

A CROSS CULTURAL COMPARISON OF SMARTPHONE USE IN THE
UNITED STATES AND THE KINGDOM OF SAUDI ARABIA

by

Mohammed Zaidan Almahfud

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of

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in

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DEDICATION

To my parents and to my family here, especially my wife.

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ABSTRACT

Few studies have investigated how university students in the United States or in other countries use smartphone technologies to support their learning. Much of the current research has investigated the general use mobile devices such as smartphones rather than identifying the specific applications used by university students to support their learning. In addition, there is a lack of research investigating the influence of institution, gender and culture on university students' use of smartphones to supporting their learning. The purpose of this study was to investigate how US university students and university students from Saudi Arabia use smartphone for learning in the undergraduate teacher education courses. A total of 249 undergraduate teacher education students from Montana State University and 320 undergraduate students from King Kahlid University, Saudi Arabia were surveyed to assess their use of smartphone applications to support their learning. Results from the 43 item smartphone survey found that MSU students reported using their smartphones "sometime to often" during class and outside of classroom setting while KKU students on the other hand reported using smartphones "Never or Rarely" during class or outside of class. The most frequent use of smartphones by MSU students reported was for communicating and collaborating with others by texting or through email. The most frequent uses of smartphones reported by KKU students during and outside of class were for "communicating with others by texting and "accessing course information". Although MSU and KKU students differed significantly on some of the items assessing smartphone use in and outside of the classroom, the differences were very small in magnitude. Both MSU and KKU students reported that they "never or rarely" observed others using their smartphones to dishonestly to complete assignments or during quizzes and exams. Results from this study indicate that smartphone applications are under utilized as a learning tool in higher education. As university students continue to have greater access to mobile devices, university faculty should consider ways to develop courses that are accessible by smartphones and other mobile devices to increase student learning opportunities.

CHAPTER I

INTRODUCTION

Smartphone Use In Higher Education

Technology is a relatively new addition to the daily lives of people around the world. More than ever, technology is affecting how people work, how they exercise, and spend leisure time, as well as how children are educated in schools. Modern lives have been revolutionized by this access to information and ease of communication.

“[T]echnologies and new forms of mobile communication and collaboration have been widely adopted by young people and integrated into their everyday lives” (Milrad, 2007, p. 62). Smartphones have been a major contribution in this shift to technology-based living. They are often used by individuals who seek to work in multiple contexts including at home, during commutes to work, and on vacation (Butt & Phillips, 2008). Smartphones allow people to access information quickly and efficiently while taking breaks from routine work or home activities. For example, Montana State University (MSU) has recently developed a smartphone app that can be used to access the Montana State website in addition to other MSU resources such as online courses, the library and course schedules. Similar results were found for KKKU students as well.

Currently, “Nearly half (46%) of American adults own smartphones (New, 2012) while even a greater percentage of individuals own smartphones in other countries. For example, Crum (2012) estimates that 60 percent of Saudi Arabian people use smartphones in their daily lives. The use of mobile devices has enabled seamless access

to the Internet across both formal and informal learning contexts (Scanlon, Jones & Waycott, 2005). For example sixty-eight percent of white-collar workers report doing using a mobile device (e.g., laptop, smartphone, tablet) for work purposes (Barbier, Bradley, Macaulay, Medcalf & Reberger, 2012). Children in the US are now more likely to own a mobile phone than a book suggesting that these devices are supplanting written text for electronic text as a source of information and entertainment.

The use of mobile devices by university students has increased dramatically in recent years and has become their primary source of Internet access on campus (Keller, 2011). A study conducted by Chen & Denoyelles (2013) at the University of Central Florida found that of 1,082 students surveyed, 79% owned a smartphone. A comprehensive study of 100,000 students from 195 college campuses conducted by Dahlstrom in 2013 found that most students still owned laptop computers (86%). Sixty-two percent of these same students reported owning smartphones while 15% reported owning tablets. More importantly, 67% of those students who reported owning smartphones or tablets indicated that they used them for academic purposes. This percentage nearly doubled over the percent of students reporting the use of mobile devices for academic purposes in 2011.

The use of computers and tablets has opened the door for university students to personalize their learning to fit their individual needs (Crompton, 2013). Students can utilize the technology they have to streamline information and learn in a way that makes sense to them. Computers and tablets allow students to engage in learning activities in both formal and informal contexts (Scanlon, Jones & Waycott, 2005). They can complete written papers and other homework assignments in a variety of different places outside of

the classroom such as the library, at home or at the local coffee shop. Even during class, students are able to send and receive information related to concepts taught in class through texting and instant messaging (Dahlstrom, Walker & Dzuiban, 2013). Tablets and computers “allow students incredible freedom over when and how to pursue the learning process” (Rossing et al, 2012, p.14). They are able to quickly take notes by typing, record their lectures, look at and manipulate slides and pictures that their professors have made available online, and customize the information in a way that works for them.

Smartphones like table computers and other mobile devices are evolved pieces of technology that have the potential to support student learning the in the classroom. Students can potentially use smartphones to record a lecture, search for definitions, or send notes to absent students, as well as use the collaborate with other students electronically to complete homework assignments. A smartphone is basically a hand held computer that allows users to access many different forms information via the Internet from one single device. A smartphone’s ability to be used as a classroom learning tool is what gives it greater value to both students and teachers (Cheung, 2009). Web 2.0 in particular social networking software applications allows the smartphone to become a research, note taking, recording, and entertainment device that has great potential for supporting learning formally inside the classroom and informally outside of the classroom (Solvberg & Rismark, 2012). One advantage of Web 2.0 applications over programs used on with a laptop computer, for example, is that they are relatively inexpensive. A smartphone “app” for note taking or a study organizer can be free or cost less than ten dollars, but the same type of program for a computer can cost the student a lot of money.

With a smart phone, hundreds of apps are at your fingertips, bringing total convenience to a wide variety of situations. Apps can provide you with the exact same features as some incredibly expensive items on the market, all from the portable touch screen of your phone. (Black, 2012)

Mobile devices, such as smartphones, have great potential to improve educational systems world wide because of opportunities they offer for seamless access to learning environments across multiple contexts and personalized learning experiences. It is a vital resource to countries that hope to remain academically competitive.

The use of smartphones in higher education has been shown to enhance learning when they are used with Mobile Web 2.0 applications to access podcast lectures, streaming video, social networking sites and a host of other course resources (Cochrane & Bateman, 2009; Huang, Wu & Chen, 2012; Solberg & Rismark, 2012; Williams & Pence, 2011). For example, Cochrane & Bateman's (2010) research demonstrated how university students in Australia used smartphones to support the development of learning communities where students engaged in reflective inquiry and problem solving using social networking software. Huang, Wu & Chen (2012) also found that undergraduate students using smartphones in a Sales and Marketing course assignment collaborated with their peers better to learn the assignment concepts than their counterparts who did not use smartphones. For this study, an assignment embedded with mobile QR codes that allowed students to access supplemental materials and questions more efficiently using their smartphones. Students in the experimental group accessed the assignment questions and typed the answers to questions on their smartphones prior to group discussions while control group students answered questions individually with no group collaboration. Findings from this study indicated that participants in the experimental group using

smartphones to write answers and discuss them with their peers realized better learning outcomes than their control group counterparts.

Benedict & Pence (2012) also investigated the use of smartphones with undergraduate students enrolled in a general chemistry course. Videos created to provide directions for using the laboratory, scaffold classroom learning activities and guide homework assignments were linked to Quick Response (QR) codes for streamlined smartphone access. Results from student evaluations of these activities found that most students felt that the streamlined access to videos using QR codes made the videos more accessible during group work and helped them to visualize problems more immediately. An important attitudinal result was that students indicated positive attitudes toward using smartphones more often to support their learning in other university courses. Finally, Solvberg & Rismark (2012) investigated the use of mobile learning devices with university students in Norway enrolled in an undergraduate sociology course. They created video lectures that could be accessed with smartphones, tablets and other mobile devices. Surprisingly, although, not required, many students still attended class lectures even though they were made available as recorded podcasts on the Internet. In addition, although connected with classmates by wireless mobile devices, students continued to meet in small groups to access video lectures and collaborate on assignments. Although, the video lectures were readily accessible through the Internet, only a small percentage of students accessed them during their campus commutes.

Although the use of smartphones to support university students' learning is promising, there are some concerns about their use in the classroom. Two concerns that seem to surface regularly related to university students use smartphones during class is

that they can be distracting and can be used to cheat during tests and quizzes. When an unmuted smartphone rings during a class, often times instructional time is reduced because the instructor students is forced to regain students' attention and repeat the concepts being taught. Student's texting while in class could also be a distraction that causes students to be inattentive and disengage from the learning environment (Tindell & Bohlander).

The increased availability of social networking software available for mobile devices provides opportunities for student to cheat by texting answers and sending other media that provides answers during tests and quizzes. Students' texting during class is a common practice. For example, a survey of 269 college students conducted by Tindall and Bohlander (2011) found that the majority of students reported sending and receiving text messages from others during class time while a minority indicated that they texted during an exam at least once. Cheating has always occurred in and outside of the classroom, however, smartphones and other mobile devices have allowed students to much more easily obtain and share information dishonestly during tests and quizzes (Carter, 2012).

The potential for distractions and dishonest behavior related to smartphone use has caused many US public schools to ban their use (Schacter, 2009). However, despite the negative aspects of smartphone use, universities appear to be embracing the use of smartphones in the classroom. Anecdotal studies investigating the use of smartphones in higher education suggest that learning is enhanced when these mobile devices are used with Web 2.0 applications to access podcast lectures, streaming video, social networking

sites and a host of other course resources (Cochrane & Bateman, 2009; Huang, Wu & Chen, 2012; Solberg & Rismark, 2012).

However, the use of smartphones by student in higher education classrooms is not embraced internationally. There are many countries that perceive that disadvantages of smartphones related to distractions and cheating outweigh the learning benefits they have the potential to provide. For example, as of 2013, in Saudi Arabia it is not culturally acceptable for students of any age to use smartphones during the school day or in other certain situations, such as when they are with parents, visitors, or attending meetings. Such behavior is considered disrespectful because the smartphone user is not giving his full attention to the other person involved in the conversation. In addition, instructors in Saudi Arabia are also expected to refrain from using smartphones in the classroom primarily because there have been instances of teachers inappropriately using smartphone technology to record videos of students and post them on the Internet. The Saudi government has dealt harshly with these teachers by demoting them to a low ranking secretarial position where they earn least half of their teacher salary. The severity of this punishment has caused teachers to not allow smartphone use in their classes even when they could be used in positive ways to enhance learning. The use of Smartphones by female students in Saudi Arabia is particularly restricted because of fears of inappropriate use for taking pictures. The cultural norms in Saudi Arabia strictly forbid taking pictures of females and sharing those pictures with others outside their immediate families.

Problem Statement

As smartphones and other mobile device use continues to increase on college campuses, institutions and their faculties will need to develop sound strategies to leverage their use for creating a more personalized and student-centered learning environment. To date, only a handful of studies have been conducted in the USA and other in countries to investigate how university students use smartphones to support their learning. Most of this research is focused on the use of the mobile devices themselves rather than investigating how they support student learning in formal classroom settings as well as in more informal settings outside of the classroom. In addition, the research studies that have been written about benefits and limitations of smartphone report very little empirical evidence to support their claims (Merchant, 2012). Although there is some evidence about students' use of smartphones in higher education, there is little research about the influence of institution, gender and culture on university students' use of smartphones for learning.

Purpose Statement

The purpose of this study was to investigate how US university students and university students from Saudi Arabia use smartphone for learning in the undergraduate teacher education courses. In particular, it analyzes how university students can use these devices to access course materials and interact with peers and the instructor within and outside the physical boundaries of the classroom.

Prior to investigating the benefits of using Smartphones for learning in university classrooms, it was important to first determine a baseline of current technology use in

education at Montana State University as well as at King Khalid University. This research was used to better understand the views of students about using smartphones in classroom settings. Further, this research provided answers to many questions such as how technology is already being used, how a student's learning is currently being assessed, how students use their smartphones outside of class, and what barriers there are to the use of mobile technologies in classrooms. The results of this research will provide accurate and vital information to educators and students about how mobile technology can be used in the classroom.

The information gathered in this research will be used to identify and help overcome barriers currently facing Montana State University and King Khalid University in the use of technology in education. On a more global scale, I think it is vital that both universities make technology a greater focus in the classroom if the country desires to stay competitive worldwide academically and economically. Comparing both of these cultures will let researchers understand different ways to get past the barriers facing them as well as obtain new ideas for how technology can be used in education.

Research Questions

1. How do university students in the United States and Saudi Arabia use their smartphones inside and outside of the classroom to support their classroom learning?
2. Do university students from the United States and students from Saudi Arabia differ in use their use of smartphones inside and outside of the classroom to support their learning?

3. Do male and female university students from the United States and Saudi Arabia differ in their use of smartphones inside and outside of the classroom to support their learning?
4. Do students at Montana State University and King Khalid University report the use smartphone technology for cheating?

Definitions

Academic Dishonesty: Any type of cheating that occurs in a formal or informal classroom setting. Academic dishonesty includes any unauthorized assistance used to complete schoolwork such as unapproved cheating on tests, quizzes, or assignments, plagiarizing, or any other type of (Schmelkin, Gilbert & Silva, 2010).

Smartphone: Smartphones are a handheld device that integrates mobile phone capabilities with the more common features of a handheld computer (Cochrane & Bateman, 2009; Wilen-Daugenti (2012).

Mobile Technology: personal mobile electronic devices that span the spectrum of technology from “cell phones”, personal digital assistants, MP3 players, tablets and laptops in addition to smartphone , game consoles, digital cameras, media players, netbooks, in-car satellite navigation, and handheld computers (Willems, 2013)

Digital Natives: a young generation of learners who have grown up immersed in new digital technologies (Prensky, 2001).

Pre-service teacher: a period of guided, supervised teaching. The college student is gradually introduced into the teaching role for a particular class by a mentor or cooperating teacher. The cooperating teacher works with and encourages the preservice

teacher to assume greater responsibility in classroom management and instruction as the experience progresses. The preservice teacher begins as an observer and finishes the preservice teaching experience as a competent professional (Virginia Wesleyan College, 2014)

Mobile Device: a compact digital portable device that an individual carries on a regular basis, has reliable connectivity, and fits in a pocket or purse (Wexler et al. 2007)

Web 2.0: The social use of the Web, which allows individuals to collaborate in knowledge creation and to share information online. Web 2.0 includes blogs, wikis, social networking & bookmarking. At the heart of Web 2.0 is a culture of sharing, interaction, active content creation and continual communication with the online environment” (Cochrane & Bateman, 2010; O’Reilly, 2005)

Social Networking: Web-based applications that allow individuals to construct a public or semi-public profile within a bounded system and interact with a list of other users with whom they share a connection with the web-based application system (Boyd & Ellison, 2007)

Pedagogy 2.0: An instructional approach that uses Web 2.0 applications to facilitate learning through personal choice, participation collaboration, and creative production (McLoughlin & Lee, 2010)

Mobile Learning (m-learning): learning across multiple contexts, through social and content interactions, using personal electronic devices (Crompton, 2013).

Limitations and Delimitations

Students' perceptions of how they use smartphones may not be accurate. They may over- or underestimate the different ways they use smartphones. Student perceptions of smartphone use may be based on their perceptions of how competent they feel in using smartphone technology. In addition, the prevailing attitude of the Saudi Arabian government as well as Saudi university and faculty is against the use of Smartphones by students in class. However, many Saudi students continue to covertly use their smartphones during class, ignoring the potential consequences. Another limitation of this study is that students may not honestly answer questions about the use of smartphones for cheating or their observation of other using smartphones in unethical ways because they are taking the survey in a classroom setting.

Significance of the Study

The increased access to smartphones by university students suggest that they will dramatically change the way in which learning occurs in universities across in the US and around the World. Outcomes from research studies investigating smartphone use in academic settings suggest that they that they have positive impacts on student learning when used appropriately. Using smart phones in education is a new idea, with potentially as much academic applicability as the use of iPads or lap computers in a classroom setting. The responsible use of smartphones as a tool to enhance education for students is emerging as more important than regulating their use in the classroom:

For years, the conversation about mobile and social technology in schools has revolved around how to block it, but it is becoming increasingly clear

that simply blocking such technologies does students a disservice. An education that fails to account for the responsible use of mobile devices and social networks prepares students for our past, but not for their future. (Stead, 2011)

In the classroom, students can use smartphones to access an unlimited amount of information for completing both individual and collaborate group assignments that use social networking to solve problems. Smartphones can be used to access Internet resources such as both interactive websites and videos that explain concepts, define new words or terms, and serve to verify or disprove assumptions. Using mobile phones is the fastest and simplest way to stay connected to other people at all times, whether this is another student learning the same course, or a family member.

Technology-enhanced instruction “has the capacity to engage students deeply in their work, connect them with countless resources, and allow them to collaborate across time and space” (Stead, 2011). Student access to smartphones increases the likelihood of engagement in academic pursuits by providing an easy and efficient means for connecting to the valuable resources available on the World Wide Web.

Summary

Technology has revolutionized the way students go about their daily lives. There are few researchers investigating how students from two different countries representing two different cultures are using smartphones for learning. The smartphone has the potential to support a student learning in the formal classroom setting as well as informal settings outside the classroom. Although, students may benefit from the use of smartphones to support their academics, the negative aspects of smartphone use related to

cheating cannot be ignored. However, when used appropriately, smartphones can be used by both Montana State University and King Khalid University students to advance their learning.

CHAPTER 2

LITERATURE REVIEW

Overview of the Research Reviewed

A sample of the major research and data acquisition methods used in the research literature reviewed for this study is found in Table 1. Of the twenty-eight research articles listed in Table 2, most used survey and case study data collection methods followed by interviews. Table 1 shows that there is a dearth of action research methods used to investigate the benefits and limitations of smartphone use for educational purposes. Although not reported as a separate research category, almost all of the data collected through surveys and test instruments reported descriptive statistics.

Several important articles that contribute to understanding the pedagogical affordances of smartphones for universities students were written by Park (2011) and Cochrane and Bateman (2009, 2010). Both provide a solid foundation for the use of Pedagogy 2.0 or the use of mobile applications to support student learning. There research along with that of Solvberg and Rismark (2012) also provide evidence to support their claims about how mobile technologies like smartphones can provide educational benefit students both inside and outside of the formal classroom setting. Stephens, Young and Calabrese (2010) provide a good starting point for understanding digital dishonesty and the misuse of mobile technologies in academic settings.

Table 1. Research and Data Acquisition Methods Investigating Smartphone Use in Education

R e s e a r c h M e t h o d o f o b s e r v a t i o n		Interview	Survey	Ed. Tests	Case Study	Observation	Journals
	Literature Review						1, 2, 4, 6, 7, 8, 9, 10, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 28, 30, 31, 32, 33, 34
	Action research						
	Experimental			9, 10, 11	8, 9, 10, 11, 12, 15, 17, 20, 28, 31		
	Correlational	5, 9, 12, 23, 26, 27, 29, 30	3, 5, 8, 9, 11, 15, 20, 26, 29, 30, 31			5, 10, 23	
	Causal-Comparative Research	1, 5, 9, 12,	3, 5, 9, 11, 21, 29	9	9, 12, 17,	1, 2, 5,	1, 2, 4, 7
	Ethnographic Research	5, 9, 12, 15,	5, 9, 10, 15, 20	9, 10,	9, 10, 12, 15, 17, 20,	5	7, 9, 10
	Evaluation Research	1, 9, 12, 15, 30, 27	8, 11, 15, 20, 31, 26, 29		8, 9, 10, 11, 12, 15, 28, 31	1, 2, 34	1, 2, 4, 6, 7, 8, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25, 30, 31 34

Table 2. Research Articles Corresponding to Research Methods Found in Table 1.

Article Number	Article Title	Authors
Article 1	Acceptable Use of Technology in Schools: Risks, Policies, and Promises (2010).	Meg Cramer, Gillian R. Hayes
Article 2	Adventures with Cell Phones (2011).	Liz Kolb
Article 3	The relationship between teacher classroom practices and 21 st century students' academic dishonesty at the secondary level (2012).	Marguerite Beth Bellipanni
Article 4	A Pedagogical Framework for Mobile Learning: Categorizing Educational Applications of Mobile Technologies into Four Types (2011).	Yeonjeong Park
Article 5	Exploring College Students' Attitudes and Self-Efficacy for Mobile Learning (2012).	Shih-hsien Yang
Article 6	Connecting Learning Spaces Using Mobile Technology (2012).	Chen, Wenli
Article 7	Digital Technologies and Dishonesty in Examinations and Tests (2006).	Jean Underwood
Article 8	Exploring the Determinants of Perceived Value of Smartphone in a Value of Co-Creation Ecosystem from Service-Dominant Logic Perspective (2011).	Venkata Sruvan, Kumar Dharmabotla
Article 9	Blended learning with everyday technologies to activate students' collaborative learning (2010).	Mikko Vesisenaho, Teemu Valtonen, Jari Kukkonen, Sari Havu-Nuutinen, Anu Hartikainen and Sirpa Karkkainen
Article 10	The Effectiveness of Using Procedural Scaffoldings in a Paper-Plus-Smartphone Collaborative Learning Context (2012).	Hui-Wen Huang
Article 11	iLearning: The future of higher education? Student perceptions on learning with mobile tablets (2012).	Jonathan P. Rossing, Willie M. Miller, Amanda K. Cecil, Suzan E. Stamper
Article 12	Digitally distanced learning: a study of international distance learners' (non)use of technology (2011).	Neil Selwyn
Article 13	Is Mobile Learning for the 21 st century? Educational considerations from various perspectives (2012).	Minakashi Lahiri James L. Moseley
Article 14	The International Electronic Journal of Health Education (2012).	Cynthia Kratske
Article 15	Learning spaces in mobile learning environments (2012).	Astrid M. Sølvyberg and Marit Rismark
Article 16	Technologies for learning? An actor-network theory critique of 'affordances' in research on mobile learning (2011).	Steve Wrighta and Gale Parchoma
Article 17	Fostering Personalized Learning in Science Inquiry Supported by Mobile Technologies (2012).	Yanjie Song , Lung-Hsiang Wong, Chee-Kit Looi

Table 2. Continued

Article Number	Article Title	Authors
Article 18	Using Smartphones as Essential tools for learning (2011).	Cathleen Norris
Article 19	Smartphones give you wings: Pedagogical affordances of mobile Web 2.0 (2010).	Thomas Cochrane and Roger Bateman
Article 20	Does moral judgment go offline when students are online? A comparative analysis of undergraduates' beliefs and behaviors related to conventional and digital cheating (2013)	Jason M. Stephens , Michael F. Young & Thomas Calabrese
Article 21	Teaching digital natives: Identifying competencies for mobile learning facilitators in distance education (2012)	M. Makoe
Article 22	The current perspectives, theories and practices of mobile learning (2011)	Nilgun Ozdamar Keskin David Metcalf
Article 23	Tools of the trade: How mobile learning devices are changing the face of higher education (2012)	Wylie Wong
Article 24	Viewing mobile learning from a pedagogical perspective (2012)	Matthew Kearneya, Sandra Schucka, Kevin Burdenb and Peter Aubussona
Article 25	What seams do we remove in mobile-assisted seamless learning? A critical review of the literature (2011)	Lung-Hsiang Wong and Chee-Kit Looi
Article 26	Hi-Tech cheating: Cell phones and cheating in schools, a national poll (2009)	Common Sense Media
Article 27	A review of research methodologies used in studies on mobile handheld devices in K-12 and higher education settings (2009)	Wing Sum Cheung and Khe Foon Hew
Article 28	Affective responses of students who witness classroom cheating (2009)	Michael Firmin, Amanda Burger, and Matthew Blosser
Article 29	Anytime, anywhere learning supported by smart phones: Experiences and results from the MUSIS project (2007)	Marcelo Milrad and Daniel Spikol
Article 30	Mobile devices in the classroom: Phones, netbooks and iPods are finding a place in the curriculum and expanding access to technology (2009)	Ron Schachter
Article 31	The use and abuse of cell phones and text messaging in the classroom: A survey of college students (2011)	Deborah R. Tindall and R.W. Bohlander

Table 2. Continued

Article Number	Article Title	Authors
Article 32	Defining, Discussing, and Evaluating Mobile Learning: The moving finger writes and having writing. (2007)	John Traxler
Article 33	Multi-media learning: Are we asking the right questions. Educational Psychologist (1997)	Robert Mayer
Article 34	Mobile technologies: prospects for their use in learning in informal science settings 1 Introduction 2 Learning science (2005)	Eileen Scanlon, A. Jones, Jenny Waycott

Technology and Education

People learn in a variety of ways. Theories as to how the brain processes and stores information are abundant. Information processing demonstrates how learners process information, remember content from the past, and solve problems. The student could have learned this information incorrectly in the past, or information from one source may contradict other information found within the same source. Individuals handle this in different ways:

People have developed ways around [memory constraint] by organizing information, such as grouping together or ‘chunking’ disparate elements into sets of letters, numbers or pictures that make sense to them (Bransford, 2011, p.18).

Metacognition is thinking about the process of thinking. Its purpose is to reflect on one’s own performance. Metacognition is as dependent on experience as on knowledge. It can include deliberately memorizing information, as well as coming up with mnemonic strategies, which use rehearsal as a technique. Rehearsal works when students repeat facts and figures to themselves multiple times to build a pattern of

retrieval in their memory (Bransford, 2011). Technology in particular mobile devices, can assist learners in using metacognitive strategies to support their learning. These devices support metacognitive processes by allow learners to process information in meaningful ways through personal and contextualized engagement. In addition, to supporting metacognition, there is evidence that demonstrates that access to multimedia information also enriches student learning. Mayer's (2009) research found that students who have access to information presented in both verbal and visual formats generated more creative solutions to problems than students who only received visual information from mobile devices such as iPads and smartphones. Smartphones can be used by students to access the increasing multimedia resources available on the Internet and other information at anytime and anyplace reducing the reliance on memorized facts while at the same time increasing opportunities to engage in critical thought necessary to solve problems.

Technology is a key contributor to 21st century learning (Kolb, 2011). Students use technology daily to check email, send text messages, or use them to interact with others using social networking sites. Smartphones are owned by 40–50% of Americans, are carried on the body every day, and run on wireless communication networks and open operating platforms such as iPhone, BlackBerry, and Android (Kratzke, 2012). Students have technology ingrained into every aspect of daily life, and the use of technology to enhance student learning should be no exception. Technology is very important to these students because they understand how their devices work and would rather use a computer to produce a paper than write it by hand. Technology-savvy students, or “Digital Natives,” need instant feedback provided by mobile devices when finding

pertinent resources to help them complete assignments or other problems related to school work and everyday (Makoe, 2012).

Mobile devices are used to increase communications and productivity in many of today's occupations (Wright, 2011). Introducing k-12 and university students to the use of mobile devices and applications will provide them with job skills that may give them advantage over others when competing for jobs in the workplace. In addition, instruction related to smartphones would also teach students how to use mobile applications that have the potential to support their learning. This type of classroom engagement would help to circumvent the age-old question of "Why is this topic important?" Teachers could use smartphones as a focal point for instruction while at the same time preparing students for careers requiring the use of sophisticated communication technologies (Kearney et al., 2012).

"The next step toward a truly connected youth is bridging the gap between in-school and out-of-school technology use, both in policy and practice" (Cramer & Hayes, 2010, p. 43). Cramer & Hayes' (2010) assertion suggests removing the barriers between education and technology use by letting students use their own mobile devices such as smart phones to support their learning. Creating learning environments that allow university students to engage in classroom activities outside of the classroom in more informal settings such as in the dormitory at home, or at the coffee shop will increase their learning opportunities. Mobile technologies provide university students with access to their coursework from both on and off campus environments. This type of ubiquitous access not only allows students to access their assignments but also provides feedback in the form of course grades and comments from both their instructors and fellow students.

With multiple pressures from families, work, and other daily obstacles, university students of today need to be able to use the precious few minutes of their break, walk, or bus ride home to finish their coursework, read the next day's chapters, and check their grades (Solvberg & Rismark, 2012). Access to "seamless learning," (Song et.al, 2012, p. 679) through mobile technology promotes student skills, knowledge, and positive attitudes toward learning outside, as well as inside, the classroom and is an incredibly powerful tool. The level of access provided by mobile technologies allows students to integrate learning into their lives and provides more opportunities for them to accomplish their educational goals as they synthesize information from multiple sources across multiple contexts (Wong, 2011).

Research conducted by Lahari (2012) found that most students would rather use a mobile phone than a computer or iPad during class. The most popular application identified by Lahari's (2012) study was a language-learning application that allowed them to interact and solve activities while learning a language. It was suggested that the popularity of this language-learning software was due to the quick feedback provided for quizzes and tests. Students were also observed to use their smartphones to record lectures and take notes. As students have increased access to the use of mobile technologies, instructors more than ever will be able to move from the role of "transmitters of knowledge" to one that more readily engages students and facilitates their learning. (Lahari, 2012).

Mobile Learning

Mobile learning (m-learning) refers to the use of mobile or wireless devices such as smartphones, tablets, PCs, and laptops while on the move (Park, 2011). Crompton (2013) further suggests that m-learning can be characterized as “learning across multiple contexts, through social and content interactions, using personal electronic devices.”. Within the context of Park’s definition, learning is no longer limited to the confines of a physical four-walled classroom during a specific period of time. Traxler (2007) suggests that the defining characteristic of mobile learning is finding information and processing it with a community of learners to create knowledge. He further suggests that the delivery model for mobile learning can be characterized as “just-in-time,” “just enough,” and “just for me” (Traxler, 2007, p. 5). Use of mobile devices provides learners the flexibility to make choices about when they engage in coursework and interactions with other learners.

There are conflicting ideas about what constitutes “mobile learning,” with some experts believing it is strictly using mobile devices such as PDAs or smartphones. Some university faculty see mobile learning as an extension of e-learning (Keskin, 2011). This perspective suggests that the line between e-learning and mobile learning is not so clear. E-learning involves students taking classes or completing coursework online through an educational Learning Management System (LMS), such as Montana State University’s Desire2Learn (D2L), while mobile learning is viewed as when a student accesses a course or coursework, whether in class or out of class, from a mobile device such as an iPad, smartphone, or tablet device. With the recent development of Web 2.0 tools, students can use mobile devices to engage in coursework that was limited to portable

laptop devices just a few years ago. For example, students can use Web 2.0 applications to access the content housed in electronic courserooms, engage in discussions, review instructor posted content, view videos, listen to podcasts and other interactive multi-media—e.g. using YouTube videos (Cochrane & Bateman, 2010). However, the effective use of mobile technologies to their fullest potential to support learning is only attainable if the instructors are willing to integrate mobile compatible technologies within their courses. Although instructors should be open to the use of mobile technologies, they also have the right to choose which technologies are most compatible with their skills and course content (Wong, 2012).

Effects of Student Perceptions on Technology Use

Three factors need to be considered when talking about how students perceive using technology. The *perceived value* is the expectation of fulfillment of specific needs in regards to a smartphone. *Perceived Ease of Use* refers to the extent that the user can utilize the product easily and with little or no effort. *Perceived usefulness* is the degree to which a user thinks a smartphone will help him or her in daily life (Dharmabotla, 2011). This means that the perception of using a product may overshadow the actual reality of using these products. For example, when purchasing a new smartphone, a student might choose the product he or she thinks will be easy to use, help in daily life tasks, and will fulfill one's smartphone needs. These expectations may not be realistic. The same principle needs to be applied to teachers when they implement mobile technology into their classrooms. They need to be aware that they might do a lot of work for little to no reward as the technology may not be easy to use, or their students might not find it as

important as the teacher does. The perceived value of a smartphone is what drives most consumers, students and teachers alike, to purchase one (Dharmabotla, 2011).

In a study conducted at Purdue University, students found that while the iPads were easy to use and useful for learning during class, they were also very distracting (Miller, 2012). Students tended to engage with the numerous applications found on the iPads rather than attending to class activities. Using this type of technology makes the class more interesting, because most students would not have access to this technology otherwise. Due to the different learning styles students have, some might feel they are taking better advantage of their education when using a hands-on device rather than simply listening to the lecture.

The use of technology by students and faculty is a common occurrence in university classroom today. When integrated properly, technology such as the iPad can be highly beneficial to student engagement and perceptions of technology use (Rossing et al. 2012). The main concept that instructors should try to remember is that students choose how they want to learn, whether their method is a “pick-and-mix” where students use a variety of learning ways or they stick to either using or not using technology (Sewlyn, 2011). Students will choose the technologies that are most beneficial to their learning. One of the reasons that mobile learning is so useful is that students have opportunities to choose when, where and how they want to engage in the learning interactions. When students have choices about their learning environments and interactions they are more likely to be engaged in the learning process and motivated toward higher achievement.

The use of technology to support learning during and outside of formal classroom settings occurs regularly on colleges and university campuses. When integrated properly,

technologies such as the iPad can be highly beneficial to student engagement and perceptions of technology use (Rossing et al. 2012). An important consideration that instructors should try to remember is that students may choose a variety of technologies or no technology at all when interacting with course content to learn. (Sewlyn, 2011). The advantage of mobile technologies is that students can decide which will provide the greatest and most accessible learning opportunities.

Gender Differences Related to Technology Use

Much has been reported in the literature about gender differences with respect to access and use of the Internet. However, this research is somewhat conflicting. Research conducted in the late 1990s suggests that males were more competent in using the Internet than females and used the Internet more often. Odell, Krogen, Schumaker & Delucchi (2000) found that female college students tended to access the Internet more often for emails and school related activities while male college students used the Internet more frequently for entertainment. Joiner et al. (2005) found that although males accessed the Internet much more often for gaming, males and females did not differ Internet use for communication purposes. Other studies have suggested that males are skilled and have more positive attitudes toward using the Internet than females (Li, Kirkup, & Hodgson, 2001; Sherman et al., 2000). Another reason suggested that may contribute to genders differences related to technology use are results from studies which indicate that females tend to evidence higher levels of anxiety related to the use of computers and the internet (Jackson et al., 2001; Ong & Lai, 2006). Higher levels of anxiety experienced by females could lead to negative attitudes toward using Internet

applications thus reducing the likelihood of their accessing the Internet to complete both school-related and personal tasks.

More recent research related to gender differences in computer and Internet use suggests that these differences appear to be diminishing as children are exposed to the applications of information and communication technologies at earlier and earlier ages (Mossberger, Tolbert & Stansbury, 2003). The shrinking gender gap in computer and Internet use is further supported by results from research conducted by the UCLA Internet project which found that males and female participants did not differ in terms of Internet anxiety. Mobile devices, in particular smartphones, may serve to motivate individuals to use the Internet applications to solve problems relate to instructional and home environments. This notion may be especially true when considering the m-learning theory proposed by Crompton (2013), which suggests that users of smartphones have choices about how they interact with these hand-held devices. Individuals can personalize their interactions with Internet by choosing from a range of applications that are familiar and non-threatening. In addition, smartphone users have choices about when and where they access the Internet—thus further personalizing the context within which they choose to engage in tasks related to home and school environments. Providing individuals with choice about how and when they access the Internet is essential for motivating their access and use of the Internet in powerful ways that can improve their everyday lives. An issue related to the literature reviewed for this study is the lack of known research examining gender differences in technology use, particularly with respect to mobile devices, in Saudi Arabia.

Smartphone Use in Higher Education

Access to smartphone devices by university students continues to grow rapidly. The cost of these devices has decreased while their ease of use has increased. A study conducted by Chen & Denoyelles (2013) at the University of Central Florida found that of 1,082 students surveyed, 79% owned a smartphone. A comprehensive study of 100,000 students from 195 college campuses conducted by Dahlstrom in 2012 found that most students still owned laptop computers (86%). Sixty-two percent of these same students reported owning smartphones while 15% reported owning tablets. More importantly, 67% of those students who reported owning smartphones or tablets indicated that they used them for academic purposes. This percentage nearly doubled over the percent of students reporting the use of mobile devices for academic purposes in 2011.

There are many smartphone applications that university students can use to support their learning. For example, Web 2.0 technologies allow students to access “Podcasts, oral quizzes and tests Mobile Geotagging sites, Digital Storybooks, photo projects, digital report systems, and research tools” (Kolb, 2011). These resources and many others provide students with a variety of ways to complete coursework in a manner that fits their learning style. The use of mobile devices such as smartphones will continue to grow in importance as not only a learning device but also as a technology that will be important for students to integrate into their repertoire of skills they prepare for 21st century careers (Kolb, 2011).

Solvberg & Rismark (2012) investigated the use of mobile learning devices with university students in Norway enrolled in an undergraduate sociology course. They

created recorded video lectures that could be accessed with smartphones, tablets and other mobile devices. Three different learning environments were created for students to access course lectures. The first learning environment provided students with an opportunity to watch a class lecture via computer in real time from another location. During this lecture, students were able to ask questions and interact with the lecturer in real time, but felt awkward because they were in front of cameras and recorders. Most students did not attend these lectures after a while, because the lectures could also be viewed at home. The second learning environment allowed students to watch the lectures at different locations on campus and complete coursework and submit it to the instructor via the Internet. Students reported that they liked the flexibility of this learning environment because they could access recorded lectures based on their own class and work schedules. The third learning space created allowed students to access lectures off-campus. Most students read or listened to audio for their courses from their cars or public transport. Students indicated that they enjoyed being able to multi-task and go about their daily lives without missing important class content. Although Solvberg & Rismark's (2012) study found that all three types of learning environments had benefits and limitations, they all offered learners a personal choice about the type of learning environment that they felt was most effective for meeting their learning needs.

Smartphone Applications for Learning

Although limited, there is evidence from the research that suggests that smartphones offer increased learning opportunities for university students. For example, research by Katz (2005) found that mobile phones were beneficial for accessing Internet

resources, tutoring and connecting students and instructors. Cochrane & Bateman's (2009, 2010) research demonstrated how university students in Australia used smartphones to support the development of learning communities where students engaged in reflective inquiry and problem solving using social networking software. An important outcome of their study was that, as with any new technology, students and instructors needed training related to using smartphones with mobile Web 2.0 applications that were suited for effectively supporting reflective discourse and inquiry. Huang, Wu & Chen (2012) investigated the use of smartphones in a sales and marketing course with undergraduate and graduate Taiwanese university students. They developed an assignment embedded with mobile QR codes that allowed students to access supplemental materials and questions more efficiently using their smartphones. Students in the experimental group accessed the assignment questions and typed the answers to questions on their smartphones prior to group discussions while control group students answered questions individually with no group collaboration. Findings from this study indicated that participants in the experimental group using smartphones to write answers and discuss them with their peers realized better learning outcomes than their control group counterparts.

Benedict & Pence (2012) also investigated the use of smartphones with undergraduate chemistry students. Videos created to provide directions for using the laboratory, scaffold classroom learning activities and guide homework assignments were linked to QR codes for streamlined smartphone access. Results from student evaluations of these activities found that most students felt that the streamlined access to videos using QR codes made the videos more accessible during group work and helped them to

visualize problems more immediately. An important attitudinal result was that students indicated positive attitudes toward using smartphones more often to support their learning in other university courses.

Disadvantages of Smartphone Use in Higher Education

A major drawback of smartphones in the classroom is their potential to cause distractions during class. A comprehensive study by Campbell (2007) regarding mobile phone use in higher education found both faculty and students generally reported negative attitudes toward the use of mobile phones in college classrooms. For example, if a student's unmuted smartphone rings during class both the students' and instructor's focus is interrupted. More specifically, Campbell's research found that the vast majority of university students surveyed in his study reported that mobile phones ringing during class were a serious distraction. In fact students participating in the study agreed that university policies should be created to restrict the use of mobile phones in classrooms. Other studies have reported that mobile phones cause a variety of distractions during class including student texting, checking email, surfing the Internet and answering calls (Baker, Lusk, & Neuhauser, 2012).

Student texting during class rather than listening and participating has also been identified as a problem when students have access to smartphones during class. Results from a study conducted by Tindall and Bohlander (2012) with 269 undergraduate students found that the vast majority of students (92%) admitted that they have sent or received a text message in class at least once or twice while almost one-third reporting texting during class every day. Baker, Lusk, and Neuhauser (2012) found that almost 25% of the 889

university students they surveyed reported sending text messages in almost all of their classes. In addition, 29% of those same students indicated they checked text messages in almost every class. Overall results from these studies suggest that in addition to distractions caused by ringing cell phones students are spending much of their time texting and not paying attention to the class lectures.

Digital Dishonesty

A major disadvantage of smartphone access in higher education expressed by students and faculty is their potential to be used for cheating during class quizzes and tests (Baker, Lusk, and Neuhauser, 2012; Bugeja, 2008, Watson, 2010). Aaron Tooley, director of online media for Online Education.net, suggests that cheating has always occurred and the use of 3G and 4G smartphones makes cheating in academic settings even easier (Carter, 2012). Professors should know how their students use smart phones in their classes and be able to understand the different methods of cheating that their students use. Teens with mobile telephones typically send 440 text messages weekly, with 110 of those digitized missives being shot off during classes, according to one study. Students said they routinely ignored bans on mobile phone use at school (US Teens Use, 2009). As technology that can be used to cheat is advancing, technology that educators may use to thwart cheating is also advancing, such as the use of websites like “Turnitin.com” as found in an *Ethics and Behavior* article (Stephens et, al, 2012, p. 252-253). It is clear that both the positive and negative attributes of smartphone use should be studied.

Research investigating the methods of cheating pointed out that technologies such

as smartphones are not enabling or causing more students to cheat, but have simply become a tool in the hands of students who would have cheated with or without technology access (Stephens, 2007). There is a disparity between how many students admit to cheating and how many of their parents believe that their own child cheats using their mobile phone. “One third of the teenagers with cell phones (35%) admit to using the devices to find an answer for a test,” and as for the parents, “76% say cell phone cheating happens at their child’s school. But, perhaps not surprisingly, just 3% of parents say their child has ever cheated with cell phones” (Bush & Cameron, 2011).

There is little in the research that empirically reports how smartphones are used for cheating in higher education. However, both faculty and students alike perceive that mobile phones can be used by students to gain an unfair advantage on quizzes or exams (Baker, Lusk, and Neuhauser, 2012; Campbell, 2007). For example, as described above, studies report that students commonly send and check text messages during their classes. It is not inconceivable that the practice of texting during class could also be used to access information for use to answer questions on quizzes and exams. Although the use of mobile devices for cheating is of concern, there are few if any studies that report actual observed occurrences of university students using their smartphones to cheat.

Summary

The use of mobile devices by university students has increased dramatically in recent years and has become their primary source of Internet access on campus (Keller, 2011). These mobile devices are popular because they allow students choice in how they want to engage in learning. The learning affordances offered by smartphone applications

are well documented. Students can use smartphones to access course information, to interact with their classmates, or to contact instructors outside of the classroom using a variety of Web 2.0 applications that provide increased learning opportunities. However, there are disadvantages of using smartphones in and outside of university classroom as well. The distractions caused by unmuted mobile phones and student texting are perceived to have negative effects on classroom learning. In addition, the potential for misusing smartphones to access information and engage in unpermitted collaboration with others during quizzes or exams has also been considered a major disadvantage of their use in higher education classroom settings.

CHAPTER 3

METHODS

Research related to the use of mobile devices has just begun to investigate how mobile devices such as smartphones can be used to enhance student learning. Only a handful of studies have been conducted in the US and other in countries to investigate how university students use smartphones to support their learning. Most of this research is focused on the use of the mobile devices themselves rather than the pedagogical affordances that they offer. Although there is isolated evidence about students' use of smartphones in higher education, there is little research about the influence of institution, gender and culture on university students' use of smartphones for learning (e.g., Cochrane & Bateman, 2009).

The purpose of this study was to investigate how US university students and university students from Saudi Arabia use smartphones for learning in the undergraduate teacher education courses. In particular, the study addressed how King Khalid and Montana State University students use these devices to access course materials and interact with peers and the instructor within and outside the physical boundaries of the classroom.

Research Questions

1. How do university students in the United States and Saudi Arabia use their smartphones inside and outside of the classroom to support their classroom learning?

2. Do university students from the United States and students from Saudi Arabia differ in use their use of smartphones inside and outside of the classroom to support their learning?
3. Do male and female university students from the United States and Saudi Arabia differ in their use of smartphones inside and outside of the classroom to support their learning?
4. Do students at Montana State University and King Khalid University report the use smartphone technology for cheating?

Design

This descriptive study used a survey design to collect data about university undergraduate education majors' use of smartphones. The survey focused on how university students use their smartphones inside and outside of class, and if there is evidence to show that smartphone technology is used for academic cheating. Undergraduate teacher education students in the United States and Saudi Arabia were surveyed to determine how they use smartphone technology to support their learning both inside and informally outside of the classroom.

Participants

The United States participants for this study were 249 undergraduate students enrolled in teacher education courses at Montana State University (MSU) in Bozeman, Montana, and 320 undergraduate teacher education students from King Khalid University

(KKU) located in Aba, KSA. Both universities are public and have similar student enrollments. The demographic information is presented in Table 3.

Table 3. Demographic Reported by Institution

Montana State	<i>f</i>	<i>%</i>	King Khalid University	<i>f</i>	<i>%</i>
Gender			Gender		
Male	58	23.3	Male	157	49.1
Female	191	76.7	Female	163	50.9
Class Standing			Class Standing		
Freshman	15	6.2	Freshman	39	12.2
Sophomore	57	23.7	Sophomore	225	70.5
Junior	95	39.4	Junior	46	14.4
Senior	74	30.7	Senior	9	2.9

The numbers of males and females participating in the study from KKU were almost equal. However, over two-thirds of the participants from MSU were females as compared to males. When examining class standing, the majority of undergraduates from MSU were either classified as Juniors (39.4%) or Seniors (30.7%) while the majority of students from KKU were Sophomores (70.5%). The average ages of the undergraduate teacher education students from MSU ($M = 22.36$, $SD = 4.21$) and from KKU ($M = 23.67$, $SD = 8.08$) were very similar.

Instruments

A survey based on research conducted by the University of Missouri (Carter, 2012) review of the Smartphone literature and classroom observations was developed to assess university students' perceptions of smartphone usage (DeVellis, 2003). One version of the smartphone survey items was written in English and the other version was written using Arabic language for administration to the KKU students. Once the Smartphone survey items were written, they were sent to a select group of MSU and KKU university professors and graduate students to review for clarity, understanding and bias using procedures recommended by DeVellis (2003). This expert review panel provided comments to improve the clarity and accuracy of the survey questions used to collect data for this study. After receiving feedback from expert reviewers, items were revised where necessary and the revised items were piloted with undergraduate education students. Results from the pilot study found that the internal consistency reliability for the final 41-item scale was .81 for MSU students and .91 for KKU students. The Smartphone survey developed for this study can be found in Appendix A.

Procedures

The final version of the 43-item survey was administered to gather perceptions of how university students' majoring in Education used their smartphone use in and outside of the classroom. Education majors were also asked to answer items designed to assess how frequently they observed others using smartphones for cheating during quizzes and exams. Students were asked to respond to each question using a five-point Likert scale

consisting of the following descriptors: (1) Never (Not at all), (2) Seldom (less than weekly), (3) Sometimes (multiple times a week but not daily), (4) Often (Daily), and (5) Always (Multiple times a day). Seven multiple-choice demographic questions were included in the survey, along with four open-ended questions. The Smartphone survey was distributed to students in a face-to-face classroom setting. One group of students completed the survey using the web-based Survey Monkey tool. Although, web-based surveys are found to yield smaller response rates, research suggests they will yield similar participation rates to paper and pencil surveys when respondents feel a personal connection and are engaged (Bennett & Nair, 2011; Perkins, 2010). For this study, the web-based survey was administered during class and participation was encouraged by the instructor. Once students completed the survey, it was collected by the researcher and student responses were entered into the Statistical Package for the Social Sciences (SPSS) for analysis.

Summary

A -31-item survey was designed to assess Montana State University and King Khalid University preservice teachers' smartphone use in the classroom and for informal settings outside of the classroom. Thirty-one of the items were used to answer the research question for this study. The internal consistency reliability from the pilot administration of the smartphone survey for both MSU and KGU students was found to be acceptable according to criteria established by Crocker & Algina (2006). Coefficient alphas for both groups exceeded .80. Two hundred and forty MSU preservice teachers completed the survey while 320 KGU undergraduate students completed the Saudi

version of the survey. Descriptive statistics and Mann-Whitney U tests were used to answer the research questions posed for this study.

CHAPTER 4

RESULTS

Introduction

The purpose of this study was to investigate how US university students and university students from Saudi Arabia use smartphone for learning in the undergraduate teacher education courses. In particular, how King Khalid University and Montana State University students use these devices to access course materials and interact with peers and the instructor within and outside the physical boundaries of the classroom.

Research Questions

1. How do university students in the United States and Saudi Arabia use their smartphones inside and outside of the classroom to support their classroom learning?
2. Do university students from the United States and students from Saudi Arabia differ in their use of smartphones inside and outside of the classroom to support their learning?
3. Do male and female university students from the United States and Saudi Arabia use their use of smartphones inside and outside of the classroom to support their learning?
4. Do students at Montana State University and King Khalid University report the use smartphone technology for cheating?

The Coefficient Alphas for the survey items were .92 for the MSU students and .98 for the KKU students indicating satisfactory internal consistency reliability according to criteria proposed by Crocker & Algina (2006).

Research Questions 1 and 2 were answered by presenting the descriptive statistics for smartphone use inside and outside of the class in Tables 4 and 5. In addition, the results reported these tables also report results from institutional comparisons.

Research Questions 1 and 2

“How do university students in the United States and Saudi Arabia use their smartphones inside and outside of the classroom to support their classroom learning?”

“Do university students from the United States and students from Saudi Arabia differ in use their use of smartphones inside and outside of the classroom to support their learning?”

Group items responses for both MSU and KKU were found to be significantly non-normal and in many cases the group variances were also significantly different. Due to violations of the assumptions necessary to conduct parametric *t*-tests, nonparametric Mann-Whitney U tests were performed to compare average item ratings by institution. Family-wise error rates were corrected for by dividing the alpha level by the number of comparisons. In this case, the alpha level of .05 was divided by 12, yielding a threshold for significance of .004. Effect sizes were also calculated to eliminate the effects of sample size on the significance of comparisons using procedures outlined in Corder &

Foreman (2009). Effect sizes based on Cohen's (1988) work were interpreted as follows:

.01 = small, .30 = moderate and .50 = large.

Descriptive statistics reported in Table 4 show that MSU students reported that the most frequent use of smartphones in class was for "communicating with others by texting" ($M = 3.66$, $SD = 1.17$), followed by "accessing course information" ($M = 3.27$, $SD = 1.07$), and "communicate with others about assignments through email" ($M = 3.25$, $SD = 1.18$). The smartphone use inside the classroom rated as being used least often was "for taking notes in class" ($M = 1.45$, $SD = .80$). These uses of smartphones in class for learning still ranged from often to only sometimes. Generally, KKU students reported "never or only rarely" using their smartphones in class. The items with the highest average ratings by KKU students were "communicate with others by texting" ($M = 3.01$, $SD = 1.33$) and "accessing course information" ($M = 2.55$, $SD = 1.31$). The lowest average item rating by KKU students was for "recording a lecture" ($M = 1.68$, $SD = 1.04$). Results from Mann-Whitney U tests found that MSU students rated their average smartphone use significantly higher on nine of thirteen items assessing smartphone use inside the as compared to KKU students. MSU students rated their smartphone use significantly higher in magnitude on the items "communicating with others about class assignments through email" ($d = .46$) while KKU students reported used their smartphones in class significantly more often for "listening to a lecture (podcast)" ($d = .38$). In terms of effect size, the magnitude of these two comparisons were considered large. However, although significant, the effect sizes for the remaining differences were found to range from small to moderate.

Table 4. Means and Standard Deviations by Smartphone Use Within Classrooms Across Institutions

Item	MSU		KKU		Effect size
	M^a	SD^b	M	SD	
How often did you use your Smartphone during class to:					
1. access course information (e.g., syllabus, assignments etc.)?	3.27	1.07	2.55	1.31	.29*
2. read course materials (e.g., notes)?	2.47	1.10	2.35	1.18	.07
3. take notes in class?	1.45	.802	2.28	1.30	.34*
4. find the meaning words or terms used in class?	2.83	1.20	2.14	1.18	.30*
5. find reference material for class activities/assignments?	2.66	1.55	2.21	1.29	.20*
6. view pictures (e.g., diagrams, maps, etc.)?	2.58	1.20	1.99	1.16	.25*
7. view PowerPoints?	1.97	1.09	1.86	1.20	.08
8. record a lecture?	1.18	.560	1.68	1.04	.30*
9. listen to a lecture (e.g., podcast)?	1.30	.70	2.25	1.41	.38*
10. view a course video?	1.73	1.01	1.87	1.17	.04
11. communicate with others by texting?	3.66	1.17	3.01	1.33	.24*
12. communicate with others about class assignments through email?	3.25	1.18	1.96	1.22	.46*
13. participate in polls created by the instructor (vote on class issues)?	1.97	1.06	2.13	1.26	.04

Table Note. Items were rated by students using a five-point Likert scale where 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often and 5 = Always. ^aMean, ^bStandard Deviation, $p < .004$

The descriptive results from the analysis of the smartphone survey items shows that MSU students generally reported that they used smartphones outside of class “Sometimes to Often” to support their learning. The highest mean ratings were found for “communicating with others by texting” ($M = 3.87$, $SD = 1.15$), “collaborating on assignments with others by texting, emails or wikis” ($M = 3.56$, $SD = 1.17$), “communicating with others about assignments through email” ($M = 3.51$, $SD = 1.15$)

and “access course information ($M = 3.37$, $SD = 1.12$). The least used smartphone application outside the class for learning was “listening to a lecture (podcast)” ($M = 1.37$, $SD = .812$).

The average item ratings for KKKU students again indicated that for the most part they “Never or Rarely” used their smartphones outside of the classroom to support their learning. The two items rated the highest on average by KKKU students was for “accessing course information ($M = 3.00$, $SD = 1.35$) and “communicating with others about assignments by texting” ($M = 2.76$, $SD = 1.40$). The lowest rated item was “collaborating on assignments with others by texting, emails or wikis” ($M = 1.50$, $SD = 1.09$).

Results from Mann-Whitney U tests found that MSU students rated their average smartphone use significantly higher on ten of the thirteen smartphone uses outside of the classroom when compared to KKKU students. In terms of effect size, the largest differences were found in favor of MSU for “communicating with others about class assignments through email” ($d = .48$) and “communicating with others about assignments by texting” ($d = .37$). Again, Cohen’s (1988), criteria were used when interpreting the magnitude of the effect size (.10 = small, .30 = moderate and .50 = large). The effect sizes for the remaining significant differences ranged from small to moderate.

Table 5. Results by Institution for Smartphone Use Outside of the Classroom

	MSU		KKU		
Item	<i>M</i> ^a	<i>SD</i> ^b	<i>M</i>	<i>SD</i>	Effect size
How often did you use your Smartphone outside of class to:					
14. access course information (e.g., syllabus, assignments etc.)?	3.37	1.12	3.00	1.35	.13*
15. read course materials (e.g., notes)?	2.50	1.22	2.39	1.26	.06
16. find the meaning words or terms used in class?	2.50	1.22	2.32	1.23	.23*
17. find reference material for class activities/assignments?	2.76	1.23	2.18	1.31	.21*
18. view pictures (e.g., diagrams, maps, etc.)?	2.44	1.28	1.94	1.25	.21*
19. view PowerPoints?	1.86	1.12	1.82	1.13	.02
20. listen to a lecture (e.g., podcast)?	1.37	.812	1.99	1.28	.28*
21. view a course video?	1.60	.973	2.00	1.27	.14*
22. communicate with others about assignments by texting?	3.87	1.15	2.76	1.40	.37*
23. communicate with others about assignments through email?	3.51	1.15	2.13	1.29	.48*
24. collaborate on assignments with others by texting, emails or wikis	3.56	1.17	1.50	1.09	.21*
25. participate in polls created by the instructor (vote on class issues)?	1.74	1.06	2.19	1.27	.19

Table Note. Items were rated by students using a five-point Likert scale where 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often and 5 = Always. ^aMean, ^bStandard Deviation, $p < .004$

Research Question 3

“Do male and female university students from the United States and Saudi Arabia use their use of smartphones inside and outside of the classroom to support their learning?”

The descriptive statistics for smartphone use inside the classroom by gender are reported for both MSU and KKU students in tables 6 and 7. Mann-Whitney U tests were

used to compare MSU males and females on items assessing smartphone use during class. MSU females rated their average use of smartphones inside the classroom significantly higher than males for “accessing course information”, “reading course materials” and “viewing pictures.” Although these differences were significant, the effect sizes were considered small in magnitude.

Table 6. Results for MSU Gender Comparisons by Smartphone Use Inside the Classroom

Item	Males		Female		Effect size
	<i>M</i> ^a	<i>SD</i> ^b	<i>M</i>	<i>SD</i>	
How often did you use your Smartphone during class to:					
1. access course information (e.g., syllabus, assignments etc.)?	2.85	.97	3.39	1.07	.22*
2. read course materials (e.g., notes)?	2.05	1.22	2.59	1.09	.20*
3. take notes in class?	1.22	.500	1.51	.863	.13
4. find the meaning words or terms used in class?	2.47	1.10	2.93	1.17	.17
5. find reference material for class activities/assignments?	2.21	.960	2.79	1.18	.21*
6. view pictures (e.g., diagrams, maps, etc.)?	2.19	1.16	2.70	1.20	.18*
7. view PowerPoints?	1.68	2.07	1.97	1.09	.14
8. record a lecture?	1.17	.386	1.18	.600	.07
9. listen to a lecture (e.g., podcast)?	1.23	.572	1.32	.730	.02
10. view a course video?	1.60	.824	1.78	1.10	.06
11. communicate with others by texting?	3.28	1.25	3.77	1.12	.17
12. communicate with others about class assignments through email?	3.05	1.20	3.26	1.17	.08
13. participate in polls created by the instructor (vote on class issues)?	1.94	.933	1.98	1.07	.01

Table Note. Items were rated by students using a five-point Likert scale where 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often and 5 = Always. ^aMean, ^bStandard Deviation, **p* ≤ .004

Gender comparisons using Mann-Whitney U tests were also used to compare KKU males and females on items assessing smartphone use during class (see Table 7). KKU males rated their average use of smartphones inside the classroom significantly higher than females for “communicating with others about class assignments through email,” “reading course materials” and “viewing pictures.” Although these differences were significant, the effect sizes were considered very small in magnitude indicating the differences were not of practical significance.

Table 7. Results for KKU Gender Comparisons, Smartphone Use Inside the Classroom

Item	Males		Female		Effect size
	<i>M</i> ^a	<i>SD</i> ^b	<i>M</i>	<i>SD</i>	
How often did you use your Smartphone during class to:					
1. access course information (e.g., syllabus, assignments etc.)?	2.65	1.23	2.46	1.39	.08
2. read course materials (e.g., notes)?	2.52	1.10	2.19	1.24	.16*
3. take notes in class?	2.31	1.13	2.24	1.43	.07
4. find the meaning words or terms used in class?	2.02	.999	2.24	1.33	.04
5. find reference material for class activities/assignments?	2.12	1.10	2.31	1.44	.02
6. view pictures (e.g., diagrams, maps, etc.)?	1.94	1.02	2.04	1.29	.01*
7. view PowerPoints?	1.62	.950	2.10	1.36	.16
8. record a lecture?	1.59	.883	1.78	1.16	.03
9. listen to a lecture (e.g., podcast)?	2.13	1.29	2.38	1.52	.06
10. view a course video?	1.78	1.02	1.96	1.30	.04
11. communicate with others by texting?	3.30	1.22	2.98	1.44	.02
12. communicate with others about class assignments through email?	1.67	.957	2.25	1.36	.20*
13. participate in polls created by the instructor (vote on class issues)?	2.04	1.16	2.21	1.34	.05

Table Note. Items were rated by students using a five-point Likert scale where 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often and 5 = Always. ^aMean, ^bStandard Deviation, * $p \leq .004$

Results from comparisons by gender for smartphone use outside of the classroom were also made for MSU and KCU students are reported in Tables 8 and 9. Results from Mann-Whitney U tests shows that MSU males were found to use their smartphones at a significantly higher average frequency than MSU females when “accessing course information” and “collaborating on assignments with other by texting, email or through wikis. However, the effect sizes for these differences were very small in magnitude. Mann-Whitney U tests were also used to compare KCU males and females by smartphone use outside of the classroom. Results indicated that KCU females reported using their smartphones an average more frequently than KCU males for “viewing Power Points” and “viewing Pictures.” However, the effect sizes for these differences were very small in magnitude.

Table 8. Results for MSU Gender Comparisons by Smartphone Use Outside of Class

Item	Males		Female		Effect size
	<i>M</i> ^a	<i>SD</i> ^b	<i>M</i>	<i>SD</i>	
How often did you use your Smartphone outside of class to:					
14. access course information (e.g., syllabus, assignments etc.)?	3.02	1.02	3.50	1.12	.19*
15. read course materials (e.g., notes)?	2.16	.960	2.61	1.27	.15
16. find the meaning words or terms used in class?	2.63	1.05	3.02	1.37	.13
17. find reference material for class activities/assignments?	2.40	.997	2.81	1.28	.13
18. view pictures (e.g., diagrams, maps, etc.)?	2.09	1.10	2.55	1.31	.15
19. view PowerPoints?	1.79	1.05	1.88	1.15	.02
20. listen to a lecture (e.g., podcast)?	1.29	.653	1.39	.854	.01
21. view a course video?	1.53	.804	1.63	1.02	.01
22. communicate with about assignments by texting?	3.60	1.24	3.95	1.11	.13
23. communicate with others about assignments through email?	3.23	1.26	3.60	1.10	.10
24. Collaborate on assignments with other by texting, email or through wikis.	3.12	1.30	3.70	1.10	.18*
25. participate in polls created by the instructor (vote on class issues)?	1.62	.945	1.78	1.10	.05

Table Note. Items were rated by students using a five-point Likert scale where 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often and 5 = Always. ^aMean, ^bStandard Deviation, *p* < .004

Table 9. Results for KKK Gender Comparisons by Smartphone Use Outside of Class

Item	Males		Female		Effect size
	<i>M^a</i>	<i>SD^b</i>	<i>M</i>	<i>SD</i>	
How often did you use your Smartphone outside of class to:					
14. access course information (e.g., syllabus, assignments etc.)?	2.93	1.25	3.08	1.45	.06
15. read course materials (e.g., notes)?	2.37	1.16	2.40	1.35	.02
16. find the meaning words or terms used in class?	2.19	1.04	2.45	1.38	.07
17. find reference material for class activities/assignments?	1.97	1.15	2.38	1.43	.13
18. view pictures (e.g., diagrams, maps, etc.)?	1.67	1.03	2.20	1.38	.20*
19. view PowerPoints?	1.47	.707	2.18	1.36	.26*
20. listen to a lecture (e.g., podcast)?	1.79	1.04	2.19	1.45	.10
21. view a course video?	1.87	1.13	2.13	1.38	.08
22. communicate with about assignments by texting?	2.53	1.22	3.00	1.53	.14
23. communicate with others about assignments through email?	1.89	1.05	2.39	1.45	.15
24. Collaborate on assignments with other by texting, email or through wikis.	1.29	.487	1.71	1.50	.01
25. participate in polls created by the instructor (vote on class issues)?	2.05	1.12	2.32	1.40	.06

Table Note. Items were rated by students using a five-point Likert scale where 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often and 5 = Always. ^aMean, ^bStandard Deviation, $p < .004$

Research Question 4

Do students at Montana State University and King Khalid University report the use smartphone technology for cheating?

Results from items asking students to report how often on average they observed their peers using smartphones for unethical practices are reported in Table 10. Results indicate that overall both MSU and KKK students reported that they “never or rarely” observed students using smartphones inside or outside of the classroom for cheating.

KKU students observed others using smartphones for cheating significantly more often than MSU students for “sending answers to others during an exam or quiz”(d=.15), “receiving answers from others during a quiz or exam” (d = .13), “accessing lecture notes or other course materials during an exam or quiz” (d = .18), “sharing answers with someone who has not taken an exam or quiz” (d = .17) and “checking facts while writing a paper during a quiz or exam” (d=.15). Although, KKU and MSU students differed significantly on these items, the effect sizes were considered very small and not practically significant.

Table 10. Results for Smartphone Use for Cheating During Class by Institution

Item	MSU		KKU		Effect size
	<i>M^a</i>	<i>SD^b</i>	<i>M</i>	<i>SD</i>	
How often did you use your Smartphone during class to:					
26. Cheat on tests, quizzes and Other assignments.	1.36	.713	1.49	.930	.05
27. Send (by text/email) answers to others during a quiz or an exam.	1.35	.861	1.58	.978	.15*
28. receive (text/email) answers from others during a quiz or exam.	1.26	.699	1.45	.896	.13*
29. Access lecture notes or other course materials during a quiz or exam.	1.32	.730	1.67	1.08	.18*
30. Share (text/email) answers with someone who has not taken the exam or quiz yet.	1.41	.770	1.74	1.04	.17*
31. Check facts while writing a paper during a quiz or exam.	1.34	.775	1.65	1.13	.15*

Table Note. Items were rated by students using a five-point Likert scale where 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often and 5 = Always. ^aMean, ^bStandard Deviation, $p < .004$

Summary

This study was undertaken to determine how students in the United States and Saudi Arabia use their smartphones for learning both inside and outside of the classroom. A descriptive analysis of the items used to assess smartphone use found that MSU students generally used their smartphones “sometimes” inside and outside the classroom. The smartphone uses with the highest average ratings for frequency of use by MSU students inside the classroom was for “communicating with others by texting, “accessing course information” and “communicate with others about assignments through email.” On the other hand, KKU students overall reported that they “never or rarely” used their smartphones inside the classroom. The items with the highest average ratings by KKU students for smartphone use inside the classroom were for “communicating with others by texting and “accessing course information.”

MSU students reported also reported that they used their smartphones generally “sometimes” similar sometimes to support their learning outside of the classroom. The items with the highest average frequency ratings included “communicating with others by texting,” “collaborating on assignments with others by texting, emails or wikis,” “communicating with others about assignments through email,” and “accessing course information.” KKU students on the other hand again reported “never to rarely” using their smartphones outside of the classroom to support their learning. KKU students reported “accessing course information and “communicating with others about assignments by texting” as the most frequent of smartphones by them in class.

Mann-Whitney U tests were also conducted to compare MSU and K KU students on their use smartphones inside and outside of class. Overall, MSU students rated their use of smartphones significantly higher than K KU students. However, with the exception of using smartphones for “communicating with others about class assignments through email,” the effect sizes for the other differences between smartphone use items were very small. Similar results were found when comparing MSU and K KU students on smartphone use outside of the classroom.

Mann-Whitney U tests were also conducted to compare MSU and K KU males and females on their average smartphone use inside the classroom. Although MSU females rated their average use of smartphones inside the classroom significantly higher on three of the twelve items, these effect sizes for these differences were very small in magnitude. K KU males on the other hand, rated their average use of smartphones inside the classroom significantly higher than females for “communicating with others about class assignments through email,” “reading course materials” and “viewing pictures.” Although significant, these differences were very small in magnitude. When compared on the use of smartphones outside of the classroom, MSU males and females evidenced significant differences on three items but as was the case with smartphone use inside the classroom, the effect sizes for these comparisons very small. Similar results were found for male and female comparison for smartphone use outside of the classroom for K KU students.

Both MSU and K KU students reported overall that they “never or rarely” observed others using smartphones to cheat on exams or quizzes. Smartphone item

comparisons found that KGU and MSU students did not differ significantly on the reported use of smartphone for cheating.

CHAPTER FIVE

DISCUSSION

The use of mobile devices by university students has increased dramatically in recent years and has become their primary source of Internet access on campus (Keller, 2011). Several studies have found that the majority of students attending college own a laptop in addition to a smartphone (Chen & Doyelles, 2013). More importantly, the majority of students owning smartphones and other mobile devices, such as tablets, reported using these devices for academic purposes. The use of mobile devices has provided opportunities for university students to personalize their learning to fit their individual needs (Crompton, 2013). Students can utilize the technology they have to streamline information access and learn in a way that makes sense to them. Portable laptop computers and tablets allow students to engage in learning activities in both formal and informal contexts. For example, they can complete written papers and other homework assignments in a variety of different places outside of the classroom such as the library, at home, or at the local coffee shop. Even during class, students are able to send and receive information related to concepts taught in class through texting and instant messaging (Dahlstrom, Walker & Dzuiban, 2013). Students are able to quickly take notes, record lectures, review Point Presentations, pictures and other resources that their professors have made available online. Students are afforded more opportunities to engage in personalized learning.

Smartphones, like tablet computers and other mobile devices, are powerful technologies that have the potential to support student learning within the context of

multiple learning environments. A smartphone's ability to be used as a classroom learning tool is what gives it greater value to both students and teachers (Cheung, 2009). Web 2.0 software applications allow the smartphone to become a research, note taking, recording, and entertainment device that has great potential for supporting learning formally inside the classroom and informally outside of the classroom (Solvberg & Rismark, 2012). One advantage of Web 2.0 applications over programs used on a laptop computer, for example, is that they are inexpensive as compared to computer software programs. Mobile devices, such as smartphones, have great potential to improve educational systems world wide because of opportunities they offer for seamless access to learning environments across multiple contexts and personalized learning experiences. It is a vital resource to countries that hope to remain academically competitive.

As smartphone and other mobile device use continues to increase on college campuses, institutions and their faculties will need to develop sound strategies to leverage their use for creating a more personalized and student-centered learning environment. However, there is research available to guide the use of mobile technologies such as smartphones for learning. Most of this research is focused on how students use mobile devices rather than relating their use to pedagogies that are in turn linked to solid learning outcomes. Little empirical evidence exists to guide faculty's intentional use of technology that takes advantage university students' access to smartphone devices.

This study was conducted to investigate how university students and university Saudi Arabia and the United States use smartphones for learning in the undergraduate teacher education courses. Specifically, this study examined how university students used these devices to access course materials and interact with peers and the instructor within

and outside the physical boundaries of the classroom. The results from this research will provide universities and their faculty with a better understanding of student views about using smartphones in classroom settings. This research further provided answers to many questions about how smartphone technology is currently being used both inside and outside of the classroom, and what barriers exist relative to the use of mobile technologies in classrooms. The results of this research provide accurate and vital information to educators and students about how mobile technology can be used to support learning in both formal context of the physical classroom and in other contexts outside the walls of the physical classroom.

As smartphones and other mobile device use continues to increase on college campuses, institutions and their faculties will need to develop sound strategies to leverage their use for creating a more personalized and student-centered learning environment. However, there is research available to guide the use of mobile technologies such as smartphones for learning. Most of this research is focused on how students use mobile devices rather than relating their use to pedagogies that are in turn linked to solid learning outcomes. Little empirical evidence exists to guide faculty's intentional use of technology that takes advantage university students' access to smartphone devices.

Conclusions

MSU and KKU Smartphone Use

Smartphone use both inside and outside of the classroom by preservice teachers at Montana State University was found to range from sometimes to often. University students from King Khalid university on the other hand reported using their smartphone never to rarely both In

general, preservice teachers from MSU reported using their smartphones more often than KKU students to support their learning both during and outside of class. However, students from both institutions reported using their smartphones often to communicate with others about their classes through texting. Students reported using texting applications to communicate with others during class and to gain information about course assignments. This finding is aligned with other research reporting that texting is a common method for communicating with others. For example, recent research by Davis (2010) found that young people are using texts an average of fifty-three hours per week as compared to the seventy-seven minutes per day documented in 2004. In addition, Tindall and Bohlander (2012) survey found that university students' use of smartphones for texting is prevalent before and during class at the college level. The majority of students surveyed reported sending or receiving a text message in class at least once or twice while about one-third text in class every day.

A large difference between KKU and MSU students was the use of smartphones for collaboration. One reason suggested for this large difference is that technology such as smartphones and other mobile devices are just beginning to be integrated into university classrooms in Saudi Arabia (Al-Nuaim, 2012). Although Saudi university students are permitted to possess smartphones, instructors do not encourage their use as a learning tool. In addition, online learning is just beginning to emerge in Saudi universities, and the amount of online resources that could be used to access smartphones is sparse (Al-Fahad, 2009), reducing access to course information and collaboration on assignments through texting or email outside of classes. MSU students were also found to use their smartphones much more often for collaboration than KKU students. This is not surprising when considering the cultural differences related to teaching approaches in the

United States as compared to those in Saudi Arabia. The predominant teaching style by public schools and institutions in the Middle East is teacher-centered as compared to the United States which uses more learner-centered constructivist learning approaches that support student collaboration (Porcaro & Al Musawi, 2009).

Smartphone Use by Gender

There were few and very small differences between the frequency of smartphone use for MSU male and female students. Likewise very few and small differences were found for KKU gender comparisons. One explanation thought to explain the differences in smartphone for MSU males and females may be simply that females in general use their smartphones more often than males (Beaver, Knox & Zusman, 2010). Results from this research found that females use their smartphones more often than males for accessing course information, reading course materials and viewing pictures. This outcome, however, contradicts results from research conducted by Ding (2009), who found that females tend to engage with technologies such as smartphones far more verbally and less visually than their male counterparts. For KKU students, cultural differences may play a role in smartphone use. In Saudi Arabia, universities are tolerant of male use of smartphones in the classroom while smartphone use by female university students is strictly prohibited due to fear that pictures of unveiled women could be distributed electronically. (Alzabn & Altruraif, 2007).

MSU females reported using their smartphones more often than males for collaborating on assignments. This result is similar to outcomes from research by Lan & Tsai (2011) who found that females engage in texting activities much more often than

males. Their research suggests that females are more relationship-oriented than males and use texting as a way to collaborate with others both socially and when engaged in learning activities. Our results also seem to confirm that there are fewer gender gaps in the use of mobile technologies between males and females evidenced by the fact that MSU males and females differed on only 3 of 13 items during class and 2 of 13 items for smartphone use outside of class. Similar results were found for gender comparisons for KKU students.

KKU females were found to be more likely to use smartphone applications than their male counterparts only for viewing pictures and Power Points outside of the classroom. These differences were minor and might be explained by women's role in the Saudi Culture. Women spend more time in their homes than Saudi males and rely on their smartphones more often to interact with others and access information. However, the low frequency of access for both males and females using their smartphones outside of class could also be because there are not many learning materials related to their university coursework available. E-learning in Saudi Arabia is only beginning to be used to deliver instruction and it could be that university faculty do not use many web-based resources for students to access outside of the physical boundaries of the face-to-face classroom (Hussan, 2011). Another potential issue for KKU students is that wireless access to the Internet is limited outside of their university as compared to the ubiquitous wireless Internet access available off campus to MSU students.

Digital Dishonesty

Results indicate that that MSU and KKU university students reported “never or rarely” observing other students using smartphones inside or outside of the classroom for cheating. Although KKU students in some cases reported smartphone cheating significantly more often than MSU students when using some smartphone applications, these differences were very small. Student perceptions of cheating gathered from this study are somewhat inconsistent with those reported in the literature. For example, a survey of 1,035 undergraduate students by Stephens, Young and Calabrese (2007) found that almost 50% engaged in some form of cheating using handheld PDA or other digital devices. In particular they used these devices to copy homework, engage in unpermitted collaboration and accessed notes during a test or quiz). Roberts and Wasieleski (2012) found that the more online tools such as PDAs and smartphone devices were accessible by college students to help them complete assignments, the more likely students were to copy the work of others. However, similar to the results reported for this study, Watson (2010) found that only 3% of the 635 undergraduate students surveyed reported that they used text messaging through a cellphone or a handheld device during an exam or quiz. One reason for the inconsistencies in results related to the use of smartphone devices for cheating is that the data collected to assess digital cheating is from survey data and not from direct observations. Many students may feel uncomfortable reporting their own cheating as well as others’ dishonest use of mobile devices for academic purposes regardless of guarantee of anonymity.

Recommendations for Further Research

It is suggested that interviews and observations be conducted in addition to a survey similar to the one used for this study to verify the perceptions of student smartphone use during classes. The data collected for this study is based on self-report and may be somewhat biased. For example, as discussed above, it is difficult to ask students to admit to or report cheating behavior because of the consequences ranging from a verbal reprimand, being assigned a failing grades or expulsion. However, an experiment unrelated to student coursework could be devised that would allow researchers to observe students using their smartphones. This type of research would allow for the collection of observational data that would provide a better understanding of the frequency of smartphone misuse during quizzes, exams or other high-stakes assessments. In addition, more in-depth interview data may reveal other beneficial uses of smartphones for learning other than those investigated for this study. Likewise, interviews may also reveal more details about how students misuse their smartphones during class and outside of formal class settings.

Summary

Results from this study indicate that in general, MSU students use their smartphones general sometimes” for learning both inside and outside of the classroom. KKKU students on the other hand reported using their smartphones never or rarely during class as well as informally outside of the classroom. In general, these results found that males and females differed very little in their use of smartphones to support their

learning. Lastly, both MSU and KKU students reported never or rarely observing others using their smartphones to cheat during quizzes or exams.

These findings have important implications related to supporting the learning of preservice teachers and other undergraduate students majoring in other disciplines. Regardless of cultural or gender differences both KKU and MSU students use their smartphone infrequently to support their learning. As students are increasingly likely to bring their smartphones to class, instructors should make efforts to use them to their advantage to enrich student learning. For example, classroom activities and assignments could be created using social network applications to provide a way for students instantaneously interact with one another to create new knowledge and understanding. These immediate, text-based interactions can further enhance learning when accompanied by media-based resources such as videos, audio files and pictures. The use of Web 2.0 social networking tools can also be used also to encourage communications between student and instructors. Students can receive more immediate clarification about assignments while instructors can provide more immediate feedback related to student performance. Short, electronic surveys or polls could also be created to allow students to anonymously express their opinions. Engaging students in this manner may serve to stimulate more in-depth discourse among students related to pertinent course topics.

Communication barriers that exist within the Saudi culture could also be reduced with the use of smartphone technologies. In Saudi Arabia there is a deep respect by the young Saudi individuals for older family members and adults. Verbal interactions can be characterized by younger adults listening to the verbalizations of older family members and other older adults. Smartphone communication may provide a strategy that allows for

balanced discourse between both young and old that otherwise would not occur when meeting face-to-face. Saudi students are expected to listen to the professor and are not encouraged to engage discussion or questioning. However, smartphones provide more opportunities for students and instructors to engage with one another that is not culturally acceptable in public university classrooms. The use of smartphones in the Saudi university classrooms may help to create a more interactive learning environment where students have opportunities to contribute to knowledge construction along side of their instructors.

An important implication for Saudi female students is access to course materials and participation in collaborative learning activities. Saudi females students are strictly prohibited from using smartphones during class for fear that unauthorized pictures will be taken and distributed to other individuals outside of their immediate family. However, when not in school, Saudi women spend most of their time at home with ready access to smartphones. Classroom activities could be designed to allow for Saudi female students to communicate about and collaborate on assignments from their homes with other female students creating similar learning opportunities to those available to their male counterparts.

Results from this study indicate that smartphone applications are underutilized as a learning tool by universities and their faculty to support student learning. Although the m-learning research, particularly with respect to smartphone use, is fairly recent, results from this study and others suggest that faculty should consider how they can develop course materials that are accessible by smartphones and other mobile devices. Curriculum development designed with respect to mobile technologies is vitally important to increase

student opportunities for students to learn as university students' access to mobile technologies continues to grow.

REFERENCES

- Al-Fahad, F.N. (2009). Student' attitudes and perceptions toward the effectiveness of mobile learning in King Saud University, Saudi Arabia. *The Turkish Online Journal of Educational Technology*, 8(3), 111-119.
- Al-Nuaim, H.A. (2012). The use of virtual classroom in e-learning: A case study in King Abdulaziz University, Saudi Arabia. *E Learning and Digital Media*, 9(2), 1-12.
- Alzabn, E. & Altruraif, G. (2007, May 29). The level of fear of crime among students at girls colleges in Riyadh City. Alriyadh.com, issue 14218, Retrieved from <http://www.alriyadh.com/2007/05/29/article252841.html>.
- Baker, W. M., Lusk, E.J., and Neuhauser, K.L. (2012). On the use of cell phones and other electronic devices in the classroom: Evidence form a survey of faculty and students. *Journal of Education for Business*, 87, 275-289.
- Barbier, J., Bradley, J., Macaulay, J., & Reberger, C., (2012). BYOD and virtualization: Top 10 insights from CISCO IBSG horizons study. CISCO IBSG Horizons. Retrieved from <http://www.cisco.com/web/about/ac79/docs/BYOD.pdf>
- Beaver, T., Knox, D. & Zusman, M.E. (2010). Hold the phone: Cell phone use and partner reaction among university students. *College Student Journal* .44 (3), 629-632.
- Benedict, L. & Pence, H.E. (2012). Teaching chemistry using student-created videos and photo blogs accessed with smartphones and two-dimensional barcodes. *Journal of Chemical Engineering* ,89, 492-49.
- Bennett, L. & Nair, C.S. (2010). A recipe for effective participation rates for web-based survey. *Assessment & Evaluation in Higher Education*, 35 (4), 357–365
- Bugeja, M. (2008). The age of distraction: The professor or the processor? *The Futurist*, 42(1), 66-68.
- Black, R. (2012, May 18). Eight inexpensive apps that mimic expensive items. CreditReport.org RSS. Retrieved March 20, 2013, from <http://www.creditreport.org/8-inexpensive-apps-that-mimic-expensive-items/>
- Boyd, D., & Ellison, N. (2007). Social network sites: Definition, history, and scholarship. *Journal of Computer-Mediated Communication*, 13 (1), 210–230
- Bransford, J., Brown, A. L., & Cocking, R. R. (2000). How people learn: Brain, mind, experience, and school. Washington, D.C.: National Academy Press.

- Bush, M.H. & Cameron, A.H. (2011). *Digital course materials: A case study of the apple ipad in the academic environment*. (Unpublished doctoral dissertation). Pepperdine University, Malibu, CA.
- Butt, S.J., & Philips, J.G. (2008). Personality and self reported mobile phone use. *Computers in Human Behavior*, 24, 346-330.
- Campbell, S.W. (2007). Perceptions of mobile phones in classrooms: Ringing, cheating, and classroom policies. *Communication Education*, 55(3), 280-294
- Carter, Dennis. (11 April 2012). Research: Spread of smartphones leads to rampant cheating. Retrieved from <http://www.ecampusnews.com/top-news/research-spread-of-smart-phones-leads-to-rampant-cheating/>.
- Chen, B. & Denoyelles, A. (7 Oct. 2013). Exploring students' mobile learning practices in higher education. EDUCAUSE Review Online. Retrieved from www.EDUCAUSE.edu
- Cheung, W.S. & Hew, K.F. (2009). A review of research methodologies used in studies used on mobile handheld devices in K-12 and higher education settings. *Australasian Journal of Technology*, 25(2), 153-183.
- Cochrane, T., & Bateman, R. (2010). Smartphones give you wings: Pedagogical affordances of mobile web 2.0. *Australasian Journal of Educational Technology*, 26(1), 1-14.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Erlbaum
- Corder, G.W. & Foreman, D.I. (2009). *Nonparametric statistics for non statistician: A step-by-step approach*. Hoboken, NJ: Wiley.
- Crocker, L. & Algina, J. (2006). *Introduction to classical and modern test theory*. Belmont, CA: Wadsworth
- Crompton, H. (2013). A historical overview of m-learning: towards leader-centered education. In Berg, A. L. & Muilenburg, L. Y. (Eds). *Handbook of mobile learning* (pp 3-14). New York: Routledge.
- Cramer, M., & Hayes, G. (2010). Acceptable use of technology in schools: Risks, policies, and promises. *IEEE Pervasive Computing*, 9(3), 37-44. doi: 10.1109/MPRV.2010.42

- Crum, C. (2012). Google analyzes how people use smartphones in different countries. *WebProNews*. Retrieved from www.webpronews.com/google-analyzes-how-people-use-smartphones-in-different-countries-2012-05.
- Dahlstrom, E., Walker, J.D. & Dzuiban, C. (2013). ECAR study of undergraduate students and information technology (Research Report). Louisville, CO: EDUCASE Center for Analysis and Research. Retrieved from <http://www.educause.edu/ecar>
- Davis, M. R. 2010, January 27. Students Tap Mobile Tech. for Increased Media Use: Heavy Media Activity Linked to Poor Grades, Kaiser Study Finds. *Education Week*. <http://www.edweek.org/ew/articles/2010/01/27/19digital.h29.html> (accessed December 19, 2011).
- DeVellis, R.F. (2003). *Scale development: Theory and applications (2nd ed.)*. Thousand Oaks, CA: Sage.
- Dharmabotla, V. S. K. (2011). Exploring the Determinants of Perceived Value of Smartphone in a Value Co-creation Ecosystem from Service-dominant Logic Perspective. Houston, TX: University of Houston.
- Ding, N. (2009). Visualizing the sequential process of knowledge elaboration in computer-supported collaborative problem solving. *Computers & Education*, 52(2), 509–519.
- Firmin, M., Burger, A., & Blosser, M. (2009). Affective Responses of Students Who Witness Classroom Cheating. *Educational Research Quarterly*, 32(2), 3-15.
- Huang, H., Wu, C. & Chen, N. (2012). The effectiveness of using procedural scaffoldings in paper-plus-smartphone collaborative texts. *Computers & Education*, 59, 250-259.
- Hussan, H.B. (2011). Attitudes of Saudi University faculty toward using the e-learning management system JUSUR. *The Turkish Online Journal of Educational Technology*, 10(2), 43-53.
- Jackson, L. A., Ervin, K. S., Gardner, P. D., & Schmitt, N. (2001). Gender and the Internet: Women Communicating and Men Searching. *Sex Roles*, 44, 363–379.
- Joiner, R., Gavin, J., Duffield, J., Bronsan, M., Crook, C., Durndell, A., et al. (2005). Gender, Internet identification, and internet anxiety: Correlates of Internet use. *Cyberpsychology & Behavior*, 8, 371–378.
- Katz, J. E. (2005). Mobile phones in educational settings. *A sense of place: The global and the local in mobile communication*, 305-317.

- Keller, J. (2011, January). As the web goes mobile, colleges fail to keep up. Retrieved June 2nd, from <http://chronicle.com/article/Colleges-Search-for-Their/126016/>
- Kearney, M., Schuck, S., Burden, K., & Aubusson, P. (2012). Viewing mobile learning from a pedagogical perspective. *Research in Learning Technology*, 20, 1-17.
- Keskin, N. O. (2011). The current perspectives, theories and practices of mobile learning. *The Turkish Online Journal of Educational Technology*, 10(2), 202-208. Retrieved April 01, 2013.
- Kolb, L. (2011, February). Membership. Educational Leadership: Teaching Screenagers: Adventures with cell phones. Retrieved April 12, 2013, from <http://www.ascd.org/publications/educational-leadership/feb11/vol68/num05/Adventures-with-Cell-Phones.aspx>
- Kratzke, C. (2012). Smartphone technology and apps: Rapidly changing health promotion. *The International Electronic Journal of Health Education*, 15, 72.
- Lahari, M. & Moseley, J.L. (2012). Is Mobile learning for the 21st century? Educational considerations from various perspectives. *Educational Technology*, 52(4), 3-13
- Lan, Y., & Tsai, P. (2011). Using Mobile-Memo to Support Knowledge Acquisition and Posting-Question in an Mobile Learning Environment , 5, 632–638.
- Li, N., Kirkup, G., & Hodgson, B. (2001). Crosscultural comparison of women students' attitudes toward the Internet and usage: China and the United Kingdom. *Cyberpsychology & Behavior*, 4, 415–426.
- Makoe, M. (2012). Teaching digital natives: Identifying competencies for mobile learning facilitators in distance education. *Committee of University Principals of South Africa*, 26(1), 26th ser., 91.
- McLoughlin, C. & Lee, M.J. (2010). Pedagogy 2.0: Critical challenges and responses to web 2.0 and social software in tertiary teaching. In C. McLoughlin M.J. Lee (Eds.). *Web 2.0-based e-learning: applying social informatics for tertiary teaching* (pp 43-69). Hershey, PA: IGI Global.
- Merchant, G. (2012). Mobile practices in everyday life: Popular digital technologies and schooling revisited. *British Journal of Educational Technology*, 43(5), 770–782.
- Miller, W. (2012). iTeaching and learning: Collegiate instruction incorporating mobile tablets. *Library Technology Reports*, 48(8), 54-59.

- Milrad, M., & Spikol, D. (2007). Anytime, anywhere learning supported by smart phones: Experiences and results from the MUSIS Project. *Educational Technology & Society*, 10 (4), 62-70.
- Mossberger, K., Tolbert, C. J., & Stansbury, M. (2003). *Virtual inequality: Beyond the digital divide*. Georgetown University Press.
- New, C. (2012, March 01). Smartphones are used by nearly half of Americans. *The Huffington Post*. Retrieved March 20, 2013, from http://www.huffingtonpost.com/2012/03/01/most-americans-have-a-smartphone_n_1314914.html
- Odell, P., Korgen, K., Schumacher, P., & Delucchi, M. (2000). Internet use among female and male college students. *Cyberpsychology & Behavior*, 3, 855–862.
- O'Reilly, T. (2005). What is Web 2.0: Design patterns and business models for the next generation of software. Retrieved March 2006, from <http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html>
- Ong, C., & Lai, J. (2006). Gender differences in perceptions and relationships among dominants of e-learning acceptance. *Computers in Human Behavior*, 22(5), 816–829.
- Park, Y. (2011). A pedagogical framework for mobile learning: Categorizing educational applications of mobile technologies into four types (Unpublished doctoral dissertation). Virginia Tech. Retrieved from <http://www.irrodl.org/index.php/irrodl/article/view/791/1699>
- Prensky, M. (2001). Digital natives, digital immigrants part 1. *On the Horizon*, 9(5), 1-6. Retrieved from <http://www.emeraldinsight.com/journals.htm?issn=1074-8121>
- Roberts, J. a., & Wasieleski, D. M. (2012). Moral Reasoning in Computer-Based Task Environments: Exploring the Interplay between Cognitive and Technological Factors on Individuals' Propensity to Break Rules. *Journal of Business Ethics*, (3), 355–376.
- Rossing, J., Miller, W., Cecil, A., & Stamper, S. (2012). iLearning: The future of higher education? Student perceptions on learning with mobile tablets. *Journal of the Scholarship of Teaching and Learning*, 12(2), 1-26.
- Schachter, Ron. (Nov. 2009). Mobile devices in the classroom: Phones, netbooks and iPods are finding a place in the curriculum and expanding access to technology. *District Administration Magazine*.

- Scanlon, E., Jones, A. C., & Waycott, J. (2005). Mobile technologies: prospects for their use in learning in informal science settings. *Journal of Interactive Media in Education*. Retrieved <http://www-jime.open.ac.uk/jime/article/viewArticle/2005-25/303>
- Schmelkin, L., Gilbert, K., & Silva, R. (2010). Multidimensional scaling of high school students' perceptions of academic dishonesty. *The High School Journal*, 93(4), 156-65.
- Sewlyn, N. (2011). Digitally distanced learning: A study of international distance learners' (non)use of technology. *Distance Education*, 32(1), 85-99.
- Sherman, R. C., End, C., Kraan, E., Cole, A., Campbell, J., Birchmeier, Z., et al. (2000). The Internet gender gap among college students: Forgotten but not gone? *Cyberpsychology & Behavior*, 3, 885-894.
- Solvberg, A., & Rismark, M. (2012). Learning Spaces in Mobile Learning Environments. *Active Learning in Higher Education*. doi: 10.1177/1126978741142989
- Song, Y., Wong, L., & Looi, C. (2012). Fostering Personalized Learning in Science Inquiry Supported by Mobile Technologies. *Education Technology Research Development*. doi: 10.007/s11423-012-9245-6
- Stead, G. (2011, June 3). Moblearn: An agent for change: Use smartphones in class, say school principals. *Moblearn.blogspot.com*. Retrieved October 12, 2012, from [tp://moblearn.blogspot.com/2011/06/use-smartphones-in-class-say-school.html](http://moblearn.blogspot.com/2011/06/use-smartphones-in-class-say-school.html)
- Stead, G. (2011). School principals speak out about mobile and social...and it is good! *Tribal Labs*. Retrieved from www.triballabs.net.
- Stephens, J., Young, M., & Calabrese, T. (2007). Does Moral Judgment Go Offline When Students are Online? A Comparative Analysis of Undergraduates' Beliefs and Behaviors Related to Conventional and Digital Cheating. *Ethics and Behavior*, 17(3), 233-254.
- Tindall, D.R. & Bohlander, R.W. (29 Dec. 2011). The use and abuse of cell phones and text messaging in the classroom: A survey of college students. *College Teaching*, 60(1), 1-9.
- Traxler, J. (2007). Defining, Discussing, and Evaluating Mobile Learning: The moving finger writes and having writing. *The International Review of Research in Open and Distance Learning*, 8(2), 1-12
- US teens use smart phones for cheating: Study. (2011). *Phys.org*. Retrieved from Phys.org/news164627196.html.

- Virginia Wesleyan College (2014). Education department website. Retrieved from <http://www.vwc.edu/education/field-experiences/preservice-teaching.php>
- Watson, G. & Sottile, J. (2010). Cheating in the digital age: Do students cheat more in online courses? *Online Journal of Distance Learning Administration*, 13(1), 1-9.
- Wexler, S., Schlenker, B., Brown, J., Metcalf, D., Quinn, C., Thor, E., van Barneveld, A. & Wagner, E. (2007). *Research 360° report on mobile learning*. Santa Rosa, CA: The eLearning Guild.
- Wilen-Daugenti, T. (2012). *Society 3.0 How technology is reshaping education, work and society*. New York: Peter Lang.
- Willems, J. A. (2013). M-learning during emergencies, disasters, and catastrophes: An Australian story. In Berg, A. L. & Muilenburg, L. Y. (Eds). *Handbook of mobile learning* (pp 3-14). New York: Routledge.
- Williams, A. J., Pence, H. E., Society, R., O, U. S., Forest, W., Carolina, N., & States, U. (2011). Smart Phones , a Powerful Tool in the Chemistry Classroom, 683–686.
- Wong, W. (2012). Tools of the Trade: How Mobile Learning Devices Are Changing the Face of Higher Education. *Community College Journal*, 82(5), 54-60.
- Wright, S., & Parchoma, G. (2011). Technologies for Learning? An Actor-Network Theory Critique of “Affordances” In Research on Mobile Learning. *Research in Learning Technology*, 19(3), 248-258.

APPENDICES

APPENDIX A

SMARTPHONE SURVEY FOR MSU STUDENTS

Smartphone Survey

1. Do you own a Smartphone?
 - a. Yes
 - b. No

If you answered no, to question 1, please discontinue the survey and submit

If you answered yes, continue to question 2

2. Please indicate your gender?
 - a. Male
 - b. Female
3. What is your class standing?
 - a. Freshman
 - b. Sophomore
 - c. Junior
 - d. Senior
 - e. Other – please explain
4. What is your age:
5. Please indicate your major:
6. What company makes your Smartphone
 - a. Motorola
 - b. Palm
 - c. Apple
 - d. Nokia
 - e. LG
 - f. Samsung
 - g. Blackberry
 - h. Other_____
7. Who is your mobile carrier
 - a. Sprint Nextel
 - b. Verizon Wireless
 - c. AT&T
 - d. T-Mobile
 - e. Other_____

8. How often do you use your Smartphone in class?

- a. Never
- b. Rarely
- c. Sometimes
- d. Often
- e. Very Often

Please answer the following questions about how you use your Smartphone **in class** for your studies at MSU using the following descriptors": **"Never (Not at all), Seldom (less than weekly), Sometimes (multiple times a week but not daily), Often (Daily), Always (Multiple times a day)"** for each question.

Please check one descriptor for each question!

During the past school year how often did you use your Smartphone during class to:	Never	Rarely	Sometimes	Often	Always
9. access course information (syllabus, assignments etc.)?					
10. read course materials (notes)?					
11. take notes in class?					
12. find the meaning words or terms used in class?					
13. find reference material for class activities and assignments					
14. view course pictures (diagrams, maps, etc.)?					
15. view course PowerPoints?					
16. record a class lecture?					
17. listen to a class lecture (podcast)?					
18. view course videos?					
19. communicate with others about class assignments texting?					
20. communicate with others about class assignments through email?					

22. Please describe other ways that you use your smartphone **in class** for your studies at MSU

Please answer the following questions about how you use your Smartphone **outside of class** for your studies at MSU using the following descriptors: “**Never (Not at all)**, **Sometimes (Multiple times a week but not daily)**, **Often (Daily)**, **Very Often (Multiple times a day)**” for each question.

Please check one descriptor for each question.

During the past school year , how often do you use your Smartphone outside of class to:	Never	Rarely	Sometimes	Often	Very Often
23. access course information (syllabus, assignments etc.)?					
24. read course materials (notes)?					
25. find the meaning words or terms used in class?					
26. find reference material for class activities/assignments					
27. view course pictures (diagrams, maps, etc.)?					
28.view course PowerPoints?					
29. listen to class lectures (podcast)?					
30. view course videos?					
31. communicate with others about class assignments by texting?					
32. communicate with others about class assignments through email?					
33. others by texting, email or through wikis.					

35. Please describe other ways that you use your smartphone **outside of class** for your studies at MSU

Please answer the following questions about how you use your Smartphone **in class** for your studies at MSU using the following descriptors: “**Never (Not at all)**, **Seldom (less than weekly)**, **Sometimes (multiple times a week but not daily)**, **Often (Daily)**, **Always (Multiple times a day)**” for each question.

Please only check one descriptor for each question

During the past school year , I have observed others using their smartphones in class to:	Never	Rarely	Sometimes	Often	Always
36. cheat on test, quizzes, and other assignments.					
37. send (text /email) answers to other students during an quiz or exam.					
38. receive (text /email) answers from other students during a quiz or exam.					
39. access lecture notes or other course materials during an quiz or exam.					
40. share (text /email) answers with someone who has not taken the exam or quiz yet.					
41. check facts while writing a paper during an quiz or exam.					

42. Please describe other ways that smartphones might be used to cheat when completing assignments, tests, quizzes etc.

43. Please describe other general ways that you use your smartphone.

Please answer the following questions about the amount of time you use your Smartphone for various school related activities at MSU using the following descriptors: **“Never (Not at all), Seldom (less than weekly), Sometimes (multiple times a week but not daily), Often (Daily), Always (Multiple times a day)”** for each question.

Please only check one descriptor for each question

How often do you use your Smartphone for :	Multiple times a day	Daily	Multiple times a week but not daily	Weekly	Less than weekly	Not at all
44. reading email						
45. writing email						
46. reading news						
47. accessing media (music, video, etc)						
48. Gaming						
49. browsing the internet for information						
50. tasks (banking, ordering ,etc)						

APPENDIX B

SMARTPHONE SURVEY FOR KCU STUDENTS



1/ هل تمتلك هاتف ذكي ؟		☐ نعم		☐ لا	
إذا كانت الإجابة " لا " يرجى عدم إكمال الاستبيان .					
2/ تحديد السنة الدراسية في الجامعة .		☐ الأولى		☐ الثانية	
		☐ الثالثة		☐ الرابعة	
		☐ الخامسة			
3/ تحديد العمر .					
4/ تحديد الجنس .		☐ ذكر		☐ أنثى	
5/ تحديد التخصص .					
6/ هاتفك الذكي من شركة .		☐ Nokia		☐ Apple	
		☐ أخرى		☐ Blackberry	
		☐ LG		☐ Samsung	
		☐ Palm		☐ Motorola	
7/ الشركة المزودة للخدمة .		☐ الاتصالات		☐ موبايلى	
		☐ زين		☐ أخرى	
8 / الرجاء الإجابة على الأسئلة التالية حول كيفية استخدام الهاتف الذكي الخاص بك (داخل الفصل الدراسي) في جامعة الملك خالد باستخدام العبارات التالية: أبداً (لا تستخدم الجهاز في الفصل الدراسي) ، ونادراً (مرة في الأسبوع) ، وأحياناً (عدة مرات في الأسبوع) ولكن ليس يومياً ، وأحياناً (يومياً تستخدم جهازك في الفصل الدراسي) ، دائماً (عدة مرات في اليوم).					
هل تستخدم جهازك الذكي في الفصل الدراسي ؟					
خلال السنة الدراسية الماضية كان استخدامك للهاتف الذكي الخاص بك (داخل الفصل الدراسي) في					
الوصول لمعلومات عن المادة المنهج ، الواجبات وغيرها ؟					
قراءة المواد المستخدمة في المادة (مذكرات) ؟					
تكوين الملاحظات في الفصل ؟					
التغور على معنى أو مصطلح لكلمة مستخدمة في الصف ؟					
البحث عن المصادر والمراجع ؟					
البحث بالصور عن (الرسوم البيانية ، والخرائط وغيرها)					
البحث عن العروض التي تستخدم برنامج البوربوينت					
تسجيل المحاضرة ؟					
الاستماع إلى المحاضرة ؟					
مشاهدة فيديو عن المحاضرة ؟					
التواصل مع الآخرين حول الواجبات والأبحاث الدراسية عن طريق الرسائل النصية ؟					
التواصل مع الآخرين حول الواجبات والأبحاث الدراسية عن طريق البريد الإلكتروني ؟					
المشاركة في استطلاع الرأي التي يقيمها المعلم ، التصويت على قضايا داخل الفصل ؟					
10/ يرجى وصف الطرق الأخرى التي تستخدمها في هاتفك الذكي (داخل الفصل الدراسي) في جامعة الملك خالد.					
1 / الرجاء الإجابة على الأسئلة التالية حول كيفية استخدام الهاتف الذكي الخاص بك (خارج الفصل الدراسي) في جامعة الملك خالد باستخدام العبارات التالية: أبداً (لا تستخدم الجهاز في الفصل الدراسي) ، ونادراً (مرة في الأسبوع) ، وأحياناً (عدة مرات في الأسبوع) ولكن ليس يومياً ، وأحياناً (يومياً تستخدم جهازك في الفصل الدراسي) ، دائماً (عدة مرات في اليوم).					
خلال السنة الدراسية الماضية كان استخدامك للهاتف الذكي الخاص بك (خارج الفصل الدراسي) في					
الوصول لمعلومات عن المادة المنهج ، الواجبات وغيرها ؟					
قراءة المواد المستخدمة في المادة (مذكرات) ؟					

تدوين الملاحظات في الفصل ؟	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
العثور على معنى أو مصطلح لكلمة مستخدمة في الصف ؟	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
البحث عن المصادر والمراجع ؟	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
البحث بالصور عن (الرسوم البيانية ، والخرائط وغيرها)	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
البحث عن العروض التي تستخدم برنامج البوربوينت	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
تسجيل المحاضرة ؟	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
الاستماع إلى المحاضرة ؟	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
مشاهدة فيديو عن المحاضرة ؟	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
التواصل مع الآخرين حول الواجبات والأبحاث الدراسية عن طريق الرسائل النصية ؟	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
التواصل مع الآخرين حول الواجبات والأبحاث الدراسية عن طريق البريد الإلكتروني ؟	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
المشاركة في استطلاع الرأي التي يقيمها المعلم ، التصويت على قضايا داخل الفصل ؟	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
12/ يرجى وصف الطرق الأخرى التي تستخدمها في هاتفك الذكي (خارج الفصل الدراسي) في جامعة الملك خالد.					
1 / الرجاء الإجابة على الأسئلة التالية حول كيفية استخدام الهاتف الذكي الخاص بك (داخل الفصل الدراسي) في جامعة الملك خالد باستخدام العبارات التالية: أبدأ (لا تستخدم الجهاز في الفصل الدراسي)، ونادراً (مرة في الأسبوع)، وأحياناً (عدة مرات في الأسبوع) ولكن ليس يومياً، وأحياناً (يومياً تستخدم جهازك في الفصل الدراسي)، دائماً (عدة مرات في اليوم).					
خلال السنة الدراسية الماضية، سبق وأن لاحظت أحد الطلاب يستخدم هاتفه الذكي في					
الغش في الاختبارات، الأبحاث، أو أي مهام أخرى	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
إرسال (رسائل نصية/ البريد الإلكتروني) فيها الأجوبة للطلاب الآخرين أثناء الاختبار أو الامتحان	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
استلام (رسائل نصية/ البريد الإلكتروني) فيها الإجابات من الطلاب الآخرين أثناء الاختبار أو الامتحان	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
قراءة المحاضرة أو شيء له علاقة بالمادة خلال الاختبار أو الامتحان	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
إرسال (رسالة نصية/ البريد الإلكتروني) فيها الإجابات لشخص لم يأخذ الامتحان بعد	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
التحقق من معلومة أثناء الامتحان	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
14/ يرجى وصف الطرق الأخرى التي يمكن أن تستخدم فيها الهواتف الذكية في الاختبارات أو الامتحانات					
15/ يرجى وصف الطرق الأخرى العامة التي تستخدمها مع هاتفك الذكي .					
16/ الرجاء الإجابة على الأسئلة التالية حول مقدار الوقت الذي تستخدم الهاتف الذكي الخاص بك لمختلف الأنشطة المدرسية ذات الصلة بدراساتك في جامعة الملك خالد ،،، يرجى اختيار إجابة واحدة لكل سؤال .					
غالباً تستخدم الهاتف الذكي الخاص بك في :					
قراءة البريد الإلكتروني	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
كتابة البريد الإلكتروني	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
قراءة ومتابعة الأخبار	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
متابعة وسائل الإعلام (استماع أو مشاهدة مقاطع)	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
الالعاب الترفيهية	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
تصفح الإنترنت للحصول على معلومات	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً
المهام الشخصية (متابعة الحساب البنكين المشتريات، إلخ)	☐ أبدأ	☐ نادراً	☐ أحياناً	☐ غالباً	☐ دائماً

APPENDIX C

DEAN'S PERMISSION, KKU

الرقم ٣٩ / ١٠٣٥
التاريخ ١٤٤٤ / ٩ / ٢١
المرفقات ٣



المملكة العربية السعودية
وزارة التعليم العالي
جامعة الملك خالد

٣٨
كلية التربية
٣٩

سعادة أ.د. / وكيل الجامعة للدراسات العليا والبحث العلمي حفظه الله

السلام عليكم ورحمة الله وبركاته وبعد

بناء على قرار مجلس الكلية الرابع عشر ١٤٣٤/٣٣هـ بتاريخ ١٤٣٤/٧/١٧هـ، والمتضمن الموافقة على تفويض سعادة الدكتور عميد كلية التربية أو من ينوب عنه بصلاحيات مجلس الكلية خلال فترة الإجازة الصيفية للعام الدراسي ١٤٣٣-١٤٣٤هـ، وما يتخذ باسم المجلس من قرارات أو توصيات خلال هذه الفترة .

وبناء على الطلب المقدم من المحاضر/ محمد زيدان عبدالله آل محفوظ والذي يرغب تمديد رحلته العلمية من شهر إلى ثلاثة أشهر. وبناءً على توجيه المشرف العلمي للمحاضر وكون المدة السابقة لا تكفي لجمع البيانات؛ عليه تنفيذ سعادتك بأنه لا مانع لدى الكلية من تمديد فترة الرحلة العلمية إلى ثلاثة أشهر تنتهي في ١٤٣٤/١٠/٢٩هـ.

أمل التكرم بالاطلاع واتخاذ ما ترونه مناسباً .

والله يحفظكم ويرعاكم ،،،

عميد كلية التربية
٩/٢٠
١٤٤٤
د. محمد بن حسن آل سقران

APPENDIX D

HEAD OF DEPARTMENT'S PERMISSION, KKU

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



المملكة العربية السعودية
وزارة التعليم العالي
جامعة الملك خالد

الرقم
التاريخ
المرفقات

إلى من يهمه الأمر

بناء على الخطاب المقدم من المعيد/ محمد زيدان عبدالله آل محفوظ والمتضمن من إنهائه للرحلة العلمية الخاصة بجمع البيانات والمعلومات الخاصة بمشروع مرحلة الدكتوراه المعنون "اختلاف الحضارات واستخدام الهواتف الذكية في الفصول التعليمية دراسة مقارنة بين جامعة مونتانا الأمريكية وجامعة الملك خالد" من خلال الأدوات البحثية المعدة لذلك . فعليه نفيكم بأن المذكور أعلاه قد أنهى رحلته العلمية من الفترة ١٤٣٤/٨/١ هـ إلى الفترة ١٤٣٤/١٠/٣٠ هـ ولكم جزيل الشكر والتقدير.

رئيس قسم المناهج وطرق التدريس

د. محمد صالح الشهري

APPENDIX E

INSTITUTIONAL REVIEW BOARD PERMISSION, MSU



INSTITUTIONAL REVIEW BOARD
For the Protection of Human Subjects
FWA 00000165

960 Technology Blvd. Room 127
 c/o Immunology & Infectious Diseases
 Montana State University
 Bozeman, MT 59718
 Telephone: 406-994-6783
 FAX: 406-994-4303
 E-mail: cherylj@montana.edu

Chair: Mark Quinn
 406-994-5721
 mquinn@montana.edu
Administrator:
 Cheryl Johnson
 406-994-6783
 cherylj@montana.edu

MEMORANDUM

TO: Mohammed Almahfud and Art Bangert
FROM: Mark Quinn, Chair *Mark Quinn CJ*
DATE: March 27, 2013
RE: "A Cross Cultural Comparison of Smartphone Use in the United States and the Kingdom of Saudi Arabia"
 [MA032713-EX]

The above research, described in your submission of March 27, 2013, is exempt from the requirement of review by the Institutional Review Board in accordance with the Code of Federal regulations, Part 46, section 101. The specific paragraph which applies to your research is:

- ☐ (b) (1) Research conducted in established or commonly accepted educational settings, involving normal educational practices such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.
- ☒ (b) (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation.
- ☐ (b) (3) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior that is not exempt under paragraph (b)(2) of this section, if: (i) the human subjects are elected or appointed public officials or candidates for public office; or (ii) federal statute(s) without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.
- ☐ (b) (4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available, or if the information is recorded by the investigator in such a manner that the subjects cannot be identified, directly or through identifiers linked to the subjects.
- ☐ (b) (5) Research and demonstration projects, which are conducted by or subject to the approval of department or agency heads, and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs; (iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs.
- ☐ (b) (6) Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed, or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the FDA, or approved by the EPA, or the Food Safety and Inspection Service of the USDA.

Although review by the Institutional Review Board is not required for the above research, the Committee will be glad to review it. If you wish a review and committee approval, please submit 3 copies of the usual application form and it will be processed by expedited review.