

Benefits of Online Class Notifications on Higher Education Courses

By
Ghada Abdulaziz Alsaif
M.S.E, University of Kansas
B.S., King Saud University

Submitted to the graduate degree program in Department of Educational Leadership and Policy Studies, and the Graduate Faculty of the University of Kansas in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

Chair: Dr. Ronald J Aust

Dr. Richard Branham

Dr. Bruce Frey

Dr. Suzanne Rice

Dr. Jennifer Ng

Dr. Robert Isaacson

Date Defended: August 28, 2017

The dissertation committee for Ghada Abdulaziz Alsaif certifies that this is
the approved version of the following dissertation:

Benefits of Online Class Notifications on Higher Education Courses

Chairperson: Dr. Ronald J Aust

Date Approved:

ABSTRACT

This study investigates the effects of using online notifications in higher education courses. University students in Education and Design courses received weekly notification advising them on: upcoming instruction, recommended readings, study groups, due dates for assignments, activities and exams. The students received the notifications on their preferred media. They either used both mobile devices (cell phones or tablets), or fixed desktop computers in their homes or university. The study sought to understand how students value class notifications and how the effectiveness of notifications was influence by usage factors such as: mobile or fixed access, usage skills, types of notifications, and demographic factors such as age, sex, major and academic year.

The study used both quantitative and qualitative techniques in collecting and analyzing data. Students in Education (N=32) and Design (N=37) courses participated in a 16-week intervention followed by an online survey. Carefully timed and designed messages were distributed throughout the semester. A 77 item survey was sent to 69 applicants. One-way ANOVA, independent-sample t-test, and correlation coefficient were used to compare the relation between the value of notification and the usage and demographic factors. Descriptive statistics were used to examine students' perspectives of class notifications. The mean values of the 6 class notifications items (M=4) was significantly above the 3 likert scale midpoint ($p<.000$). A correlation coefficient was used to determine associations between the survey items. Among other quantitative

findings the results showed a significant positive correlation between the Value of Class Notifications and Mobile Technology Use ($r=.355$, $p=0.016$) and Value of Class Notifications and Usage Skills ($r=0.351$, $p=0.017$).

Responses to the open-ended qualitative questions indicate that online class notifications assist learners significantly in meeting class expectations. Notification also supports learners in completing tasks in a timely fashion. This study shows that class notification are particularly beneficial when they are continuously accessible from mobile devices, when the learners are skilled in using the notifications and when the notifications are related to course expectations. Qualitative analysis indicated that by assisting students in keeping track of class activities and due dates, notifications can reduce mental load, encourage social engagement with teachers as well as peers and foster a greater belonging in university courses. Further studies may wish to consider the influence of class notification on achievement and students perception of course organization and quality.

DEDICATION

I dedicate this work to:

My beloved Mother and Father,

*Who were and still are my first teachers, who gave their unconditional support,
affection, love, pray day and night for me.*

My beloved husband, Turki Alturki,

*Who has showed patience, sacrifices, and encouragement, which inspired me to
make this endeavor possible.*

My apple of my eye, my children,

Bader and Jenna

Who were the source of my strength, hope and joy.

My beloved sisters and brothers,

Who with their supplication and love I prevailed.

May Allah protect you all and grant you with great faith, health, and success.

ACKNOWLEDGEMENTS

In the Name of Allah, the Beneficent, the Merciful

All praise, thanks, gratitude is due to Almighty Allah, for his blessing and all the mercy he bestowed on me. I thank Allah for giving me the ability to pursue my graduate education and to earn my doctorate degree. This endeavor can't be possible without the help and guidance of Allah.

I am especially indebted to my home country the Kingdom of Saudi Arabia, for their help and financial support. Thank you. May Allah bless this country and their leaders and keep this country safe and peaceful.

I would like to express my sincere appreciation and gratitude to my academic advisor Dr. Ronald Aust. Your comments and supervision helped me to focus on my PhD program and achieve my goals successfully.

I would like to extend my appreciation and thanks to my dissertation committee members, Dr. Branham, Dr. Frey, Dr. Suzanne Rice, Dr. Jennifer Ng, and Dr. Isaacson. Thank you for your valuable feedback, comments, suggestions, assistance and time. A special gratefulness and thanks for Dr. Branham, who supported me a lot with advice, books, encouragement, and patience all the time during my academic journey. Also, a special thanks and appreciation go to Dr. Frey who advice me the statistical analysis part of my dissertation. I am also gratefulness to Dr. Rice for her patience, suggestions and encouragement.

I would like to thank my beloved parents for their unlimited support, encouragement, prayer, care, and endless-love. I ask Allah to give them the health and accept their good deeds.

Love and sincere appreciation go to my family, my husband, Dr. Turki and my children, Bader and Jenna. Thank you my husband for the efforts, encouragement and sacrifices that you provided for me during my entire academic journey. Thanks my wonderful children, Bader, and Jenna for bringing joy, hope, happiness to me, and realizing how important the time was for your mother to work and complete this life chapter.

I would also express my gratitude and thanks to my mother in law for her prayers; and to my brothers and my sisters; for their prayers, support, encouragement and bring joy and happiness to me. A special gratefulness and thanks for my sister, Dr. Nora, for her knowledge support and help in my academic journey, and my sister Asma for her care and love. Finally, there are no words can express my thanks to my best friend in foreign land Shamma ALKaabi; thank you for standing by my side when times get hard, thank you for being my sister when my siblings far away, thank you help me find out who I really am.

May Allah protect you all and bless you with faith, health, and happiness.

TABLE OF CONTENTS

Abstract.....	iii
Dedication.....	v
Acknowledgements.....	vi
Table of Contents.....	viii
List of Tables.....	xiv
List of Figures.....	xvi
Chapter One.....	1
Introduction.....	1
1.1 Background and History of Technology and Education.....	1
1.2 Definition of Terms.....	4
1.3 Mobile Technologies and Social Life.....	5
1.4 Text Messaging and Social Life.....	6
1.5 Mobile Technologies and Social Media.....	8
1.6 Mobile Technologies and Learning (M-Learning).....	8
1.7 Notifications Systems such as Text Messaging in Education.....	11
1.8 The Importance of the Study.....	13
1.9 The Purpose of the Study.....	16
1.10 Research Questions.....	18

1.11	Research Hypotheses	18
1.12	Chapter Summary	19
	Chapter Two.....	20
	Literature review	20
2.1	Theoretical Framework.....	21
2.1.1	Informal and Long-Life Activities Theory.....	21
2.1.2	Collaborative Learning.....	22
2.1.3	Constructivist Learning.....	23
2.2	Mobile Devices and Learning or M-Learning.....	24
2.3	Higher Education Students Use of Mobile Devices in Learning	26
2.4	Mobile Devices' Notifications and Messages	27
2.5	Factors Affecting Learning Notifications	33
2.6	Cognitive Overload and Memory.....	34
2.7	Benefits of Using Mobile Devices in Learning:.....	37
2.8	Benefits of learning Notifications and Short Messages	39
2.9	Barriers to Effective Use of Notifications and Mobile Devices in Learning	39
2.10	Chapter Summary	41
	Chapter Three.....	43
	Methods.....	43

3.1	Research Design.....	44
3.2	Research Questions	47
3.3	Research Hypothesis	48
3.4	Research Setting.....	48
3.5	Data Collection Procedures.....	50
3.6	Participants.....	52
3.7	Instruments.....	52
	3.7.1 Validity.....	54
	3.7.2 Reliability.....	55
3.8	Data Analysis	57
3.9	Description of the Variables.....	57
3.10	Chapter Summary	60
	Chapter Four	61
	Study Results Analysis	61
4.1	Statistical Methods.....	62
4.2	Population and Sample.....	62
	4.2.1 Participant Demographics.....	63
	4.2.2 Participants' Ages	64
	4.2.3 Participants' Gender.....	65

4.2.4	Participants' Year of Study	66
4.2.5	Major and Specialization.....	67
4.3	Findings of Survey Questions	70
4.3.1	Research Questions One.....	70
4.3.2	Research Question Two	72
4.3.3	Research Questions Three.....	74
4.3.4	Research Question Four	76
4.3.5	Research Question Five.....	78
4.3.6	Research Question Six	79
4.3.7	Research Questions Seven & Eight.....	80
4.3.7.1	First open-end question	81
4.3.7.2	Second open-ended question	84
4.4	Differences in Demographic Characters	87
4.4.1	The Differences in Age Variable	87
4.4.2	The Differences in Gender variable	88
4.4.3	The Differences in year in school variable.....	89
4.4.4	The Differences of Major and Specialization Variable.....	90
4.4.5	The Differences in Data Plan on Cell Phone Variable.....	91
4.5	Chapter Summary.....	91

Chapter Five.....	93
Conclusion	93
5.1 Purpose of Study	93
5.2 Participants and Data Collection	94
5.3 Summary of Procedures	94
5.4 Findings	95
5.4.1 Research Question One	95
5.4.2 Research Question Two	100
5.4.3 Research Question Three	103
5.4.4 Research Question Four	105
5.4.5 Research Question Five.....	107
5.4.6 Research Question Six	108
5.4.7 Research Question Seven and Eight.....	110
5.5 Implications.....	113
5.6 Recommendations	114
5.7 Suggestions for Future Research.....	116
5.8 Limitations	117
5.8.1 Internal Validity:	117
5.8.2 External Validity:	117

5.9 Conclusion.....	117
Bibliography	120
APPENDIX A: University of Kansas Human Subject Review Board Application	137
APPENDIX B: Human Subject Oral Consent Form	139
APPENDIX C: Internet Statement “Consent” with Digital Survey	140
APPENDIX D: Survey	141
APPENDIX E: Message Sample	146

LIST OF TABLES

Table 1: <i>Level and Affiliation of Participants</i>	49
Table 2 : <i>Do you have a data plan (Internet) on your cell phone?</i>	63
Table 3: <i>Distribution of Individuals According to Age</i>	64
Table 4: <i>Distribution of Participants According to Gender</i>	65
Table 5: <i>Participants Current Academic Year</i>	66
Table 6: <i>Participants major and specialization</i>	67
Table 7: <i>Participants general major</i>	68
Table 8: <i>Communication tools use most often for class activities</i>	69
Table 9: <i>Responses to RQ 1 (using mobile technologies for learning)</i>	71
Table 10: <i>Responses to RQ 2 (using desktop computers for learning)</i>	73
Table 11: <i>Responses to RQ 3 (value of class notifications)</i>	75
Table 12: <i>Responses to RQ 4 (situation of read course notifications)</i>	76
Table 13: <i>Responses to “situation of read personal notifications”</i>	77
Table 14: <i>Compare item “Receive class notifications” in mobile technology and desktop computer.</i>	78
Table 15: <i>Responses to RQ 5 (skills in using class notifications)</i>	78
Table 16: <i>Correlation of the value of class notifications and using cell phone</i>	79
Table 17: <i>Class notifications advantages and diadvantages</i>	83
Table 18: <i>Advantages or disadvantages of mobile devices for learning</i>	85
Table 19: <i>Results of T-test with age as variable</i>	88
Table 20: <i>Results of T-test with gender as variable</i>	88
Table 21: <i>Results One-way ANOVA with current year in school as variable</i>	89

Table 22: <i>Results independent sample T-test with major as variable</i>	90
Table 23: <i>Results of independent sample T-test with data plan as variable</i>	91

LIST OF FIGURES

Figure 1: Do you have a data plan (Internet) on your cell phone?	63
Figure 2: Distribution of Individuals According to Age.....	64
Figure 3: Distribution of Participants According to Gender.....	65
Figure 4: Participants Current Academic Year.....	66
Figure 5: Participants major and specialization	67
Figure 6: Participants general major	68

CHAPTER ONE

INTRODUCTION

1.1 Background and History of Technology and Education

As the world becomes increasingly dependent upon technology, an inability to wield technology will likely increase the chances of being edged out in various ways by others with basic technological skills. Use of computers and their associated applications continue to dominate everything in contemporary postindustrial everyday life, including home, work, entertainment, and education.

Early education is often described as a form of learning in which the knowledge, skills, and habits of a group of people is transferred from one generation to the next through teaching, training, or research. Traditional education, where students sit and listen to the teacher, is in the process of disappearing from the modern classroom. In traditional education, students get the information just from one direction—from their teacher. Then the students one after another repeat what the teacher said, trying to memorize the information as success on homework and tests depends on their memorization of the knowledge (Beck, 2009). Traditional education is being supplanted by more effective education techniques. One of these effective education methods is educational technology, where technology is integrated into education to sustain the learning process via an ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources (Richey, 2008).

Technology develops rapidly day by day, especially in the area of mobile

technology (e.g., cell phones, MP3 players, and tablets). Over the years, technology has advanced and brought new options and opportunities to learning and education. The traditional model of personal face-to-face teaching and learning is changing with the introduction of the mobile technology. More and more mobile devices, such as smart phones and Personal Digital Assistants (PDAs), are gaining recognition as educational tools. Their use goes beyond their original purposes for communication. It is still premature for mobile technology to escape the categorization of a support tool for learners. The application of these devices in support of learning and performance has evolved into a research and education field known as mobile learning, or m-learning.

Face-to-face education once was the only method for the education process. The emergence of distant education with the advance of technology gave birth to m-learning. M-learning has been described as learning anywhere and at any time by using mobile devices such as laptops, notebooks, tablets, smart phones, mp3 players, and others (Crompton, 2013). It is key to understand the relationship between distance learning and m-learning before further details are discussed. Distance education can be traced to the late 1800s and earlier 1900s (Gunawardena & McIsaac, 2004; Meyer, 2002). Despite the growing popularity of distance education, face-to-face remained the preferred form of education method during this era. Students learned to adopt distance learning because of its availability and limitlessness to location and time.

The postal system made it possible for students to communicate with teachers and complete coursework as they were physically separated from their instructors. The recent technological revolution has created an environment for distance learning to flourish. By making communication and accessible information available to student and teachers, m-

learning emerged as an unstoppable method of education (Gunawardena & McIsaac, 2004; Meyer, 2002).

In the 1950s and 1960s as television and radio grew popular, distance learning also grew in popularity. Neither students nor teachers had to travel to interact with each other and institutions implemented newer technologies to reach their student populations. Broadcasts of lessons were transmitted to students and communication with them via telephone was established (Meyer, 2002; Sherry, 1996). Sherry (1996) noted that teachers considered these methods beneficial because they could reach large numbers of students. In the early 1980s, larger groups of students could be reached with the availability of satellite transmissions (Meyer, 2002). Despite the teacher shortages in the 1980s, an increase in the number of courses that could be offered to students was recorded (Gunawardena & McIsaac, 2004).

The next big invention leading to a revolution in teaching practices was the internet. With this latest technological advancement the limitation of distance and time in education diminished even more (Meyer, 2002). The internet has been regarded as the most influential tool that transformed the traditional classroom (Gunawardena & McIsaac, 2004). Keegan (2002) believes that the relationship between the Internet as an educational tool and education process led to the creation of e-learning. O'Reilly (2004) defines e-learning as the use of technology or a networked environment to provide training or education. By the late 1990s, e-learning had been widely established as a method on a trajectory to replace learning methods confined by place and time (Keegan, 2002; Stojanovic, Staab, & Studer, 2001). However, learners are more likely to have access to smartphones than any other technology, because the cell phone is more affordable,

acceptable for learning texting, learning notifications and available almost everywhere. This brief history accounts for the emergence of m-learning.

1.2 Definition of Terms

Electronic learning, or e-learning, is defined as learning directed through electronic media, typically on the internet (“E-Learning,” n.d). In this paper, *m-learning* is defined as "learning across multiple contexts, through social and content interactions, using personal electronic devices" (Crompton, 2013, p.3).

This paper defines *notifications* as “something that gives official information to someone the action of notifying someone or something” (Merriam-Webster, n.d.). In addition, *learning notifications, or class notifications*, is defined as frequent messages delivered to learners when an event occurs (such as, an assignment is created, a survey is submitted, or a test is overdue). The reminder can be sent through one or more distribution mechanisms such as text messages, email, applications...etc.

Social media includes “computer-mediated tools that let persons or companies to generate, share, or exchange knowledge, occupation interests, thoughts, and photos/videos in virtual populations and networks” (Buettner, 2016).

Mobile applications, or mobile apps, are a term used to define internet applications that run on smartphones and other mobile devices. Mobile apps mostly assist users by connecting them to internet services normally opened on desktop or notebook computers, or making it easier to use the internet on portable devices. A mobile apps may be a mobile website bookmarking utility, a mobile-based instant messaging user, Gmail for mobile, and many other applications (“Mobile Application,” n.d.).

This paper defines *Group Me* as a messaging application that allows users to communicate with each other individually and facilitate a group so messages can be sent to members instantly (Mitroff, google plus, & bio, 2014). *Facebook* is an online popular social networking website (Valenzuela et. al, 2009); *Facebook group* is a Facebook function that allows users to create an independent group that includes certain members and allows feature that can be determined according to the groups' needs and interest (Wang et. al, 2012); and *email* is defined as a function that is available online on computer to exchange information between users (Roblyer et al., 2010).

In summary, mobile learning, or m-learning is one of type e-learning. Mobile devices have two key features that contribute to their ability to enhance learning effectiveness: their ability to travel almost anywhere and be used any time, and their notifications features. This research explores the benefits of course notifications for their potential to enhance the effectiveness of learning occurring in higher education. In particular, this research used a rigorously designed process of gathering and analyzing data in order to examine benefits and barriers of using learning notifications to determine how to improve their use in higher education.

1.3 Mobile Technologies and Social Life

Mobile technologies have developed in various ways to establish social relationships and expand people's options for communication. Cell phones have impacted young people's peer groups in an immense degree. Adolescence is an age that people's influence is observed (Ling & Helmersen, 2000). Therefore communication

among peer groups is key to individual identity. Cell phones have transformed the peer group into a truly networked society (Williams & Williams, 2005).

Functionality or ‘micro-coordination’ is the main drive that encouraged adolescents to use of the mobile phone in their social life. This period in a human life is a time of transcending the family boundaries and expanding more extensive networks with other adolescents. The use of mobile phone extended the fixed phone era to empower its users to organize, communicate and further extend the network of peers free from the constraints of physical proximity (Geser, 2004). The flexibility that mobile phones bring had directly led to a “more fluid culture of information social interaction” (Geser, 2004, p.20).

Mobile phones connected young people their peer group. Netsafe (2005) reported that in a New Zealand study, high school students (56%) reported that talk and text with friends is the most important reason for using a mobile phone. Without a doubt using mobile phone have increased connectivity among individuals. This can be shown by the ever-expanding uses of social networks and the large numbers of subscribers to them. What makes mobile phone relevant is the mobility it provides to users.

1.4 Text Messaging and Social Life

All age groups have embraced a form of technology that seems to help them stay connected. Adolescents have thoroughly embraced text messaging as a means of communication. Teenagers use texting services to conduct several social activities such as coming together, interacting with peers, and establishing independence in real-time (Grinter, Palen, & Eldridge, 2006).

Pettigrew (2009) reports that the emergence of innovations in communication modalities such as text messaging promoted relationship building and interpersonal skills over various distances in cheap, easy and fast way. On the other hand, Luo (2014) argues that the same innovations have displaced face-to-face communications and reduced love and closeness. The advancement of faster and easier technologies may assist those with social anxiety (Kavanaugh, Carrol, Rosson, Zin, & Reese, 2005). People use text messaging primarily to interact with those already in their established social networks, which positively correlated with relationship maintenance (Thompson, 2012).

Users' sense of time was thought to have changed by distracting them from real time, face-to-face conversations with one another (Przybylski & Weinstein, 2013). However, they found that texting, using social media, or the simple presence of cell phones in relationships had the same outcomes on users' perception of time. This finding was the first evidence to compellingly verify the simple presence of positive relationships around technologies (Przybylski & Weinstein, 2013).

Along these lines of negative effects of technologies over relationships, the idea of investigating their affects emerged. In an extensive examination of the presence of cell phones over face-to-face interactions, Hebert (2016) investigated the new norms of texting and the intrusion of shared social spaces. The results show that the immediate connectivity of social networks had received more attention over peoples' present face-to-face interactions in real time. In addition, they concluded that those present with someone using a phone felt ignored and were frustrated with obvious and intrusive text messages.

1.5 Mobile Technologies and Social Media

The use of digital communication media to promote social connectedness has influenced our sociocultural lives immensely in the late twentieth and early twenty-first centuries. Mobile technology in particular is an increasingly sophisticated tool for bringing people closer together through its ability to utilize various social media, from Facebook and Twitter to the more intense and personal texting. It remains under debate whether or not people use these media—especially texting—to sustain their need for social connectedness in an exclusive approach (Mentor, 2011). Kaplan and Haenlein (2010) argue that social exchanges in interpersonal relationships were changed by the emergence of new technologies such as cell phones and online applications. Floyd (2011) explains that effective communication competency needed for successful and productive relationships remains defined as the advancement of social skills, resolving conflicts, and coping mechanisms. The field of psychology continues to be interested in these themes as integral areas of research (Griffin, 2007). Recently, social media more and more defines interpersonal communication. Large numbers of adult Americans are now cell phone owners. The age bracket with the highest percentage of cell phone owners is 18-29 years old. Approximately 83% of adults own a cell phone and use text messaging as the most frequently feature (Duggan and Rainie, 2012).

1.6 Mobile Technologies and Learning (M-Learning)

It is well established that mobile phones are more and more commonly found in the hands of students (Armatas, Holt, & Rice, 2005; Ison, Hayes, Robinson, & Jamieson, 2004). Wagner (2008) argues that among all mobile devices, mobile phones show the

greatest potential as a method for delivering educational content to students. Furthermore, Wagner (2008) stresses that research needs to focus on specific applications of mobile technologies to support education. However, he added that might not be achievable due to the still developing field of m-learning. One approach to researching this area of m-learning is to focus on what the technology enables the user to do, not on the technology itself (Ison et al., 2004). A strong motivation to research is the belief that current mobile technologies have the ability to keep students engaged with material being taught.

Despite the lack of research on m-learning, Wagner (2008) and Rau, Goa, and Wu (2008) argue that m-learning has the potential to be considered the extension of education. Ison et al. (2004) states that in order for implementation of m-learning to be effective, one must examine beyond the technology itself and focus on the technology's potential abilities to benefit the users. Ison et al. (2004) argue that mobile technologies have the ability to keep students' minds engaged with material from the classroom. Once they leave school, students can continue to learn and participate in other educational activities such as assignments, tests, and quizzes. Cell phones have become a part of youth culture; therefore, interest in how mobile phones might be used to support education has increased (Ison et al., 2004).

M-learning fall under two categories of education method, distance education and e-learning (Keegan, 2005; Mellow, 2005). There are several distinctions that support an independent categorization of m-learning. Similar to e-learning, m-learning does not limit the user to a place and time. However, m-learning provides learners with the ability to remain on the move while communicating with people and accessing information and services (Trifonova & Ronchetti, 2003). There is some disagreement to what pieces of

equipment constitute an m-learning device. Some argue if the device is “mobile” then it is sufficient to label the type of education using the device as m-learning. At the time this research was written these devices include: mobile phones, smartphones, palmtops and handheld PDAs, tablet PCs, laptop computers, and personal media players (Kukulska-Hulme, 2005). However, Keegan (2005) argues that larger devices should be excluded, such as laptop computers. It is argued that the device should be small enough to be carried in a pocket or handbag, be fully mobile, provide computing, and have a high level of reachability between users (Mellow, 2005; Keegan, 2005; Kim, Mims, & Holmes, 2006).

Likewise, teachers connecting with students through ways that are socially relevant to them as individuals may feel it to be novel. Teachers do practice communication through technologies such as emails; therefore, they are already operating in the same realm of technology as adolescents and young adults. It is the nature of technology to evolve and advance in various ways and introduce new strategies to support learning. Development in technology is constantly happening and being tested. Often new strategies lead to a bigger workload. M-learning provides the convenience of not requiring hours of additional work in busy schedules and can easily be incorporated into daily schedules. Mass text messages to all students are permitted for teachers to group their students together and send out one piece of information to all. This function may provide extra time for teachers and students (Sorensen 2011).

Consequently, when a device can receive and send notifications and information on the go, then it should be expected that m-learning is occurring.

1.7 Notifications Systems such as Text Messaging in Education

Several researchers (Brett, 2011; Gasaymeh & Aldalalah, 2013; Lim & Mansor, 2011) have argued that the capability of mobile phones to send and receive notifications messages and the growing worldwide popularity and a availability has triggered a growing interest in how SMS (Short Message Service) technology can be used in adult education. The use of texting is receiving attention in adult education practice and research (Bull & McCormick, 2011; Kalinic, Arsovski, Stefanovic, Arsovski, & Rankovic, 2011; Ting, 2013). Many adults seek online education either entirely or partially (Means, 2010). Online education provides adults the opportunity to receive formal education while maintaining day-to-day obligations (Owston, York, & Murtha, 2013; Rubin, 2013). Distance education provides access to learning for those who are at a geographical disadvantage (Moore, Dickson-Deane, & Gaylen, 2011).

Belair (2012) and Falloon (2011) explain that transactional distance theory describes how learning via Group Me/Facebook takes place given the space between learners and teacher. Transactional distance is identified as the cognitive space that emerges between instructors and learners in a distant educational setting (Moore, 1993). It is paramount to establish students' interactions with teachers and prepare the learning mechanisms for supporting students' persistence in their endeavors in an educational setting (Shaw & Chen, 2012; Kuh, 2009). There are strong indications that in order to formulate theoretical implications and potential applications for facilitating positive student outcomes in courses. Further research on extending the transactional distance theory model to SMS texting in learning is needed (Lee, Srinivasan, Trail, Lewis, & Lopez, 2011).

Course completion and student satisfaction are two salient student success indicators used in understanding the effectiveness of adult learning education methods (Hart, 2012; Hawkins & Barbour, 2010). Kovalik & Hosler (2010) argue that texting notifications technology presents opportunities for inquiry into the facilitation of student satisfaction (Kovalik & Hosler 2010) and online course completion (Atchley et al., 2013).

Educators may be able to make a substantial use of texting as a learning mechanism as it is already established as a part of adolescent culture. The “educational text messages” would be smoothly incorporated into the lives of adolescents without disruption. They may be motivated to receive, read (and sometimes respond to) messages connected to their classes (Grinter, Palen, & Eldridge, 2006).

Texting in school settings may also support a student’s individual transition to university life by maintaining relationships that relate to their everyday life (Harley, Pemberton, Wilcox, & Winn, 2007). School-to-student text communication provides students access to networks of social support and facilitates learning among academic systems at new institutions (Harley et al., 2007). Students can receive text messages giving them information about upcoming events at their school such as games, meetings, and emergency notifications.

Considering the growing interest and the lack of research in this area, a unique opportunity emerges to explore how learning notifications can be integrated into the educational process via mobile devices to help support student learning and performance. The current research attempts to address a component of the current gap in understanding of the potential effects of mobile technologies on education.

1.8 The Importance of the Study

The idea behind this study was to determine how can educators extend learning and engage students outside classroom settings using technology that they already possess and frequently use. Mobile devices have built-in notifications system. These mobile devices play an active role in transferring information among people in higher education. Specifically, students and faculty members find mobile devices to be very helpful to support education and to facilitate communication among students and teachers in higher education.

Keegan (2002) argues that the future of learning is represented in m-learning. Also, it seems that the relationship between education and technology is positive in which they both evolve together. New technologies provide opportunities and almost always find their way to the classroom (Keegan, 2002).

There are more than a billion and a half mobile phones around the world, and a large percentage of them are college students (Alsaadat, 2010). It is important to take a look at the developments and technologies that are making learning accessible to people with a simple click. The availability of mobile information on affordable devices has significantly influenced the way people interact with knowledge on daily basis (“Basics,” n.d.). Gupta and Koo (2010) state that in 2004, half of the world population used mobile phones. They expected 80% would use mobile phones in 2013. In the United States, mobile device ownership grew every day from 10.8 million to 22.4 million in one year between January 2008 and January 2009. In 2008, 15.6% of people used active internet on a mobile device and about 40 million mobile subscribers use these mobile internet services each month (Gupta & Koo, 2010).

Mobile technologies are developing at such a fast pace that those in education cannot make good use of these technologies. In 2011, 79% of United Kingdom (UK) adults were online users, and the weekly usage of mobile devices to perform online tasks by UK citizens has increased 300% since 2009. Terras and Ramsay (2012) argue that understanding the challenges of psychology is imperative in m-learning contexts for both educators and researchers. They defined m-learning as using a hand phone to perform tasks such as using the calculator, checking date and time, and setting up reminders. A person performing these tasks is defined as a person who has been subjected to m-learning of some kind. They argue the use of a mobile device is considered a type of e-learning (Terras & Ramsay, 2012). Cell phone development has followed the increasing consumer demand for tools to enhance productivity. Cell phone companies continue to introduce more technology to have miniature computers at the fingertips of users.

The shift of attitudes toward cell phone from being a luxury to more of a necessity has enormously boosted the number of cell phone users worldwide. In 2011 79.86% of the world population used a cell phone. This number is translated to 5.6 billion active cell phone users around the world (“How Many Are There,” 2012). Smith’s (2011) survey showed that around 83% of American, ages 18 years and older reported owning a cell phone. Following China and India the United States was ranked third out of 60 countries in the highest number of cell phone users (“How Many Are There,” 2012). Mobile phone companies have always expanded cell phone capabilities. One area that seems to be of high interest to users is text messaging. Cell phones occupy a firm role in society and its use has various ramifications. These effects are to a large extent positive in enhancing the connectivity and wellbeing of individuals (McGinn, 2014).

In regards to this research, course notifications via mobile device is argued to be important in higher education because it reminds students about future class activities, provides an easy way for the teacher to communicate with students, and creates a bigger chance that students received critical information in time because they check their mobile devices almost everywhere. Communication can be increased between students and instructors by using chat, a suitable app, or email on mobile devices. Using mobile technologies as supplemental tools for learning will increase and facilitate learning for students. For that reason, this study provides a window into understanding how students perceive the use of mobile technology as a method of increasing or facilitating their learning.

To facilitate learning, higher education institutions should become more adaptive to the learner's needs and support inferred forms of communication like user awareness, recommender systems, and social navigation. There is a general direction of research shying away from focusing on specific mobile applications in education and student learning (Wagner, 2008). Students' perceptions of using technology of m-learning has grabbed the attention of some previous research (Kim, Mims, & Holmes, 2006; Uzunboylu, Cavus, & Ercag, 2009). Also, investigating m-learning technology as organizational and administrative functions deserves attention (Hackemer & Paterson, 2005). It seems fitting that an investigation of notifications via mobile technology is addressed in this research. The findings from this research shed some light on this area. It is the focus of this study to provide an adequate assessment of the use of mobile devices in support of learning as these mobile phones and smartphones are ubiquitous on and off school campuses (Armatas, Holt, & Rice, 2005; Ison, Hayes, Robinson, & Jamieson,

2004). The ubiquity of mobile devices amongst students in higher education creates an opportunity to expand learning beyond the walls of the classroom. Mobile devices have the potential to keep students engaged in learning even outside the classroom. This study contributes to increasing the literature on messages and notifications through m-learning and expanding its base within the host of tools available to educators. It measured the effectiveness of class notifications through experimentation and utilized data analysis to generate new ideas both for future research and application of notifications system in higher education classrooms.

Although m-learning is a relatively new concept (Uzunboylu, Cavus, & Ercag, 2009), research has shown that mobile devices are a prominent technology that may help support learning (Hoppe, Joiner, Milrad, & Sharples, 2003). The acceptability is high among students as well (Kim, Mims, & Holmes, 2006; Trinder, 2005). This study shares the interest of previous research for investigating the effects of text messages and mobile technology. This study replicates aspects of other studies targeting student learning. The replication of research gives insights and support to past findings, checks validity, examines trends over time, and checks findings using different methodologies (Gall, Gall, & Borg, 2007). However, there are some elements of the current study that exemplify its unique effort to build from past research and add to the body of knowledge.

1.9 The Purpose of the Study

The purpose of this study is to examine the usage of a notifications feature on mobile devices within a higher education context in support of the class learning goals. This study showed how mobile devices as a new notifications model in academic

environments that can extend the boundaries of traditional ways of notifying beyond email. It also demonstrated benefits and barriers to utilizing notifications in the classroom.

Social apps distribute an enormous number of notifications in cell phone users' social life. For that reason, this study investigates the effects of alerting students about new activity or due dates of assignments via popular applications in their mobile devices. Utilizing these platforms and approaching students where they are present online is argued by this study to increase awareness by notifying users about activity in the learning environment. As will be shown, activity notifications system can serve throughout social media in students' own mobile devices.

This research is focused on in-class notifications by using mobile devices as an efficient method to improve the student learning experience. It investigates sending reminder messages from faculty to students at a university education level. This study also addresses the overall challenges and benefits of providing regular class notifications about upcoming assignments and events with mobile technology such as cell phones or fixed technologies such as desktop computers. The study also evaluates the relative disadvantages of class notifications and sheds light on the factors relevant to overcoming these barriers in order to build better notifications system in the future in higher education institutions.

Furthermore, this study examines a wide range of relevant literature on text messages and course notifications by m-learning and the benefits of its application into classrooms. The study pursues its evaluation of electronic notifications system through two main methods. The first is the experiment's research design, where notifications are

used in some classes in a higher education setting. The second is a survey to measure the result of applying course notifications in classrooms was administrated. These two methods complemented each other and provide an opportunity to investigate the challenges that may hinder using class notifications through mobile devices.

1.10 Research Questions

This study is designed to uncover the impact of class notifications by using mobile devices as an efficient information delivery method. To tackle this issue, the study addressed the following questions:

1. How are college students currently using mobile technologies for learning?
2. How are college students currently using desktop computers for learning?
3. Do students value class notifications?
4. Where do college students read course notifications?
5. What skills do students have in using class notifications?
6. Is proficiency in using mobile devices associated with perceived value of class notifications?
7. What are the advantages of using class notifications?
8. What are the disadvantages of using class notifications?

1.11 Research Hypotheses

Addressing the research questions led to a series of hypotheses. The researcher developed these hypotheses to test the research questions:

- 1) College students are learning with mobile technology.
- 2) College students are learning with desktop computers.
- 3) College students value notifications about class activities.
- 4) College students have good skills for using class notifications.
- 5) There is a significant relationship between the use of mobile devices and receiving benefit from class notifications.
- 6) There are many advantages of class notifications.
- 7) There are some disadvantages of class notifications.

1.12 Chapter Summary

In this chapter relevant research to explain the importance of this study is presented. This presentation is followed by the purpose of the study which is to investigate the effects of mobile device notifications on student learning. More precisely, this study examines university students' attitude towards receiving class notifications on their phones. This investigated is manifested as a series of research questions that attempts to address how mobile technologies can improve learning.

The following section presents the literature relevant to the current research. The findings on mobile devices benefits in learning, notifications use, factors and challenges are discussed.

CHAPTER TWO

LITERATURE REVIEW

The literature review contains a general review, moving from a broad viewpoint of the overall literature on mobile devices and learning to a narrow focus on the literature on the notifications system of texting on learning. With technology moving at an unprecedented pace, it is only fitting to examine the overall work performed in relation m-learning. This research study focused on the process of facilitating the learning of higher education students using reminder notifications texting. This research grounds its new way of utilizing an information delivery method in the previously existing literature. It provides a new insight into how to adapt already existing mobile technologies to the classroom. This new way uses text messages from the instructor as an enhancement to the delivery of learning for adults in higher education. The purpose of this descriptive study was to examine the impact of learning notifications support on higher education courses and the satisfaction of the students enrolled in an undergraduate and graduate classes at a university level.

The literature review begins with a theoretical framework, and then defines mobile messages and notifications as learning tools, SMS as a learning tool, and the role of mobile devices in learning. Potential uses in mobile devices and learning, benefits, distinguishing characteristics, students' perceptions of mobile text notifications and accepting of learning by using mobile devices, and some factors and barriers are discussed.

2.1 Theoretical Framework

The task of expressing an accountable theory of learning notifications begins with consideration of the unique advantages that mobile devices have over conventional learning or even all learning types for that matter. Learners with their mobile devices can receive learning notifications messages in various locations. Therefore, learning notifications messages might be one solution to keep students engaged in learning despite the intensity and mobility of their lives.

There are many classifications used in learning theories: 1) Informal and long-life activities theory; 2) Collaborative theories, where activities support learning through social interaction; 3) Constructivist learning, developed by Piaget, Bruner, and Papert refers to activities in which learners actively construct new ideas or concepts based on both their previous experience and current knowledge; and 4) Transformative learning, where students learn by discussing with others and supporting reasons for interpretations by critically examining evidence, arguments, and alternative points of view (“Learning Theory (Education),” n.d).

2.1.1 Informal and Long-Life Activities Theory

Informal learning has been defined as activities that include the investigation of knowledge, information, or skills external to the curriculum outlined by an institution (Livingstone, 1999). Other definitions of informal learning have related the procedure to on-the-job learning and work performance or have referred to it as life-long learning (Smith, 1999). Informal and lifelong activities support learning outside conventional environments. Everyday life learning opportunities make the outside environment a

source for knowledge such as through conversations, TV and newspapers, or even by accident. Thus, notifications by using technology and mobile devices that are used to help learning should be blended with everyday life in the same way that learning is blended with everyday life (Naismith et al., 2004). Mobile technologies, with their small size, ease of use, and their notifications system offer the potential to support such a learning process. With regard to accidental learning, learning periods are hard to predict. The personal and portable aspect of mobile technologies makes them very strong informal learning candidates for recording, reflecting, and rapid sharing via its notifications system.

2.1.2 Collaborative Learning

Collaborative learning theory is structured around the premise that diversity of knowledge and experience supports learning. This theory incorporates Jean Piaget's theory that learners must be cognitively ready to learn and advance to higher levels. Along the way learners require additional help to get them to a higher level of understanding. By grouping students together, students learn to incorporate and analyze multiple points of view and support each other in the learning process (Firestone, n.d.).

Notifications messages in mobile device applications provide a prime space for fostering collaboration because of the capabilities and wide variety of contexts for use, which plays a vital role in collaborative learning. Ease of communication already exists among people via their mobile device notifications system, which are an embedded feature that all devices are equipped with. Learners can share data, files, and messages with their mobile devices and enjoy fast response or reminders of important deadlines

and information. These applications in the devices are characteristically used in a group setting and facilitate interactions and collaboration among learners (Naismith et al., 2004). Moreover, faculty members believe that students use mobile devices as social tools in the classrooms. Students reported that they sometimes used texting and engagement in social network for educational purposes. Sharing resources and discussing class materials were reported among activities performed on mobile devices. Students added that they would like to further discuss class material on forums from their devices (Pollara, 2011).

2.1.3 Constructivist Learning

Constructivist learning is similar to collaborative and cooperative learning. Both approaches aim at constructing knowledge and transferring it to students. The theory of constructivism states that experience is the motivation of developing our understanding of the world around us. Each person produces his/her own set of rules, which are used to make sense of individual experiences. Thus learning is a process of adjusting our rules to understanding experiences.

Therefore, the purpose of learning is to develop a personal constructed meaning. It is expected that educators operate under this theory to enrich a tradition of learning and understanding that fosters the ability to analyze and predict information, rather than the ability to memorize the “correct” answer to a given question. This theory promotes a deep meaningful conversation among students to achieve meaning and understanding (“Educational Theories,” n.d.).

Papert and many others understood that instead of computers tutoring the learners,

students learn better when computers became the tutee and the learner is forced into directing the computer on how to perform tasks and solve problems. This was achieved through a specifically designed computer programming language called Logo. Papert named this alternative approach to constructivist learning constructionism because students were actively constructing their own information and learning by building interactive models (Naismith et al., 2004). Students could build knowledge from reading reminder messages and the dialog in mobile communication apps to answer their questions.

Teachers play a pivotal role in managing classrooms especially when providing learning enhancing feedback and learning activities to students. Therefore, understanding students' strengths and weaknesses is key to determining adequate feedback. The current study shows that teachers reported that students were inclined to reduce their misconceptions after receiving messages notifications. Students were able to externalize arguments in defense of their responses as the notifications messages system helped teachers dialogue. The system can be used as a support tool rather than an automated one that does actions on students work or demonstrate what is expected of the teacher to do next (Martinez-Maldonado et al., 2015). Notifications messages from lecturer to students could help to build and organize the list of homework and tasks that students should do during the semester by the due dates.

2.2 Mobile Devices and Learning or M-Learning

Some authors argue that learning using mobile devices, which is represented just by cellphones, is m-learning. Cellphones have more capabilities, with lower prices, than

other mobile devices and cellphones have wide ownership; most students carry cell phones all the time (Croop, 2008).

M-learning defined as learners taking advantage of the learning opportunities offered by mobile technologies. M-learning seems to be understood as a subset of e-learning, educational technology, and distance education (Sharples et al., 2007); a broad combination of processes and content by using computers and networks to scale and/or process one or more important elements of an education value series, including administration and delivery (Adrich, 2004); or e-learning as solely related to the internet: the use of internet technologies to deliver a broad range of clarifications that improve understanding and performance (Rosenberg, 2001). M-learning is also defined as learning by using wireless to access information and to collaborate in locations that are most conducive to achieving learning outcomes (Croop, 2008). M-learning is define by the author as learning through mobile devices that a person can carry such as cellphones, PDAs, laptops, tablets, MP3s and iPods, and digital cameras. In addition, the author includes each of these concepts but in a narrower context of students interacting and learning via electronic devices.

To highlight the iniquitousness of the spread of mobile device use among students is the results of a survey conduct in the US. Among 107 students in Texas, a survey showed that all participating students own cellphones. For that reason, the first device that research should focus on as a device in m-learning is cellphones (Corbeil & Valdes-Corbeil, 2007).

Despite of the as-yet-nascent adaptation of mobile phones as an educational tool, a number of positive incorporations of mobile phones have been noted. The mobility

provides users with unparalleled learning experiences. Individualized learning, reeducation of time spent teaching, and empowering teachers to keep track of current content and trends are but few benefits of mobile phones (Kim, Mims, & Holmes, 2006). It is expected that larger numbers of younger students will adopt mobile smart phones to learning in the near future (Cavus & Ibrahim, 2009).

2.3 Higher Education Students Use of Mobile Devices in Learning

Learners adopt technology in education to facilitate communication and collaboration. No communication tool is more widely used than mobile devices among students. Motiwalla (2007) gives an example from the University of Massachusetts; the m-learning applications were pilot-tested for two semesters with a total of 63 students from undergraduate and graduate courses. The students used mobile devices with the m-learning environment and then they described their experiences through a survey and interviews at the end of the semester. The outcomes from this pilot study supply a better understanding of the role of mobile technology in higher education. This study finds that the classroom using mobile devices was more interactive in discussions between instructors and students and feedback was provided faster than the class that did not use mobile devices.

M-learning is a new concept in the e-learning field. Whereas popular mobile communication devices, such as cellphones, cannot directly provide accommodation for traditional synchronous content due to the major limitation of display size and other restraints also restrict convenient interactions while using mobile devices in a synchronous learning environment. For that reason, the pilot study was designed with

context-awareness of synchronous learning systems to improve models for achieving mobile interaction in a synchronous learning environment (Motiwalla, 2007). For that reason, Huang et al. (2008) sought to design context-awareness in synchronous learning systems and to develop a corresponding pedagogical framework with the mobile devices. That model is for increasing achievement in mobile interaction with a synchronous learning environment, which enables interactions between teachers and students through a short message delivery system called Interactive Service Module. To supply adaptation to the variety of devices, several content styles have been developed and an appropriate style can be selected for a learner. The outcome showed that the system could facilitate synchronous learning by enabling students to access lessons conveniently and efficiently from any location, using common mobile communication devices.

Cheon et al. (2012) reported that m-learning potentially supports all forms of education. For that reason, universities play big roles in supporting the integration of student-centered m-learning because mobile devices are everywhere in universities. A mobile device does a lot of things in academic higher education student life. As an example, students get fast feedback from their instructors via mobile devices. Also, easy-to-check electronic resources supplement the face-to-face class. Moreover, instructors could use mobile devices to more efficiently complete tasks such as checking attendance and learning progress.

2.4 Mobile Devices' Notifications and Messages

SMS is a short support educational tool that happen to be a trademark of mobile phones (Kim, Mims, & Holmes, 2006; Trifonova, 2003). Recent studies have shown

positive results with the use of SMS in education (Mellow, 2005). SMS is an inexpensive mean of communications and a central part of young people's lives as they interact with their friends, make themselves more available to other peers, and establish independence (Horstmanshof, 2004, Grinter, Palen, & Eldridge, 2006; Uzunboylu et al., 2009). Smart phones have a growing list of features that may very well impact learning positively. Many of these features are assistant functions such as big storage capability, computing and calculation functions, video and photos, web access and emailing, and voice text communication (Croop, 2008).

Caudill (2007) defined the delivery of learning materials using a mobile computing device as m-learning. Caudill examined that lack of mobility that is associated with desktop technology in comparison to the efficiency of m-learning. It was claimed that accessing courses and reviewing relevant learning material is possible while performing day to day activities such as sitting in a restaurant or riding a bus. The unique features associated with smart phones and similar devices have increased the efficiency of student learning. Caudill argued that texting is even very efficient due to its functionality without Wi-Fi or internet access.

Tomita (2009) stated that texting affords an effective delivery for student's education, furthers improvement of communities of exercise, and inspires students to write (p. 189). Tomita (2009) concluded this showed that the study from Coventry University indicating that texting encouraged more reading, so enhanced literacy skills. The Coventry University study was a pedagogy study that tested the special effects of texting on kid's literacy skills. However, the study did not test the effects of texting on adults' literacy skills. Instructors may simply be unskilled with the technology and the

nature of texting. Tomita (2009) continued,

Students need to communicate efficiently . . . using short text messages . . .

Beyond mastering traditional writing skills, students will also need to understand and master tools like Twitter and IM [Instant Messaging]. These are tools of the 21st century; the tools that will help to transform the ways teachers teach and students learn. (pp. 189-190)

One study compared two groups, where one was handed assignments on paper versus a second that received assignments through sending three SMS messages daily. Researcher argued that texting group performed better (Thornton and Houser 2005). Thornton and Houser (2005) sent 44 Japanese university female participants practice assignments and then they administered an exam on both groups. Thornton and Houser concluded that the texting group performed the highest score. As a result, the researchers concluded that when students receive text messages they were encouraged to study.

Horstmanshof (2004) maintained that texting is an efficient method in learning when students attempt to communicate important information with university lecturers. Horstmanshof (2004) argued that SMS is time saving for all involved, less disruptive than mobile phone calls, and less expensive. It was also highlighted that group texting is efficient for class notifications. The study showed that younger students were more susceptible to accepting texting than older students. However, Horstmanshof (2004) does not argue for the efficiency of texting in learning or instruction. The researcher only examined connection and communication among students and lecturer. The implication of Horstmanshof's work provides significant starting points to texting-based learning methods. More work is needed to unpack the potential of texting as an effective, efficient

tool to motivate and encourage students to learn at higher levels.

In one study, teachers were challenged to compact courses into concentrated pieces of information and were forced to think creatively to accommodate the use of mobile technology (Peters, 2007). Peters' argument of the necessity to introduce creative ways of teaching promotes the method of texting-based instruction in a unique and innovative educational instruction.

In an experiment, Rau et al. (2008) examined the difference between short messages, email, and online forum in the instructional process on student pressure, motivation, and performance of learning. Pressure and motivation were measured by six items on a five point Likert scale through a pre- and post-experiment questionnaire. Learning performance was measured by the score obtained on a weekly quiz. Participants included 176 juniors majoring in accounting in a Taoyuan vocational high school. Participants were then assigned to one of four groups: 1) the short messages group, 2) the email group, 3) the online forum group, or 4) the control group. The experiment took place over the course of three weeks. In the first two weeks, two messages were sent to students in the experimental groups three days after the lecture via their assigned medium. These messages consisted of learning materials such as exercises and lecture notes. In addition, the day before each quiz a reminder was sent to each participant in the experimental groups. Students in the control group were given the same information but all the information was given to them in the classroom.

The results of the experiment were mixed. In terms of the performance of learning, a one-way ANOVA yielded no significant differences at the .05 level. Although this was the case, nearly all the means of the experimental groups were higher than those

of the control group (with the exception of the quiz two where the short messages mean was 64.64 and the control mean was 64.65). When viewing the results for the pressure to learn and motivation, the results varied between the experimental groups. For the short messages group, a significant difference was found when compared to the control group in regard to learning pressure, with the short messages group feeling less pressure ($t = -3.302, p < .05$). Although the questionnaire revealed that many students felt short messages would increase motivation, an overall non-significance was found when compared to the control group. The email group showed no significant difference in both learning pressure and motivation. Again, like the email group, no significant difference was found when compared to the control group in regard to learning pressure and motivation. Rau et al. (2008) results show that short messages have potential as an educational tool.

In a study that explored the uses of short messages, Cavus and Ibrahim (2009) presented evidence that repetition of text messages to learners increased learning. The study also showed that using short messages method increased the success rate in learning new words. Cavus & Ibrahim (2009) developed an SMS support system to facilitate students learning new English words. They used a simple pre-test/post-test of student knowledge of learnt words. Their hypothesis of informal learning and constructive learning were confirmed. The test score results and the feedback from the 27 participant were positive. In another study, Chen (2001) also showed that SMS can support new vocabulary learning. The researcher looked into the performance of two groups. One used concept mapping in conjunction with SMS messages to teach new vocabulary words for the study group and the other was a control group using traditional

classroom methods. Results showed a significance higher performance in the SMS group. Kim, Lee, and Kim (2014) investigated learning processes using a mixed methods design. They examined the outcomes of students' learning processes from a group discussion assignment. Participants were asked to use only one form of communication: SMS messaging, an Internet instant messaging service, or the online classroom discussion board. The 48 participants were students in the education department of a university in South Korea. Subjects were divided into three groups following their preference of communication method mentioned earlier. Results showed that the group using SMS seemed to be more cohesive and reflected a higher level of teamwork (Kim et al., 2014).

Bull and McCormick (2011) measured perception of student and instructor perception of text messaging in a pre-algebra course in North Carolina at a community college. They used a mixed method of instructor interview, focus group, and surveys. Their results argue that text messaging would have a positive effect on student perceptions in the pre-algebra course.

Davis and Abbitt (2013) examined the impact of an SMS intervention on procrastination, performance, and reaction of students. The subjects were students enrolling in an online course at a university. Although the study included a small sample of three subjects, their finding support a positive attitude towards SMS as an intervention in the course. Their study also showed a positive effect on procrastination and performance (Bull & McCormick, 2011; Davis & Abbitt, 2013). Kovalik and Hosler (2010) employed the Community of Inquiry framework to investigate the effect of SMS among online learners. They found that students were highly receptive to receiving SMS messages as part of the online learning experience.

In another study that measured the impact of SMS on students, Kalinic et al. (2011) showed that students had a positive perception about receiving SMS. The researchers looked at the results of two surveys to garner student perception in six online courses. The results were attributed to the instructor's strong record of expertise in teaching in the online environment (Kalinic et al., 2011). The function of SMS as a learning support tool was investigated by Gasaymeh and Qablan (2013) in an introductory programming course at a Jordanian university. Data was collected over a period of two weeks. SMS topics included concepts discussed in class, questions to engage students in the subject, and points related to upcoming topics. The experiment was administered to two groups. The posttest scores showed that the scores of the group which received SMS were significantly higher than those of the other group which did not receive SMS text messages. Also, student perception was positive regarding SMS in the interviewed following the experiment. Although they acknowledged the advantages of SMS communication, the researchers raised some issues regarding technology itself (Gasaymeh & Qablan, 2013).

Overwhelming evidence shows that student perception of SMS as a learning support tool in courses has been mostly positive (Bull & McCormick, 2011; Cavus & Ibrahim, 2009; Gasaymeh & Adalalah, 2013; Gasaymeh & Qablan, 2013; Kovalik & Hosler, 2010).

2.5 Factors Affecting Learning Notifications

Redfern et al. (2016) managed to analyze qualitative data in patients (focus group), which showed high levels of user engagement in text messaging program (TEXT

ME) for providing advice, motivation, and information that aimed to improve general heart health, diet, physical activity, and encourage smoking cessation. Seven factors that influence user engagement were identified. These themes were: the ability to save and share messages, having the support of provider and family, a feeling of support through receiving the program, the program being initiated close to the time of the event, personalization of the messages, opportunity for initial face-to-face contact, and consistency of message with previous advice and credible source.

Cheon et al. (2012) reported that many established universities, such as Stanford, the University of Washington, and Abilene Christian, have been adopting m-learning; however implementing m-learning in higher education is still challenging because of social, cultural, and organizational factors. For example, student acceptance of using mobile devices for class, the usefulness of mobile devices, how people accept new systems, social influences such as the school support or no support for using m-learning, and self-management of learning. For that reason, Cheon et al. (2012) argued that the recognition of perceptions toward m-learning should be the first step to implementing m-learning on college campuses.

2.6 Cognitive Overload and Memory

Following a Multi-Store Model presented by Atkinson & Shiffrin (1968), cognitive information is stored in the human brain under three types of memory. They are Sensory memory, short-term memory and long-term memory.

Learning involves a certain number of internal processes that involve the use of memory, motivation and thinking (Ally 2005). It is argued that the processing capacity

affects the degree of learning. Ally (2005) argued that information a learner encounters in verbal and visual form enhances memory. He also adds that personalized learning is facilitated by mobile learning simply anywhere and anytime.

Memory has limited capacity. Therefore, information thought to be organized into pieces of appropriate sizes. Miller (1956) suggested that due to the short-term memory humans demonstrate, information should be organized into meaningful strings. As a result, Ally (2005) argued that information should be displayed on m-learning devices in a manner that complements the capacity of the short-term memory and the size of the mobile unit. Ultimately, suggesting that information appear between five and nine meaningful sequences (Ally 2005).

On the other hand long-term memory is argued of a different storing technique in the human brain. Novak, Gowin and Johanse (1983), maintained that information in long-term memory is stored in a hierarchic structure. The use of such information demands these cognitive tasks to be involved in deep critical processes (Novak, Gowin and Johanse 1983).

The accessibility to short and long term memory is vital when students are tasked with working on m-devices. It is important because small pieces of information are available to them on display while constructive framework is demanded from them as a result. The display on m-devices must be organized in a certain way to ensure competence of small screens. It also must bridge between the learner and learning materials (Ally 2005).

There are factors that play a role in the affecting cognitive abilities to perform well. Cognitive load is known as the demand that information-processing requires in

performing a task (Block, Hancock, & Zakay 2010). Several studies managed to establish a connection between memory and cognitive load. Lamble, Kauranen, Laakso, & Summal (1999) investigated the abilities of car drivers to notice that the distance between them and the car in front of them has shortened. The researchers over loaded car drivers with mental tasks (inputting numeric digits on cell phone) and found that when cognitive load is increased the time that is needed to notice a change in the distance had increased. Also, their ability to input the correct numeric digits was challenged. Lamble, Kauranen, Laakso, & Summal (1999) argued that cognitive load positively impact short-term memory. Sweller, J. (1988) suggested that ineffectiveness of problem solving as a learning device, is that the cognitive processes required capacity which is consequently unavailable for schema acquisition. It is believed that cognitive load and memory are having a role in ineffectiveness of problem solving (Sweller, J. 1988).

Wang & Shen (2012) asserted that there is a lack of design on m-learning where mobility, memory and cognitive load interact. They also argued that when design takes into consideration long, short term memory and cognitive while load placing images, spoken language and written text in appropriate sequences instructional effectiveness is maximized.

It is no doubt that human brains are responsible for cognitive processes that involve deep thinking and quick responses. These cognitive tasks are triggered by external audio and visual factors. Understanding how impulses are affected by external element might be worth considering when learning at stake. It is more relevant when learning is introduced through mobile device that inherently built on audio and visual features.

2.7 Benefits of Using Mobile Devices in Learning:

Students use cell phones in learning for an abundance of practical reasons. Cheon et al. (2012) addresses many benefits of using mobile devices in learning, such as learning everywhere and anytime by using mobile applications. Also, it is cheaper than traditional learning. For that reason, the U.S. government is looking to reduce costs by encouraging schools to transition from paper-based to digital textbooks within the next five years.

Using mobile devices in learning is a specific type of e-learning, while e-learning uses many types of computer technologies to support individual learning. Therefore, mobile devices encapsulate many features of e-learning, such as multimedia content and communications with other students, but it is distinctive in terms of time and location flexibility (Cheon et al., 2012).

Communication in learning is one of the benefits of mobile devices. A study of students in United States universities found that mobile devices increase the communication between students and teachers and also increase interaction (Croop, 2008). Moreover, the ease of sharing and discovering knowledge via mobile device is considered the main benefit. These activities of interacting, communicating, and sharing information with colleagues are principal to increasing the outcomes of learning. Another potential advantage of m-learning is the great assistive technology for students with disabilities. Also, m-learning could enhance effective personal tutoring. Currently, the famous devices that represent mobile device are the cellphone and tablet. Croop (2008) predicted that increasing cell phone features and capabilities by adding more functions would reflect the individuals and they would carry full-features mobile device all time.

Therefore, some students have already adapted to m-learning. It was observed that higher education students may be ready to adopt m-learning sooner than K-12 students because more college students have their own mobile devices. Nevertheless, mobile device use in higher education is still in the early stages of development. For example, while many universities provide free applications, the contents are mostly non-instructional (e.g., news, event calendars, and maps). In order for m-learning to succeed in higher education, it is necessary to understand the factors college students consider important in the adoption of m-learning (Cheon et al., 2012).

Mobile devices enjoy three basic features that make them a unique tool in education: (1) portability: mobile devices can be easily carried out and used in different locations; (2) context sensitivity: mobile devices can be used to find and collect real or simulated information; and (3) immediate connectivity: mobile devices can be used to access a diversity of information anytime and anywhere. These three characteristic features of mobile devices can represent a unique learning experience. In addition, the advanced hardware of mobile devices (e.g., camera, accelerometer) and various available software provide more options to organize, manipulate, and generate information for learning and teaching (Cheon et al., 2012).

Motiwalla (2007) states some benefits that the use of information and communication technology (ICT) in higher education has developed learning where learners can exchange information with the lecturer asynchronously at the learner's (and lecturer's) own time or place. Moreover, mobile devices are highly individualized and collaborative communications tools, which give students and faculty flexible tools for complementing the existing technologies and extending learning beyond the classroom

and home to remote places like airports or trains where students do not have access to computers.

2.8 *Benefits of learning Notifications and Short Messages*

Due to the natural popularity of short messages, several benefits have been seen in using short messages in education, namely, decrease in attrition, flexibility, specific content, study aids, student engagement, and means of study support (Mellow, 2005).

On a given day, students are exposed to a vast array of information. At times, the cognitive load may be overwhelming and therefore too much for them to absorb, which would naturally and inevitably lead to students forgetting important educational information. Text messaging may circumvent the loss of information by sending students small pieces of information they were exposed to during the day. This step may increase the chance of important concepts and information being understood and remembered outside the classroom. Cavus & Ibrahim (2009) argue that the ‘pushing’ of information through mobile technologies can have a positive effect on learner performance. In addition it is noted that material students are exposed to more frequently is more likely to be remembered. Spaced repetition has been seen to improve learning.

2.9 *Barriers to Effective Use of Notifications and Mobile Devices in Learning*

In spite of widespread acceptance of using mobile device among teens and adults in social life, faculty and staff acceptance of using mobile device in learning in schools, universities and academic libraries is still low. It was found that student sometimes express unwillingness and disinterest in using m-learning (Donaldson, 2010).

Some students report some technology issues: small screen, limited access to online material and downloads, and limited functionality of some application in learning management systems such as Blackboard. In addition, some students find difficulty with small screens and some websites are not designed for small screens and mobile use. Moreover, some have difficulties using the touch keyboard and some find that small storage and memory and difficulties of editing documents may limit mobile academic activities (Shudong & Higgins, 2005).

Previously it was shown that there is an undivided trend in student's positive attitudes to using SMS in learning. It was also hinted that this functionality in learning has some general negative effects that may have an indirect relation to using SMS in learning. For example, Hudson, Bliss, and Fetro (2012) associated lack of sleep, stress and anxiety increase with SMS usage, as well as noted the intense feelings of frustration, miscommunication, jealousy, and others expressed by the focus group in their study of text messages relationships. In another study, Harrison, Bealing, and Salley (2015) collected data from 152 participant and results showed that texting sidetracked people from personal interaction. Moreover, Angestermichel and Lester (2010) concluded that participants in their study associated negative relationship satisfaction with texting. Harrison and Gilmore (2012) added that in their study, students felt texting has distracted them from their surroundings. Gilmore (2012) reported that phonological forms of grammar, punctuation, etiquette, and spelling as acronyms were impacted by texting.

The research that was surveyed showed a divide in attitude to texting. On one hand learners had overwhelming positive attitudes towards using SMS in learning. On the other hand participants (college students and others) felt that texting has a negative

impact on their relationships and may have caused them intense feelings. Although these two groups have examined texting in a different environment—social relationships vs. learning—it remains a puzzle how one tool would be viewed differently depending on its use.

2.10 Chapter Summary

In summary, research indicates that students are displaying a positive attitude towards using m-learning and notifications learning. More importantly, it is becoming more apparent that this technology is shaping the future of e-learning. It is with overwhelming evidence that use mobile device in learning is manifesting into a diverse versatile tool that with no doubt provides opportunities, facilitates learning, and helps shape the learning mechanism. It was also demonstrated that notifications via mobile device has a positive impact on all parties involved in the learning scheme. Teachers as well as students have reported that notifications made attainment of information possible. More importantly, it proved to be a valuable educational tool that helped learners stay on task and perform adequately in manners that positively encourage learning. It is also demonstrated that this specific area has not receive the attention it deserves in research despite its potential impact on education.

This chapter presented pioneering research on mobile devices and notifications. It provided a sound picture and firm back ground to understanding issues related to using mobile devices and messaging in education. This chapter also presented difficulties and benefits that researchers have uncovered during relevant research. The section stands as the foundation to the current investigation of classroom use of the notifications system on

mobile devices. The study at hand puts forward a unique research approach to highlight the use of mobile notifications as well as the associated benefits and challenges and how to best protect students in the process of integrating mobile notifications into the adult learner classroom.

The following chapter describes the methodological process of this research.

CHAPTER THREE

METHODS

The methodology used in this study is described in detail to ensure that repeatability is obtainable by any institution that provides higher education. Higher education institutions such as universities, colleges, distance learning programs, and any institution that deals with adult learners will find this section beneficial because it provides a step-by-step illustration to help future assessment of the current study and to pose as a guideline to future studies in the field of education technology in general and in using mobile notifications system in specific. Since this current research is one of the first in its field, this section of the paper might be the most important aspect. This is not to say that other section are less important but to highlight that the methodology used is to be maintained and scrutinized by future researchers. The experiment that was conducted and surveyed are also products of careful research and have been validated by experts to ensure its reliability. As explained later, the careful construction of both sections of the methodology were piloted to ensure that the effects of notifications usage were measured accurately and according to scientific research methods.

In this chapter, steps and procedures are organized in such a manner that will allow the reader to understand the methodology that was used. This chapter includes the following sections:

1. Research Design
2. Research Questions
3. Research Hypotheses

4. Research Setting
5. Data Collection Procedures
6. Participants
7. Instrumentation
 - a. Validity
 - b. Reliability
8. Data Analysis
9. Description of the Variables
10. Chapter Summary

3.1 Research Design

The study followed a careful and well-researched design that ensures a specific and accurate measure of the data in order to test the hypothesis. A descriptive-correlational research method was adopted in this study. An empirical goal that this design strives to achieve is to determine how efficiently notifications via mobile messages support learning. The researcher attempted to answer the research questions by determining the efficiency of sending messages in terms of the learning experience. The researcher conducted a study of messages methodology, which is a sequential description of the procedures used. The design of this study allows it to be replicated in a college or university setting. As noted earlier, this study relies on two main parts: text notifications and questioner data. The following 17 steps is the protocol that was administrated by the researcher to collect data from both parts of the study:

1. Prior to the start of the experiment, the researcher met with the professors of the classes to view the syllabus and discuss the most important items. Items were noted and prepared to be sent to students in the form of text messages. These messages summarize and synthesize what was covered in class and what is expected for the following class (see Appendix D and see example below).
2. The researcher built a schedule of the messages, dates, and time in a wiki to be sent once or twice a week at a specific time of day in correlation to items in the syllabus (see example message –session- example below).

EXAMPLE MESSAGES

Session 5: Audio Media Design Wed Feb 17

Message 1 sent Feb 11:

During this week with your group on the Instructional Design website.

For next class:

- 1- Bring headphones w/ microphone.
- 2- Possibly develop a script for an educational audio narration.
- 3- Search the web for background sounds (e.g. music, waterfalls...), reinforcing sounds (e.g. applause, cheers...), and notifications (e.g. short tones, beeps...) that can be used as instructional markers.

Session 6: Drill and Practice Wed Feb 24

Message 1 sent Feb 18:

For next class:

- Select a topic (keep it simple). What is your theoretical foundation?
- Describe the basic instructional design? Find relevant graphic(s).
- Describe your evaluation strategy. How will you know when this is successful?
- Please contact your client and let them know that I will be sending them a letter about your team and project.

3. In the first class of the semester, the researcher was introduced to the students.
4. The researcher received oral consent from students to send messages (see Appendix B).
5. Students were asked about their preference of mobile applications to receive notifications messages.
6. It was made very clear to students that the application will guarantee privacy of class messages.
7. Participants were given options to receive messages through a cell phone application or by email.
8. The researcher declared that students could delete the applications and not receive messages at any time during the semester.
9. The researcher attended most classes to take notes of updates.
10. The researcher updated and adjusted the messages with the professor every week to accommodate changes in the class.
11. Messages were sent weekly at a specific time, following the prepared schedule.
12. At times, participants respond with questions and follow ups.
13. The researcher answered the participants' questions and follow ups.
14. Texts notifications continued from the beginning of the class until the end of the semester for a length of four months.
15. At the end of the semester, an electronic survey was sent by email to all students to answer questions about their experience with the course notifications messages (see Appendix D).

16. The researcher marked a main word or phrase with some definition in the survey (i.e., notifications intended meaning).

17. The researcher analyzed the survey data using SPSS.

The protocol presented above illustrates the steps the researcher undertook to gather data. Careful design of the texts notifications and survey was maintained by previous preparation of the experiment. Targeting certain items in the syllabus at specific times in the semester was done to gear participants towards engagement with class material. For example, sending text reminders to student to bring headphones and microphones to class proved extremely beneficial to ensure individual student's participation in that class. Also, sending texts notifications prior to assignments ensured submitting assignments on time. At times, for example when sending exam notifications some students (primarily undergraduates) respond with questions regarding the notifications content. These inquire seek further illustration such as: materials included in the test, open book test and the like. It also worth highlighting that the nature of the notifications was not limited to a certain number of characters. That added feature in the messaging apps and emails gave flexibility to notifications to include more helpful information. This came highly valued when students demanded more information.

3.2 Research Questions

This study is designed to uncover the efficiency of using notifications system as an efficient method of conveying information to students in a higher education classroom. The study addresses the following questions:

1. How are college students currently using mobile technologies for learning?
2. How are college students currently using desktop computers for learning?
3. Do students value class notifications?
4. Where do college students read course notifications?
5. What skills do students have in using class notifications?
6. Is proficiency in using mobile devices associated with perceived value of class notifications?
7. What are the advantages of using class notifications?
8. What are the disadvantages of using class notifications?

3.3 *Research Hypothesis*

Based on the above questions, the researcher developed the following hypotheses to test the research questions:

1. College students are learning with mobile technology.
2. College students are learning with desktop computers.
3. College students value notifications about class activities.
4. College students have good skills for using class notifications.
5. There is a significant relationship between the use of mobile devices and receiving benefit from class notifications.
6. There are many advantages of class notifications.
7. There are some disadvantages of class notifications.

3.4 *Research Setting*

Determining the efficacy of using learning notification messages via mobile devices is the main goal of the study. Students in four higher education classes were selected for this study. These classes were among the classes offered by The School of Education and The School of Design at the University of Kansas at the main campus in the United States. Each class met in the same location for the whole semester; two classes met in a lab where every student had their individual computer while the other two classes met in regular classrooms. Every participant in this study had either a mobile device or desktop access.

Data were generated based on the results of the survey distributed to students at the end of the spring semester in 2016. The total number of participants amounted to 69 students. 53 were undergraduate students and 16 were graduates. 37 participants were students of the School of Design; 32 undergraduate students and 5 graduate students. 32 participants were from the School of Education; 21 undergraduate students and 11 graduate students. The table below summarizes the information about the participants.

Table 1: Level and Affiliation of Participants

College	Class name	Class	Students	Lv.
Design	Design Strategies and Methods	ADS712	5	Gradate
	Methods in Design	INDD512	32	Undergraduate
Education	Design of Educational Technology	ELPS812	11	Gradate
	Ed. Tech. in Middle & Secondary Education	ELPS302	21	Undergraduate
Total			69	

3.5 *Data Collection Procedures*

The first step in this research was to obtain permission to conduct this study. It was made available from the Human Subjects Committee of the University of Kansas for the Protection of Human Subjects in Research. Appendix A contains a copy of the approval to conduct the research.

The experience of participants was collected in the form of a questionnaire after conducting the carefully designed procedure of sending regular class notifications via text and email. Students' perception toward class notifications through their mobile devices data was the main target for the survey. The benefits of class notifications via mobile and fixed technology were measured. This study also collected information about barriers surrounding class notification via m-learning in higher education. This approach gave a broad prospective about how to achieve the best methods in using this m-learning approach effectively.

Following the human resources approval, the researcher contacted the professors of the classes. Prior to the beginning of the semester, a meeting was set to discuss and create a table (Appendix E) of the most important reminder messages. These messages were designed to target important items in the syllabus. The table included specific information regarding certain item with brief messages that were sent on a specific day and time to send notifications. Additionally, communication was continued with the class professor after each class to update in any information to be included in the next reminder messages. Notifications content included upcoming assignments, tests, synthesis to important previous reading, future reading, presentations, clarifications of course expectations, and additional class materials. The experiment design originally set a

schedule of sending one notification a week, however at certain times the professor would ask for additional information to be forwarded to students. That demanded an additional, non-reoccurring notifications to be sent.

There are multiple methods to send notifications to participants. The option of direct text cell phone messages was quickly discarded due to concerns of participants' privacy as cell phone numbers must be disclosed. Therefore, alternative means were incorporated to maintain privacy and ensure the smoothness and accurate delivery of notifications on time. To choose other practical alternatives, privacy, ease of use, seamlessness, and user preference were factors that led to choosing Facebook, Group me, and email as notifications delivery system. These applications were popular among participants, eliminated any privacy concerns, and most importantly, guaranteed a safe, secure, and fast notifications delivery.

The notifications content included reminders and alerts about class content-related items such as class readings, assignments, exams, and presentations. In most cases, this was just-in-time reminder information already in the course syllabus. For example, the notifications might read "By now you should have the following items posted to your portfolio course page: 01: Information Searches; 03: Educational Imagery; 04: Please let us know if you need assistance in posting any of these activities. In the next class we will work on the educational data activity. Please read the instruction page on this activity in advance."

The researcher gathered information about students' experience of applying notifications through mobile devices in learning and their views toward that learning delivery mechanism. The researcher used a rigorous design methodology to set up and

document sending weekly notifications. At the end of the semester, the researcher used electronic surveys and some open-end questions. The digital survey was sent by email to all students in the classes. The goal of this study is to present an understanding of the effectiveness on student learning of sending notifications by mobile technology.

3.6 Participants

The participants in this experiment study were undergraduate and graduate students at the University of Kansas (KU) in Spring 2016. Approximately 69 students, both male and female, were encouraged to participate. The diversity of the students was representative of the diversity in KU's student population. However, the response to the survey was totally voluntary (see Appendix C). The groups consisted of students enrolled as sophomores, juniors, seniors, and graduate. They were majoring in education, design, and architecture. Most of the participants own multiple mobile devices and have data plans for their phones. Participants were enrolled in ELPS 302 "Educational Technology in Middle and Secondary Education" and ELPS 812 "Design of Educational Technology" taught by professor Aust in the ELPS department, ADS 712 "Design Strategies and Methods" and INDD 512 "Methods in Design" taught by professor Branham in the Design department as shown in Table1. All students in four classes ELPS 302, ELPS 812, ADS 712 and INDD 512 were included in the study.

3.7 Instruments

Effectiveness of course notifications via mobile devices has many definitions in general as well as in specific domains within the field of education research. The survey

instrument was constructed in five parts: (a) value of notifications messages; (b) current use of technology in learning; (c) experience of using mobile devices and notifications; (d) demographic information; (e) open-ended questions. These parts are explained further below.

Part 1: Value of notifications messages. Nine items were included to determine the overall value of implementing notifications messages in the class such as the value of time, communications, motivation, interaction, and location. Participant responses were quantified using a five-point Likert-type scale from Strongly Agree (5) to Strongly Disagree (1).

Part 2: Current use of technology in learning. This section of the survey was constructed to assess respondents' level of current use with mobile devices, computers, and notifications. It included twenty-six items and respondents were quantified using a five-point Likert-type scale from Always (5) to never (1). *Part 3: Experience of using notification mobile devices and notifications.* The 7 items in this section reflected participants' experience in using mobile devices and notifications. Participant responses were quantified using a five-point Likert-type scale from Strongly Agree (5) to Strongly Disagree (1).

Part 4: Demographic information. Demographic information was gathered about members, such as gender, age, academic major, academic department, academic degree, academic year, owned mobile devices and data plan.

Part 5: Open-ended questions. This part of the instrument consists of open-ended questions to determine the advantages and disadvantages of implementing online instruction (see Appendix D).

Items were written in both direction and some of the item scales reversed score so that high scores point to high effectiveness course notifications via mobile devices and low score point to low effectiveness from higher education students.

The test was divided into demographic questions, items questions, and two open-end questions. The 77 items were chosen and designed to maintain a high level of reliability in measurement of the effectiveness of class notifications via mobile devices.

Participants were asked to respond to all questions in each section. Six questions relate to demographic information. The demographic information for students contained 21 items. Experience with notifications and technology had 56 items. Twelve items relate to the notifications. Thirteen items relate to the mobile devices, and thirteen items relate to stationary computers. Eleven related to communication tools. Seven related to skills and experience in using mobile notifications.

In order to ensure confidentiality and reduce the effects of response bias, participants were provided with a cover letter that had a written description of the purpose of the study and how the data would be used. They were informed that participation in the study was voluntary and their responses would not be personally identifiable.

3.7.1 Validity

Slabin (1992) defines validity as the degree to which an instrument in a survey instrument actually measures the concept it is intended to measure. To ensure content validity the questionnaire was submitted to a panel of experts in education and statistics at the University of Kansas. Six individuals, including instructors in the School of

Education, were asked to review the questionnaire and provide feedback before initiating the study. Upon receipt of the comments and suggestions from the panel, the questionnaire was evaluated and revised.

Item-written rules for perception scales were used to construct this scale. The items should relate to notification m-learning, course notifications definitions, measurable student perception of course notifications via m-learning, and the benefits and barriers from the perspective of students in higher education. The focus group should understand the items and should test whether or not the scale has face validity. Most of the items are related to the concept of effectiveness of class notifications and m-learning depending on their definitions and the domains of benefits and barriers. Validity is achieved through including the example questions below of the class notifications items (see appendix D):

- NOTIFICATIONS of class activities help me complete assignments by the due date.

Scale from Strongly Agree (5) to Strongly Disagree (1).

Due to the importance of content validity, the questionnaire was submitted to a panel of experts in education for formal review. Upon receipt of the comments and suggestions from the panel, the questionnaire was evaluated and revised.

3.7.2 Reliability

Cronbachs alpha were used to evaluate the internal consistency for the subscales of the surveys in order to determine the reliability of the scores on the instruments. Crocker & Algina (1986) argue that reliability is key as it points to the direction of how consistent and reproducible scores may be on an instrument. The term reliability is known as the degree to which a survey instrument consistently measures what it is

intended to measure (Slavin, 1992). Mueller (1986) states that a consistent and accurate measurement instrument is supposed to have a high degree of reliability. As a result, any biases that may accrue in the study are therefore eliminated (Yin, 2003). It is, however, argued by Cooper and Schindler (2001) that reliability is a necessary contributor but is not a sufficient condition for validity.

The pilot sample's responses ($\alpha=.87$) was more than ($\alpha=.80$) for the instrument to be considered reliable. In addition, most items were written in Likert-type format, so response options scaled from 1 to 5, which should allow for sufficient variability to produce reliable results. Constructive feedback from the focus group should imply that they read the items and found the survey to be intriguing. It also should provide an indication that responses will be not random. These items were administered to the pilot group and based on the data collected Cronbach's alpha and item-to-total correlations were calculated to assess the reliability of these items. Items that appeared to be weak were reviewed. At this point, the researcher was already working with the study classroom teacher to develop the text messages notifications.

In addition to the surveys, an expert review was conducted to assess items measuring satisfaction and perspective with the use of notifications messaging for the purpose of learning. For each item being reviewed, the reviewers were asked to assess the clarity of the item, the correct use of spelling and grammar, and to give any suggestions for change in that item.

In addition, the researcher sent the open-ended questions to a select group of students from the same levels of the target population to ensure that the survey questions were appropriate for the target population.

3.8 Data Analysis

The Statistical Package for Social Science (SPSS) program was used to analyze and code the data in view of questions and hypotheses proposed for the study. Different statistical procedures that were applied to analyze the collected data are discussed in the next section.

3.9 Description of the Variables

1. *Dependent variables.* The dependent variables of this study measure perspectives of students toward (1) course notifications via mobile devices, (2) benefits of using mobile technology in learning, (3) barriers that might prevent the effective of using course notifications via mobile technology, (4) factors supporting class notifications usage in learning.

2. *Independent variables.* The independent variables of this study are age, academic major, academic year, owning and using a mobile device, data plan, and experience in using mobile devices. Descriptive statistics, which include means, standard deviations, and frequencies, were used to describe the data. They also were used to determine the perceptions toward class notifications, mobile devices, benefits, and barriers. A correlation coefficient was used to determine the relationship between the experience variable and various items on the instrument. Different statistical procedures that were used to analyze the gathered data include the following:

1. Descriptive statistics, which include mean, standard deviation, frequencies, and percentage, were calculated in order to garner a general idea about the demographic information and its distribution. They were also used to define participant perspective

toward notifications in their learning experience, value of using notifications to enhance learning, and to measure the degree of importance of each barrier.

2. A correlation coefficient was used to determine associations between the demographic variables and various items on the instrument. In addition, a correlation coefficient was used to examine the relation between usage of mobile devices in learning and value of class notifications.

3. An independent-sample t-test, one-sample t-test, paired-sample t-test and one-way ANOVA were applied to a comparison of some dependent variables, demographic variables and student perspective toward class notifications.

4. The probability level for a test of statistical significance for the study is $p < .05$, to ensure a 95% confidence in generalization of the findings.

Below are the hypotheses with an example of the questionnaire items related to the hypothesis (Appendix D).

H1. College students are learning with mobile technology.

Sample items. (Likert Scale from Always (5) to Never (1)).

I use my CELL PHONE OR OTHER MOBILE DEVICE to:

A) Share educational media and websites with classmates.

B) Create a study group.

H2: College students are learning with desktop computers.

Sample items. (Likert Scale from Always (5) to Never (1)).

How did you use STATIONARY COMPUTER(s) in this class to:

A) Share educational media and websites with classmates.

B) Create a study group.

H3. College students value notifications about class activities.

Sample items. (Likert scale from Strongly Agree (5) to Strongly Disagree (1).

NOTIFICATIONS of class activities...

A) help me remember class activities.

B) help me interact with others about class activities.

H4. College students have good skills for using class notifications.

A. I know how download or delete applications (apps).

B. I know how to turn notifications ON or OFF.

H5. There is a significant relationship between the use of mobile devices and receiving benefit from class notifications.

Compare sample items of use of mobile devices. For example; (Likert Scale from Always (5) to Never (1)).

I use my CELL PHONE OR OTHER MOBILE DEVICE to:

A) share educational media and websites with the teacher.

B) discuss class topics with my classmates.

With sample items of receiving benefit from class notifications for example; (Likert scale from Strongly Agree (5) to Strongly Disagree (1)).

NOTIFICATIONS of class activities...

A) help me remember class activities.

B) help me complete assignments by the due date.

H6: There are many advantages of class notifications; and

H7: There are some disadvantages of class notifications.

Sample items:

(Open-end question)

Describe how receiving CLASS notifications benefits or interferes with your learning for this class?

3.10 Chapter Summary

The goal of this study is to present an understanding of the effectiveness of sending notifications by mobile technology on student learning. This chapter covered and presented the methodology and procedures that were used to investigate the effectiveness of using class notifications. A step-by-step protocol was presented to ensure that the study instrument was reviewed and is replicable. The methodology and its analysis made it possible to evaluate the responses of the participants of the study. Furthermore, this chapter included research design, research questions and hypotheses, research setting, data collection procedures, description of the variables, target population, instrumentation, data analysis, and validity and reliability. In the following chapter the results of the study are presented.

CHAPTER FOUR

STUDY RESULTS ANALYSIS

The objective of chapter four is to present the data and findings of the statistical analysis. The purpose of the study is to understand the extent of the efficiency of integrating class notifications through mobile technology in higher education. The experiment focused on Facebook and Group Me to send messages (i.e., notifications to the class). The researcher collected data from university student volunteers for this experiment. Weekly message notifications were sent during a semester followed by an online survey. This study is designed to answer a number of research questions. As a convenience, these questions are repeated here:

1. How are college students currently using mobile technologies for learning?
2. How are college students currently using desktop computers for learning?
3. Do students value class notifications?
4. Where do college students read course notifications?
5. What skills do students have in using class notifications?
6. Is proficiency in using mobile devices associated with perceived value of class notifications?
7. What are the advantages of using class notifications?
8. What are the disadvantages of using class notifications?

To properly address these questions, a presentation of statistical methods, population and sample, descriptive statistics of the data, findings of the research questions, and results of the open-ended questions is included in this chapter.

4.1 *Statistical Methods*

The statistical analysis manipulated descriptive statistics in order to acquire a whole idea about the demographic data. They also were used to determine participant perspective toward class notifications. One-way ANOVA analysis and independent-sample t-test were used to compare relation between the value of notifications and mobile devices users or computer users. In addition, descriptive statistics were used to examine students' perspective of class notifications. A correlation coefficient was used to determine associations between the demographic variables and various items on the instrument. An independent-sample t-test was applied to a comparison between student demographic questions and other items regarding class notifications. Additionally, content analysis was used to analyze open-ended questions. The open-ended responses were summarized to clarify participants' perceptions toward course notifications and mobile devices in learning. The data is analyzed and coded using SPSS. The data were coded to reflect the participants' responses on the survey instrument.

4.2 *Population and Sample*

Participants in this study are students at the University of Kansas. The total population targeted in this study is N=69 during the spring semester of 2016. Sixty-nine surveys were sent and 46 of them were counted in the final data analysis. All 23 remaining surveys were either submitted blank or no survey was submitted.

4.2.1 Participant Demographics

The study's main focus is university level students. The demographic information analyzed includes participants' age, gender, academic major and academic year, having a data plan in their phones, and type of mobile devices owned. The results reported in the chapter follow the same presentation order in the survey. Results to the first question, "Do you have a data plan on your cell phone (Internet)?" are presented in the table below.

Table 2 : Do you have a data plan (Internet) on your cell phone?

	Frequency	Percentage
Yes	42	91.3%
No	4	8.7%
Total	46	100%

Table 2 shows that 42 participants (91.3%) have a data plan on their cell phones whereas 4 individuals (8.7%) don't have a data plan.

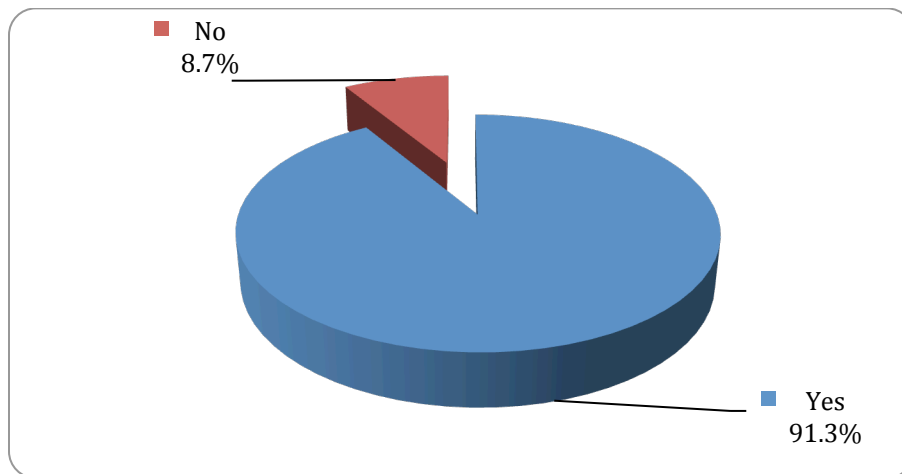


Figure 1: Do you have a data plan (Internet) on your cell phone?

4.2.2 Participants' Ages

Participants in the study are divided into two groups based on their age. The first group is from 19-24 which included 31 individuals (67.4%). The second group age range is 25 or older, which included 15 participants (32.6%). Table 3 presents the distribution of individuals according to age.

Table 3: Distribution of Individuals According to Age

Age	Frequency	Percentage
19-24	31	67.4%
25 or older	15	32.6%
Total	46	100%

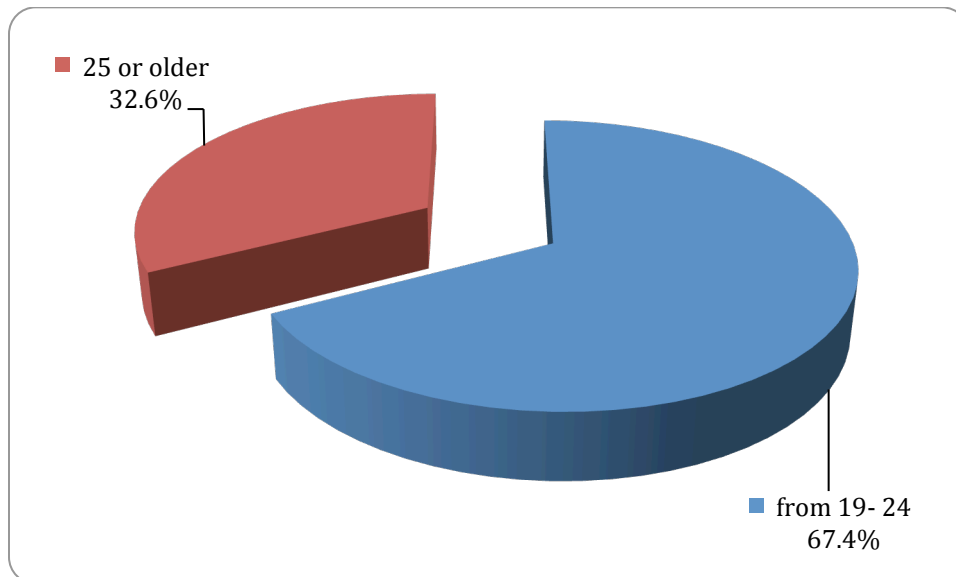


Figure 2: Distribution of Individuals According to Age

4.2.3 Participants' Gender

The study also took into consideration the gender of participants. Table 4 below demonstrates the gender distinction in the survey. Table 4 illustrates that 31 individuals (67.4%) are female, whereas 15 (32.6%) are male.

Table 4: Distribution of Participants According to Gender

Gender	Frequency	Percentage
Male	15	32.6%
Female	31	67.4%
Total	46	100%

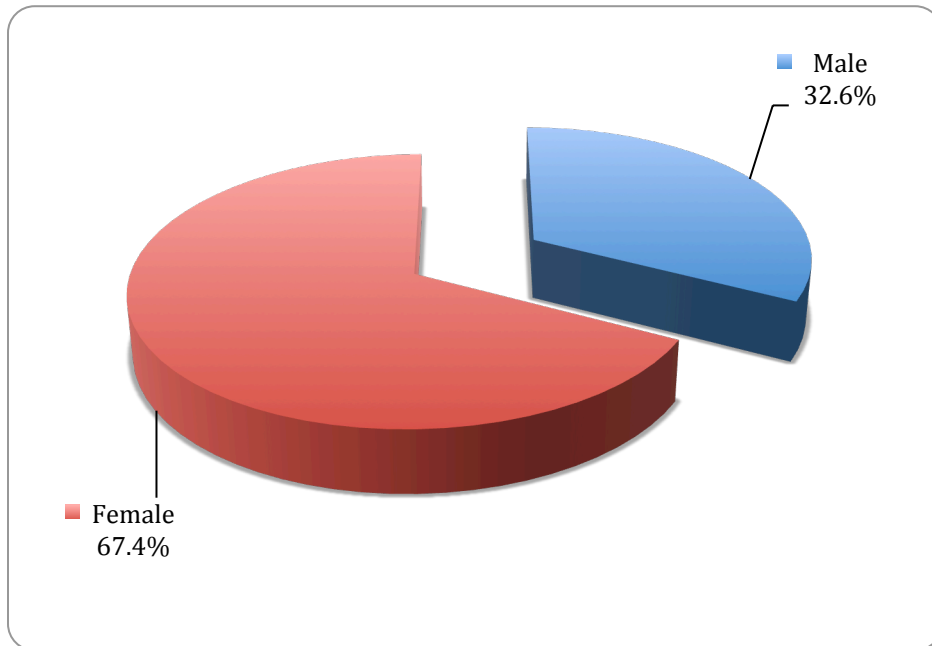


Figure 3: Distribution of Participants According to Gender

4.2.4 Participants' Year of Study

The individuals' year of study breakdown is presented in Table 5.

Table 5: Participants Current Academic Year

	Frequency	Percentage
Sophomore (2nd year)	14	30.4%
Junior (3rd year)	13	28.3%
Senior (4th year)	5	10.9%
Graduate Student	14	30.4%
Total	46	100%

Table 5 shows that participants were divided into 4 different university levels. It is clear from Table 5 that 14 (30.4%) are sophomores (2nd year), whereas 14 (30.4%) are graduate students, 13 (28.3%) are juniors (3rd year), and 5 (10.9%) are seniors (4th year).

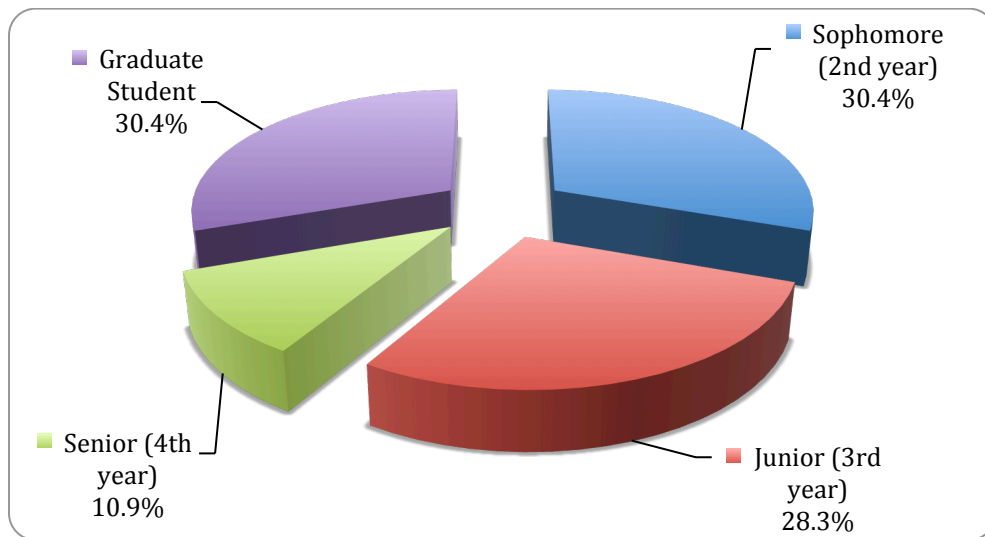


Figure 4: Participants Current Academic Year

4.2.5 Major and Specialization

Table 6: Participants major and specialization

	Frequency	Percentage
Social Studies	1	2.2%
Foreign Language	3	6.5%
Elementary Ed.	2	4.3%
Ed. Technology	7	15.2%
Math	1	2.2%
Design	23	50.0%
Higher Ed.	1	2.2%
English Ed	2	4.3%
Curriculum & Teaching	1	2.2%
History of Art	1	2.2%
Secondary English	2	4.3%
Architecture	2	4.3%
Total	46	100%

It is clear from Table 6 that 23 participants (50.0%) have a major and specialization in design, whereas 7 (15.2%) are majoring in education technology, 3 (6.5%) in foreign language, 2 (4.3%) in elementary education, 2 (4.3%) in English education, 2 (4.3%) secondary English, 2 (4.3%) in architecture, 1 (2.2%) in social studies, 1 (2.2%) in math, 1 (2.2%) in higher education, 1 (2.2%) in curriculum and teaching, and 1 (2.2%) in history.

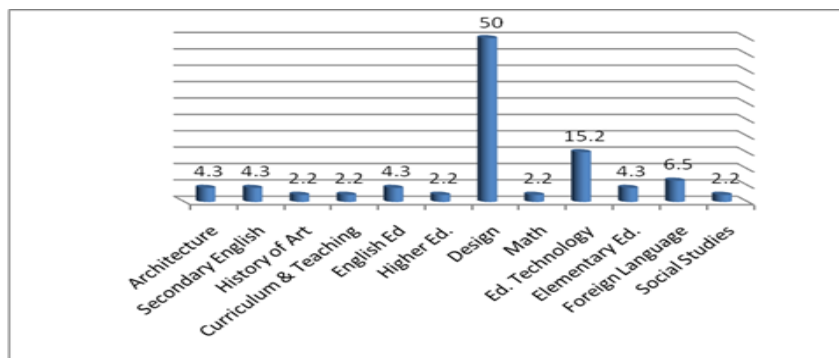


Figure 5: Participants major and specialization

In Table 7, the researcher merged architecture and design under design and merged secondary English, history, curriculum and teaching, English education, higher education, math, educational technology, elementary education, foreign language, and social studies under educations because of similarities, and the low numbers in those majors in the study.

The focus is directed to education and design because most majors within the data set do not include large numbers of students. Moreover, all majors are included under the education specialization. Most importantly, limiting the interest to two majors makes comparison more manageable and yields better results.

Table 7: Participants general major

	Frequency	Percentage
Education	21	45.7%
Design	25	54.3%
Total	46	100%

It is clear from Table 7 that 25 individuals (54.3%) have a major and specialization in design, whereas 21 (45.7%) have a major and specialization in education.

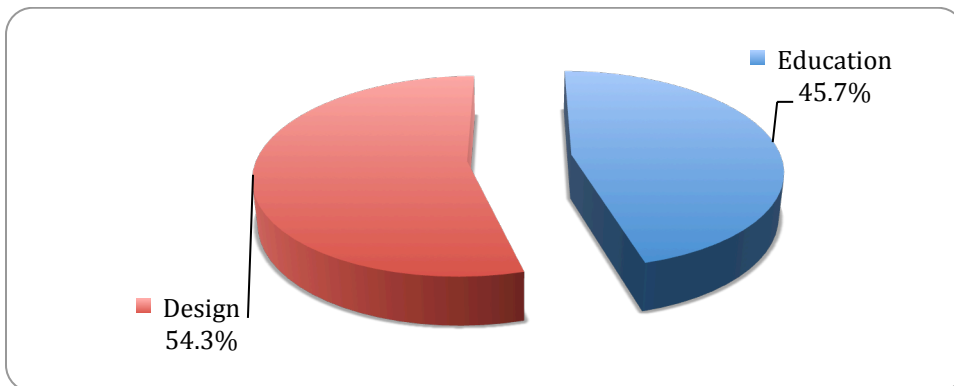


Figure 6: Participants general major

Table 8: Communication tools use most often for class activities

Rank	Communication Tools	Mean ¹	Standard Deviation	Percent ²
1	Email	4.65	0.57	69.6%
2	GroupMe	3.41	1.50	32.6%
3	Facebook	2.91	1.40	21.7%
4	Instagram	2.80	0.98	6.5%
5	Google Groups	2.70	1.47	19.6%
6	LINE	2.35	1.40	10.9%
7	Google+	2.33	1.46	15.2%
8	Messenger	1.74	1.24	4.3%
9	WhatsApp	1.65	1.18	4.3%
10	Twitter	1.63	1.18	4.3%
11	Hangouts	1.39	0.91	2.2%
12	Telegram	1.17	0.61	-
		2.39	0.48	

¹ The scale was (Always 5-4-3-2-1 Never).

² Percent =% of those choosing (Always).

This research investigated whether or not students used a wide range of mobile apps as part of their participation in classes. Through the above stated results it is clear that the individuals in the widely vary on what communication tools they use to support their learning for classes (2.39, SD=0.48). However, almost all students regularly use email as part of class participation (4.65, SD=0.57).

Students tended to use Group Me more frequently than the other communication tools (3.41, SD=1.50).

Other tools that were used fairly commonly include Facebook (M=2.91, SD=1.40), Instagram (M=2.80, SD=0.98), and Google Groups (M=2.70, SD=1.47). Messenger (M=1.74, SD=1.24), WhatsApp (M=1.65, SD=1.18), Twitter (M=1.63,

SD=1.18), Google Hangouts (M=1.39, SD=0.91), and Telegram (M=1.17, SD=0.61) were found to be rarely used by student participants as part of class activities.

Statement No. (8) which is “Telegram” came in fifth rank in average of (1.17, SD=0.61).

4.3 Findings of Survey Questions

The study was designed to answer the following research questions investigating student perspectives toward implementing class notifications, as well as the benefits implementation of class notifications and the barriers interfering with the benefits of class notifications in institutions of higher education. The data were gathered from those participants received class notifications during the semester and responded to the survey questionnaire (see appendix D) after applying the course notifications through Spring 2016 by using a Likert-type scale ranking of 5 to 1 with Strongly Agree (5); Somewhat Agree (4); Neither agree nor disagree (3); Somewhat Disagree (2); and Strongly Disagree (1).

4.3.1 Research Questions One

How are college students currently using mobile technologies for learning?

The survey items investigated a wide range of potential classroom activities that students might be currently using their mobile devices to complete. Table 9 details all the items that this research investigated.

Table 9: Responses to RQ 1 (using mobile technologies for learning)

Rank	Items	Mean ¹	Standard Deviation	Percent ²
1	Check class website for syllabus and due dates.	3.78	1.15	30.4%
2	Communicate about education topics with classmates.	3.57	1.03	21.7%
3	Receive class notifications.	3.52	1.24	26.1%
4	Set alert/alarm or calendar for due dates for classes.	3.43	1.34	28.3%
5	Use learning manage system (e.g. Blackboard, Moodle).	3.37	1.36	23.9%
6	Use social networks (Facebook, Google Grps...) for classes.	3.37	1.25	26.1%
7	Read educational content for classes.	3.30	1.13	15.2%
8	Take or edit pictures or videos for class activities.	3.11	1.32	19.6%
9	Access educational podcasts or videos.	2.93	1.18	10.9%
10	Communicate about ed. topics and class with the teacher.	2.91	1.28	17.4%
11	Record field observations for research, or web quests.	2.65	1.29	10.9%
12	Translate words or passages into another language.	2.61	1.34	15.2%
13	Play an educational game (e.g., Words with Friends).	2.59	1.36	17.4%
		3.17	0.86	

¹ The scale was (Always 5-4-3-2-1 Never).

² Percent =% of those choosing (Always).

The scale in Table 9 was always (5) through never (1). The participant college students currently positively using mobile technologies for academic learning average $M=3.17$, $SD=0.86$. *Individuals agreed most of the time in statements that ranked 1, 2, 3, and 4.* The statements in the previous table have scored as follows: statement “check

class website for syllabus and due dates” came in first rank: (M=3.78, SD=1.15), statement “communicate about education topics with classmates” came in second rank: (M=3.57, SD=1.03), statement “receive class notifications”: came in third rank (M=3.52, SD=1.24), statement “set alert/alarm or calendar for due dates for classes” came in fourth rank: (M=3.43, SD=1.34), Moreover, *Individuals agree sometimes in following statements*. Statements scored as follows: statement “use learning manage system (e.g. Blackboard, Moodle)” came in fifth rank: (M=3.37, SD=1.36), statement “use social networks (Facebook, Google Grps...) for classes” came in sixth rank: (M=3.37, SD=1.25), statement “read educational content for classes” came in seventh rank: (M=3.30, SD=1.13), statement: “take or edit pictures or videos for class activities” came in eighth rank: (M=3.11, SD=1.32), statement “access educational podcasts or videos” came in ninth rank: (M=2.93, SD=1.18), statement: “communicate about Ed. topics and class with the teacher” came in sixth rank (M=2.91, SD=1.28), statement: “record field observations for research, or web quests” came in 11th rank: (M=2.65, SD=1.29), statement “translate words or passages into another language” came in 12th rank: (M=2.61, SD=1.34). Finally, *Individuals agree rarely in statement, “play an educational game (e.g., Words with Friends)” (M=2.59, SD=1.36)*.

4.3.2 Research Question Two

How are college students currently using desktop computers for learning?

In order to have a basis for comparison for mobile device usage in learning, desktop usage of the same items was investigated (see Table 10).

Table 10: Responses to RQ 2 (using desktop computers for learning)

Rank	Items	Mean ¹	Standard Deviation	Percent ²
1	Check class website for syllabus and due dates.	4.22	1.05	50.0%
2	Read educational content for classes.	4.11	1.04	43.5%
3	Use learning manage system (e.g. Blackboard, Moodle).	4.00	1.12	41.3%
4	Communicate about education topics with classmates.	3.83	1.06	26.1%
5	Communicate about ed. topics and class with the teacher.	3.78	1.03	26.1%
6	Access educational podcasts or videos.	3.67	1.18	30.4%
7	Take or edit pictures or videos for class activities.	3.54	1.33	28.3%
8	Use social networks (Facebook, Google Grps...) for classes.	3.54	1.19	26.1%
9	Receive class notifications.	3.30	1.36	28.3%
10	Record field observations for research, or web quests.	2.80	1.28	13.0%
11	Translate words or passages into another language.	2.70	1.23	10.9%
12	Set alert/alarm or calendar for due dates for classes.	2.37	1.44	15.2%
13	Play an educational game (e.g., Words with Friends).	2.22	1.40	10.9%
		3.39	0.82	

¹ The scale was (Always 5-4-3-2-1 Never).

² Percent =% of those choosing (Always).

The scale was always (5) through never (1). College students currently using desktop computers for academic learning in average of (M=3.39, SD=0.82). It is clear from the results and the that the individuals agree always in statement, “check class website for syllabus and due dates,” (M=4.22, SD=1.05).

It is clear from the results that the study sample individuals are agree most of the Time in statements ranked 2 to 8. The statements from table 10 shows that: statement “read educational content for classes” came in second rank: (M=4.11, SD=1.04),

statement “use learning manage system (e.g. Blackboard, Moodle)” came in third rank: (M=4.00, SD=1.12), statement “communicate about education topics with classmates” came in fourth rank: (M=3.83, SD=1.06), statement “communicate about ed. topics and class with the teacher” came in fifth rank: (M=3.78, SD=1.03), statement “access educational podcasts or videos” came in sixth rank: (M=3.67, SD=1.18), statement “take or edit pictures or videos for class activities” came in seventh rank: (M=3.54, SD=1.19), statement “use social networks (Facebook, Google Grps...) for classes” came in eighth rank: (M=3.54, SD=1.19). Also, *Individuals agree sometimes in statements ranked 9, 10, and 11*. The statements scored: statement “receive class notifications” came in ninth rank: (M=3.30, SD=1.36), statement “record field observations for research, or web quests” came in tenth rank: (M=2.80, SD=1.28), statement “translate words or passages into another language” came in eleventh rank: (M=2.70, SD=1.23). Moreover, *Study sample individuals agree rarely to rank 12 and 13*. The statements scored as follows: statement “set alert/alarm or calendar for due dates for classes” (M=2.37, SD= 1.44) and then statement “play an educational game (e.g., Words with Friends)” came in (M=2.22, SD=1.40).

4.3.3 Research Questions Three

Do students value class notifications?

The items correlated to the third research question investigate student perception of specific aspects of the usefulness of class notifications (Table 11). Students’ perception of the degree of helpfulness of each item indicates the degree of effectiveness of this research carefully designed semester-long course notifications plan.

CLASS NOTIFICATIONS...

Table 11: Responses to RQ 3 (value of class notifications)

Rank	Item	Mean ¹	Standard Deviation	p ²
1	Help me complete assignments by the due date.	4.33	1.06	< .001
2	Help me remember class activities.	4.26	1.06	< .001
3	Help me interact with others about class activities.	3.87	1.26	< .001
4	Improve my learning.	3.72	1.11	< .001
5	Are private communications for students & teacher.	3.67	1.12	< .001
6	Give me a greater sense of belonging to class.	3.54	1.31	< .001
		3.90	0.90	< .001

¹ The scale was (Strongly Agree 5-4-3-2-1 Strongly Disagree).

² Significant at the 0.01 levels if $p < .01$.

The scale was strongly agree (5) through strongly disagree (1). In order to answer research question 3, do students value class notifications? Descriptive statistics were used to analyze the data gathered about the value of using class notifications in the sample classes. Overall, students had a positive attitude towards class notifications (M=3.90, SD=0.90).

Individuals strongly agree about a value to notifications in the first statements.

Statements appear in table 11 scored as follows: statement “help me complete assignments by the due date” came first rank: (M=4.33, SD=1.06) and statement “help me remember class activities” came in second rank: (M=4.26, SD=1.06). Also,

Individuals agree somewhat about a value to notifications in rest four statements.

Statements “help me interact with others about class activities” came in third rank:

(M=3.87, SD=1.26), statement “improve my learning” came in fourth rank: (M=3.72, SD=1.11), statement “are private communications for students & teacher” came in fifth rank: (M=3.67, SD=1.12) and statement “give me a greater sense of belonging to class” came in sixth rank (M=3.54, SD=1.31).

4.3.4 Research Question Four

Where do college students read course notifications?

Two pieces of data were analyzed to answer this research question. The first is the place that students received notifications. The second is the device that students receive the notifications through. Analyzing where students read their course notifications throughout the semester allowed the researcher to compare mobile app use between personal and classroom needs. Comparing when the different types of notifications were checked allows for a better understanding of how students integrate class learning into their daily lives.

Table 12: Responses to RQ 4 (situation of read course notifications)

Pair1	Items: “read course notifications...”	N	Mean ¹	Standard Deviation	t
1	Outside of the classroom or Break time	46	3.71	0.75	6.21*
2	During lecture time in the classroom.	46	2.83	1.27	

¹ The scale was (Always 5-4-3-2-1 Never).

*Significant at level p<.001

A paired-sample t test conducted to evaluate whether college students read course notifications during lecture time or in the break time outside the classroom. The result indicated that the mean concern for outside of the classroom or break time ($M = 3.71$, $SD = .75$) was significantly greater than the mean concern for during lecture time in the classroom ($M = 2.83$, $SD = 1.27$), $t = 6.21$, $p < .001$.

Table 13: Responses to “situation of read personal notifications”

Pair1	Items: “read personal notifications...”	N	Mean ¹	Standard Deviation	t
1	Outside of the classroom or Break time	46	4.23	0.73	6.27*
2	During lecture time in the classroom.	46	3.33	1.16	

¹ The scale was (Always 5-4-3-2-1 Never).

*Significant at level $p < .001$

A paired-sample t test conducted to evaluate whether college students read personal notifications during lecture time or in the break time outside the classroom. The result indicated that the mean concern for outside of the classroom or break time ($M = 4.23$, $SD = .73$) was significantly greater than the mean concern for during lecture time in the classroom ($M = 3.33$, $SD = 1.16$), $t = 6.27$, $p < .001$.

In the second part of answering this research question the researcher determined which devices students receive class notifications through between mobile devices or desktop. Here the researcher compares item “Receive class notifications” from the survey in Table 9 (Using mobile technologies for learning) and Table 10 (Using desktop computer for learning).

Table 14: Compare item “Receive class notifications” in mobile technology and desktop computer.

Rank	Item	Mean ¹	Standard Deviation	
1	I use mobile technology to receive class notifications	3.52	1.24	(See Table 9)
2	I use desktop computer to receive class notifications	3.30	1.36	(See Table 10)

¹ The scale was (Always 5-4-3-2-1 Never).

Table 14 above display that table 9 mean of students who use mobile devices to read class notifications is M=3.52 with a SD=1.24. Table 10 shows that the mean of students who read notifications using stationary computers is M=3.30 with an SD of 1.36. A thorough comparison and discussion of these results are presented in chapter five.

4.3.5 Research Question Five

What skills do students have in using class notifications?

Table 15: Responses to RQ 5 (skills in using class notifications)

Rank	Item	Mean ¹	Standard Deviation	Percent ²
1	I know how to turn notifications ON or OFF.	4.89	0.38	91.3%
2	I know how download or delete applications (apps).	4.89	0.43	93.5%
3	It is easy to me read notifications or messages by my phone.	4.61	0.80	76.1%
4	It is easy to me to type messages on my phone.	4.54	0.89	71.4%
		4.73	0.63	

¹ The scale was (Strongly Agree 5-4-3-2-1 Strongly Disagree).

² Percent =% of those choosing (Strongly Agree).

These results found that most participants reported that they had competent skills in using class notifications in average of 4.73 out of 5.0.

Overall, individuals agree always to above statements in table 15. Table 15 shows the scores for every statement: statement “I know how to turn notifications ON or OFF”

came in first rank: (4.89 out of 5), statement “I know how download or delete applications (apps)” came in second rank: (4.89 out of 5), statement ranked 1 and 2 share the same mean. However, statement ranked second because S.D is less than statement ranked first. Statement “It is easy to me read notifications or messages by my phone” came in third rank: (4.61 out of 5) and statement “It is easy to me to type messages on my phone” came in fourth rank: (4.54 out of 5).

4.3.6 Research Question Six

Is proficiency in using mobile devices associated with perceived value of class notifications?

To answer this research question the relationship between the value of class notifications (see Table 11) and the following tables were examined.

Table 16: Correlation of the value of class notifications and using cell phone

	Value of Class Notifications (see Table 11)
Using mobile technologies for learning (see Table 9)	r=0.4*
Skills in using class notifications (see Table 15)	r=0.4*
Using communications tools for class activities (see Table 8)	r=0.1*
Using desktop computer for learning (see Table 10)	r=0.02*

*Correlation is significant at the 0.05 level

It is clear through analysis of Table 16 that there is significant relation between notifications perceived value and the use of cellphones or other mobile devices in academic activities ($P=0.016$ and $r=0.355$).

In addition, the relationship between value class notifications (Table 11) and the skills in using class notifications (Table 15) was analyzed. It is clear through the results that there is a significant relationship between the value students place on class notifications and the skills in using class notifications ($P=0.017$ and $r=0.351$).

However, table 16 shows that there is no significant relationship between values class notifications and using communications tools nor using stationary computer for class activities at level 0.05.

4.3.7 Research Questions Seven & Eight

What are the advantages of using class notifications?

What are the disadvantages of using class notifications?

This section will address the survey's final two open-ended questions; Q1: Describe how receiving class notifications benefits or interferes and with your learning for this class and Q2: What advantages and/ or disadvantages do you see in using your cell phone or other mobile devices for learning? Students were asked to respond to those two open-ended questions. The majority of them 38 students (82.6%) responded to these questions. It is always a challenge to interpret the results of an open-ended question due to the nature of responses that they may generate. Their answers were categorized by using content analysis, which looks at key words, features, outlines, and key ideas of the statements, then ranks them based on the highest frequency and percentage for each

statement. To understand participants' various responses for the two questions, the researcher grouped responses into multiple categories. These categories capture students' responses and provide the opportunity to make sense of their perceptions. Participants responded to the two questions with a good amount of detail. This is considered a strong indication of their participation in the survey. It also shows that the research questions managed to attract them to providing a good amount of feedback.

4.3.7.1 First open-end question

First open-end question—Q1: What are the advantages and disadvantages of using class notifications? —have prompted the following categories under the benefits component of the study's hypotheses: expectations, punctuality, convenience, communication, reduce mental load, engagement, and general. As for the second part of the question, all responses were grouped under the general category of Interferes. The justification for assigning responses to categories is addressed under the explanation of each category in the following sections.

Table 17 below shows the participants' responses to Q1 with its two parts, benefits and interferes. There were 55 responses to this question. 50 responses (91%) were included under the benefits group leaving 5 responses (9%) in the interfere group. It details the categories, number of responses, percentage within each group, and overall percentages. Responses were assigned to categories based on the explicit nature of feedback. They were categorized under expectations whenever the response indicated such. For example one response stated, "it allows the students to undoubtedly know their next classes expectations." Others needed some interpretation such as "what we will be

doing in the next class.” Overall, participants’ expectations are ranked highest among all categories with 33% (18 responses) and 36% with benefits.

The second category is punctuality. Responses were assigned under this category when they connected to notifications in terms of submitting assignments on time or refereeing to due dates. This category also refers to the impression that notifications assisted students to be punctual. For instance, one participant wrote “I think it benefits to remind me of due dates.” Other responses were not as clear cut such as “It’s helpful to receive notifications about what we need to complete before the next class...” Punctuality responses received 25% (14 responses) and ranked second among benefits as perceived by students with 28%.

The third category is called convenience and comfort. This category captures responses that referred to the convenience of the tool. It also describes the ease and speed of reading messages in terms of the very little effort needed to comprehend the notification itself. For instance, a response is noted claiming that reading a message does not require more than “a couple of seconds.” Another student highlighted how great it is to “have one channel to receive notifications through my phone.” Convenience and comfort registered at 14% (8 responses) overall with 16% with group performance.

Table 17: Class notifications advantages and diadvantages

	Advantages				Disadvantages			
	Categories	Freq.	% Within Benefits	% Overall Bnf.+Interf.	Categories	Freq.	% Within Interfere	% Overall Bnf.+Interf.
1	Expectations	18	36	33	General	5	100	9
2	Punctuality	14	28	25	-	-	-	-
3	Convenience & Comfort	8	16	14	-	-	-	-
4	Communication	3	6	5	-	-	-	-
5	Reduce Mental Load	2	4	4	-	-	-	-
6	Engagement	4	8	7	-	-	-	-
7	General	1	2	2	-	-	-	-
		50		91		5		9
				55				

The fourth category is titled communication. It captures responses that highlighted student-student and student-teacher interactions. It also included responses that revealed an interest in communication and building class related connections and communication. For example a response was recorded claiming, “It also told me who would be presenting so I could know their names better.” Overall communication scored 5% of responses (3 tokens) with a 6% within group performance.

The fifth category is labeled mental load. There are only two responses under this category. However its importance demanded a class of its own. Although the issue of brain capacity and students’ state of mind is not a concern of this study, it is nevertheless worth a brief mention due to its presence and serious implications. This category captures participants’ claims that considered receiving notifications helped in reducing functions

of the brain. For example, a student stated “It definitely benefits due to my lack of memory from having so much on my mind in regards to classwork and projects.” The mental load category included a 4% (2 responses) overall and 4% within performance.

The sixth category is identified as engagement. The responses under this category include those that showed interest to participate in class activities and involvement. For instant, one response stated, “It helps me know what is going on in class.” A 7% (4 responses) was recorded overall with 8% within overall results.

Finally, the general category which included responses of general trait. There were only 1 response in this category (2% overall and 2% within). Usually the “general” group contains larger numbers of data; however, the strikingly clear distinctions that students included in their response urged the researcher to include them in other categories. In other words, only one student talked about the general benefits of notifications without mentioning details. This is a good indication of the wide range and effects of the notifications system on students. It is also good that the generality of benefits were shadowed by highlighting other important aspect of students’ interest and only 5 responses (9%) in the interfere group. The interferences were two of them that Facebook is more personal not for school, two of them feel that they do not need it, and one of them that feel some time receive many notifications for the same event.

4.3.7.2 Second open-ended question

Q2: What advantages and/ or disadvantages do you see in using your CELL PHONE or other mobile devices for learning?—is concerned with the mobile device

itself. It discloses participants' opinions on using mobile devices in learning. The style of presentation of Q1 is applied here as well.

To make sense of open-ended responses it seems ideal to categorize them into groups under advantages and disadvantages. Both groups had four categories of responses. The advantages group included accessibility, time saver and fast, mobile features, and general. The disadvantages group included distraction, prevent social interaction, lack of resources, and other. Explanations of why responses were classified into each category will be addressed when presenting data within each category.

The following table shows responses assigned to categories under advantages and disadvantages. It presents the number of responses in each category, within group percentages and overall percentages. Out of 60 responses for Q2, the advantages were 35 responses (58%) while the disadvantages were 25 responses (42%).

Table 18: Advantages or disadvantages of mobile devices for learning

	Advantages				Disadvantages			
	Categories	Freq.	% Within Adv	% Overall Adv+Dis	Categories	Freq.	% Within Dis	% Overall Adv+Dis
1	Accessibility	17	49	28	Distraction	13	52	22
2	Time saver & fast	6	17	10	Prevent social interaction	2	8	3
3	Mobile features	5	14	8	Lack of resources	3	12	5
4	General	7	20	12	Other	7	28	12
		35		58		25		42
				60				

The first category under advantages is labeled accessibility. This category includes responses that refer to the ease of use, ability to access information anywhere, and handiness. For example, “it is quick and easy for looking things up.” Accessibility scored the highest overall and within the group with 28% (17 responses) and 49% respectively.

The second category—time saver and fast—is concerned with responses that stressed the importance of time and speed that mobile devices can provide. For instance, “they are fast and can store and come back to easily.” Overall this category registered 10% (6 responses) with 17% within group performance.

The third category is mobile features. This category captures responses that were concerned with specific mobile features such as reminders, calendar, and other apps and features that mobile devices provide. Responses were along the line of this example, “I really enjoyed using the Group Me app for my class.” There were 5 responses that amounted to an overall of 8% and 14% within performance for mobile features.

The final category under advantages is a general group, which captured unspecified positive comments about using mobile device in learning. For example, a participant comment, “technology can really help us learn more,” another stated, “mobile technology is here to stay. Why would we not use it?” this category included 7 responses with an overall of 12% and a within group of 20%.

The second part of the question is concerned with the comments that showed a disadvantage to mobile devices in learning. Most participants’ comments were aimed at the distraction that mobile devices carry with them. 22% (13 responses) with more than half of within group performance (52%) were registered under the distraction category.

Responses included these types of comments: “people might become too distracted by cell phone use in the classroom” and “cell phone and technology in general create a lot of distraction which is a problem.”

The second category is labeled prevent social interaction. As mentioned earlier, due to the importance of this point and explicit comments that claim technology curbs social interaction an independent category is created to capture these disadvantages.

Overall, 3% (2 responses) were noted and 8% of within group. An example of students’ feedback is “It can take away from and intermix with other aspects of social mediating”

The third category included responses that highlighted some lacks in capability of mobile device or the unavailability to the persons themselves. For example, one student mentioned that “the screen is too small,” another mentioned that some students have better phones than others. This category included 3 responses with an overall of 5% and 12% for the within group percentage.

The final category included a variety of disadvantages that it couldn’t be categorized in other groups. These comments had a wide range such as: “technology maybe misused,” “brings burden,” or the unpracticality of the Blackboard app on phones. Seven responses were listed under this category with an overall of 12% and with 28% for within performance.

4.4 Differences in Demographic Characters

4.4.1 The Differences in Age Variable

Results of T-test: independent Sample T-test for differences between study individuals' responses according to difference of age variable.

Table 19: Results of T-test with age as variable

	Age	N	Mean	Std. Dev	T	Sig.
Value of class notifications (see Table11)	19-25	31	3.98	0.9	0.864	0.392
	25 or older	15	3.73	1.0		
Using mobile technologies for learning (Table 9)	19-25	31	3.17	0.8	0.008	0.994
	25 or older	15	3.16	1.0		
Use desktop computer for learning (see Table10)	19-25	31	3.33	0.9	0.805	0.425
	25 or older	15	3.53	0.6		
Using communication tools for class activities (see Table 8)	19-25	31	2.45	0.5	1.051	0.299
	25 or older	15	2.29	0.3		
Skills in using class notifications (see Table 15)	19-25	31	4.16	0.5	0.825	0.414
	25 or older	15	4.02	0.7		

It is clear through the results in Table 19 that there are no statistically significance differences at 0.05 level and less in individuals' trends within the categories of value class notifications, use cell phone or other mobile devices in learning, use computer in learning, use communication tools, and skills and practices of using notifications in difference of age variable.

4.4.2 The Differences in Gender variable

Results of T-test: independent Sample T-test for differences between study

individuals' responses according to difference of Gender variable.

Table 20: Results of T-test with gender as variable

	Gender	N	Mean	Std. Deviation	T	Sig.
Value of class notifications (see Table 11)	Male	15	4.14	0.88	1.299	0.201
	Female	31	3.78	0.90		
Using mobile technologies for learning (see Table 9)	Male	15	3.18	0.80	0.076	0.940
	Female	31	3.16	0.90		
Using desktop computer for learning (see Table 10)	Male	15	3.46	0.60	0.391	0.698
	Female	31	3.36	0.92		
Using communications tools for class activities (see Table 8)	Male	15	2.42	0.49	0.267	0.790
	Female	31	2.38	0.48		
Skills in using class notifications (see Table 15)	Male	15	4.19	0.56	0.649	0.520
	Female	31	4.08	0.55		

It is clear from Table 20 that there are no statistically significance differences at 0.05 level and less in individuals' trends within the categories of value of class notifications, use cell phone or other mobile devices in learning, use computer in learning, use communication tools, and skills and practices of using notifications in difference of gender variable.

4.4.3 *The Differences in year in school variable*

Results of T-test: one-way ANOVA for differences between study individuals' responses according to difference of current year in school variable.

Table 21: Results One-way ANOVA with current year in school as variable

		Sum of Squares	df	Mean Square	F	Sig
Value of class notifications (see Table 11)	Between groups	4.827	3	1.609	2.139	0.110
	Within groups	31.588	42	0.752		
	Total	36.415	45			
Using mobile technologies for learning (see Table 9)	Between groups	1.214	3	0.405	0.530	0.664
	Within groups	32.051	42	0.763		
	Total	33.266	45			
Using desktop computer for learning (see Table 10)	Between groups	1.868	3	0.623	0.923	0.438
	Within groups	28.324	42	0.674		
	Total	30.192	45			
Using communications tools for class activities (see Table 8)	Between groups	0.666	3	0.222	0.975	0.414
	Within groups	9.562	42	0.228		
	Total	10.228	45			
Skills in using class notifications (see Table 15)	Between groups	0.334	3	0.111	0.358	0.784
	Within groups	13.079	42	0.311		
	Total	13.413	45			

It is clear through the above stated results that there are no statistically significance differences at 0.05 level and less in individuals' trends within the categories of value of class notifications, use cell phone or other mobile devices in learning, use

computer in learning, use communication tools, and skills and practices of using notifications in difference of current year in school variable.

4.4.4 *The Differences of Major and Specialization Variable*

Results of T-test: independent Sample T-test for differences between study individuals' responses according to difference of major and specialization.

Table 22: Results independent sample T-test with major as variable

	n	Major	Mean	Std. Deviation	T	Sig
Value of class notifications (see Table 11)	21	Education	3.71	1.02	1.282	0.206
	25	Design	4.05	0.77		
Using mobile technologies for learning (see Table 9)	21	Education	3.25	1.10	0.546	0.589
	25	Design	3.10	0.61		
Using desktop computer for learning (see Table 10)	21	Education	3.64	0.75	1.908	0.063
	25	Design	3.19	0.83		
Using communications tools for class activities (see Table 8)	21	Education	2.32	0.51	0.957	0.344
	25	Design	2.46	0.45		
Skills in using class notifications (see Table15)	21	Education	4.07	0.61	0.529	0.599
	25	Design	4.15	0.50		

The results in Table 22 demonstrate that there are no statistically significance differences at 0.05 level and less in individuals' trends within the categories of value of class notifications, use cell phone or other mobile devices in learning, use computer in learning, use communication tools, and skills and practices of using notifications in difference of major and specialization.

4.4.5 The Differences in Data Plan on Cell Phone Variable

Results of T-test: independent Sample T-test for differences between study individuals' responses according to difference of have a data plan on cell phone (internet) variable.

Table 23: Results of independent sample T-test with data plan as variable

	N		Mean	Std. Deviation	T	Sig.
Value class notifications (see Table 11)	42	Yes	3.92	0.86	0.632	0.531
	4	No	3.63	1.40		
Use cell phone or other mobile devices in learning (see Table 9)	42	Yes	3.18	0.89	0.306	0.761
	4	No	3.04	0.40		
Use computer in learning (see Table 10)	42	Yes	3.47	0.75	2.169	*0.035
	4	No	2.58	1.20		
Use communication tools (see Table 8)	42	Yes	2.39	0.49	0.366	0.716
	4	No	2.48	0.37		
Skills in using class notifications (see Table 15)	42	Yes	4.10	0.56	0.514	0.610
	4	No	4.25	0.29		

* Significant at level $p < 0.05$

It is clear from the results in Table 23 that there are statistically significance difference at 0.05 level in using computer in learning and having a data plan on cell phone ($p=0.035$, $p \geq .05$). However, there are no statistically significance differences at 0.05 level and less in value of class notifications, use cell phone or other mobile devices in learning, use computer in learning, use communication tools, and skills and practices of using notifications in difference of have a data plan on cell phone (Internet) variable.

4.5 Chapter Summary

Five significant findings emerged from hypothesis testing: first, a significant positive relationship was found between value class notifications and current use of mobile device ($r=0.355$, $p=0.016$, $p < .05$). Second, between class notifications and the

skills in using class notifications ($r=0.351$, $p=0.017$, $p<.05$). Third, read course notifications outside of the classroom or break time significantly greater than the mean concern for during lecture time in the classroom, $t= 6.21$, $p < .001$. Fourth, read personal notifications outside of the classroom or break time significantly greater than the mean concern for during lecture time in the classroom, $t= 6.27$, $p < .001$. Fifth, in using computer in learning and having a data plan on cell phone ($p=0.035$, $p\geq.05$).

In summary, the chapter covers the results of the statistical analysis of data collected from 46 students at KU about the benefit of implementing class notifications. The chapter covers statistical methods, population and sample, descriptive statistics of the data, findings of research questions, and open-ended questions results. The research data were analyzed using frequency, means, correlations, one-sample t-test, paired-sample t-test, Independent sample t-test, and One-Way ANOVA. SPSS was used to conduct the analyses. Chapter five provides research discussion, recommendations, implications, and suggestions for future research.

CHAPTER FIVE

CONCLUSION

In this chapter, the researcher discusses the conclusion and implications of the research on using technology to enhance learning in the classroom. More specifically, the section argues that class notifications via mobile device can improve the learning experience and motivate engagement and participation. This chapter presents the purpose of the study, participants, summary of procedures, discussion, and conclusion. Additionally, it provides the findings and interpretations from the statistical analyses of data presented in the previous chapter and discusses how these findings can be related to the body of literature on this topic. This chapter also provides the limitations and implications of the study, the recommendations for future research, and the conclusion.

5.1 Purpose of Study

This study is designed to investigate the efficiency of utilizing notifications in higher education and to uncover the benefits of implementing class notifications via mobile devices as an efficient method of communication in higher education. The study was guided by the following research questions:

1. How are college students currently using mobile technologies for learning?
2. How are college students currently using desktop computers for learning?
3. Do students value class notifications?
4. Where do college students read course notifications?

5. What skills do students have in using class notifications?
6. Is proficiency in using mobile devices associated with perceived value of class notifications?
7. What are the advantages of using class notifications?
8. What are the disadvantages of using class notifications?

To address the research questions an experiment was designed and conducted, followed by a survey. The 72 items on the survey were carefully designed to address the research questions.

5.2 Participants and Data Collection

The study recruited students from a university level. Participants (N= 69) in this study were female (N= 31, 67.4%) and male (N= 15, 32.6%) at the University of Kansas. The data were collected from participants' responses to the survey (see Appendix D). Six questions relate to demographic information. The demographic information for students contained 21 items. Experience with notifications and technology had 56 items. Twelve items relate to the notifications. Thirteen items relate to the mobile devices, and thirteen items relate to stationary computers. Eleven related to communication tools. Seven related to skills and experience in using mobile notifications.

5.3 Summary of Procedures

A descriptive research method was used to accomplish the objectives of the study and to measure the benefits of implementing class notifications and to learn about the efficiency of applying notifications through mobile technology in higher education. One-

way ANOVA analysis and independent-sample t-test were used to ascertain the relationship between the value of notifications and mobile devices users or computer users. In addition, descriptive statistics were used to examine how students' perspective regarding their experience with class notifications. A correlation coefficient was used to determine associations between the demographic variables and various items on the instrument; and content analysis, which was used to analyze responses to the open-ended questions. The data were analyzed and coded using SPSS Discussion of Research Question

5.4 Findings

The current study addressed eight research questions to meet its objectives. This section presents the discussions and findings in light of the study results. This section analyzes every item in the survey as they correspond to the research questions. Items are presented as they appeared in chapter four. Discussions, arguments, and implications will be drawn for every item.

5.4.1 Research Question One

The first research question for the study asked, "How are college students currently using mobile technologies for learning?" The survey included 13 items that were designed to address this question. Participants were asked to respond to these items on a scale from always to never. Overall, college students use mobile technologies for academic learning in average of $M=3.17$. This result has serious implications for the application of mobile use at the university level and in learning in general. Students in

this study have shown a strong tendency of utilizing cell phones in their higher education learning experience. Every item in the survey is covered in order to address the first research question. Items are presented in the same order as chapter four. Implications of each are highlighted in terms of how they correspond to the argument of the study.

The first item invokes more specific uses that participants responded to in the survey. The first item, “check class website for syllabus and due dates,” scored first in average of $M=3.78$. This result informs us that students’ main interest in using cell phones is in checking school material and the syllabus. This item is believed to be the highest use of mobile devices in learning due to the ease and accessibility of cell phones. The implication of this should be taken into consideration when building class material and creating an easily accessible platform for students to interact with. The second item, “communicate about education topics with classmates,” scored second in average of $M=3.57$. This is an indication that students already use mobile devices to communicate with each other for academic purposes. It also shows that participants of the study value this feature in mobile devices in education. The third item, “receive class notifications,” ranked third in average of $M=3.52$. This particular result is extremely vital to the main goal of the study. The use of a mobile-friendly notifications system in learning is highly valued by university level students. This could be evidence that notifications effectiveness is important to mobile users.

“Set alert/alarm or calendar for due dates for classes” ranked fourth with $M=3.43$. It appears that students extend their use of mobile devices to set daily alarms and manage calendars for due dates. “Use learning manage system (e.g., Blackboard, Moodle)” scored an average of $M=3.37$. Although it has been a long time since learning manage systems

were introduced to education, the use of cell phones to access these systems has fallen from the top three high uses slots. It is true that students use their devices to access Blackboard scored above average but at the same time other uses of mobile devices trumped the use of this specific system that is designed to serve academic purposes. Overall, students expressed little desire to access Blackboard from their cell phone. In one response in the in the first open-ended question, a student expressed difficulty accessing Blackboard from his or her cell phone. The accessibility difficulty on cell phones maybe a factor that motivated lack of interest among students to favor checking Blackboard.

“Use social networks (Facebook, Google Grps...) for classes” scored an average of $M=3.37$. The important of this question lies in the use of social networks in learning. In other words, students may be using their cell phones to access social networks, however they are not using their cell phone to access social networks for academic purposes. This assumption can be supported from student feedback from open-ended question one. Several students expressed their dislike of using Facebook for class. They added that they interpret their use of Facebook as personal and they prefer to keep their personal medium separate from their academic applications.

“Read educational content for classes” scored an average of $M=3.30$. Although the mean is still above average, students seemed not in favor using mobile phones to read material as I will demonstrate later when I compare this result with their use of desktop. “Take or edit pictures or videos for class activities” came in fourth rank with an average of $M=3.11$. As cell phones advance and include better cameras and other functions, students extend these features in learning. This result shows that students extend the uses

of cell phone cameras and audio and video capabilities beyond personal use to academic learning. “Access educational podcasts or videos” scored $M=2.93$. Students scored less than average in this use of cell phones. “Communicate about educational topics and class with the teacher” ranked $M=2.91$. This result supports evidence that teacher-students communication via cell phones is not occurring as much as we will see when comparing this item to desktop use. In this study, students have explained that one great use of cell phones is the availability of students-teacher communication. They added that its promptness and quick response aided their learning.

“Record field observations for research, or web quests” scored $M=2.65$. This shows that students in this study were not using a lot of their cell phones for research purposes. It is probably that there is a lack of applications to support research on cell phones or that other practical means are used by students such as note taking and field journals. “Translate words or passages into another language” scored $M=2.61$. Although the study did not focus on the use of multiple languages in learning, this question gives an indication about the features that students use on their cell phones. Furthermore, this study did not distinguish first language speakers of English from second language speakers of English. Nevertheless, student responses recorded a mean of $M=2.61$ in the use of translation using mobile devices. “Play an educational game (e.g., Words with Friends)” scored an average of $M=2.59$. This result is the least of the 13 uses of cell phones by college students. Results may vary in another setting, such as if participants were of younger age. It is likely that this use performed least due to the age of participants.

Results from this research indicate that college students currently positively use

mobile technologies for academic learning with a mean of 3.17 and standard deviation of 0.860.

These findings reflect that most students in the higher education use their mobile technologies for learning. In general the findings were consistent with Wagner (2008), Ison et al. (2004), Armatas, Holt, and Rice (2005), Robinson and Jamieson (2004), Hoppe, Joiner, Milrad, and Sharples (2003), Gall, Gall, and Borg (2007), Saylor (2012), Mellow (2005), Motiwalla (2007), Huang et al. (2008), Cheon et al. (2012), Croop (2008), and Tomita (2009). “Communicate about education topics with classmates” was consistent with Cheon et al. (2012) and Motiwalla (2007); “set alert/alarm or calendar for due dates for classes” was consistent with Cheon et al. (2012); “read educational content for classes” was consistent with Cavus & Ibrahim (2009); “access educational podcasts or videos.” was consistent with Croop (2008); “communicate about educational topics and class with the teacher” was consistent with Motiwalla (2007) and Grinter, Palen, and Eldridge (2006); and “play an educational game (e.g. Words with Friends)” was consistent with Chen (2001).

Students use cell phones for several of purposes well beyond the scope of this survey. The result shows that most students in higher education use their mobile technologies for learning very often. However, this survey presented a unique window into students’ uses within a university level setting. These results and implications carry a significant value to educators, learners, and institutions. The way that students employ their cell phones to serve their academic needs is worth more in-depth investigation. As to addressing the first research question, this research unpacked several points that are worth attention in research. It is, however, the goal of this research is to focus on

notifications via cell phones. Therefore, the most relevant item that we will direct attention to in question one is item 3. The following section continues to discuss notifications by addressing question two and comparing the results to the first question.

5.4.2 Research Question Two

The second research question for the current study asks, “How are college students currently using desktop computer for learning?” The survey included 13 items that were tailored to correspond to this question. Participants were asked to respond to these items on a scale from always to never. Overall, college students uses of desktop computers for academic learning averaged $M=3.39$. The data reveals striking implications for the application of desktop units use in university level and in learning in general. More importantly, when cross examining the data of this question with the data of the first question it was found that uses of mobile device are different from desktop uses. Furthermore, it was discovered that students favor mobile units to accomplish tasks more than desktops. This section discusses the most relevant items in the survey. Items are presented as they were in chapter four. Arguments and implications are discussed for every item.

The first item, “check class website for syllabus and due dates,” came in first rank with an average of $M=4.22$. This indicates that participants of this study equally prefer using desktop computers and cell phones for browsing class websites. Although the two means are distinct, where Q1 is $M=3.78$ and Q2 is $M=4.22$, students maintain that their dominant use of desktops and cell phone is the same in learning. The contribution of this finding reveal that although cell phones are not the go-to device to check a class website,

it is becoming a strong contender against desktops for performing this task. The second item, “read educational content for classes,” scored an average of $M=4.11$. Students continue to use their desktops to read materials relevant to their classes. This piece of information is important to educators and institutions to invest more and have class materials accessible in a digital format. When comparing the mean of the same item under Q1 ($M=3.30$) to the one under Q2 ($M=4.11$) it was uncovered that students prefer desktops over cell phones to perform this task. We could only speculate why this difference occurred. It is perhaps that the formats of class materials do not support mobile access.

“Use learning manage system (e.g., Blackboard, Moodle)” scored an average of $M=4.00$. Students have expressed that learning manage systems are better viewed on desktops. This data supports their expressed preference. “Communicate about education topics with classmates” came in fourth rank with an average of $M=3.83$. Although the mean slightly dropped compared to the mean of the first three items, students maintain strong preference to using desktops to communicate with classmates. By examining this piece of data to the same item in Q1 ($M= 3.57$)—ranked second among uses—it was immediately noticed that mobile device use in communication is favored. The open-ended data show that students expressed that cell phones helped them better engage and collaborate with classmates. The peer collaboration and sense of cooperation in learning is better supported by cell phones. “Communicate about educational topics and class with the teacher” came in fifth rank with an average of $M=3.78$. It is interesting to notice that students in this study ranked their use of desktop with their peers and their teachers 4th and 5th respectively, while for the same uses with mobile devices they ranked their

communication with their peers 2nd and their teachers 10th. This could be interpreted that teacher prefer a desktop medium (emails) over cell phones. Moreover, privacy concern issues related to cell phone numbers could be a factor here. As this research discovered, students in this study preferred not sharing their cell phone numbers others.

Item 8 in Q2, “receive class notifications,” when compared to the same item from Q1, speaks directly to the main objective of the study which is measuring the effectiveness of notifications in mobile technology. This comparison between the use of mobile devices and desktops give a clear idea of which medium students’ uses to receive notifications. Item 8 in Q2 scored a mean of $M=3.30$, while under the use of mobile devices in Q1 it scored $M=3.52$. The fact that the mean of item 8 in Q1 is more than the mean in same item in Q2 means that students’ receive notifications by using mobile devices more than desktops because of the mobility feature that makes cell phone notifications available anywhere and anytime. This particular use ranked ninth in desktop use, while in using cell phones it ranked third. One of the features that cell phones continue to upgrade is an audio and visual feature. The sounds and blinking lights that attract users to check their phone as soon as they go off are irresistible. Notifications are no different. Notifications go hand in hand with the innovation of cell phones. Also the mobility of cell phones gave a significant advantage over desktops with this item. These two feature that mobile device offer to students could be the two main driving factors that led participants in this study to rank receiving notifications in Q1 third while leaving this use at the ninth under Q2.

5.4.3 Research Question Three

So far we've seen evidence that in general students consider receiving class notifications on mobile device as valuable. This question investigates in-depth how students value notifications. This section addresses the question, "Do students value class notifications?" Six survey items were designed to garner information from students on different facets of the research question. The high average that the data reveals is a strong indication of how students value notifications.

The overall of student value of class notifications is positive (M=3.90). These results of strong agreement show that students value all six items. More specifically, they strongly value items 1 and 2. Students responses to item 1, "help me complete assignments by the due date" scored first with an average of (M=4.33). The implications to this item are serious. Students indicate that receiving a notification keeps them from falling behind on due dates. As most classes revolve around assignments scattered over the semester, student find this feature to be very beneficial. Submitting assignments on time may be one of the important elements that support learning and improvement. This punctuality provide a systematic way of keeping progress moving forward and ensuring that students are moving at the planned pace. Incorporating notifications in a class may very well be the most practical and stress free method to keeping students on track and maintaining their ability to respect assignment due dates.

Moreover, students responses to item 2, "help me remember class activities" scored positively high with an average of M=4.26. Students inherently strive to perform at their best in classes. Notifications reminding students of class activities assist them in maintaining their goal of learning. This is manifest in their ranking of item 2. This item

mainly targets expectations of what students need to prepare for coming to classes and students value this item very much. Between items 1 and 2 students realize that meeting assignment deadlines is important to preparing for future class activities. Notifications have advanced to keeping students engaged before and after classes.

Item 3, “help me interact with others about class activities,” scored $M=3.87$. This result is consistent with an earlier study by Kim et al. (2014). Notifications made it possible for students to utilize a platform for interaction. Students highly value peer interaction and realize its importance in learning. This value is realized in interactions among group applications such as Facebook and Group Me where a question or a comment is shared among students where more than a single response occurs.

Item 4, “improve my learning,” averaged $M=3.72$. The finding in this item is consistent with earlier studies such as Thornton and Houser (2005), Horstmanshof (2004), Peters (2007), Rau et al. (2008), Cavus and Ibrahim (2009), and Gasaymeh and Qablan (2013). Higher scores occurred for the group that received text messages than the one that did not receive text messages. This data supports that the hypothesis that notifications facilitated learning. Notifications synthesized important information that students need during a class. This information includes due dates, important aspects of classes and future activities. This facilitation gave students the ability to stay on track and achieve class goals.

Moreover, the survey raised item 5, “are private communications for students & teacher,” which scored a high average of $M=3.67$. This finding is consistent with an earlier study by Mellow (2005). The privacy issue is paramount to the success of any application. As long as privacy is maintained, students are encouraged to use

applications. Thus, the researcher made efforts to suggest creating a private group on Facebook and Group Me. This means that sharing information between students was extremely restricted to user names. The implication of this item's data resides in the nature of applications used by students. Users prefer programs that guarantee their privacy. Educational institutions must take this issue into consideration to ensure a safe and comfortable environment for learning.

Finally, item 6, "give me a greater sense of belonging to class," comes last with an average of $M=3.54$. Students also expressed this point in the open-ended questions. Class notifications managed to boost students' morale and go beyond being a tool to remind students of academic requirement. This data shows that students felt that notifications help them to develop a sense of comradery. This shows that they felt they belong to a specific group that is concerned with the class. Achieving such feeling will no doubt create an appetite to learn and engage in the class.

The strong positive overall ($M=3.90$) indicate that student value notifications. All 6 items shows that students liked notifications as they felt notifications assist their academic learning and improve their sense of engagement in classes.

5.4.4 Research Question Four

Research question four asks "where do college students read course notifications?" The question is designed to investigate the ability of higher education students to control notifications. Evidence has shown that notifications can be considered a source of distraction. This inquiry unpacks students' ability to overcome that negative effect of notifications. Students showed great ability to control notifications access to outside the

classroom or during break time ($M = 3.71$, $SD = .75$) was significantly greater than the mean concern for during lecture time in the classroom ($M = 2.83$, $SD = 1.27$), $t = 6.21$, $p < .001$ (see Table 12). Finally, students showed great control over course notifications. That can be supported with the mean average of $M=4.73$ recorded skills in using class notifications (see Table 15).

The second piece of information that provides evidence to respond to question four comes from (Table 13). Here participants are asked to respond to reading personal notifications outside the classroom, during break time or during class time. Students' responses were very similar to the responses to the previous question except in the last item. Students checked their personal notifications outside the classroom or break time ($M = 4.23$, $SD = .73$) was significantly greater than the mean concern for during lecture time in the classroom ($M = 3.33$, $SD = 1.16$), $t = 6.27$, $p < .001$. Finally, students showed great control over personal notifications. However, students showed some discrepancy in their average to viewing personal notifications during class time. They averaged $M=3.33$, which is considered different than their response to course notifications. Here we should elaborate to why students viewed personal notifications in class higher than course notifications. One way to make sense of these differences in averages is by looking at the actual instances of texts notifications that students received during the course. As explained earlier, students received 1-2 notifications a week. Furthermore, they already know what time and day of the week they should expect these notifications (mostly Thursday at 10 AM). Therefore, there might be no interest for students to check their device during class to examine course notifications. These course notifications did not become a distraction for them. On the other hand, students may receive large numbers of

personal notifications daily. These large numbers require students to observe them outside, during break time and during class time. What is also interesting here is that students were able to distinguish between course notifications and personal ones. They viewed notifications in general as a distraction while at the same time they did not look at course notifications as a source of inconvenience. Evidence supporting this statement comes also from students' statements to the open-ended questions. While they stated that notifications in general are a distraction, class notifications were not. Here we should highlight that planning and talking with students openly over sending notification is critical to influencing their perception. For this study, class notifications were designed very meticulously to serve specific purposes of reminding and encouraging students to be aware of class activities and due dates. These class notifications were not randomly sent, they were built around the syllabus.

5.4.5 Research Question Five

This question attempts to understand how students incorporate mobile skills to get benefits of using notifications. More precisely, it asks, "What skills do students have in using class notifications?" The overall mean of students' responses scored positively high with a mean of $M= 4.73$ (see Table 15). Students show a great ability to skills in using class notifications. Students showed that knowing the basic function of turning notifications ON & OFF is mastered ($M=4.89$). This means that students can adjust notifications activities to fit their needs. Moreover, they showed that their ability to download or delete applications is as competent. The mean average scored $M= 4.89$ with S.D. of 0.43. In addition, reading class notification was determined by this study to be

easy on cell phones. That is represented by students high mean in skills in using notifications feature on cell phones $M= 4.61$. The open-ended questions supported this item as students highlighted that reading notification is easy and requires a “couple of seconds.” Finally, participants showed that typing message on the phone is easy. Responses scored an average of $M=4.54$. This is an indication that students feel comfortable with class notifications to the extent that reading and responding to notifications does not amount to being a challenge. As a result, students are more relaxed and willing to engage in discussions and class activities due to the ease of using notifications.

Table 15 in chapter four provides a list of the skills in using class notifications ordered from highest to lowest mean score. The results showed the skills of using features of mobile devices with mean of 4.73 and standard deviation of 0.63. That means that most students have a high skills of using mobiles such as knowing turn on and off the notifications, knowing download and delete applications, easy to read class notifications, and easy to type messages by using phones.

5.4.6 *Research Question Six*

So far evidence has shown that mobile devices have the potential to compete with desktops in receiving notifications. Other features of mobile devices empower users to using cell phones as a primary tool in learning. The research question addresses whether students who use mobile devices receive greater benefits from class notifications than those who do not use mobile devices. It states, “Is proficiency in using mobile devices associated with perceived value of class notifications?” To respond to this question, a

Pearson Correlation was calculated to look the relationship between the value of class notifications and the usage mobile devices is used. The relation between class notifications and usage of cellphone or other mobile device in learning is significant at the 0.05 level ($p=0.016$, $r=0.355$). This means that the relationship between use of devices and benefits of class notification is positive. In other words, students who get benefits from using their mobile devices in learning are more likely to value course notifications. This mean that experienced students who use their phones very often in learning are more likely to get benefits from class notifications because they are already experts on using the features of their phone. This result shows that savvy users of mobile devices have a better chance to benefit from a class notifications system and as a result may increase their chances to learn better than their peers. Educators attempting to adopt notifications for their classes should take this result into consideration. This may factor into students' performance in their class. It is, however, not concluded how this would factor in the actual learning, therefore this is an area that demands attention from researchers in m-learning.

In addition, the relationship between value class notifications (Table 11) and the skills in using class notifications (Table 15) was analyzed. It is clear through the results that there is a significant relationship between the value students place on class notifications and the skills in using class notifications ($P=0.017$ and $r=0.351$). That means that students who know a lot of skills and practices in using mobile technologies and notifications features are more likely to value course notifications.

However, table 16 shows that there is no significant relationship between values class notifications and using communications tools nor using stationary computer for class activities at level 0.05.

5.4.7 Research Question Seven and Eight

The goal of this section is to address research question seven and eight (What are the advantages of using class notifications?; What are the disadvantages of using class notifications?). Information presented in Table 17 is analyzed as well as data from the two open-ended questions. The open-ended questions posed a challenge to account for students responses. However, this challenge is alleviated due to the introduction of the procedure of creating groups and subcategories. The idea behind the researcher treatment of the open-ended questions is not just a scheme to make sense of students' responses but to carefully add an in-depth understanding to various opinions about notifications. The detailed treatment of procedures was introduced earlier in the previous chapter. The approach that was followed proved to be highly valued as will be shown in this section.

The survey included two open ended questions (Q1:What advantages and/ or disadvantages do you see in using class notifications?; Q2: What advantages and/ or disadvantages do you see in using your CELL PHONE or other mobile devices for learning?). These questions generated a wide array of responses that were captured by creating multiple groups for the first question (expectations, punctuality, convenience, communication, reduce mental load, engagement, and general). Multiple groups were also created to capture responses for the second question (accessibility, time saver and fast, mobile features, general, distraction, prevent social interaction, lack of resources,

and other). The criteria for creating all groups for the two questions were presented in chapter four.

There was a high amount of survey participation among students (82.6%). This rate is a strong indication that participants seriously engaged in the study throughout the semester the study ran. It is also a positive indication of student' willingness to provide feedback. Table17 provide all relevant information from the two open-ended questions.

It is true that students found that receiving class notifications could interfere with their learning. However, this interference is extremely limited and it is wide ranged to an extent it could only be captured by a general group. Out of the 82.6 % of students' participation in the open-ended questions only 5 (9%) responses were recorded as interference. On the other hand, the majority of responses (91%) believed that receiving class notifications are beneficial. Responses could in fact be grouped to better understand how these benefits were realized. 33% of responses considered receiving notifications helped in setting their expectations of what is required of them for following class expectations and assignments and other aspects of the course they needed to meet. Moreover, 25% of responses supported the belief that notification was a positive factor in their punctuality. They perceived receiving class notifications as a beneficial to learning. Assertions that literally highlighted that fact that class notifications about due dates helped them turn in assignments on time are clear indication of the level of impact that notifications have on learning. Other responses of the importance of notifications in learning are captured under other categories such as: convenience and comfort, communication, reduce mental load and engagement. Students' responses are testimonies of how participants in the study viewed the benefits of notifications in their learning.

They were explicit in stating that they felt better communication was achieved. Moreover, they believed that it help them engage more in the course. Also, 4% of responses have indicated that the mental load had been lessened due to incorporating notifications in this experiment.

The survey also included another open-ended question that will help in addressing research question seven from a different prospective. Although this question aimed at looking at the advantages and disadvantages of using cell phone for learning, it provided insights on the main interest of this study. Despite the fact that 22% of participants claimed that cell phones as units are a source of distraction (see Table 18) which is consistent with other studies—Gilmore (2012), Przybylski and Weinstein (2013), Harrison, Bealing, and Salley (2015), Angestermichel and Lester (2010), Shudong & Higgins (2005)—they were able to discern that notification is a valuable beneficial tool that helps in learning. This distraction is not identified by class notifications as a tool but the whole existence of a cell phone in general is a distraction. This realization was reached from examining student responses to the open-ended questions. When asked, students were able to distinguish the disadvantages of cell phone while praising the benefits of notifications. Participants cited the advantages of accessibility and mobile features that enable them to interact as they receive notifications and access information easily.

Participants in this study demonstrated that receiving class notifications benefits learning in various ways. Most notably, class notifications enable learners to meet class expectations. It also supports learners to perform tasks in a timely fashion in accordance with class due dates. Addressing this question shows that class notifications benefits go

beyond learning and academic assistance. This study shows that a class notifications system has the potential to reduce social retreatment by encouraging engagement with teachers as well as peers. There is also evidence that incorporating class notifications can reduce mental load as a few of the participants expressed.

The study also shed light on other areas of interference. The reason behind these student perceptions of interference as explained before is the various nature of responses, scarcity, and wide range of interest. For example, one response stated that the means of the notifications (in this instance Facebook) is better for personal use, not school. Though this may be true in this participant's instance, the benefit of class notifications itself was not contested. This means that this particular student felt that notifications are beneficial but was not keen in using Facebook for notification. Another felt that notifications were beneficial in reminding him/her of due dates but added it might be redundant due to the information availability in the syllabus.

5.5 Implications

The implications of this study have a wide scope due to the nature of cell phone uses. Mobile devices and notifications have become an essential part of student's social lives. This study found that proficiency in using mobile devices is associated with how students value class notifications. They provide higher education institutions with a new channel to extend assist students. Adopting notifications as a tool to help students perform is an effective way to facilitate the academic sources of higher education students. Introducing class notifications into learning may help students feel positive about their learning experiences. This study demonstrated that students felt positively

about themselves and more importantly felt that they were punctual, met their expectations and reduced mental load. This includes submitting assignments on time and preparing for class activities. It also helps students to engage more and provides a sense of inclusion that urges students to participate and attend classes effectively. This study showed that a class notifications system has the potential of reducing brain overload and social seclusion. These two psychological and social aspects are supported by students' attitudes to receiving class notifications.

Another implication of the current research is that careful planning of class notifications to target certain aspects of the course is paramount to its success. The researcher strove to prepare clear content and consistent timing for every notification. This preparation bears the fruit of the success of this study. Too many notifications would have been considered as a distraction and too little would have been overlooked. Students have expressed concerns over privacy issues. They are very protective of their personal information and thus privacy should be a main concern when attempting the adoption of this tool.

5.6 Recommendations

The investigation of notifications has shed light on various issues in relation to the study itself as well as some outside its scope. Notifications have been regarded as a tool to support students. . The adaptation of notifications may prove beneficial to students. Facilitators and teachers should be introduced to effects of notification on their classes. Also on one hand, students should obtain certain basic skills of dealing with their mobile devices, and on the other, education institutions should encourage an approach that show

how notification may increase students perception to class activities. This could be attained by providing workshops or targeted training to guarantee a positive outcome of student use of notifications. Furthermore, institutions have to satisfy student concerns over privacy issues. Study participants raised concerns over using their personal number during the experiment. Therefore, institutions must create innovative tools, applications, and programs to protect student personal information. Companies and developers should address mobile applications that protect student and teacher privacy to avoid social applications such as Facebook.

Also, education platforms such as Blackboard must take into consideration that students are heading toward using their cell phones for more computer based tasks. As a result these platforms must keep up to students need to ensure an easy accessible source for courses and relevant materials. More attention should be directed to programs that help creating syllabus and include digital features to sending notifications.

5.7 Suggestions for Future Research

Based on the results of this study and the literature review, the following suggestions should be considered for future research:

1. Replicate the experiment study on a larger number of participants and in other institutions in higher education to get general idea about students' perceptions toward digital class notifications.
2. This study has not measured students' performance. Therefore research needed to address influence of class notification on achievement.
3. Conduct a comparison experimental study between students who applied notifications courses and those who take traditional courses to ensure quality of learning notifications
4. Developers should create applications specialized for auto notifications related to the syllabus.
5. A qualitative study on class notifications for faculty members and designers should be conducted to find a good model of mobile application with more concern for notifications.
6. Future studies must look at the best strategies for effectively applying mobile class notifications into higher education.
7. The psychological and social impact of notifications is also an interesting and innovative field of research that may be investigated.

5.8 Limitations

5.8.1 Internal Validity:

The study focused only on how the conducted experiment related to the benefits, barriers, and student perspectives toward course notifications and m-learning in a selected sample of students in the University of Kansas from many possible influential variables. The study relied on self-evaluations; therefore, the participants may have a different measurement of themselves and they may not have responded honestly to the survey questions.

5.8.2 External Validity:

It would not be generalized because of many things:

1. Participants were not randomly assigned to groups.
2. This study applied within only The University of Kansas and would not generalize to all universities and institutions.

The study was conducted in the Spring 2016. The limitation of time may not be appropriate for students and does not represent all future time.

5.9 Conclusion

To sum up, an overwhelming number of responses poured into this study from participants in favor of effectiveness of class notifications. The study identified several positive academic and social aspects to using class notifications in learning. This investigation into notifications effectiveness via mobile device indicates that the correct use of learning tools may increase the productivity and learnability of students. In this

study students expressed their positive opinions regarding class notifications with a mean of 3.90 and standard deviations 0.90 (Table 11). This could be seen in their belief that notifications effectively helped them meet expectations and be punctual. It also shows that other social aspects of students in a learning environment may be improved when class notifications are used accurately. This study showed that students felt notifications increased their confidence and engagement in learning. On the other hand, there are few interferences that were recorded such as distracting; however, these interferences related to technology in general not specific to the interest of this investigation of class notifications. This study found that most of students could handle interferences by displaying the skills needed for using technology and control it with mean 4.73 and standard deviation of 0.626 (see Table 15).

In conclusion, the results of this study provide valuable insights into participants' views toward class notifications, benefits of class notifications, experiences in applying class notifications, barriers that interfere with gaining benefit from class notifications, and the factors that help in effectiveness of class notifications. This study is designed to address the effectiveness of notifications via mobile device in learning. The focus of this inquiry included several aspects that play a role in using a notification system in a university classroom. This research attempted to shed light on relevant features that may contribute to the effectiveness of using notifications in learning. The findings of this study contribute directly to learning in general. This study found out that class notifications are an important tool for supporting learning. It is demonstrated over the course of this paper that notifications made substantial impact on students. Students' perception over receiving class notifications went beyond education and learning. The findings showed

that notifications help students state of mind and potentially reduce overload. No doubt that extensive research is needed to fully understand that kind of effect of learning notifications on students; nevertheless the evidence that is brought up by this research cannot be overlooked. Another unique contribution is highlighted by the finding that skilled cell phone users are better equipped to effectively integrate class notifications into their learning process. Cell phones are here to stay and continuously evolving. Having a good grasp of the feature on a cell phone may shape students in the future. An important, unanticipated finding is the benefit of careful and meticulous planning on using notifications for classes. The researcher believes that this planning is the sole reason that helped students view class notifications positively and not consider them a distraction.

The researcher believes this study is a step in offering a new way of supporting learning for students in higher education based on digital class notifications via mobile device. A mobile phone allows the sending and receiving of emails. However, emails are often full of important and non-important messages. The class notifications messages used especially with the inclusion of mobile for pictures provides a highly efficient manner in which to support learning.

BIBLIOGRAPHY

- Adrich, Clark. (2004). *Simulations and the Future of Learning*. San Fransisco: Pfeiffer, p.240.
- Ally, M. (2005). Using learning theories to design instruction for mobile learning devices. *Mobile learning anytime everywhere*, 5-8.
- Alsaadat (2010) The Importance of M Learning In The Educational Arena, *Edulearn10 Proceedings*, pp. 6021-6026.
- Angstermichael, A., & Lester, F. (2010). An exploratory study of students' use of cell phones, texting, and social networking sites. *Psychological Reports*, 107, 402-404.
- Armatas, C., Holt, D., & Rice, M. (2005). Balance the possibilities for mobile Technologies in higher education. *In Proceedings of the 2005 ascilite conference*. Brisbane, Australia. Retrieved from http://www.ascilite.org.au/conferences/brisbane05/blogs/proceedings/04_Armatas.pdf
- Atchley, W., Wingenbach, G., & ANers, C. (2013). Comparison of Course Completion and Student Performance through Online and Traditional Courses. *International Review of Research in Open & Distance Learning*, 14(4), 104-116. Retrieved from <http://www.irrodl.org/index.php/irrodl>
- Atkinson, R. C., & Shiffrin, R. M. (1968). Human memory: A proposed system and its control processes. In K. W. Spence and J. T. Spence (Eds.), *The psychology of learning and motivation: Advances in research and theory* (Vol. 2, pp. 89-195). NY: Academic Press.

- Basics - MOBILE Learning Handbook. (n.d.). Retrieved March 1, 2014, from
<https://sites.google.com/a/adlnet.gov/mobile-learning-guide/basics>
- Beck, Robert H. (2009). *The Three R's Plus: What Today's Schools are Trying to Do and Why*. U of Minnesota Press. pp. 3–6. ISBN 978-0-8166-6017-9.
- Belair, M. (2012). The investigation of virtual school communications. *Techtrends: Linking Research & Practice to Improve Learning*, 56(4), 26-33.
doi:10.1007/s11528-012-0584-2111
- Block, R. A., Hancock, P. A., & Zakay, D. (2010). How cognitive load affects duration judgments: A meta-analytic review. *Acta psychologica*, 134(3), 330-343.
- Brett, P. (2011). Student experiences and engagement with SMS for learning in higher education. *Innovations in Education & Teaching International*, 48(2), 137-147.
doi:10.1080/14703297.2011.564008
- Buettner, R. (2016). Getting a Job via Career-oriented Social Networking Sites: The Weakness of Ties. 49th Annual Hawaii International Conference on System Sciences. Kauai, Hawaii: IEEE. doi:10.13140/RG.2.1.3249.2241.
- Bull, P. H., & McCormick, C. (2011). Mobile learning: enhancing a pre-algebra course at a community college with text messaging. *International Journal of Instructional Technology and Distance Learning*, 8(1), 25-35. Retrieved from
<http://itdl.org/index.htm>
- Caudill, J. (2007). The growth of m-learning and the growth of mobile computing: parallel developments. *International Review of Research in Open and Distance Learning*, 8 (2), 1-13.

- Cavus, N., & Ibrahim, D. (2009). m-Learning: An experiment in using SMS to support learning new English language words. *British Journal of Educational Technology*, 40(1), 78-91.
- Chen, N. S., & Hsieh, S. W. (2008). Effects of short-term memory and content representation type on mobile language learning.
- Chen, Y. J. (2001). Dimensions of transactional distance in World Wide Web learning environment: A factor analysis. *British Journal of Educational Technology*, 4(32), 459-470.
- Cheon, J., Lee, S., Crooks, S. M., & Song, J. (2012). An investigation of m-learning readiness in higher education based on the theory of planned behavior. *Computers & Education*, 59(3), 1054–1064. doi:10.1016/j.compedu.2012.04.015
- Cooper, D.R., & Schindler, P.S. (2011). *Business research methods* (7th ed.). Boston: Irwin/McGraw-Hill.
- Corbeil, J. R., & Valdes-Corbeil, M. E. (2007). Are you ready for mobile learning? *Educause Quarterly*, 30(2), 51-58.
- Crocker, L., & Algina, J. (1986). *Introduction to classical and modern test theory*. New York: Holt, Riehardt & Winston.
- Crompton, H. (2013). A historical overview of mobile learning: Toward learner-centered education. In Z. L. Berge & L. Y. Muilenburg (Eds.), *Handbook of m-learning* (pp. 3–14). Florence, KY: Routledge.
- Croop, F. J. (2008). Student perceptions related to mobile learning in higher education (Order No. 3341141). Available from ProQuest Dissertations & Theses Full Text.

- (304819097). Retrieved from
<http://search.proquest.com/docview/304819097?accountid=14556>
- Davis, D. R., & Abbitt, J. T. (2013). An investigation of the impact of an intervention to reduce academic procrastination using Short Message Service (SMS) technology. *Journal of Interactive Online Learning*, 12(3), 78-102. Retrieved from
<http://www.ncolr.org/>
- Donaldson, R. L. (2010). Student acceptance of mobile learning (Order No. 3483638). Available from ProQuest Dissertations & Theses Full Text. (902631958). Retrieved from <http://search.proquest.com/docview/902631958?accountid=14556>
- Dooly, M. (2008). Constructing knowledge together. *Telecollaborative Language Learning. A guidebook to moderating intercultural collaboration online*: 21-45.
- Duggan, M. & Rainie, L. (2012) Cell phone activities 2010. Pew Internet Research Center.
- E-learning. (n.d.). Retrieved April 5, 2016, from <http://www.bluepulsehub.com/wp-content/uploads/2015/03/Bluepulse-for-eLearning.pdf>
- Educational Theories. Educational Theories. (n.d.) Retrieved from
<http://crescentok.com/staff/jaskew/isr/education/theories.htm>.engagement. *Journal of College Student Development*, 50(6), 683-706. Retrieved from
<http://www.jcsdonline.org/home.html>
- Falloon, G. (2011). Making the connection: Moore's theory of transactional distance and its relevance to the use of a virtual classroom in postgraduate online teacher education, *Journal of Research on Technology in Education*, 43(3), 187-209. Retrieved from <http://www.iste.org/learn/publications/journals/jrte>

- Firestone, M. (n.d.) What Is Collaborative Learning? - Benefits, Theory & Definition
Retrieved from <http://education-portal.com/academy/lesson/what-is-collaborative-learning-benefits-theory-definition.html#lesson>
- Floyd, K. (2011) *Interpersonal Communication*. New York, NY: McGraw-Hill.
- Gall, M. D., Gall, J. P., & Borg, W. R. (2007). *Educational Research: An introduction* (8th ed.). Boston, MA: Allyn & Bacon.
- Gasaymeh, A. M., & Qablan, B. M. (2013). SMS as out-of-class, student-instructor interaction tool: A case study of Jordanian graduate students' perceptions and usage. *International Education Studies*, 6(8), 147-160.
- Geser, H. (2004). *Towards a sociological theory of the mobile phone*. Retrieved July 12, 2005, from http://socio.ch/mobile/t_geser1.pdf
- Griffen, E. (2007). *Communication, communication, communication: A first look at communication theory*. New York: McGraw-Hill Higher Education.
- Grinter, R. E., Palen, L., & Eldridge, M. (2006). Chatting with teenagers: Considering the place of chat technologies in teen life. *ACM Transactions on Computer-Human Interaction*, 13(4), 423-447. Retrieved from http://www.cs.colorado.edu/~rhan/CSCI_7143_Fall_2007/Papers/p423-grinter.pdf
- Gunawardena, C. N. & McIsaac, M. S. (2004). Distance education. In D. H. Jonassen (Ed.) *Handbook of research for educational communications and technology*, (2nd ed., pp. 355-396). Mahwah, NJ: Lawrence Erlbaum Associates.

- Gupta, B., & Koo, Y. (2010). Applications of mobile Learning in Higher Education: An Empirical Study. *International Journal of Information and Communication Technology Education*, 6(3), 75+.
- Hackemer, K., & Peterson, D. (2005). Chapter 17: University of South Dakota Palm Initiative. In Kukulska-Hulme, A. and Traxler, J (eds.) *M-learning: A handbook for educators and trainers*, (pp. 157-163). New York, New York: Taylor and Francis, Inc.
- Harley, D., Winn, S., Pemberton, S., & Wilcox, P. (2007). Using texting to support students' transition to university. *Innovations in Education and Teaching International*, 44(3), 229–241. doi:10.1080/14703290701486506
- Harrison, M. A., & Gilmore, A. L. (2012). U txt when? College students' social contexts of text messaging. *The Social Science Journal*, 49(4), 513-518.
- Harrison, M. A., Bealing, C. E., & Salley, J. M. (2015). 2 TXT or not 2 TXT: College students' reports of when text messaging is social breach. *The Social Science Journal*, doi: 10.1016/j.soscij.2015.02.005
- Hart, C. (2012). Factors associated with student persistence in an online program of study: A review of the literature. *Journal of Interactive Online Learning*, 11(1), 19-42. Retrieved from <http://www.ncolr.org/>
- Hawkins, A., & Barbour, M. K. (2010). U.S. virtual school trial period and course completion policy study. *American Journal of Distance Education*, 24(1), 5-20. doi:10.1080/08923640903529295
- Hebert, C. (2016). *Examining text messaging frequency, interpersonal communication skills, and relational satisfaction among college-age students: A correlational*

- study* (Order No. 10109616). Available from ProQuest Dissertations & Theses Global. (1796065985). Retrieved from <https://search-proquest.com/www2.lib.ku.edu/docview/1796065985?accountid=14556>
- Hoppe, H. U., Joiner, R., Milrad, M., & Sharples, M. (2003). Guest editorial: Wireless and mobile technologies in education. *Journal of Computer Assisted Learning*, 19, 255-259. Retrieved from <http://www3.interscience.wiley.com.ezproxy.lib.usf.edu/cgi-bin/fulltext/118838472/PDFTART>
- Horstmanshof, L. (2004). Using SMS as a way of providing connection and community for first year students. In R. Atkinson (Ed.), *Beyond the comfort zone: Proceedings of the 21st ASCILITE conference*, 423-427. Perth, Australia. ASCILITE.
- How Many Are There. (2012). How many mobile phone users in the world. Retrieved on April 21, 2016 from <http://www.howmanyarethere.org/how-many-mobile-phoneusers-in-the-world/>.http://www.cs.colorado.edu/~rhan/CSCI_7143_Fall_2007/Papers/p423-grinter.pdf
- Huang, Y.-M., Kuo, Y.-H., Lin, Y.-T., & Cheng, S.-C. (2008). Toward interactive mobile synchronous learning environment with context-awareness service. *Computers & Education*, 51(3), 1205–1226.
- Ison, A., Hayes, A., Robinson, S., & Jamieson, J. (2004). TxtMe: Supporting disengaged youth using mobile technologies. Retrieved from

- http://pre2005.flexiblelearning.net.au/projects/media/txt_me_recommendations.pdf
f. Journal, doi: 10.1016/j.soscij.2015.02.005
- Kalinic, Z., Arsovski, S., Stefanovic, M., Arsovski, Z., & Rankovic, V. (2011). The development of a mobile learning application as support for a blended eLearning environment. *Technics Technologies Education Management*, 6(4), 1345-1355. Retrieved from <http://www.ttem.ba/index.html>
- Kavanaugh, A., Carroll, J. M., Rosson, M. B., Zin, T. T., & Reese, D. D. (2005), Community Networks: Where offline communities meet online. *Journal of Computer-Mediated Communication*, 10: 00. doi: 10.1111/j.1083-6101.2005.tb00266.x
- Keegan, D. (2005, October). The incorporation of mobile learning into mainstream education and training. Paper presented at the 4th World Conference on m-Learning (m-Learn 2005), Cape Town, South Africa. Retrieved from <http://www.mlearn.org.za/CD/papers/keegan1.pdf>
- Kim, H., Lee, M., & Kim, M. (2014). Effects of mobile instant messaging on collaborative learning processes and outcomes: The case of South Korea. *Journal of Educational Technology & Society*, 17(2), 31-42. Retrieved from www.ifets.info
- Kim, S. H., Mims, C., & Holmes, K. P. (2006). An introduction to current trends and benefits of mobile wireless technology use in higher education. *AACE Journal*, 14(1), 77-100. Retrieved from <http://clifmims.com/site/documents/MOBILEWireless-HigherEd.pdf>

- Kovalik, C. L., & Hosler, K. A. (2010). Text messaging and the community of inquiry in online courses. *MERLOT Journal of Online Learning and Teaching*, 6(2), 380-387. Retrieved from <http://jolt.merlot.org/>
- Kuh, G. (2009). What student affairs professionals need to know about student engagement. *Journal of College Student Development*, 50(6), 683-706. Retrieved from <http://www.jcsdonline.org/home.html>
- Kukulska-Hulme, A. (2005). Introduction. In Kukulska-Hulme, A. and Traxler, J (eds.) *Mobile Learning: A handbook for educators and trainers*, (pp. 1-6). New York, New York: Taylor and Francis, Inc.
- Lamble, D., Kauranen, T., Laakso, M., & Summala, H. (1999). Cognitive load and detection thresholds in car following situations: safety implications for using mobile (cellular) telephones while driving. *Accident Analysis & Prevention*, 31(6), 617-623.
- Learning theory (education) n.d. In Wikipedia. Retrieved February 4, 2013, from [http://en.wikipedia.org/wiki/Learning_theory_\(education\)#Transformative_learning_theory](http://en.wikipedia.org/wiki/Learning_theory_(education)#Transformative_learning_theory)
- Lee, S., Srinivasan, S., Trail, T., Lewis, D., & Lopez, S. (2011). Examining the relationship among student perception of support, course satisfaction, and learning outcomes in online learning. *Internet and Higher Education*, 14(3), 158-163. Retrieved from <http://www.journals.elsevier.com/the-internet-and-higher-education/>

- Lim, T., Fadzil M., & Mansor N. (2011). Mobile learning via SMS at Open University Malaysia: Equitable, effective, and sustainable. *International Review of Research in Open and Distance Learning*, 12(2), 122-137. Retrieved from www.irrodl.org
- Ling, R., & Helmersen, P. (2000, June). "It must be necessary, it has to cover a need": *The adoption of mobile telephony among pre-adolescents and adolescents*. Paper presented at the Social Consequences of Mobile Telephony, Oslo, Norway.
- Livingstone, D. W. (1999). Exploring the icebergs of adult learning: Findings of the first canadian survey of informal learning practices. *Canadian Journal for the Study of Adult Education*. 13(2), 49-72. Retrieved from <http://hdl.handle.net.ezproxy.lib.usf.edu/1807/2724>
- Luo, S. (2014). Research Report: Effects of texting on satisfaction in romantic relationships: The role of attachment. *Computers in Human Behavior*, 33, 145-152. doi: 10.1016/j.chb.2014.01.014
- Manceron, V. (1997). Get connected! *The French Journal of Communication*, 5(2), 229-241.
- Martinez-Maldonado, R., Clayphan, A., Yacef, K., & Kay, J. (2015). MTFeedback: providing notifications to enhance teacher awareness of small group work in the classroom. *Learning Technologies, IEEE Transactions on*, 8(2), 187-200.
- McGinn, M. C. (2014). Predicting Factors for Use of Texting and Driving Applications and the Effect on Changing Behaviors (Doctoral dissertation, SOUTHERN ILLINOIS UNIVERSITY AT EDWARDSVILLE).
- Means, B. (2010). *Evaluation of evidence-based practices in online learning: Meta-analysis and review of online learning studies*. Washington, DC: *United States*

- Department of Education, Center for Technology in Learning. Retrieved*
<http://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf>
- Mellow, P. (2005). The media generation: Maximise learning by getting mobile. In Proceedings of Ascilite 2005: Balance, Fidelity, Mobility: Maintaining the momentum? Retrieved from:
http://www.ascilite.org.au/conferences/brisbane05/blogs/proceedings/53_Mellow.Pdf
- Mentor, D. J. (2011). Exploring social connectedness via mobile phone texting . Retrieved from <http://search.proquest.com/docview/902954602?accountid=14556>
- Merriam-Webster (n.d.), merriam-webster.com, Timeline: Merriam-Webster Milestones, retrieved Apr 16, 2017
- Meyer, K. A. (2002). Quality in distance education: Focus on on-line learning. (ASHEERIC Higher Education Report: Vol. 29, No. 4. San Francisco: Jossey-Bass. Retrieved from
http://media.wiley.com/product_data/excerpt/96/07879634/0787963496.pdf
- Miller GA (1956). The magical number seven, plus or minus two: some limits on our capacity for processing information. *Psychological Review*, 63, 81–97
- Mitroff, S., googleplus, & bio, S. full. (2014, May 28). GroupMe makes group chatting fun with GIFs, emoji, and memes. Retrieved February 1, 2017, from
<https://www.cnet.com/products/groupme-android/review/>
- Moore, J., Dickson-Deane, C., & Gaylen, K. (2011). e-Learning, online learning, and distance learning environments: Are they the same? *Internet & Higher Education* 14(2), 129-135.

- Moore, M. G. (1993). Theory of transactional distance. In D. Keegan (Ed.), *Theoretical principles of distance education* (pp. 22-38). New York: Routledge.
- Motiwalla, L. F. (2007). MOBILE learning: A framework and evaluation. *Computers & Education*, 49(3), 581–596.
- Mueller, D.J. (1986). *Measuring social attitudes: A handbook for researchers and practitioners*. New York: Teachers College Press.
- Naismith, L., Lonsdale, P., Vavoula, G., & Sharples, M. (2004). *Literature review in mobile technologies and Learning*, NESTA Futurelab Series. New York: Holt, Riehardt & Winston.
- Netsafe. (2005, January). *The text generation: Mobile phones and New Zealand youth: A report of result from the internet Safety Group's survey of teenage mobile phone use*. Netsafe.
- Novak JD, Gowin DB and Johanse GT (1983). The use of concept mapping and knowledge Vee mapping with junior high school science students. *Science Education*, 67, 625–645.
- O'Reilly, S. (2004). Can e-learning deliver on expectations in the 'Knowledge' Age?, online courses. *MERLOT Journal of Online Learning and Teaching*, 6(2), 380-387. Retrieved from <http://jolt.merlot.org/>
- Owston, R., York, D., & Murtha, S. (2013). Student perceptions and achievement in a university blended learning strategic initiative. *The Internet and Higher Education*. doi:10.1016/j.iheduc.2012.12.003
- Peters, K. (2007). m-Learning: positioning education for mobile, connected future. *International Review of Research in Open and Distance Learning*, 8(2), 1-17.

- Retrieved from <http://search.ebscohost.com.gatekeeper.lindenwood.edu/login.aspx?direct=true&db=eric&AN=EJ800956&site=ehost>
- Pettigrew, J. (2009). Text messaging and connectedness within close interpersonal relationships. *Marriage and Family Review* 45(6-8). 697-716.
- Pollara, P. (2011). Mobile learning in Higher Education: A glimpse and a comparison of student and faculty readiness, attitudes and perceptions (Doctoral dissertation, Duquesne).
- Rau, P. L. P., Goa, Q., & Wu, L. M. (2008). Using mobile communication technology in high school education: Motivation, pressure, and learning performance. *Computers & Education*, 50(1), 1-22. doi: 10.1016/j.compedu.2006.03.008
- Redfern, J., Santo, K., Coorey, G., Thakkar, J., Hackett, M., Thiagalingam, A., & Chow, C. K. (2016). Factors Influencing Engagement, Perceived Usefulness and Behavioral Mechanisms Associated with a Text Message Support Program. *PloS one*, 11(10), e0163929.
- Richey, R.C. (2008). Reflections on the 2008 AECT Definitions of the Field. *TechTrends*. 52(1) 24-25
- Roblyer, M. D., McDaniel, M., Webb, M., Herman, J., & Witty, J. V. (2010). Findings on Facebook in higher education: A comparison of college faculty and student uses and perceptions of social networking sites. *The Internet and higher education*, 13(3), 134-140.
- Rosenberg, M. (2001). e-Learning: Strategies for Delivering Knowledge in the Digital Age. New York: McGraw-Hill, p28.

- Rubin, B. (2013). University business models and online practices: A third way. *Online Journal of Distance Learning Administration*, 15(1), 1-17. Retrieved from <http://www.westga.edu/~distance/ojdla/>
- Saylor, Michael (2012). *The Mobile Wave: How Mobile Intelligence Will Change Everything*. Perseus Books
- Sharples, M., Taylor, J., & Vavoula, G. (2007). A theory of learning for the mobile age (pp. 87-99). In R. Andrews & C. Haythornthwaite (Ed.), *The SAGE Handbook of Elearning Research*. London, UK: Sage Publications
- Shaw, J., & Chen, J. (2012). Transactional distance and teaching presence in e-learning environments. *International Journal of Innovation and Learning*, 11(1), 44-59. Retrieved from <http://www.inderscience.com/jhome.php?jcode=ijil>
- Sherry, L. (1996). Issues in distance learning. *International Journal of Educational Telecommunications*, 1(4), 337-365.
- Shudong, W., & Higgins, M. (2005). Limitations of mobile phone learning. Paper presented at the 2005 IEEE International Workshop on Wireless and Mobile Technologies in Education.
- Slavin, R. (1992): Research on cooperative learning: consensus and controversy. In *Collaborative Learning: A Sourcebook for Higher Education*, Vol. II. (pp. 97-104). University Park: The National Center on Postsecondary Teaching, Learning, and Assessment (NCTLA).
- Smith, A. (2011). Americans and text messaging. Pew Internet & American Life Project: A Project of the Pew Research Center. Retrieved on June 20, 2012 from <http://pewinternet.org/Reports/2011/Cell-Phone-Texting-2011.aspx>.

- Smith, M. K. (1999, 2008). Informal learning. Retrieved May 10, 2009, from <http://www.infed.org/biblio/inf-lrn.htm>
- Sorensen, C. (2011). *Learning with mobile technologies: The use of out-of class short message system text messaging to support the classroom learning of high school algebra* (Order No. 3439543).
- Stojanovic, L. Staab, S., & Studer, R. (2001). E-learning based on the semantic web. Paper presented at WebNet2001-World Conference on the WWW and Internet, Orlando, FL, United States of America. Retrieved from <http://www.unikoblenz.de/~staab/Research/Publications/WebNet2001eLearningintheSemanticWeb.pdf>
- Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive science*, 12(2), 257-285.
- Terras, M. M., & Ramsay, J. (2012). The five central psychological challenges facing effective mobile learning. *British Journal of Educational Technology*, 43(5), 820–832.
- Thompson, L. (2012). Generation Lonely? 39% percent of Americans spend more time socializing online than face-to-face. Marketwire, Retrieved from <http://www.marketwire.com/press-release/generation-lonely-americans-spendmore->
- Thornton, P., & Houser, C. (2005). Using mobile phones in English education in Japan. *Journal of Computer-Assisted learning*, 21, 217-228.

- Ting, Y. (2013). Using mobile technologies to create interwoven learning interactions: An intuitive design and its evaluation. *Computers & Education*, 60(1), 1-13. doi:10.1016/j.compedu.2012.07.004
- Tomita, D. K. (2009). Text messaging and implications for its use in education. TCC 2009 Proceedings, 184-190.
- Trifonova, A., & Ronchetti M. (2003). Where is mobile learning going? Proceedings of the E-Learn 2003 Conference, Phoenix, Az., United States of America. Retrieved from http://74.125.155.132/scholar?q=cache:G0kep4N0LSkJ:scholar.google.com/+Where+is+mobile+learning+going%3F+&hl=en&as_sdt=40000
- Trinder, J. (2005). Chapter 2: Mobile technologies and systems. In A. Kukulska-Hulme and J. Traxler (Eds.) *Mobile learning: A handbook for educators and trainers*, (pp. 7-24). New York, New York: Taylor and Francis.
- Uzunboylu, H., Cavus, N., & Ercag, E. (2009). Using Mobile learning to increase environmental awareness. *Computers & Education*, 52, 381-389. doi: 10.1016/j.compedu.2008.09.008
- Valenzuela, S., Park, N., & Kee, K. F. (2009). Is there social capital in a social network site?: Facebook use and college students' life satisfaction, trust, and participation1. *Journal of Computer-Mediated Communication*, 14(4), 875-901.
- Wagner, E. D. (2008). Realizing the promise of mobile learning. *Journal of Computing in Higher Education*, 20(2), 4-14. doi: 10.1007/s12528-008-9008-x

- Wang, M., & Shen, R. (2012). Message design for mobile learning: Learning theories, human cognition and design principles. *British Journal of Educational Technology, 43*(4), 561-575.
- Wang, Q., Woo, H. L., Quek, C. L., Yang, Y., & Liu, M. (2012). Using the Facebook group as a learning management system: An exploratory study. *British Journal of Educational Technology, 43*(3), 428-438.
- Williams, S., & Williams, L. (2005). Space invaders: The negotiation of teenage boundaries through the mobile phone. *The Sociological Review, 53*, 314-331.
- Yin, R.K. (2003) *Case Study Research (3rd ed.)*. Thousand Oaks, CA: Sage Publications, Inc.

APPENDIX A: UNIVERSITY OF KANSAS HUMAN SUBJECT REVIEW

BOARD APPLICATION

APPROVAL OF PROTOCOL

December 9, 2015

Ghada
Alsaif
ghada@ku

Dear Ghada Alsaif:

On 12/9/2015, the IRB reviewed the following submission:

Type of Review:	Initial Study
Title of Study:	The Benefits of Class Notifications using MOBILE and Fixed Technology
Investigator:	Ghada Alsaif
IRB ID:	STUDY00003458
Funding:	None
Grant ID:	None
Documents Reviewed:	• Ghada_information_statement.docx, • Ghada_oral_consent_hscl.docx, • Ghada_HSCL_Initial_Submission_Form.pdf, • Course_Notification_Survey3.pdf

The IRB approved the study on 12/9/2015.

1. Notify HSCL about any new investigators not named in the original application. Note that new investigators must take the online tutorial at https://rgs.drupal.ku.edu/human_subjects_compliance_training.
2. Any injury to a subject because of the research procedure must be reported immediately.
3. When signed consent documents are required, the primary investigator must retain the signed consent documents for at least three years past completion of the research activity.

Continuing review is not required for this project, however you are required to report any significant changes to the protocol prior to altering the project.

Please note university data security and handling requirements for your project:

<https://documents.ku.edu/policies/IT/DataClassificationandHandlingProceduresGuide.htm>

You must use the final, watermarked version of the consent form, available under the “Documents” tab in eCompliance.

Sincerely,

Stephanie Dyson Elms, MPA IRB Administrator, KU Lawrence Campus

APPENDIX B: HUMAN SUBJECT ORAL CONSENT FORM

I'm Ghada Alsaif; a student in the University of Kansas's Department of Educational Leadership and Policy Studies, I am conducting a research project about Course Notification Through Mobile Technology. I would like to send you class notification about 1-2 notifications a week about upcoming class activities and assignments. These will include notifications about topics such as class readings, assignment exam and presentations due dates and clarifications of course expectations. In some case this will be just-in-time reminder information that is already in the course syllabus. For example, "Next class Feb 02 will be the due date of submitting assignment # 3 please submit it by due date". It will be for 2-12 weeks. These notifications will be posted in Facebook class group. This class group is private "closed", which means only members can see the posts. To be a member in this group, search group class name in search engine of Facebook then request join to the group. You do not have to friend class Facebook account to me member in the class group; so, no one can see your page in Facebook. If you agree to participate, join to the group. You may withdrawal at any time. If you like to receive the notification by email just send me an email. If like to stop email notifications any time, email me to stop. If you like to receive the notification by email just send me an email. If like to stop email notifications any time, email me to stop.

After that, I will post link of the digital survey in class Facebook group or send you the link by email. The survey will be few questions to obtain your views on how course notification through online communications and social media may influence readiness to complete activities in blended university courses. Your participation is expected to take about 10 minutes answering questions. You have no obligation to participate and you may discontinue your involvement at any time. Refusal to participate or withdrawal any time will not affect your grade and will involve no penalty to you.

Your participation should cause no more discomfort than you would experience in your everyday life. Although participation may not benefit you directly, the information obtained from the study will help us gain a better understanding of effectiveness of course notification by mobile technology. Your identifiable information such as your email or your account name in Facebook will not be shared unless (a) it is required by law or university policy, or (b) you give written permission.

*It is possible, however, with Internet communications, that through intent or accident someone other than the intended recipient may hear your response.

Participation in the survey focus group indicates your willingness to take part in this study and that you are at least 18 years old. Should you have any questions about this project or your participation in it you may ask me Ghada Alsaif (ghada@ku.edu) or my supervisor, Ron Aust (aust@ku.edu) at the Department of Educational Leadership and Policy Studies If you have any questions about your rights as a research participant, you may call the Human Subjects Protection Office at (785) 864-7429 or email irb@ku.edu.

APPENDIX C: INTERNET STATEMENT “CONSENT” WITH DIGITAL SURVEY

Course Notifications and MOBILE Devices

The Department of Educational Leadership and Policy Studies at the University of Kansas supports the practice of protection for human subjects participating in research. The following information should help you decide if you wish to participate in this study. You should be aware that even if you agree to participate, you are free to withdraw at any time without penalty.

We are conducting this study to better understand course notification strategies. You will be asked to complete a brief 1 page survey that should take you about 10 minutes to complete. The content of the survey should cause no more discomfort than you would experience in your everyday life.

Although participation may not benefit you directly, we believe that the information obtained from this study will help us gain a better understanding of the benefits of using class notification systems. Your participation is solicited, although strictly voluntary. Your name will not be associated in any way with the research findings. Your identifiable information will not be shared unless (a) it is required by law or university policy, or (b) you give written permission. * It is possible, however, with internet communications, that through intent or accident someone other than the intended recipient may see your response.

Completion of the survey indicates your willingness to take part in this study and that you are at least 18 years old. If you have any additional questions about your rights as a research participant, you may contact the KU Human Subjects Committee (HSCL) (785) 864-7429 email irb@ku.edu.

Sincerely,

If you would like additional information concerning this study please contact -- Ghada Alsaif (ghada@ku.edu - 785 304 8860) or Ron Aust (aust@ku.edu 785 864 3466)

By clicking on the next page arrow and continuing to the survey, you are verifying that you are 18 years old or older and you have read and agree to this statement.

APPENDIX D: SURVEY

Identify all **MOBILE** devices that you own.

- Smart phone. Tablet such as iPad. Portable computer.
- Regular cellphone (Not Smart). Other? [] Other? []

Do you have a data plan on your cell phone (Internet)?

- Yes No

CLASS NOTIFICATIONS* _____ .

**Class notifications are messages that remind students regularly about class activities, assignments and events.*

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
help me remember class activities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
help me complete assignments by the due date.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
help me interact with others about class activities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
give me a greater sense of belonging to class.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
improve my learning.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
are private communications for students & teacher.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I read **CLASS** notifications _____ .

**Class notifications are messages that remind students regularly about class activities, assignments and events.*

	Always	Most of the Time	Sometimes	Rarely	Never
outside of the classroom.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
in the break time of the class.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
during lecture time in the classroom.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I read **PERSONAL** notifications _____ .

**Personal notifications are messages from friends family concerning personal activities and events.*

	Always	Most of the Time	Sometimes	Rarely	Never
outside of the classroom.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

in the break time of the class.

during lecture time in the classroom.

How did you use your **CELL PHONE** or other mobile devices in this class to benefit your learning.

	Always	Most of the time	Sometimes	Rarely	Never
communicate about education topics with classmates.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
communicate about Ed. topics and class with the teacher.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
use social networks (Facebook, Google Grps...) for learning.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
play an educational game (e.g. Words with Friends).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
use learning manage system (e.g. Blackboard, Moodle).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
check class website for syllabus and due dates.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
set alert/alarm or calendar for due dates for classes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

receive class notifications.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
read educational content for classes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
access educational podcasts or videos.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
take or edit pictures or videos for class activities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
translate words or passages into another language.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
record field observations for research, or web quests.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How did you use **STATIONARY COMPUTER(s)** in this class to benefit your learning.

	Always	Most of the time	Sometimes	Rarely	Never
communicate about education topics with classmates.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
communicate about ed. topics and class with the teacher.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
use social networks (Facebook, Google Grps...) for learning.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
play an educational game (e.g. Words with Friends).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
use learning manage system (e.g. Blackboard, Moodle).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
check class website for syllabus and due dates.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
set alert/alarm or calendar for due dates for classes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
receive class notifications.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
read educational content for classes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
access educational podcasts or videos.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
take or edit pictures or videos for class activities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
translate words or passages into another language.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
record field observations for research, or web quests.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Communication tools that I use most often for class activities.

	Always	Most of the time	Sometimes	Rarely	Never
eMail	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Facebook	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
GroupMe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Google Groups	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Google+	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Yammer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
WhatsApp	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
LINE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Messenger	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Twitter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Instagram	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other <input type="text"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Describe your experience in using technology?

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
I know how download or delete applications (apps).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I know how to turn notifications ON or OFF.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I turn OFF my notifications during class time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is easy to me read notifications or messages by my phone.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is easy to me type messages on my phone.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am sometimes distracted by notifications during class.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am sometimes bored in class without notifications.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What is your age?

What is your gender?

Male Female

What is your current year in school?

Freshman (1st year)	Sophomore (2nd year)	Junior (3rd year)	Senior (4th year)	Graduate Student
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What is your major and specialization (e.g secondary social studies) ?

	Foreign							Other
	?							
Social Studies	Language	Elementary Ed.	Ed. Technology	Math	Design	Higher Ed.		
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How many class notifications did you receive in this class? (Approximately)

| |

Describe how receiving **CLASS** notifications benefits or interferes with your learning for this class?

**Class notifications are messages that remind students regularly about class activities, assignments and events.*

What advantages and/or disadvantages do you see in using your **CELL PHONE** or other mobile devices for learning?

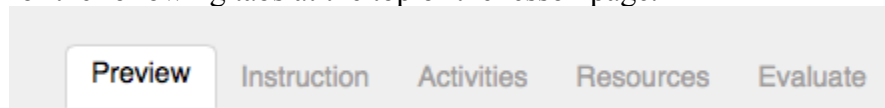
Great!..You completed all survey questions. If you would like to edit some answers, press back page arrow.
If you are done, please press next page arrow to submit the answers.

APPENDIX E: MESSAGE SAMPLE

Session 1 Introduction and Information Search Mon Jan 25

Message 1 sent 10 AM Jan 14

Greeting to all enrolled in the ELPS 302. For a preview of the class syllabus and activities visit the course website at: <http://www.edtech.ku.edu/new/courses/302/syllabus.shtml>. The first session covers information searches strategies for education. As is true for all lessons you can use the tabs at the top of the page to Preview the lesson, read the Instruction, learn about the Activity(s) you will turn in, the relevant web Resources and the Evaluation rubric. Look for the following tabs at the top of the lesson page.



We also are hoping that you will receive regular notifications about class activities.

To receive notifications through Facebook:

- 1 - Download Facebook app to your phone,
- 2 - You can become a friend with “KU EdTech” and receive messages regularly, or instead just search the ELPS302_SP16 with the Facebook's search engine and join the group. It is a closed group (only members can see posts).
- 3- Turn on group notification for the ELPS302_SP16 group in your mobile device to hear notifications as soon as it post :).

To receive notifications by email:

Sent an email to ghada@ku.edu requesting notifications for your class.

Message 2 sent Jan 21

Please create a google account. You may use an existing google account if you already have one. Please contact me if you have question. Thanks.

Session 2: Educational ePortfolios Mon Feb 1

Message 1 sent 10 AM on Jan 26

For next class please update the following on your learning technology portfolio.

1. Resume page
 2. Philosophy Page
 3. Standards 1 and 2 How I apply this standard in my teaching.
-

Session 3: Educational Imagery Mon Feb 08

Message 1 sent Feb 2

IMAGERY ASSIGNMENTS

For Graphic Manipulation, find a tonal photograph that is related to the content you teach and is at least 400 pixels wide.

For the Mosaic, find a series of 5-10 images or photographs that you will merge together. Each image should be at least 140 pixels high. These will be smaller images so realize that fine detail will be lost.

Session 4: Resource Evaluation Mon Feb 15

Message 1 sent Feb 9

1. Over the next 3 class sessions locate 3 of the best web sites (1 for each session) or software programs that relate to your educational interests.
2. Locate at least 3 of you favorite books or other resources (videos) on education and/or educational technology.

3. For the web sites download the word doc which contains 3 unique course evaluation forms
at http://www.edtech.ku.edu/new/courses/302/sessions/session_04/activities.shtml
. You will use these forms to evaluate the websites that you located (1 site for each form).
4. For your favorite books or videos, post your findings on your Teaching Philosophy web page in your portfolio below your teaching philosophy.

Message 2 sent Tuesday Feb 15

Bring the word file of the courseware evaluation to class with the CheckList Evaluation form completed.

Message 3 sent Friday Feb 18

For Feb 22, bring the word file of the courseware evaluation to class with the Open ended Courseware Evaluation form completed.

Message 4 sent Mon Sep 22

For Feb 24, complete all courseware evaluation form and open Skype account.

Session 5: Concept Mapping Mon Feb 22:

Message 1 sent Feb 16

Next class we will be doing the Concept Map Activity. You will build a concept map with the program called Inspiration. Recently Concept Mapping tools have been referred to as mind maps.

You can see the activity here

http://www.edtech.ku.edu/new/courses/302/sessions/session_11/index.shtml

If you have completed your concept map and posted a PDF, ISF and website zip file Thursday Nov. 5 is an optional workday when you can catch up on all assignments. Attend Thursdays class if you have not completed the assignments.

To learn more about the educational value of concept maps read the activity instruction page where there are examples for several content areas.

http://www.edtech.ku.edu/new/courses/302/sessions/session_11/instruction.shtml

You might consider in advance the a concept from your content area that you wish to investigate and possibly collect a view pictures to use in you concept map.

AND:

Message 2 sent Tuesday Feb 18

Bring the word file of the courseware evaluation to class with the CheckList Evaluation form completed.

Session 6: Digital Storytelling Mon Feb 28

Message 1 sent Feb 22 or Feb 22

We would like to remind you to complete: 1-Information Searches, 2-Educational Imagery, 3-Resources Evaluation, & 4-Concept Mapping which are **due Monday, Feb 29**.

Also, each group will present next class about their resources evaluation.

- 1- Discussion groups will be assigned to three session: Subject / content speciality, Random (student numbers), and Grade levels you teach.
- 2- All class members should present one piece of software at each session.
- 3- Using the relevant software evaluation form as a guide: Begin by telling your discussion group the name of the software you reviewed, the vendor/author, the subject area and the intended grade level.
- 4- Review what the software does - how it works, graphics, feedback, record keeping, etc.

- 5- Explain how you rate this software in general terms? Would you use it in your teaching (why/why not)? How would you use it? Should the district purchase a copy?
- 6- Assess the evaluation forms themselves. Would you prefer a different kind of form? Why?

For next class activity Digital storytelling:

- 1- Select a topic and a storytelling strategy that is relevant to the content that you teach.
 - 2- Include some form of information & media (photographs, video, and/or audio).
-

Session 7: Online Communication Mon Mar 07

Message 1 sent Mar 1

- 1- For next class you should have posted your personal description of how you will apply for the first three NETS for teacher standards in the Standards section of your portfolio.
- 2- Work in your Digital Storytelling which due Mar 28.

In-Class Activity

- 1-Pair off with a partner.
- 2-With your partner, review the lesson and the "Virtual Architectures Summary" under the Resources link.
- 3-Tell your partner two activities / lessons that you currently use or might use in an educational or training setting.
- 4-We will use [this list](#) to determine a unique On-Line Activity Structures for each partner.

Message 2 sent Mar 7

Online Communication assignment due Mar 28, post a PDF file to your portfolio that describes how you will use one of the technology rich activity structures in your class to enhance collaborative learning. Include three sections for your activity:

- 1-The goal of the project/collaboration.

- 2-The procedure (the specific steps that the students will follow, tools used).
- 3-The benefits of the project sand collaboration. For example, you might list the State or national standards that will be addressed.

For next class you should have posted your personal description of how you will apply for the first three NETS for teacher standards in the Standards section of your portfolio.

Session 8: Tech Integration Exam Mon Mar 21

Message 1 sent Mar 15

The following Thursday (Mar 21) you will complete the midterm exam in class. The midterm exam and exam procedures are posted at:

http://www.edtech.ku.edu/new/courses/302/sessions/session_08/index.shtml

Session 9: Educational Video Mon Mar 28

Message 1 sent Mar 22

During the next class session we will work on editing of your instructional video. Please use your wiki storyboard to gather the necessary media components (images, audio and youtube video links) and the narrative for your video this week wo that you have them ready for editing. You will have some time in the next two class sessions to work on your video.

Also we will begin the collaboration with your partners in Costa Rica. You can plan ahead by searching for web resources (pages and videos) that are relevant to the topics that you are working on. Se a list of the topics under the class wiki at http://kuedtech2.pbworks.com/w/page/106621794/KU_UCR_SP16

See you Monday

Session 11: Online Collaboration Mon Apr 04:

Message 1 sent Mar 29

During the next class session we will work on editing of your instructional video. Please use your wiki storyboard to gather the necessary media components (images, audio and youtube video links) and the narrative for your video this week so that you have them ready for editing. You will have some time in the next two class sessions to work on your video.

Also we will begin the collaboration with your partners in Costa Rica. You can plan ahead by searching for web resources (pages and videos) that are relevant to the topics that you are working on. See a list of the topics under the class wiki at http://kuedtech2.pbworks.com/w/page/106621794/KU_UCR_SP16

Message 2 sent Mon Feb 18

For the next class please bring your topic ideas and the names of up to 2 partners who you would like to work with. You can also bring topic ideas only and others can join your group. Each group will include 3 representatives from KU. Because you are collaborating with an international group, consider topics that are comparative in nature and allow group members from both countries to contribute their own unique perspectives to global issues. A list of previous topics can be found at: <http://ricoe.pbworks.com/w/page/75495077/List%20of%20Topics>

Message 3 sent Fri Feb 18

For Feb 28, communicate with Your Group and Determine How You Will Collaborate: Using email, chat, Skype or other communication tools, discuss with your project team the nature of your activities, the resources, the type of project you will present and the

roles that different team members will adopt. There are no specific rules regarding who contacts whom first. You should work as a team in initiating and maintaining regular communications during the development period.

Session 11: Universal Design Mon Apr 11

Message 1 sent Apr 05

During this session you will continue to work on your videos

You will also become familiar with evaluating and applying Universal Design for Learning principles. You will select and evaluate popular websites in your discipline using the Universal Design for Learning (UDL) Checklist checklist under Resources. Prepare in advance by reading the lesson Instruction and Activities sections to learn more about Universal Design principles and the class activity http://www.edtech.ku.edu/new/courses/302/sessions/session_11/activities.shtml

Session 12: Educational Data Mon Apr 18

Message 1 sent Apr 12

1- Next class we will work on the educational data activity. Read the Instruction page on this activity in advance at http://edtech.ku.edu/new/courses/302/sessions/session_12/instruction.shtml.

Also create a Qualtrics account which is FREE for KU students:

Go to: <https://kansasedu.qualtrics.com>

Click create an account (small type at the base of the Login panel)

Enter your email address as your username (must be a KU email acct)

Enter a password you will remember and confirm it.

Complete additional info.

You will be sent an email confirmation. Reply to this email to activate your account.

2- One of your members in Collaborative International Projects should communicate with your Costa Rica group such as asking question by email. Include all your group members emails; also, Dr. Aust (aust@ku.edu) & Dr. Quesada (allen.quesada06@gmail.com). If you need any help, please contact Dr. Aust or the assistants in the class.

Session 13: Digital Citizenship Mon Apr 25

Message 1 sent Apr 19

By now you should have the following items posted to your portfolio which is due Apr 25:

01: Information Searches; 03: Educational Imagery; 04: Resource Evaluation; 06: Digital Storytelling; 07: Online Communication; 08: Tech Integration Exam; 10: Universal Design; 11: Concept Mapping.

Also, write 3 of your personal statement in NEYS standard

Please let us know if you need assistance in posting any of these activities.

Message 2, Send Mon Apr 21:

Tuesday Nov 24 will be working day. We will be in class to help you posting assignments and answering your questions.

Session 14: Ed Tech Innovations Mon Apr 25

Session 15: Educational Technology Presentations Mon May 02

Message 1 Sent Apr 26

Next Monday we will have the final portfolio presentations. We hope that everyone will attend these sessions so that you can share and learn from your colleagues. Let me know if you have a conflict with attending.

Individual Portfolio Presentations (4 minutes max)

Each person will:

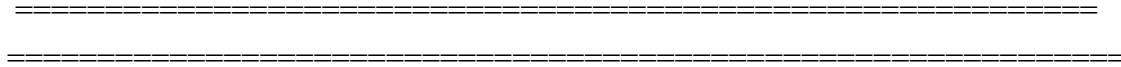
1. Briefly describe your philosophy toward integrating Learning technology in your discipline.
2. Present one or two works that you have created and describe how you will use
3. Describe briefly what aspect of information technology will have the greatest influence on teaching and learning in your discipline over the next 10 years.

The most important overall aspect of your presentation will be to convey how technology will be integrated into

Collaboration with Costa Rica. (4 minutes max)

1. Describe how you communicated with your partners.
(e.g. often or briefly through email, WhatsApp, Facebook)
2. What unique insights you gained from your partners on your topic.

3. Briefly show part of a presentation
4. How you might use this international approach in your discipline



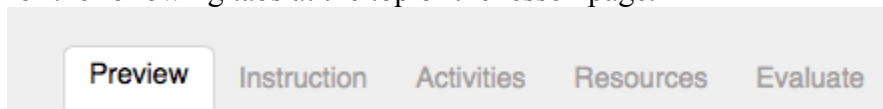
ELPS 812 Notifications

Session 1 Learning Technology Readings Weds Jan 20

Message sent 10 AM Jan 14

Greeting to all enrolled in the ELPS 812. For a preview of the class syllabus and activities visit the course website

at: <http://www.edtech.ku.edu/new/courses/812/syllabus.shtml>. The first session covers information searches strategies for education. As is true for all lessons you can use the tabs at the top of the page to Preview the lesson, read the Instruction, learn about the Activity(s) you will turn in, the relevant web Resources and the Evaluation rubric. Look for the following tabs at the top of the lesson page.



We also are hoping that you will receive regular notifications about class activities.

To receive notifications through Facebook:

- 1 - Download Facebook app to your phone,
- 2 - You can become a friend with “KU EdTech” and receive messages regularly, or instead just search the ELPS812_SP16 with the Facebook's search engine and join the group. It is a closed group (only members can see posts).
- 3- Turn on group notification for the ELPS812_SP16 group in your mobile device to hear notifications as soon as it post :).

To receive notifications by email:

Sent an email to ghada@ku.edu requesting notifications for your class.

Session 2: Educational ePortfolios Weds Jan 27

Message sent 10 AM Jan. 21

Please create a google account. You may use an existing google account if you already have one. Please contact me if you have question. Thanks.

Session 3: Client Project Weds Feb 03

Message sent Jan 28

For Tue Sep 08 Please do :

PORTFOLIO

1. Resume page
2. Philosophy Page
3. Standards 1 and 2 How I apply this standard in my teaching.
4. Post Assignment 1 “Searching” as a PDF file linked under your course

IMAGERY ASSIGNMENTS

For Graphic Manipulation, find a tonal photograph that is related to the content you teach and is at least 400 pixels wide.

For the Mosaic, find a series of 5-10 images or photographs that you will merge together. Each image should be at least 140 pixels high. These will be smaller images so realize that fine detail will be lost.

Session 4: Instructional Design Weds Feb 10

Message 1 sent Feb 04

Work with your client

1. Contact your client and see if they wish to work with you.
 2. Negotiate the best way to communicate with your client -- email, facebook, phone, texting
 3. Organize a time when you can meet (have a design charrette) with you client
 4. Decide a general description of your client's goals and work on a good title.
 5. Ask you client about the target audiences for your activity.
 6. Ask your client what are the best resources for achieving the goals, professional organizations, web sites, books, state or national standards.
- NOTE: During next session you will describe you interaction with your client.

For your portfolio

1. Over the next 3 class sessions locate 3 of the best web sites (1 for each session) or software programs that relate to your educational interests.
2. Locate at least 3 of you favorite books or other resources (videos) on education and/or educational technology.
3. For the web sites download the word doc which contains 3 unique course evaluation forms
at http://www.edtech.ku.edu/new/courses/302/sessions/session_04/activities.shtml
. You will use these forms to evaluate the websites that you located (1 site for each form).
4. For your favorite books or videos, post your findings on your Teaching Philosophy web page in your portfolio below your teaching philosophy.

Session 5: Audio Media Design Weds Feb 17

Message 1 sent Feb 11

During this week with your group on the Instructional Design website.

For next class:

- 1- Bring headphones w/ microphone.
- 2- Possibly develop a script for an educational audio narration.

3- Search the web for background sounds (e.g. music, waterfalls...), reinforcing sounds (e.g. applause, cheers...), and sonifications (e.g. short tones, beeps...) that can be used as instructional markers.

Session 6: Drill and Practice Weds Feb 24

Message 1 sent Feb 18

For next class:

- Select a topic (keep it simple) What is your theoretical foundation?
 - Describe the basic instructional design? Find relevant graphic(s).
 - Describe your evaluation strategy. How will you know when this is successful?
 - Please contact your client and let them know that I will be sending them a letter about your team and project.
-

Session 7: Learning Management and Analytics Weds Mar 02

Message 1 sent Feb 24

Please setup a KU Qualtrics account and have an idea for your survey. Contact me with question.

Message 2 sent Fri Mar 09

Online Communication assignment due Mar 15, post a PDF file to your portfolio that describes how you will use one of the technology rich activity structures in your class to enhance collaborative learning. Include three sections for your activity:

The goal of the project/collaboration.

The procedure (the specific steps that the students will follow, tools used).

The benefits of the project and collaboration. For example, you might list the State or national standards that will be addressed.

Message 3 sent Wed Mar 07

For class next Thursday (March 8), please make sure you have posted the 1) Search, 2) Imagery and 3) Resource Evaluation activities to your portfolio. Also you should have posted your personal description of how you will apply for the first three NETS for teacher standards in the Standards section of your portfolio.

The following Thursday (October 15) you will complete the midterm exam in class. The midterm exam and exam procedures are posted at:

http://www.edtech.ku.edu/new/courses/302/sessions/session_08/index.shtml

Session 8: Tech Design Exam Weds Mar 09

Message 1 sent Mar 03

****Next week will be the exam. Please read the directions**

here: http://www.edtech.ku.edu/new/courses/812/sessions/session_08/index.shtml

*The next assignments are:

- 1- Posting Analytics report and describing how you will use this information to improve your website
 - 2- Creating survey at least 10 items or questions and thank you page by Qualtrics to increase the quality of designing website such as asking the user about the navigation, text, images,...etc.
-

Session 9: Learning Technology Readings Weds Mar 23

Message 1 sent Mar 17

Complete the assigned readings in advance.

(If you have a large file "more than one 128 MB", upload this file to your Google drive and then share the public link)

Session 10: Online Collaboration Weds Mar 30

Message sent Mar 24

1/ Communicate with Your Group and Determine How You Will Collaborate by Using email, chat, Skype or other communication tools, discuss with your project team the nature of your activities, the resources, the type of project you will present and the roles that different team members will adopt. There are no specific rules regarding who contacts whom first. You should work as a team in initiating and maintaining regular communications during the development period.

2/ Presentation Guidelines (10 minutes)

Introduction

Tell us your name(s) and current positions for each member of the group.

Describe Your Topic and What You Learned

The Topic Title and Key Issues

Which resources (websites, media, books) did you find most useful in learning about your topic?

Describe what you learned about your topic and any unique perspective that you gained from international comparisons with people from another country.

Describe/demonstrate knowledge artifact that you produced about the topic and the development environment that you used (wikis, video, PowerPoint, Prezi, website...).

Describe your Method(s) of Communications and Future Plans.

Describe how and how much you collaborated (email, teleconferencing e.g. Skype, Wikis, Facebook...).

Describe future plans or other types of activities that you might engage in to learn more about your topic

Session 11: Learning Animation Weds Apr 06

Message sent Mar 31

During this week:

- 1- Work in your comparative analysis resources.
- 2- Communicate, share your wiki and meet with your client.

On Tuesday we will be doing the Concept Map Activity. You will build a concept map with the program called Inspiration. Recently Concept Mapping tools have been referred to as mind maps.

You can see the activity here

http://www.edtech.ku.edu/new/courses/302/sessions/session_11/index.shtml

If you have completed your concept map and posted a PDF, ISF and website zip file Thursday Nov. 5 is an optional workday when you can catch up on all assignments. Attend Thursdays class if you have not completed the assignments.