyable?

- A) Yes
- B) Somewhat enjoyable
- C) No

26. Do you plan to continue using your mobile device for receiving educational content?

- A) Yes
- B) No
- C) Maybe

27. What did you like or dislike about the mobile learning experience? Please explain.

## Appendix B

The misspellings in this appendix were left on purpose to keep the authenticity of student responses.

Question 19: If you answered yes to the previous question, do you feel your improved learning is due to the availability or was it presented in a way that made it easier for you to learn? Please explain.

- Because I always bring my smart phone with me but I wont always remember to bring traditional flash cards or course material with me. Therefore, it makes my study more efficient (eg. I could read flash cards while waiting for subway, bus, etc.)
- I can take it with me without the bulk of books or notebook paper.
- available - can do it in the car - great supplemental learning option
- The flashcards were hard for me to follow. If they had been easier to follow, I would have used it a ton!

Question 27: What did you like or dislike about the mobile learning experience?

- I found it not much different from what my phone could do prior to learning about the Mobile Learning. I have an iphone 4 and could get on that website and check all of the same things that I checked online. Nothing much seemed different.
- The mobile site is a great idea, but limited in content. I was unable to access the flashcards as the application is not available for my phone, but it would be something I would find beneficial.
- Like: I could listen to music while read my flash cards anywhere outside of my laptop.
- It was hard to see the class content on my Ipod touch. Words at the bottom of the page would not show up. Having all content information formated for a mobile device is a must.

- The only problem that I confronted was that the flashcards offered were mostly definitions. There need to be more available as far as application to content such as questions that would be similar to the examinations. These are the types of questions and content I use to help study.
- the flexibility and ability it gave me to spend more time studying/concentrating on the lesson material I actually enjoy studying/learning I jsut have a hard time fitting it all in - this helps
- I would have liked to have the flash cards available for smart phones, not jsut for iphones
- I like using an actual computer. I find it easier and faster to use. I also like that I can easily print out the information that I need.
- Many of my online courses require a lot of discussion board participation. I cannot read or post on my course discussion boards using my phone. I can only access the syllabus and announcements which is not particularly useful.
- It was a great experience. I envision mLearning to be a big part of distance education in the very near future. I was expecting more mActivities, but since it was a study and I was confused where to find things - in the actual online class on the computer or on the mDevice - maybe the number of required mTasks was just right. Thanks!