1-1-2015

Investigating University Instructors' Experiences And Uses Of Mobile Technology In Teaching And Learning In Saudi Arabia

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INVESTIGATING UNIVERSITY INSTRUCTORS' EXPERIENCES AND USES OF MOBILE TECHNOLOGY IN TEACHING AND LEARNING IN SAUDI ARABIA

by

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DISSERTATION

Submitted to the Graduate School

of Wayne State University,

Detroit, Michigan

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

2015

MAJOR: INSTRUCTIONAL TECHNOLOGY

Approved by:

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Advisor Date

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DEDICATION

This work is dedicated to:

My beloved Mother and Father,

Wife and Children.

Thank you for your patience, support and prayers.

It is dedicated to my Brothers and Sisters as well, for their support and encouragement.

May Allah bless all of us with faith.

ACKNOWLEDGEMENT

بسم الله الرحمن الرحيم

In the Name of Allah, the Beneficent, the Merciful

All praise and thanks are due to Allah (The Almighty God) for helping me complete my PhD journey very successfully. His favors on me are countless and unlimited.

Second, I sincerely thank Dr. Ke Zhang, my major advisor, for her great support, patience, positive feedback throughout my PhD journey. In addition, special thanks and sincere gratitude are to Dr. Timothy Spannaus, Dr. James Moseley, and Dr. Stine Eckert for their continuous support and enormous inputs as well as their knowledgeable guidance.

I would like to thank Mrs. Michele Norris, the IT department secretary, for her help throughout my study years at the IT program.

I would like to thank all friends in the IT program for their support, collaboration and encouragement.

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CHAPTER 1: INTRODUCTION

Background

In 2013-14, an estimated number of 1,165,091 students were enrolled in the 25 Saudi government-sponsored universities around the large country besides an estimated number of 54,673 university faculty members, including all academic ranks, for teaching them (MOHE Statistics Center, 2015). This number of university students and university instructors out of the country's 2013 estimated population of 28.83 million (World Bank, 2015) has been increasing in recent years. This is due to the recent opening of 18 new universities, in the last decade, and the expansions of old universities through opening new branches and colleges in the different regions of the kingdom. This comes along with the current 25-year plan for higher education national project called "Afaq" or horizon (Ministry of Higher Education's Plan to Achieve Excellence in Science and Technology), in order to promote a knowledge-based society and help improve the country's economy through different arenas other than its reliance on crude oil.

Saudi Arabia has been the largest information and communication technology (ICT) demanding market in the Middle East due to the huge number of consumers and the urgent need of ICT for infrastructure projects. (SAGIA, n.d.). Besides other ICT projects followed by other ministries, the Ministry of Higher Education in Saudi Arabia has established large-scale projects for its 25-year plan in order to fulfill the plan's initiatives and to define its vision for higher education in Saudi Arabia (Almarwani, 2011). Almarwani lists the eight infrastructure projects that have already been established in order to urge and encourage Saudi Universities

to seriously consider and implement distance learning and its variations (e-learning, and mobile learning). The projects are:

- The National Centre for E-Learning and Distance Education (NCELDE),
- The Learning Portal of the National Center of E-learning & Distance Learning,
- JUSUR, A Learning Management System,
- MAKNAZ, National Repository for Learning Objects,
- Excellence Award of e-learning in university, on a yearly basis,
- Training Programs to faculty members and technical staff in the Saudi universities in the area of e-learning and its applications,
- Saudi Digital Library,
- And, SANEED, the Saudi Centre for Support and Counselling to all beneficiaries of e-learning (Almarwani, 2011).

These projects encourage all different Saudi university instructors to learn and understand the possibilities and the applicability of distance education and e-learning not only in their universities' systems, but also to be used and applied in their different courses, and encourage their students to embrace the new way of education.

Mobile learning has been the latest trend in education, and especially for distance education (Ally, 2009; Altameem, 2011; Al-Fahad, 2009; Al-Shehri, 2013; Kim, Mims & Holmes, 2006; Narayanasamy & Mohamed, 2013). The number of university students preferring the use of mobile technology in and out of the classrooms for educational purposes is noticeably increasing (Wilson & McCarthy, 2010), and the same is with Saudi university

students (Al-Fahad, 2009; Nassuora, 2012) especially after the notion of learning anywhere, anytime ‘with no boundaries’.

Research Problem Statement

Saudi Arabian higher education has seen major changes and improvements in recent years through training, scholarships, infrastructure, and technology being made available to instructors and students and especially through the large expenditure on higher education in Saudi Arabia. One of the recent large expenditures on higher education in Saudi Arabia as explained in Abouammoh, Smith and Duwais (2014) is that, in 2013, almost 49 % of the SR 204 billion for education and training were allocated to higher education only. In the 2014 Horizon Report, by Johnson, Becker, Estrada and Freeman (2014), there was a major focus on the key trends accelerating higher education technology-adoption through the adoption of online, hybrid and collaborative learning and the uses of social media.

The topic of mobile learning and using mobile technologies in higher education for teaching and learning is very dynamic and is one of the most active topics around the world (Johnson, Levine & Smith, 2009). This can be noticed through the many large mobile projects and the multiple studies done periodically. With having that in mind, along with the many studies that concluded the many benefits and advantages of mobile learning for students (Alsaggaf, Hamilton & Harland, 2013; Santos & Ali, 2011), instructors (Reader, 2013), universities (Chuang, 2009), and for the whole higher education system (Chuang, 2009; Lahiri & Moseley, 2012; Valk, Rashid & Elder, 2010), there has not been a satisfying, comprehensive

study covering the Saudi higher educational system in regard to the actual uses and experiences of mobile technologies by university instructors for teaching and learning purposes.

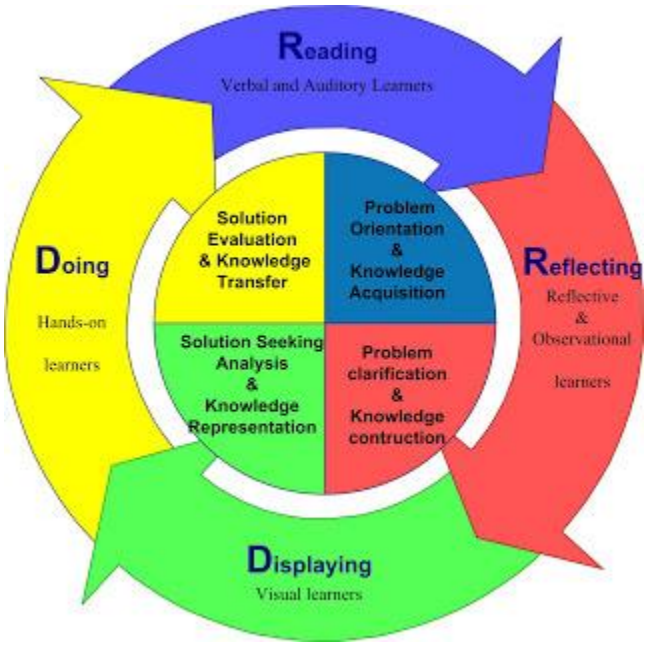
There have been some small-scale studies (Al-Fahad, 2009; Narayanasamy & Mohamed, 2013; Nassuora, 2012; Seliaman & Al-Turki, 2012) investigating Saudi university students' preferences around the uses of mobile technology and they all showed positive attitudes towards adopting mobile technology for learning. Other studies (Almarwani, 2011; Al-Shehri, 2013) pointed out the opportunities of mobile learning in the Saudi context including the huge national projects related to mobile technology, and future possibilities of mobile learning. A recent study (Aljuaid, Alzahrani & Atiquil, 2014) that focused on Saudi university instructors' readiness towards mobile learning in higher education was limited to instructors from only one college within one university and it used only quantitative data. Aljuaid, Alzahrani and Atiquil (2014) recommended approaching and including all instructors from Saudi universities in new studies about mobile learning. Also, due to the limited resources and studies about the real uses and experiences of mobile technology in higher education, this research study investigated Saudi university instructors' actual uses and experiences in regards to using mobile technology in their teaching in a large scale study that covered all public universities in Saudi Arabia.

R2D2 Model

The R2D2 model (*Figure 1:* R2D2 Model (Reading, Reflecting, Displaying, and Doing)) which stands for Reading, Reflecting, Displaying, and Doing was introduced by Curtis Bonk and Ke Zhang in 2006 to help and provide online instructors with great lists of activities that can be utilized in any online course (Bonk & Zhang, 2006). Bonk and Zhang both are

experts in the areas of online learning, social media, and mobile technology. Observing a lack of guidance and structure of distance courses, mainly online courses for many years, Bonk and Zhang introduced the R2D2 model and provided enormous activities for the different categories of the model in order to guide and direct the process of designing and delivering online learning.

Figure 1: *R2D2 Model (Reading, Reflecting, Displaying, and Doing)*



Note. From *Empowering online learning: 100+ activities for reading, reflecting, displaying, and doing* (p. 6), by C. J. Bonk and K. Zhang, 2008, San Francisco, CA: Jossey-Bass. Copyright 2008 by John Wiley & Sons. Adapted with written permission.

This model, and the various proposed activities, has been used by online instructors as a framework for designing teaching and learning materials and for determining the media through which the materials will be delivered to online learners. The R2D2 model, through its four categories, helps online instructors know what tools and software are available, and how

to use them to create or perform the related activities after checking with some key instructional technology considerations such as cost, risk, time, learner-centeredness or instructor-centeredness and/or the duration of the activities (Bonk & Zhang, 2008). The R2D2, briefly, consists of four categories (i.e., reading, reflecting, displaying, and doing) that help educators, and mainly new online instructors, to understand the "Web of Learning" through providing them with different activities within each category to allow instructors to choose the best activities based on their online learners' preferences (i.e., verbal and auditory, reflective and observational, visual, or hands-on learning) (Bonk & Zhang, 2006; 2008).

Several studies incorporated and used the R2D2 model as a framework because of its flexibility as a "holistic approach" for teaching in online environments (Kruger, 2008, p. 1), and because of its support for collaborative and active learning (Cartner & Hallas, 2009). Some other studies referred to the R2D2 model to support their activities such as creating and using e-portfolios for reflection (Chang, 2008), listening to podcasts as a supplement to online learning (Stiffler, Stoten & Cullen, 2011), using podcasts mainly for auditory learners which falls within the first category of reading (Panday, 2009). In another study, the R2D2 model was used also along with the TPACK model, which stands for technology, pedagogy and content knowledge, "to guide the selection of activities that emphasized interactivity, group work and collaboration." (Maor, 2013, p. 534).

The R2D2 model can as well be used as a problem solving wheel, including the four components (Problem orientation, Problem clarification, Solution analysis, and Solution evaluation within the four categories of reading, reflecting, displaying and doing), to help in

guiding the process of problem based learning (PBL) in its design and implementation, especially for online courses (Bonk & Zhang, 2008).

The four categories of the R2D2 model are primarily divided to address the different learning preferences (i.e., verbal and auditory, reflective and observational, visual, or hands-on learners). From these learning preferences, the learning activities have been suggested and distributed into the four R2D2 categories based on some key instructional considerations (e.g., time, cost, risk, duration or activity, and/or whether the activity is learner or instructor-centered); however, many learning activities can be used in different categories or to address more than one type of learning preferences (Bonk & Zhang, 2008). Table 1 lists the different activities for all categories of the R2D2 model.

Table 1: *Learning Activities in each phase of R2D2.(Table 1.3)(Bonk & Zhang, 2008, 10-11)*

Reading	**Reflecting**	**Displaying**	**Doing**
1. Online Scavenger Hunt	26. Post Model Answers	51. Anchored Instruction with Online Video	76. Web - Based Survey Research
2. Web Tours and Safaris	27. Reuse Chat Transcripts	52. Explore and Share Online Museums and Libraries	77. Video Scenario Learning
3. WebQuest	28. Workplace, Internship, or Job Reflections	53. Concept Mapping Key Information	78. Content Review Games
4. Guided Readings	29. Field and Lab Observations	54. Video-streamed Lectures and Presentations	79. Online Review and Practice Exercises
5. Discovery Readings	30. Self - Check Quizzes and Exams	55. Video-streamed Conferences and Events	80. Mock Trial or Fictional Situations
6. Foreign Language Reading Activities and Online News	31. Online Discussion Forums and Group Discussions	56. Interactive News and Documentaries	81. Online Role Play of Personalities
7. FAQ and Course Announcement Feedback	32. Online Portal Explorations and Reflections	57. Interactive Online Performances	82. Action Research
8. Question- and - Answer Sessions with Instructor	33. Lurker, Browser, or Observer in Online Groups	58. Design Evaluation	83. Interactive Fiction and Continuous Stories
9. Online Expert Chats	34. Podcast Tours	59. Design Generation	84. Real - Time Cases
10. Online Synchronous Testing	35. Personal Blogs	60. Design Reviews and Expert Commentary	85. Course Resource Wiki Site
11. Synchronous or Virtual Classroom Instructor Presentations	36. Collaborative or Team Blogs	61. Online Timeline Explorations and Safaris	86. Wikibook Projects
12. Online Webinars	37. Online Resource Libraries	62. Virtual Tours	87. Online Glossary and Resource Links Projects
13. Public Tutorials, Wizards, and Help Systems	38. Social Networking Linkages	63. Visual Web Resource Explorations	88. On - Demand and Workflow Learning
14. Expert Lectures and Commentary	39. Online Role Play Reflections	64. Animations	89. Digital Storytelling

15. An Online Podcast Lecture or Podcast Show	40. Synchronous and Asynchronous Discussion Combinations	65. Advance Organizers: Models, Flowcharts, Diagrams, Systems, and Illustrations	90. Online Documentation of Internship, Field Placement, and Practicum Knowledge Applications and Experiences
16. Audio Dramas	41. Self - Check Reflection Activities	66. Virtual Field Trips	91. Authentic Data Analysis
17. Posting Video - Based Explanations and Demonstrations	42. Electronic Portfolios	67. Video Modeling and Professional Development	92. Online Science Labs and Simulations
18. Online Sound or Music Training	43. Individual Reflection Papers	68. Movie Reviews for Professional Development	93. Simulation Games
19. Online Literature Readings	44. Team or Group Reflective Writing Tasks	69. Whiteboard Demonstrations	94. Simulations and Games for Higher - Level Skills
20. Online Poetry Readings	45. Super - Summaries, Portfolio Reflections, and Personal Philosophy Papers	70. Online Visualization Tools	95. Client Consulting and Experiential Learning
21. Posting Webliographies or Web Resources	46. Online Cases, Situations, and Vignettes	71. Video Blogs and Adventure Learning	96. Online Tutoring and Mentoring
22. Text Messaging Course Notes and Content	47. Satellite Discussion or Special Interest Groups	72. Charts and Graph Tools	97. Cross - Class Product Development and Creativity
23. Text Messaging Course Reminders and Activities	48. Small - Group Case Creations and Analyses	73. Mashups of Google Maps	98. Cross - Class Content Discussions, Analyses, Competitions, and Evaluations
24. Online Language Lessons	49. Small - Group Exam Question Challenges	74. Broadcast Events	99. Learner Podcast Activities, Events, and Shows
25. E - Book and Wikibook Reports and Critiques	50. Reaction or Position Papers	75. Online Multimedia and Visually Rich Cases	100. Design Course Web Site

Note. From *Empowering online learning: 100+ activities for reading, reflecting, displaying, and doing* (p. 10-11), by C. J. Bonk and K. Zhang, 2008, San Francisco, CA: Jossey-Bass.

The R2D2 model has been considered and selected as a framework for this study because of its flexibility in the design and delivery options of online learning and the different approaches embedded within it (i.e., applicability for problem-solving or problem-based learning, addressing the different learning preferences, guiding and directing online instructors in the selection and application process of the many learning activities). From the many definitions and characteristics of mobile learning, we can see that mobile learning is a part of distance learning and online learning (Bates, 2005; Leung & Chan, 2003) and especially through using mobile technologies to support distance learners (Traxler, 2005). Shih (2007) explains and elaborates more about mobile learning in that:

> "*When comparing mobile learning to online learning …, varied and changing locations, the ability for more immediate interaction with teachers and fellow students, and the portability and affordability of smaller, handheld wireless devices, coupled with their capacity to accommodate learners from different backgrounds, make mobile devices a logical choice for educators." (p. 9)*

This research study, about mobile technology in higher education, has adapted the R2D2 model to be used as an instrument as well to help in directing the data collection methods and procedures. The R2D2 model has been chosen for this study due to its comprehensiveness of most possible activities related to online learning in higher education, and that they may be easily integrated and applied into mobile learning or through the use of mobile technologies. Again, the R2D2 model covers different skills, provides a series of learning activities with advice and suggestions on how to select and apply them, and addresses the different learning preferences which help in covering most of learners' backgrounds and needs (Bonk & Zhang, 2008).

Purpose and Significance of the Study

As an instructor affiliated with one of the 25 Saudi public universities, and currently completing my graduate studies in the U.S., I have had the chance to compare the two countries in regards to the uses of mobile technology and the integration of mobile learning in higher education and in university environments. The idea of this research emerged from my desire to investigate Saudi university instructors' uses and experiences with mobile technology in their teaching and to get their reflection on their students' learning while using mobile technology, and to find out the major factors impacting the instructors' decisions around mobile learning. The future of mobile learning in Saudi Arabia is very promising (Al-Fahad, 2009; Al-Shehri, 2013) and the 25-year-plan, by the ministry of higher education in Saudi Arabia, consistently focused on e-learning and distance learning. Mobile learning is considered to be a new shift of distance learning (Al-Fahad, 2009) or a new paradigm of electronic learning (Leung, & Chan, 2003). This research was to help in fulfilling the eagerness of Saudi instructors to use mobile technology in their teaching and learning through examining their current and actual uses of mobile technology for educational purposes and then provide decision-makers and university administrators with valid and reliable data on the best ways for integrating mobile learning into higher education. The results of this study have shown and proven the very positive attitude of instructors towards using mobile technology in their teaching in general, and specifically for many learning activities.

There have been a few research studies about the uses of mobile technology by university instructors in Saudi Arabia; therefore, this research study was done and was inclusive of all instructors from all Saudi universities especially after the recommendation by Aljuaid, Alzahrani & Atiquil, in their recent study, (2014) where they recommended

approaching and including all instructors from Saudi universities in new studies about mobile learning. Quantitative and qualitative data collection methods were used in this study. This was very important to have broader perspectives and understanding of the university instructors' uses of mobile technology and their experiences in teaching and learning. Moreover, results from this study have contributed greatly to the body of literature of mobile learning in higher education.

This exploratory study investigated the experiences and uses of mobile technology by university instructors in Saudi Arabia for teaching and learning. This study adapted the Bonk and Zhang's R2D2 model for online learning, which proved its validity and applicability in many ways through the different recent studies around the world (Cartner & Hallas, 2009; Kruger, 2008; Maor, 2013). This model was used and applied to examine and investigate the learning activities done at Saudi universities using mobile technologies. The findings of this study should help university teaching faculty, management and administrations, at Saudi universities to better understand the actual uses and the real experiences of mobile technology for teaching and learning especially after the establishment of the national projects, mentioned above, and being available for all Saudi educators to access and make use of.

This research targeted all instructors (62991) in the 25 public universities in Saudi Arabia including both male instructors (36211), and female instructors (26780). These numbers cover the two groups (In-home and Abroad groups).

Research Questions

The following research questions were developed in order to examine the major factors that should always be considered to help in better integration of mobile learning in higher education, and mainly in Saudi Arabia.

Q 1. What are the university instructors' general experiences in using mobile technology in higher education?

Q 2. What are the university instructors' attitudes towards using mobile technology for teaching purposes?

Q 3-A. To what extent are R2D2 categories balanced in their integration to address the learner preferences? What categories are considered most?

Q 3-B. How frequently do university instructors use their mobile technology for creating and conducting the learning activities?

Q 4. What are the instructors' views about the role of mobile learning in the next generation of learning in Saudi Universities?

Q 5. What concerns do university instructors have, if any, about using mobile technology in their teaching practices?

This research included all instructors from all majors and disciplines, and from both genders from the 25 public universities in Saudi Arabia.

Key Terms and Definitions

R2D2 model: Is "a new model for designing and delivering distance education, and in particular, online learning" (Bonk & Zhang, 2006, p. 249). R2D2 is an acronym for the four categories (reading, reflecting, displaying, and doing).

It is important to mention that this R2D2 model, by Bonk and Zhang, which is used in this study is different from the other R2D2 model (Recursive, reflective, design and development) developed by Willis (1995) as an instructional design model. R2D2 model, by Bonk and Zhang, used in this study, was chosen because of its different categories that address the different learner preferences, and because of the model's various learning activities for the online learning which fit our study of the uses of mobile technologies.

Reading category: According to Dictionary.com, the word "read" means "to look at carefully so as to understand the meaning of (something written, printed, etc.)". Bonk and Zhang (2008) explain the reading category as "the exploration, the fact finding, knowledge acquisition stage of the learning process" (p. 9). This category is very broad and it covers many different activities other than reading and listening. Activities within this category are explained in Chapter 2.

Reflecting category: According to Dictionary.com, the word "reflect" means "to serve to give a particular aspect or impression". In Bonk and Zhang (2008), the reflecting category means to pay "special attention to activities and events that stimulate personal reflection through collaboration and virtual group activities" (p. 9). Activities within this category are explained in Chapter 2.

Displaying category: According to Dictionary.com, the word "display" means "to show or exhibit; make visible; also, the visual representation of the output of an electronic device, also, to give special prominence to (words, captions, etc.) by choice, size, and arrangement of type". Bonk and Zhang (2008) explain the displaying category in that "it aims to help online learners not only to understand the content being taught, but also to further their own knowledge base with strategies such as concept mapping, visualization, and advance organizers" (p. 9).

Doing category: According to Dictionary.com, the word "do" means "to perform an act, duty, role, etc." as a verb used with objects. Bonk and Zhang (2008) explain the doing category in that "it addresses the crucial need for hands-on experiences in online learning environments" (p. 9). Activities in this category vary in order to promote knowledge application and higher order thinking skills.

Asynchronous Communication and Collaboration: any communication or collaboration that happens at different times and in different places (e. g. discussion boards, emails, surveys, etc.).

Distance learning (DL): "it often describes the effort of providing access to learning for those who are geographically distant." (Moore, Dickson-Deane & Galyen, 2011, p. 129).

E-learning: electronic learning: Li, Lau and Dharmendran (2009), as cited in (Sangrà, Vlachopoulos & Cabrera, 2012), defined e-learning as: "E-learning is the delivery of a learning, training or education program by electronic means" (p. 149).

ICT: Information and communication technologies.

KASP: King Abdullah Scholarship Program.

Learning Management System (LMS): "is a software application that automates the administration, tracking, and reporting of training events." (Ellis, 2009, p. 2)

Mobile learning (m-learning): "learning that happens across locations, or that takes advantage of learning opportunities offered by portable technologies" (Chuang, 2009, p. 51).

Mobile Learning Environment (MLE): "mobile learning environment grants educators an opportunity to adopt methods of situated, contextual, just-in-time, participatory, and personalized learning." (Gagnon, 2010)

Mobile device: "mobile device is a generic term used to refer to a variety of devices that allow people to access data and information from where ever they are. This includes cell phones and portable devices." (Bucki, n.d.)

MOE: Ministry of Education.

MOHE: Ministry of Higher Education in Saudi Arabia.

Online learning: "online learning is described by most authors as access to learning experiences via the use of some technology" (Moore, Dickson-Deane & Galyen, 2011, p. 130).

PDA: Personal Digital Assistant.

PBL: Problem-based learning.

RFID: Radio Frequency Identification.

SEU: Saudi Electronic University.

Smart phone: Any mobile phone that allows Internet browsing, video watching, interactive games, etc.

Synchronous Communication and Collaboration: any communication or collaboration that happens at the same time, but in different places (e. g. audio conferencing, video meeting and conferencing, instant chat, etc.).

University Instructor: All faculty members working in Saudi Universities (including professors, associate professors, assistant professors, lecturers, instructors, or teachers).

Summary of Chapters

This research paper is a dissertation in partial fulfillment for my doctorate of philosophy in Instructional Technology. This paper is focused on university instructors' uses and experiences of mobile technologies for teaching and learning. In this study, the researcher was trying to explore the actual uses of mobile technologies by university instructors in Saudi Arabia, and the main factors influencing university instructors' decisions on whether or not to use and integrate mobile technology into their courses. The R2D2 model for online learning was adapted in this study as a framework and as an instrument to help construct the data collection method-the survey, and to help get better indications of the instructors' uses of mobile technologies.

Chapter 1 covers the introductory part of this research which includes: the research problem statement, an introduction of the R2D2 model and its various learning activities, the purpose and significance of the study, the research questions and the key terms and definitions included in this research. The second chapter is a comprehensive review of the related literature about mobile learning and mobile technology and telecommunication advancement in Saudi

Arabia as well as the R2D2 model and the different studies that support using it. Chapter 3 lists a detailed explanation of the data collection methods, the methods used for analyzing the data, limitations encountered in this study, and how R2D2 model was used in this research. The fourth chapter describes the sample of the study and explains the results after analyzing the collected data. Chapter 5 presents an overall summary for this research, conclusions and some recommendations for future studies.

CHAPTER 2: LITERATURE REVIEW

Introduction

This chapter examines the literature and research studies related to the topics of mobile learning and the uses of mobile technology in higher education and the advancements of technology in general, and in Saudi Arabia in particular. This literature review includes: (a) background and definitions of mobile learning, (b) mobile learning environment in higher education, (c) improving instruction and learning through using mobile technology, (d) Bonk and Zhang's R2D2 model for online learning, (e) multimedia learning principles in relation to the R2D2 model, (f) higher education in Saudi Arabia, and (g) advancement of technology, in general, and their availability in Saudi Arabia. This literature review guided and improved the research study by covering most, if not all, aspects related to the uses of mobile technologies in higher education.

Background and Definitions of Mobile learning

Mobile learning has recently been of one of the most discussed trends especially in education (Johnson et al., 2009). Mobile learning has brought advancement and many changes to the educational environment and has impacted all its parts. Using mobile technology for educational purposes such as content delivery, sharing information and files, communication and collaboration, etc. has been evident and has shown tremendous benefits for all parties (i.e., students, instructors, administrators, etc.). Mobile technology, in general, has changed our life-pace in terms of receiving and distributing information, social and educational communication, interaction and many other aspects. Recently, there has been an evident focus on the use of mobile learning in K-12 schools and the different aspects of it (i.e., opportunities, limitations,

easy to use, challenges, costs, etc.). There have been as well many studies done at the university and college levels surveying the perspectives of instructors and students regarding the use of mobile technology for certain classes or courses (Al-Fahad, 2009; Aljuaid, Alzahrani & Atiquil, 2014; Fillion, Limayem, Laferriere & Mantha, 2009; Nagler & Ebner, 2009; Nassuora, 2012; Omiteru, 2012).

There have been many definitions of mobile learning; some relate to the use of mobile technology, and others are more concerned with mobility. Mobile learning, simply abbreviated m-learning, has been widely integrated and used in educational settings. Mobile learning is no longer considered as a theory; rather, it has clearly moved to reality and into application (Alzaza & Yaakub, 2011). Even though mobile learning has been extensively studied, there are still some ambiguous factors related to it (e.g. multiple different definitions, the different criteria for the inclusion of the different types of technology, etc.). There have been many different definitions of mobile learning, and they mainly encompass different aspects of education and technology (Pietrzyk, Semich, Graham, & Cellante, 2011). Chuang (2009) explains mobile learning as "learning that happens across locations, or that takes advantage of learning opportunities offered by portable technologies" (p. 51). This explains the idea of learning anytime, anywhere using different mobile technologies (portable computers, mobile technology, Personal Digital Assistants 'PDA', etc.). This definition was considered the most for this research as it focuses on the various locations, in and out of the class, and focuses on the different portable, mobile technologies available for instructors (i.e. mobile devices, tablets, laptops, etc.). This definition is more practical for this stud as it explores and examines the actual uses and experiences of instructors for their courses' preparation and for the learning activities they conduct in and out of their classes.

Trifonova and Ronchetti (2003) state that “there is a common agreement that m-learning is e-learning through mobile computational devices”, and Alzaza and Yaakub (2011) add that “the main difference between e-learning and m-learning is in the addition of capabilities and limitations in the evolution aspects” (p. 96). They explained how “M-learning is considered as the next form of e-learning”, and how mobile learning offers more capabilities in regard to location and time (p. 96). Chuang (2009) again defines mobile learning as “learning that is enhanced with mobile tools and mobile communication” (p. 51). Mobile learning has recently been a major factor in the higher education environment, which is discussed in the following section.

Mobile Learning Environments in Higher Education

A mobile learning environment works better for colleges and universities than for K-12 schools due to the current regulations and policies in many schools regarding students obtaining mobile technologies in schools in many countries and especially in Saudi Arabia. A university campus may have the ability to provide students and instructors access to all the necessary resources, and can boost the learning efforts among students and faculty members by integrating the latest mobile technologies. Kim and Chung (2006) give a good example of a mobile campus where instructors and students could access “authentic” data and information, from the proper resources and refernces, using their mobile technology anytime and from any location around the campus (p. 1). This may help students be more productive and realize better achievements in their studies.

Ozdamli and Cavus (2011), in Figure 2, list the basic characteristics of mobile learning in a simple, yet very comprehensive way for understanding the best features that mobile

learning has. The main characteristics of mobile learning as mentioned by Ozdamli and Cavus (2011) are: ubiquity, being blended-offering variety of methods, portability, privacy, interactivity, collaboration, and providing instant information.

Figure 2: *The Basic Characteristics of Mobile Learning*

Note. From "Basic elements and characteristics of mobile learning" by F. Ozdamli and N. Cavus, 2011, *Procedia-Social and Behavioral Sciences, 28,* p. 940. Copyright 2011 by Elsevier Ltd. Adapted with written permission.

Today, mobile technology is creating different positive learning environments for learners in higher education (Liu & Milrad, 2010). Karimi, Hashim and Khan (2010) state that "mobile learning is anticipated to be the next substantial innovation in higher education" (p. 1). This explains how the new trend of mobile learning and its possibilities could improve the higher education environment. University communities are comprised of students, instructors, staff and management, etc., but when it comes to learning and instruction, the main focus is

on students and instructors who will be dealing with learning and instruction techniques. Therefore, wireless learning environments enable and increase the chances of collaboration and communication among students and instructors in different settings (Peters, 2007; Sotillo, 2002). Enormous technologies have been available for both instructors and students for collaboration whether using audio or video media tools and software, or through sharing texts and objects through the Internet, and for many other purposes.

Nagler and Ebner (2009) summarize the main aspects that need to be considered when integrating web 2.0 technologies into higher education, which are: ensuring clarity in all issues related to students' familiarity with the technology, the appropriateness of the devices to fulfill all the requirements, and the technology infrastructure of the university. Having clear answers to such points and questions would help in planning the integration very well. According to Alzaza and Yaakub (2011), "mobile technologies potentially create a wide variety of uses and limitations that differ significantly from desktop and laptop technologies" (p. 95). This shows the potential differences among the different types of devices and the different features and tools built in them. Such differences need to be considered when integrating mobile learning into different courses.

There have been some successful examples of integrating mobile learning and the uses of mobile technologies into the curriculum and the learning activities. More is explained in the following section.

Mobile Learning Integration

The different varieties of technologies (laptops, smart-boards, smart-phones, tablets, educational camera and projectors) used in educational settings and mainly in universities have

proven their effectiveness in the way they have changed the traditional ways of learning and instruction to more robust and innovative ways and methods. The different information and communication technologies (ICT) implemented and used in universities and school have changed and brought about new ways of learning and teaching methods (Fillion, Limayem, Laferriere & Mantha, 2009). The recent changes and wide-range developments in the delivery of content and the ways of learning and communication (audio, visual or with some simulation, etc.) that have been seen in educational institutions throughout the past decade are great examples of the huge benefits of technology. The major factor in judging the success of mobile learning is the willingness of learners and users to accept it or not (Wang, Wu & Wang, 2009); as preferences play a major role. However, Kim and Chung (2006) state that a "mobile learning environment is at the cutting edge of technology that facilitates student's learning and teaching, and both teacher and students are ready to integrate it into their curriculum" (p. 2).

Mobile learning offers many promises for better learning and education through the use of mobile technology (Motlik, 2008). Motlik supports this notion by explaining the reasons behind it (affordable devices, learners' familiarity with mobile technology, and "proper instructional design" (p. 1)) to ensure reaching the maximum benefits of mobile learning. Many researchers summarize the main benefits of mobile technology integration in higher education systems in terms of accessibility, flexibility, usability, interactivity and connectivity. (Kim & Chung, 2006; Moody & Schmidt, 2004; Sharples, Corelett & Westmancott, 2002).

Mobile learning integration in higher education environments, and within different courses, has found the respect and appreciation of the majority of students (Alzaza & Yaakub, 2011; Yordanova, 2007). Also, a study done by Al-Fahad (2009) examining students'

perceptions of the effectiveness of mobile learning at King Saud University in Saudi Arabia showed their willingness to use their mobile technology for academic activities and for reaching library resources. Heath, Herman, Lugo, Reeves, Vetter and Ward (2005) reported a great comparison between a traditional learning environment and a mobile learning environment (MLE). They showed multiple features that MLE can offer to students and instructors, and to the system, such as the different ways of interaction between students themselves or between students and instructors, the flexibility of connections, the ability of real-time streaming (audio or video), etc.

Fillion, et al. (2009) recommend that organizations, including universities, should keep up to the best ICT available in the market as well as help in the innovation of technology and electronic tools. Universities, along with corporations, companies, and other businesses, play a major role in the invention and advent of the technology we have nowadays. Having the best available tools is a good factor for producing newer and better tools in the future. For example, when universities make the best technology and tools available for their students, professors, etc., they invest in them and encourage them to produce and help in the invention and development of new ones or at least to improve them.

Mobile learning integration into different courses has shown to be very effective to improve instruction and learning. This is discussed with more details in what follows.

Improving instruction and learning through using mobile technology

In general, no one can deny the enormous advancements and the developments that technology has brought to education (teaching, learning, and the whole educational system). Mobile learning is comprised of the use of portable, mobile technology with the capability to

connect to the Internet or to other devices through various channels or means (Wireless, Bluetooth, RFID, infrared, and through wiring if needed).

With the notion of learning anytime, anywhere, and without the burden of carrying heavy books or bags, many educational entities have been studying the possibilities of mobile learning, and some entities have already considered implementing and integrating mobile learning into their curriculum and courses. Considering the easy access of mobile technology (phones, MP3s, PDAs, etc.), carried by students and instructors, they are valuable tools to reach learners and provide them with the educational materials (Santos & Ali, 2011), in different possible ways (Audio, pictures, text, video, etc.) in order to accommodate all instructors and students' needs and preferences.

Many mobile technologies and services have been used in classrooms such as SMS for administrative services, social media "social support" to encourage students (Santos & Bocheco, 2010), and regular phone calls. Many universities around the world are developing their technology infrastructure to adapt the many requirements needed for the new educational environment and to keep up-to-date with the new trends of technology and communication.

Instructors can design their courses and curricula to fit the mobile learning environment by producing mobile learning materials or e-learning materials that can be viewed, surfed and engaged with via mobile technology. Such materials come in different formats (e.g., podcasts, vodcasts, and mobile applications as well as assignments and exams for mobile technology which can be done by Blackboard learning management system or other tools, etc.). Santos and Ali (2011) state that "mobile technologies have increased the opportunities for informal

learning" (p. 850). Different mobile technologies can be adapted and used for many out-of-classroom activities in order to support course materials taught in class.

Many studies and projects are examining the possibilities and the benefits of integrating mobile technology into educational systems to improve curriculum and instruction. Valk, Rashid and Elder (2010) found that mobile learning (or learning through the use of mobile technology) is expanding in developing countries. They noticed a growth in the number of projects examining the use of mobile computing devices in different categories of education (i.e., different grades and courses). Mobile technology, and mainly iPads, are being adopted in higher education (Omiteru, 2012). Omiteru emphasizes the importance of providing teachers and users of mobile technology with regular training sessions and workshops.

Using mobile technology for educational communication and content delivery

Information and communication technologies (ICTs) have the potential to help instructors and students embrace different channels of communication and interaction (Valk, Rashid & Elder, 2010). They support the notion that mobile computing devices are considered to be "suitable tools" for advancing education in developing regions (p. 118). A study by Fillion, et al. (2009), in a large Canadian university, about onsite and online university professors and the integration of ICT in their teaching concluded that "in online courses ICT are taken as an integral part of the course compared to onsite courses where ICT are rather viewed as a complement to conventional teaching methods." (p. 26-27). Many instructors, through interviews in this study, expressed their views that the use of ICTs has improved their teaching as well as improving the presentation of the materials used in their teaching.

The advent of mobile learning and the use of the massive varieties of mobile technology have obviously enabled and created better ways to communicate (Peters, 2007). Mobile communication has already taken place in a large percent of schools and universities, along with other educational institutes around the world. Through the use of mobile technology, it is becoming very convenient for learners anywhere around the world-to access the different resources and materials provided and offered by universities (Ketterl & Oldenburger, 2013). Learners can access materials on universities' websites anytime, or from their channels on YouTube or similar sites, if they happen to have them.

The ease and convenience for students to consider mobile technology as one of the communication and content delivery mediums is expanding through the different platforms provided with/in the different mobile technology (Apple iOS, Android, Blackberry, etc.). A study done by Reader, Lindsay and Sultany (2012), as cited in Ketterl and Oldenburger (2013), indicates that 48% of learners prefer accessing their lectures online using their mobile technology.

Bonk and Zhang's R2D2 Model for Online Learning

The R2D2 model has been used for almost a decade since it was introduced in 2006 by Bonk and Zhang. This model is mainly for online learning as it helps in the design and delivery of online courses and their content, as a comprehensive online teaching model. The R2D2 model focuses and addresses the different learning preferences for online learners (i.e., verbal and auditory, reflective and observational, visual, and hands-on learners) (Bonk & Zhang, 2006).

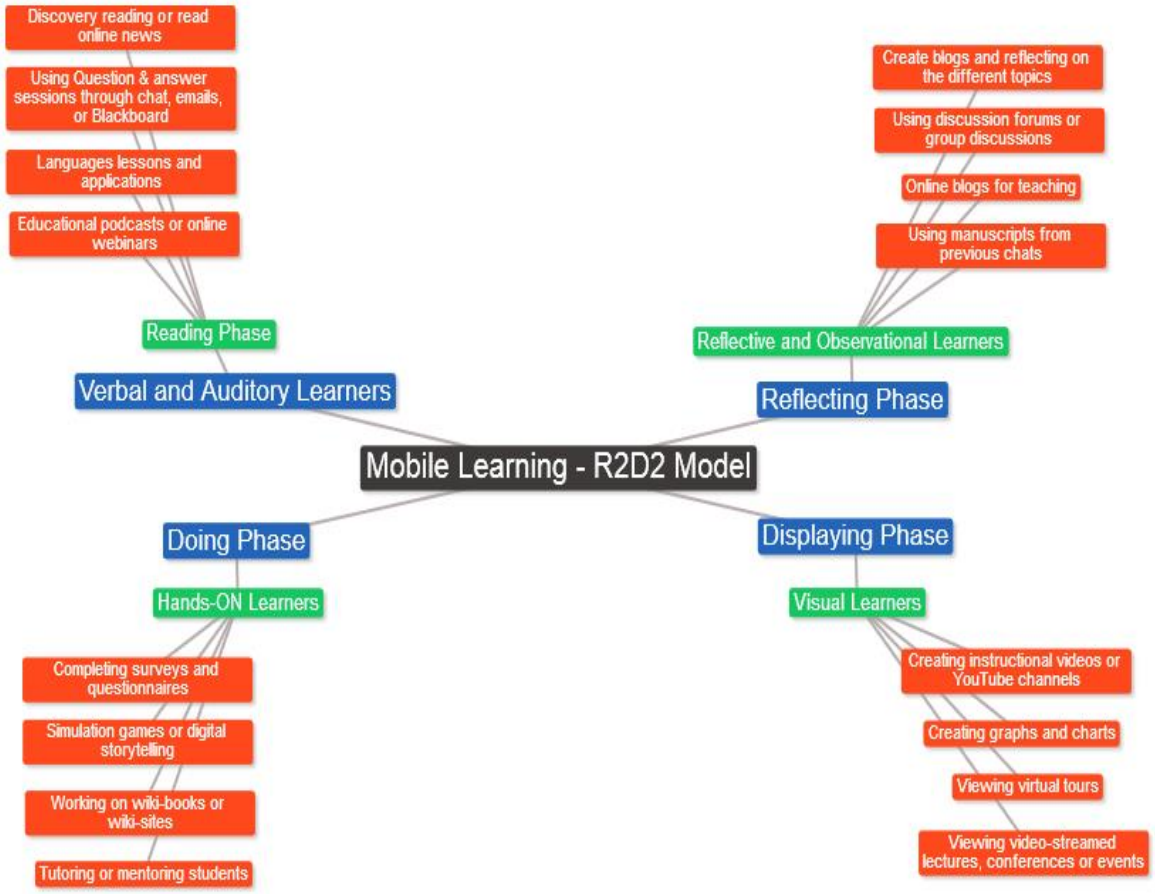
The R2D2 is an acronym for the four categories of the model (reading, reflecting, displaying and doing) which address the different preferences of online learners. After the noticeable sprouting of online courses throughout the world, and the increase of its demands by both instructors and students, R2D2 was introduced in order to help in creating online materials and help in choosing the best online delivery methods according to the learners' preferences. R2D2 model, as explained by Bonk and Zhang (2006), is "an easy-to-apply, practical model … that is designed to help online instructors integrate various learning activities with appropriate technologies for effective online learning" (p. 250). After the introduction of the R2D2 model in 2006, there came a need to further help online instructors with their online teaching and in the creation of online materials and to direct their choices of the many available tools.

A new book was introduced in 2008 by the same authors, Bonk and Zhang, titled "Empowering Online Learning: 100+ Activities for Reading, Reflecting, Displaying and Doing". A complete reference of activities and resources is found in the new book for online instructors to choose from and to direct their teaching. Again, it is important to mention that this R2D2 model, by Bonk and Zhang, which is used in this study is different from the other R2D2 model (Recursive, reflective, design and development) developed by Willis (1995) as an instructional design model. R2D2 model, by Bonk and Zhang, used in this study, was chosen because of its different categories that address the different learner preferences, and because of the model's various learning activities for the online learning which fit our study of the uses of mobile technologies.

Figure 1, earlier, explains the four categories of the R2D2 model and how they address the different learning preferences. Reading category addresses the auditory and verbal learners; reflecting category addresses the reflective and observational learners; displaying category addresses the visual learners; and finally, the doing category addresses the hands-on learners. This model should be used as a problem solving process or framework, and not as an instructional design model (Bonk & Zhang, 2006). This model, or the four categories, does not need to be followed or applied in order, but in fact, it can be used in whatever way that helps the online instructor to address the learners' preferences through the different suggested activities in each category (*Figure 1*). This model "provides some clues to what will actually work" (Zhang & Bonk, 2006, p. 3).

Figure 3 shows a mind-map of R2D2 model and its four categories addressing the different learning preferences along with many learning activities that can be done or performed using or via mobile technologies

Figure 3: *A Mind Map for R2D2 Model and Using Mobile Device for Educational Purposes*



The four categories of the R2D2 model in details

First category: Reading

Reading word has been used for its comprehensive coverage of the meaning of the first category of the R2D2 model. It means more than literally reading. Reading here means the acquisition of information and knowledge through auditory or verbal means or channels. This category is mainly addressing the auditory and verbal learners who prefer to learn through text, whether written or spoken (Bonk & Zhang, 2006). This occurs by reading books, newspapers,

listening to news podcasts, etc. The next section explains the most used activities in this category.

Sample activities suggested for reading category within R2D2 model

Bonk and Zhang (2008) suggest more than 25 activities for each category of the four categories. Some activities can be incorporated and used into more than one category. Here are listed some of the most used activities for the reading category such as reading books, listening to podcasts, discovery reading, web tours and safaris, online literature reading, online language lessons, online webinars and question-and-answer session with instructor. There are many more activities that can fall into the reading category or category. Such activities and others in the reading category should help the distance (online) instructors in designing their online courses and choosing the best activities that direct their verbal and auditory learners.

Bonk and Zhang (2008) give complete details for each activity including a description and purpose of the activity, skills and objectives needed to apply the activity, context in which the activity would be applied, some recommendations to be considered when choosing an activity and some great examples for the activities.

Second category: Reflecting

The second category of R2D2 model is reflecting, which addresses the reflective and observational learners (Bonk & Zhang, 2008). Reflecting is considered a major category in R2D2 model because of its effective impacts on learners. They need to read, read carefully and thoroughly and comprehend what they have read, in order to reflect and make judgments on what's been read or on the topic. Bonk and Zhang (2006) point out that reflective and observational learners are those "who prefer to reflect, observe, view, and watch learning,…,

and view things from different perspectives" (p. 253). To paraphrase this, reflective and observational learners are those who are deeply engaged or interested in the subject being studied or discussed, so they would put more inputs into the discussion or the presentation.

Sample activities suggested for reflecting category within R2D2 model

Twenty-five learning activities and more are suggested and explained, in Bonk and Zhang's book (2008), that fall into the reflection category or category of the R2D2 model in order to help online instructors facilitate and direct their teaching and to help their online learners get the most and the best of their learning. Some activities such as collaborative or team blogs, personal blogs, synchronous and asynchronous discussion combinations, self-check reflection activities, electronic portfolios, and some others are highly used and applied in the different online studies especially those which adapted the R2D2 model recently such as a study done by Kruger (2008) titled "Enhancing Student Learning Within a Flexible Learning Environment: Reflections of an Early Career Academic", and another study by Cartner and Hallas (2009) titled "Exploring the R2D2 Model for Online Learning Activities to Teach Academic Language Skills." In fact these studies incorporated all categories or components of R2D2 model into their studies and not only reflection.

Third category: Displaying

Displaying category is somehow different from the previous categories, and at the same time, it is completing after them by representing and displaying what the earners have learned or acquired. It is focused on visual learners through the creation and uses of concept maps, models, graphs, pictures, charts, etc. In fact, every learner does benefit from such category whether they prefer it or not, but those who prefer visual materials do learn far better than

others. Visual representation of the materials of information makes it more simplified and represented in a way that helps in understanding and comprehending it.

Sample activities suggested for displaying category within R2D2 model

Many great activities are suggested for this category such as creating flash visuals and animations, virtual tours, creating timelines or concept maps, online demonstration, drawing tools in asynchronous chat, etc. Such activities include pictures, videos, charts, maps, diagrams, etc. With the large number of tools available online, on the Internet, this category (displaying) plays a major role in learners' representation of their knowledge and understanding, and also to further their learning through the simple displayed visuals. The recent years have seen a great expansions in the design of learning objects (LOs) and in making them available for instructors and learners through the free or must-subscribe repositories such as Multimedia Education Resource for Learning and Online Teaching (MERLOT), Texas Learning Object Repository (TxLOR), or D2L Learning Object Repository, and many others. These learning objects or resources have been designed and stored in the different repositories to be purchased, or freely retrieved and then used in online courses. The learning objects and resources have been very helpful for the different online instructors and especially the new online instructors.

Fourth category: Doing

Doing category is for hands-on learners (Bonk & Zhang, 2008). Such learners prefer moving, doing, participating, and experiencing the learning whether in a classroom, laboratory, or outside of the school. In online learning, they can do group work in synchronous or asynchronous types of learning and compete their parts. This category focuses on encouraging

and directing learners to apply their knowledge and what they have learned in reality, in real life situations (Cartner & Hallas, 2009; Kruger, 2008). Although the categories of R2D2 model are not designed to be followed as stages or phases (One after the other) (Bonk & Zhang, 2008), in the doing category and by doing things, learners get the chance to learn from each other, share with each other, reflect upon each other's work, and help them get more engaged in their work. This is more obvious when learners' preference is hands-on learning.

Sample activities suggested for doing category within R2D2 model

The activities in this part of R2D2 model are mostly seen in the real world through cases, scenarios and simulation (Bonk & Zhang, 2006). There are different activities in this part such as creating galleries, online cases (business, medical or teacher education cases), games, designing websites action research, digital storytelling and others (Bonk & Zhang, 2008). Doing in online learning, online courses, somehow replaces the extra physical space needed for the traditional learning (e.g., laboratories, fields, libraries' rooms, etc.). This category is an important part where learners learn and pay back to the learning system at the same time (Bonk & Zhang, 2008). Everyone has experienced some activities of this category whether it was our learning preference or not, but when we really think back and reflect on such activities, we can see the huge benefits of those activities.

Learning Activities Selection Criteria

The four categories–reading, reflecting, displaying and doing- which represent the R2D2 model are primarily meant, through this way of division, to address the different learners' preferences (i.e., verbal and auditory, reflective and observational, visual, or hands-on learners). From the four different learners' preferences, the learning activities have been

selected and distributed into the four R2D2 categories based on some key instructional considerations (e.g., time, cost, risk, duration or activity, and/or whether the activity is learner or instructor-centered) (Bonk & Zhang, 2008).

Bonk and Zhang (2008) point out, at various chapters of their book, that some activities may be considered and applied to serve one or more categories at the same time. For example, they explained the use of podcasts where learners may listen to a podcast and this falls in the reading category for verbal and auditory learners, or some learners may choose or have been tasked to create a podcast and this falls in the doing category which addresses the hands-on learners. Learners may also choose to view a podcast tour, using their devices or the school device, to learn more about museums, locations, places, etc. and this falls within the reflecting category which addresses the reflective and observational learners. The same thing may be considered while selecting other activities to serve a certain category and to address a certain type of learners' preferences which depends on the course or lesson's plan created by the online instructor. Most importantly, selecting an activity may also depend on other factors such as availability of tools (whether free tools or those may be afforded), number of learners, or as noted by Schwartz, Clark, Cossarin and Rudolph (2004), complexity, user control, clarity, common technical framework if using a new online tool, besides the key instructional factors (i.e., cost, time, risk, and duration of activity), to help in determining the viability of applying the activity.

The several learning activities for all categories of the R2D2 model, 25 activities for each category, are shown in (Appendix A) including some indications and suggestions about

the uses and applications of such activities. This was based on experience and common uses of such activities and tools among educators.

Summary for R2D2 Model

Bonk and Zhang (2006; 2008) suggested and showed how the several activities in the four categories can be simply and effectively applied in online courses. They provided a great list of tools, technologies and resources for each activity and how to use them in detail. They have created this model as a framework to help faculty and instructors who would like to try out delivering and creating online courses. The R2D2 model will guide them through the many steps for designing and delivering their course materials to their online learners in the best way that suits instructors and at the same time suits the learners' preferences. This model would expand online instructors' boundaries and expose and show them what is really available and what is possible or applicable in online teaching and learning, and to urge them to consider most, if not all, available tools and make benefit of them for their courses. The R2D2 model is "a dynamic approach to online learning and instructional design" (Kuk, 2009, p. 546). Bonk and Zhang (2008) point out that many activties can be considered and used in more than one category as that depends on how the activity relates to the topic or lesson being taught or delivered.

Multimedia learning principles and R2D2 model

Multimedia learning principles have been around for almost two decades, since the late nineties. They stem from the cognitive learning theory which focuses on the mental part and how the human memory works mainly around receiving information through the different channels (visual and auditory channels). Richard Mayer is known for his work in multimedia

and e-learning where he set out the multimedia learning principles whose number has changed through the years where some principles have been merged with others. One of the recent publications of Clark and Mayer (2011) included these multimedia learning principles:

- Multimedia principle: using words and graphics rather than words alone,
- Contiguity principle: aligning word to corresponding graphics,
- Modality principle: presenting words as audio narration rather than on-screen text,
- Redundancy principle: explaining visuals with words in audio or text: not both,
- Coherence principle: adding materials can hurt learning,
- Personalization principle: using conversational styles and virtual coaches,
- Segmenting and pre-training principle: managing complexity by breaking a lesson into parts (Clark & Mayer, 2011).

From the list of principles above, we can see the close relationship of these principles and the R2D2 model's four categories (reading, reflecting, displaying, and doing and their several learning activities) in supporting Mayer's notion that "different people learn in different ways, so it is best to present information in many different formats." to help learners choose their preferred way of learning, or to help them rely on their most efficient channels of receiving information through varying the delivered materials–pictures, spoken words or printed words (Mayer, 2009, p. 120).

Multimedia learning "occurs when students build mental representations from words and pictures that are presented to them" (Mayer, 2003, p. 125). Types of multimedia are always seen in any type of distance learning, online learning and even mobile learning. R2D2 model comes handy to help online instructor design and deliver their online courses, and at the same

time helps them ensure committing and applying most, if not all, the multimedia principles that "meet human psychological learning requirement" (Clark & Mayer, 2011, p. 1-2). When paying close attention and maybe applying the R2D2 categories and their several activities into any course, we can notice how the multimedia principles are somehow automatically being applied. For example, the first category of R2D2 model (reading) if focused to answer the question: How will learners receive information? By choosing whatever activity from first category, we can see how the multimedia and modality principles are applied. Both principles focus on the auditory and visual channels of the human memory processing and how information is received. If we go with the second category of R2D2 model, reflecting and its activities, we can see how the personalization principle is applied by using conversational styles (i.e., first and second-person language), and making the online instructor and learner as if they are visible to each another in their blog reflection or group discussions, etc. If we apply activities from the third category, displaying, we can see how multimedia, coherence and redundancy principles are applied by creating learning materials and adding texts and pictures or creating presentation including different types of multimedia, and not adding any extraneous materials (picture, texts, sound, etc.) that may affect the learning.

The previous section is not a claim of perfecting R2D2 model for its applicability in any online course, but it was an example of its relations to the multimedia learning principles. Multimedia principles should be considered whenever an online course is designed. (Clark & Mayer, 2011).

Higher Education in Saudi Arabia

In 2013-14, an estimated number of 1,356,602 students were enrolled in all public and private universities, colleges, and higher institutions in Saudi Arabia, including the 25 Saudi government-sponsored universities, besides an estimate number of 64,689 faculty members (MOHE Statistics Center, 2015). Since 2004, higher education in Saudi Arabia has seen unprecedented moves, in its entire history, by opening 18 new government-sponsored universities. These new universities have been established to serve all parts and regions of Saudi Arabia. There has also been the opening of many private universities and community or technical colleges around the kingdom, which is relatively new to higher education in Saudi Arabia. Some universities and colleges have agreements for exchanging students and collaborating on research interests with other universities from different countries. A new trend has been noticed recently that foreign universities are opening branches and operating in Saudi Arabia. These changes are bringing major benefits to the educational system and to the educator and student body.

Table 2: *Number of students and instructors in Saudi Higher Education, and Saudi students studying abroad*

Year	No. of Students in Saudi higher education	No. of faculty members	Saudi Students Studying Abroad
2008-2009	757,770	41,589	58,710
2009-2010	903,567	49,528	80,827
2010-2011	1,021,288	54,167	116,121
2011-2012	1,206,007	59,442	174,645
2012-2013	1,356,602	64,689	199,285

MOHE Statistics Center (2015)

Table 2 shows the dramatic increases in the enrollments of students in higher education in Saudi Arabia in the five-year-period (2008-2013), as well as the number of Saudi students completing their undergraduate and graduate studies abroad. This reflects the major shifts, within the Saudi people and government, towards getting better education and towards improving the higher education system within the Kingdom of Saudi Arabia. More than 80% of Saudi students studying abroad are funded by the government through different channels (e.g., King Abdullah Scholarship Program (KASP), scholarships from universities and medical cities, etc.).

The Saudi government recently spent a huge amount on education, SR 204 billion or almost $ 54 billion in 2013, and similar amounts were granted and spent in previous years. A large portion of approximately 40% of this budget goes to higher education and governmental universities around the Kingdom to allow them to embrace and integrate the latest technology and improve their teaching and instruction techniques. Many Saudi universities are making international partnerships with foreign universities for different reasons (e.g., exchanging students, developing and improving curricula, academic training, medical training services, etc.), and some are contracting with international technology providers to provide technology services, training, maintenance, and updates. Furthermore, in 2011, the Saudi Electronic University (SEU) was established to help in serving all remote regions of the Kingdom, and to offer better services for different preferences, such as studying online while working, taking extra degrees, offering technological courses and training for employees, etc. The Saudi Electronic University was established only after the assurance of advancements of technology and communication infrastructure throughout the Kingdom.

In 2010, the Kingdom of Saudi Arabia initiated a large plan to achieve excellence in science and technology in higher education. Within and beside this large plan there are other plans such as the horizon (Afaq) plan for Higher Education, the national plan for communication and information technology, and the ministry's five-year plan encompassing the whole system of higher education. Working in accordance with these plans, the new universities have been established with more than a hundred medical and engineering colleges, the allowances and incentives system for faculty members has been updated and improved for better recruitments and encouragements, advanced research centers have been opened and a large budget is allocated for them along with many other developments and services (Ministry of Higher Education, 2010). These plans are to be completed in cooperation with other ministries and governmental entities within Saudi Arabia. In other words, such projects and changes in policies help in reforming higher education in Saudi Arabia to support Saudi Universities to be recognized at the global university ranking mainly through "embodying a Saudi model for knowledge-based socio-economic growth" (Al-Mubaraki, 2011, p. 415).

The horizon (Afaq) plan "is a 25-year plan defining the vision for Saudi Higher Education, its mission, needs, types, output quality and funding methods" (Pavan, 2013, p. 28). As listed in the Ministry of Higher Education's plan to achieve excellence in science and technology, Afaq plan focuses on these objectives:

- developing creativity and excellence among faculty members,
- developing student skills,
- creating applied programs,
- consolidating the quality assurance system in higher education,

- creating partnership with the industry and business sector,
- developing e-learning and distance education,
- developing information systems in higher education,
- achieving a high-speed educational network linked to the internet,
- and creating digital knowledge content. (Ministry of Higher Education, 2010)

The horizon (Afaq) plan focuses on the development and implementation of distance learning and e-learning. Thus, the Ministry of Higher Education, in Saudi Arabia, has established a number of projects to help in the development of the infrastructure of distance learning. The project are, as listed by Almarwani (2011):

- The National Centre for E-Learning and Distance Education (NCELDE),
- The Learning Portal of the National Center of E-learning and Distance Learning,
- JUSUR, A Learning Management System,
- MAKNAZ, National Repository for Learning Objects,
- Excellence Award of e-learning in university, on a yearly basis,
- Training Programs for faculty members and technical staff in the Saudi universities in the area of e-learning and its applications,
- Saudi Digital Library,
- And, SANEED, the Saudi Centre for Support and Counselling to all beneficiaries of e-learning (Almarwani, 2011).

More and more universities in Saudi Arabia are considering and, in fact, starting the implementation of different technologies that serve distance learning (Altameem, 2011). Nassuora (2012) highlighted the great efforts Saudi universities are undertaking to integrate

recent technology for different uses. Some Saudi universities have adapted and been using the short messaging service (SMS) for a while, and the service is available for both instructors and students; for example, students may send direct messages to their phones from any lab-PC around the campus in King Saud University (Altameem, 2011).

Technology in Saudi Arabia

Technology is becoming the nerve of most aspects and parts of our lives. All developed and developing countries are chasing after the newest and latest technology. Saudi Arabia is no different. Saudi Arabia has been making great efforts to ensure having the latest and the most developed technology in all governmental, educational and industrial entities. In recent years, Saudi Arabia has been considered as the biggest market of technology in the Middle East. There have been enormous changes in the technology infrastructure in Saudi Arabia in order to be capable of offering excellent services for all citizens and residents of Saudi Arabia as well as handle and secure it through the initiation of many e-government programs and initiatives. Businesses as well as educational, medical, military and social services are being improved and well-served by the advancements of technology and the governments' efforts of integrating technology in all aspects.

As the information and communication technologies (ICTs) play a major role in developing countries and improving their educational and economical systems, and impacting their societies, Saudi Arabia was ranked 31st in the list of 144 countries regarding the Network Readiness Index (Bilbao-Osorio, Dutta & Lanvin, 2013). This report relied on 10 pillars where each pillar has many indicators. The following indicators show where Saudi Arabia was ranked among the other 144 countries (availability of latest technologies #34, mobile phone

subscriptions #2, Firm-level technology absorption #20, Importance of ICTs to government vision #7, government success in ICT promotion #3, government procurement of advanced technology #5, ICT use and government efficiency #7). There are many other indicators regarding the social impacts, skills, affordability, etc. but the above mentioned indicators show the importance of technology in Saudi Arabia, and how the government is making a positive impact on business, educational, and governmental entities to embrace the latest technologies and integrate them into the different services for the public and promote for them. Moreover, in the World FactBook, Saudi Arabia is ranked 30th among all other countries regarding the Internet users, and ranked 26th for mobile cellular subscribers (CIA, 2015).

Ketterl and Oldenburger (2013) point out that Saudi Arabia ranks sixth out of the top ten countries in Google Play, in the category of education. This category is based on data from Google Play showing the various uses of educational applications and how the technology is used in different educational aspects on a global scale.

Summary of Literature

This review of literature about mobile learning in higher education and mainly about Saudi Arabia has shown some support for conducting this study. It has shown that there is a need to have a comprehensive understanding of instructors' current uses and experiences of mobile technology for teaching and learning in Saudi universities. This would help university administrators and decision-makers to better understand the needs and the infrastructure requirements for mobile learning integration in higher education in Saudi Arabia.

Colbran and Al-Ghreimil (2013) clearly point out that "pure distance education is a small component of the current system in the Kingdom. One question to consider is: What role

will Saudi Arabia play in developing distance education in the Arab world and beyond?" Pavan (2013) supports this point and links it to the recent advancement of technology in Saudi higher education showing how universities and administrators should consider adapting and changing in making greater efforts towards distance education.

This review, again, showed enormous advancements in technology and communication in Saudi Arabia, and that some universities are looking forward to implementing mobile technology into some of their courses and services and mainly for teaching purposes. This was emphasized by the many studies done in Saudi universities, but mainly including students' perspectives on using mobile technology and was done in specific courses. This literature review has shown tremendous opportunities for facilitating learning through the use of mobile technology for many courses, and that this practice may be generalized to other fields and courses. This review has shown how mobile learning could boost the learning processes and activities and the possibility of helping students with some needs in offering them new ways for collaboration and making their learning more active and effective. This review shows a need to investigate university instructors in Saudi Arabia regarding their uses of mobile technologies, if any, for teaching and learning and for communication with their students, in general, and to find more of what might be the barriers or the motives behind their consideration of mobile learning into their courses. The R2D2 model, explained in the literature review, and used for this study, will be a comprehensive guide for university instructors to integrate mobile learning into their courses through the perfect selection of activities that suit their students and the environment of the course.

CHAPTER 3: RESEARCH METHODS

Introduction

Chapter 3 consists of an overview of the methods used for this research study including: (1) a rationale for considering mixed methods for this research study, (2) population and sampling procedures, (3) pilot study details, (4) data collection procedures for both pilot and main study, (5) validity and reliability of the instruments, (6) data analysis, (7) and the limitations of this study.

This mixed-method research study was done to broadly and comprehensively investigate the current uses and experiences of mobile technology by university instructors in Saudi Arabia for teaching and learning. The study looked at the individual level as well as the institutional level (Saudi public universities) to gain a common understanding of the instructors' usage and experiences of mobile technology and the motives or hindering factors behind them. This study adapted the R2D2 model (Reading, Reflecting, Displaying, and Doing) by Bonk and Zhang (2008) as a framework and as an instrument to guide the data collection and analysis. This research study is an exploratory study using both qualitative and quantitative methods that helped in collecting valid and reliable data and helped in better understanding and contribution to the academic literature through answering the following research questions:

Research Questions

Q 1. What are the university instructors' general experiences in using mobile technology in higher education?

Q 2. What are the university instructors' attitudes towards using mobile technology for teaching purposes?

Q 3-A. To what extent are R2D2 categories balanced in their integration to address the learner preferences? What categories are considered most?

Q 3-B. How frequently do university instructors use their mobile technology for creating and conducting the learning activities?

Q 4. What are the instructors' views about the role of mobile learning in the next generation of learning in Saudi Universities?

Q 5. What concerns do university instructors have, if any, about using mobile technology in their teaching practices?

Research Design

This research used different methods of data collection (i.e. survey and interviews). The research questions required different tools like the survey and interview in order to answer them, so this study was a mixed-method research study including qualitative and quantitative data. There are strengths and weaknesses in each of these methods; thus, the researcher used both methods for the greater benefit as it was recommended by Burke Johnson and Onwuegbuzie (2004) that "using different strategies, approaches, and methods in such a way that the resulting mixture or combination is likely to result in complementary strengths and non-overlapping weaknesses" (p. 18). Combining the strengths of both methods helps us learn more about the study topic and the research questions in a broader and more efficient way. Using mixed

methods helps us understand the different aspects of social sciences mainly attitudes, beliefs, and perceptions of people (Creswell, Plano Clark, Gutmann, & Hanson, 2003).

Population and Sampling

The population of this study was all university faculty members including professors, associate professors, assistant professors, lecturers, instructors, or teachers from the 25 Saudi government-sponsored universities to which they are affiliated. This included both male and female instructors, no matter what their fields were or what their educational or academic ranks were. Since the number of this population was very large, the researcher used a stratified sampling method to set out two different groups of the population and make the sampling as comprehensive as possible to help in getting reliable data. Levy and Lemeshow (2013) explain that "stratified sampling is used in certain types of surveys because it combines the conceptual simplicity of simple random sampling with potentially significant gains in reliability" (Chapter. 5, para. 10). This study focused on two groups (Saudi university instructors in Saudi Arabia, and Saudi university instructors currently completing their graduate studies overseas). One group was the Saudi university instructors who are at their home universities in Saudi Arabia during the time of the research (In-home strata/group). The second group was the Saudi university instructors currently completing graduate studies abroad (overseas) who are affiliated with the 25 Saudi governmental universities as instructors, lecturers, or teachers (Abroad strata/group). Both groups were reached through using the survey instrument and interviews. There was one inclusion criterion for the online survey instrument that participants must be affiliated with one of the Saudi public universities.

Reliability and Validity

Reliability refers to how an item or tool is consistent when used in different contexts (Juni, 2007). Some of the survey main items were worded differently (reversed) to guarantee getting the same information. This was done in the pilot study as well to verify the reliability of the items before conducting the main study.

The survey items and questions were checked for their validity with the current content validity guidelines for Internet survey provided by Dillman, Smyth and Christian (2014) which are:

Guideline 1: Choose the appropriate question format,

Guideline 2: Make sure the question applies to the respondent,

Guideline 3: Ask one question at a time,

Guideline 4: Make sure the question is technically accurate,

Guideline 5: Use simple and familiar words,

Guideline 6: Use specific and concrete words to specify the concepts clearly,

Guideline 7: Use as few words as possible to pose the question,

Guideline 8: Use complete sentences that take a question form, and use simple sentence structures,

Guideline 9: Make sure "yes" means yes and "no" means no,

Guideline 10: Organize questions in a way to make it easier for respondents to comprehend the response task. (Dillman, Smyth & Christian, 2014)

The survey questions were sent to an expert in the area of mobile technologies in higher education to review the instrument and to provide comments about the items' relevance and content and construct validity. The expert was provided with a three-point scale to review the survey items for their content validity as follows: 1) not relevant, 2) needs revision, and 3) relevant. Then, the items were revised based on the experts' comments and feedback. Some

other factors were considered as well, when designing the online survey, such as the visual layout of the survey and the order in which the questions were asked (Dillman, Smyth & Christian, 2014). One expert from the Instructional Technology Department, Wayne State University, Detroit, MI reviewed the design of the online survey and its appearance and layout.

Translation and Design of the Survey Instrument

The survey instrument was available online for participants in both Arabic and English languages. A forward/backward translation was done to translate the survey from English to Arabic in order to have questions in both languages available for participants. The translation from English to Arabic was done by the researcher, who is fluent in both Arabic and English languages, and the backward translation from Arabic to English was done by a doctoral graduate in the Instructional Technology Program at Wayne State University. The graduate is fluent in English and Arabic languages and had prior professional work-related translation experience. Furthermore, two Saudi doctoral students in the Instructional Technology Department reviewed the survey translation for content agreement.

The Qualtrics survey website, made available by Wayne State University, was used for designing and developing the online survey, and for sharing the link with participants for the study, and collecting the data which later were analyzed using SPSS software.

The Survey Construction-Development

The survey was developed in five sections, and each section had various items as follows:

Section One: Demographic Information (Instructors' Characteristics)

This section focused on the different demographic information that helped in better understanding the sample of this study. Instructors were asked to identify their age, gender, their Saudi universities with which they are affiliated, their majors, their experiences in higher education (in years), their academic levels/ranks, whether they were working at their Saudi universities during the time of the study or they were completing the studies abroad, whether they use mobile technology in their teaching, types of mobile devices used in or for teaching purposes, their experiences with mobile technology in teaching, and whether or not their universities provided them with any formal training to use mobile technology in class or for teaching (Appendix D).

Section Two: Instructors' General Experience with Mobile Technology in Higher Education

This section focused on university instructors' experiences with mobile technology in higher education. This section had eight items, and used a Likert-Scale (1-5). The Likert-Scale used for collecting the data was as follows: (1) *Never*, (2) *Rarely*, (3) *Sometimes*, (4) *Often*, and (5) *Always*. (Appendix D)

Section Three: Instructors' Attitudes Towards Using Mobile Technologies for Teaching Purposes

This section focused on university instructors' attitudes towards using mobile technology for teaching purposes. This section had eight items, and used a Likert-Scale (1-5). The Likert-Scale used for collecting the data was as follows: (1) *Strongly Disagree*, (2) *Disagree*, (3) *Neither Agree nor Disagree or Neutral*, (4) *Agree*, and (5) *Strongly Agree*.

Section Four: Learning Activities and Course Preparation Via Mobile Technologies

This section focused on the learning activities and course preparation done by university instructors using mobile technologies. This section had 16 items which were divided into four categories, and used a Likert-Scale (1-5). The Likert-Scale used for collecting the data was as follows: (1) *Never*, (2) *Rarely*, (3) *Sometimes*, (4) *Often*, and (5) *Always*.

Adapting R2D2 model and its activities for the survey instrument

Table 3 shows the way R2D2 model was adapted and used to develop the fourth section and some semi-structured open-ended questions in the survey instrument. The statements or items, in Table 3, were divided into four categories, the way they are in the R2D2 model, and each category has four different randomly-selected statements and items about four different activities for that category. In each category, two of the items are mainly for the uses of mobile technology by the instructors themselves and they are marked as (I) in the table, and the other two items are for the uses of mobile technology by the students themselves after being requested, by the instructors, to use mobile technology in a course and they are marked as (S) in the table.

Table 3: *Explanation of the adaptation of the R2D2 model, used in the survey*

		Statements Through mobile technology, how often do you do these learning activities in your courses/lectures:	Never 0	Rarely 1-5/ semester	Sometimes 6-10 times/ semester	Often 11-15 times/ semester	Always Every day
Reading	**I**	Listening to educational podcasts or online webinars.					
		Accessing languages lessons and applications.					
	S	Asking your students to do discovery reading or read online news.					
		Doing any question and answer sessions with your students, through chat, emails, or Blackboard for example.					
Reflecting	**I**	Using manuscripts from previous chats with other lecturers or students in your teaching, if necessary.					
		Creating and managing online blogs and using them in your teaching.					
	S	Asking your students to use discussion forums or group discussions.					
		Asking your students to create blogs and reflect on the different topics in your course.					
Displaying	**I**	Creating instructional videos and showing them in your classes, or posting them to a YouTube channel.					
		Using your mobile technology in your class to create and show graphs and charts.					
	S	Asking your students to view virtual tours and share them with their peers in class.					
		Allowing or asking your students to view video-streamed lectures, conferences or events.					
Doing	**I**	Creating or completing surveys or questionnaires using the mobile technology.					
		Creating any simulation games or digital storytelling to be used in class via your mobile technology.					
	S	Asking your students to work on wiki-books or wiki-sites as a project (for editing, modifying, etc.).					
		Mentoring your students through mobile technology.					

Section Five: Open-Ended Questions

This section focused on getting more in-depth information (Qualitative data), and it had five questions.

The first question was a follow-up for the previous section (Section 4), and it was displayed only to respondents who selected *NEVER* for three learning activities or more from the learning activities' section (Section 4). This question was developed to get a better insight into the reasons (problems, obstacles, risks, etc.) and the rationale behind not using mobile technology for the learning activities that were *NEVER* done.

The second question was a follow-up for the previous section (Section 4), and it was displayed only to respondents who selected *ALWAYS* for three learning activities or more from the learning activities' section (Section 4). This question was developed to get a better insight of the reasons (motives, advantages, recommendations, suggestion, etc.) and the rationale behind considering and using mobile technology for the learning activities that were *ALWAYS* done.

The third question asks instructors about their thoughts of mobile technology and whether or not they think mobile technology could be a major learning tool in the coming years (mainly to find out if there has been a shift towards using mobile technology or towards mobile learning).

The fourth question focused on the advantages that could be gained from using mobile technology for teaching.

The fifth question focused on the disadvantages of using mobile technology that may affect instructors' teaching or disturb the class while learning.

Pilot Study Details

A pilot study, which sometimes is referred to as a smaller or mini version of the main study, was considered a great step with which to start a large research endeavor. It covered and delivered the big picture of the research, and helped the researcher to vision the full picture in a smaller scale. One of the best descriptions for pilot studies is that, as described by Van Teijlingen and Hundley (2002) where they stated, "pilot studies are a crucial element of a good study design." (p. 33). A pilot study of this research, using the online survey instrument, was conducted with Saudi university instructors (n = 15) affiliated with Saudi Universities currently completing their graduate studies at Wayne State University to ensure the validity and reliability of the questions, and to make any necessary changes or modifications before conducting the main study. After obtaining the approval from Wayne State University's Institutional Review Board (IRB), the survey was created using Qualtrics survey website and the link was emailed to 15 Saudi instructors (graduate applicants and candidates) completing their studies, in a variety of disciplines, at a large public research university (RU/VH) as per Carnegie classification (2015), in the Midwest, U. S. A., asking their help in completing it. The survey included many pages including a welcoming and introduction page, a research information page which included the participants' rights while and after participation, and then the different sections of questions in order to answer the main research questions. The participants had one week to complete the online survey. The participants provided comments and suggestions about the design of the survey, translation of the questions, and the time needed for completing the survey, and then many sections were changed accordingly such as

that: some questions were changed to statements for clearer understanding, and the explanation of the Likert scale for frequency (Never-Always) in the fourth section was changed from weekly basis to semester basis to measure the uses of mobile technology for conducting or doing the mentioned learning activities. Some demographic questions were modified to make them appropriate for both genders and all academic ranks.

Data Collection Procedures

Mixed methods of qualitative and quantitative data were considered and used in this research study to have better understanding of the collected data. Using mixed methods in research studies have shown the strength of the studies by having extra qualitative data to support the quantitative data and that helps in making them more valid and reliable, and helps in better representation of the data (Johnson & Turner, 2003). The demographic part along with the open-ended questions were to gain better understanding of any influences over the instructors' decisions for integrating mobile learning into their different courses.

After obtaining the IRB's approval, and conducting the pilot study, the researcher made all necessary changes and modifications to the survey instrument. Then, the survey instrument was sent through Saudi Arabian Cultural Mission's (SACM) social media, to all Saudi university instructors who are currently completing their graduate and post graduate studies in the U.S. In addition, the link to the survey was distributed through the social media channels, mainly Twitter and Facebook, to the pages and groups of Saudi graduate students in other countries, other than the U.S. (The United Kingdom, Australia, and Malaysia) for the Saudi instructors overseas (Stratum no. 2), and to the pages and groups of Saudi Universities for in-home instructors (Stratum no. 1). SACM and some Facebook and Twitter groups'

administrations were contacted earlier, and they agreed to help in this matter. There were some reminders through the social media assigned pages to participate in the survey.

Six personal interviews were conducted separately, through Skype software (Audio only), with six instructors-participants, after getting their verbal permissions to record the interviews. Two participants were from the first stratum (first group, In-home group), while the other four participants were from the second stratum (abroad group). Member-check was done with interviewees, after transcription, to ensure having data accuracy.

Data Analysis

The available software SPSS (latest version 22) was used to analyze the data from the survey and interviews. Descriptive statistics were considered and used to present the participants in the different groups and their demographic information. Likert-type scale (1-5) was used in the survey instrument to help in the analysis process. Open coding was utilized in this research to analyze the data after the survey (open-ended questions) and the interviews were conducted to help relate the data to the predetermined categories, R2D2 categories (i.e., reading, reflecting, displaying, and doing) and be able to compare between them. Interviews were transcribed to help in this matter. Analyzing data from the interviews followed these steps (Mansell, et. al, 2004):

- Interviews were audio-recorded, after permission to record was obtained from participants,
- All interviews were transcribed,
- Data were categorized into themes,
- Data were reanalyzed for content validity.

All data were deleted and destroyed after the research has been completed, and no identifiers were kept at any time during or after the study.

Table 4 explains the different data collection and analysis methods used for each research question.

Table 4: *Summary of Research Questions, Data Sources, Collection Methods, and Data Analysis Method*

Research Questions	**Data Sources**	**Collection Method**	**Analysis Method**
What are the university instructors' general experiences in using mobile technology in higher education?	Instructors	Survey Interview	-Using SPSS -Descriptive statistics. -Central Tendency -Open coding using the four R2D2 categories (reading, reflecting, displaying, and doing).
What are the university instructors' attitudes towards using mobile technology for teaching purposes?	Instructors	-Survey -Interview	-Descriptive statistics. -Open coding using the four R2D2 categories, and other found themes.
To what extent are R2D2 categories balanced in their integration to address the learner preferences? What categories are considered most? - How frequently do university instructors use their mobile technology for creating and conducting the learning activities?	Instructors	Survey	- Descriptive statistics. -Chi Square for frequency - Mann Whitney U test and T-test, for significance and differences between the two groups (In-home instructors and instructors abroad) -Kruskal-Wallis (One-way Analysis of Variance):
What are the instructors' views about the role of mobile learning in the next generation of learning in Saudi Universities?	Instructors	Interview	-Open coding using the four R2D2 categories, and other found themes.
What concerns do university instructors have, if any, about using mobile technology in their teaching practices?	Instructors	Survey Interview	-Open coding using the four R2D2 categories, and other found themes.

Potential Limitations

The potential limitations for this study were the followings:

- The use of mobile technology-smart phones was banned in some female colleges and highly discouraged in other female colleges, which did not help in extracting clear results of their actual uses of mobile technology-smartphones for teaching and learning. (Many female instructors explained that they use their smart-phones for course preparation in home and sometimes at the college, but they cannot use them in class. They use laptops in class.)
- The inter-connection among mobile learning, online learning, and e-learning definitions and their characteristics seemed to make some confusion, especially to instructors who do not use technology or only use them at a minimal rate.

- The targeted population for this research were all instructors from the 25 public universities in Saudi Arabia; however, this study might be applicable in other countries with similar characteristics, especially in higher education (e.g. countries which always adapt the newest mobile technology for their instructors and students, countries which frequently send their instructors abroad to complete their graduate studies, etc.).

Ethical Consideration

Collaborative Institutional Training Initiative (CITI) training modules were completed prior to submitting the study proposal to the IRB. Then, the Institutional Review Board (IRB) approval was obtained from Wayne State University (WSU) before conducing the pilot study and before starting the data collection procedures (Appendix H). The confidentiality and

anonymity of participants-instructors were the most important aspects that were considered throughout the research journey.

Summary

This chapter covered the different steps and procedures that carried out this mixed-method research study using qualitative and quantitative data and different analysis methods which investigated the Saudi instructors' uses and experiences of mobile technology in higher education for teaching and learning. This chapter included: (1) a rationale for considering mixed methods for this research study, (2) population and sampling procedures, (3) pilot study details, (4) data collection methods for both pilot and main study, and (5) data analysis procedures.

Chapter 4 covers the complete data analysis preparation and procedures for this study including all data from the survey and the interviews.

CHAPTER 4: RESULTS

This chapter covers and presents the results of the data analysis regarding the main research questions. Demographic information is presented early in this chapter to have a better picture and understanding of the participants and the two study groups (In-home or Abroad instructors) they refer to. The first part focuses on the research sample characteristics and description, the second part focuses on the quantitative and qualitative analyses for the research questions, and the third part focuses on the findings from the open-ended questions included in the survey instrument.

Reliability of Instrument

Reliability refers to how an item or tool is consistent (the consistency of the measurement) (Juni, 2007). Cronbach's Alpha (α) was calculated to check and evaluate the reliability of the survey instrument and sections used to collect the data. As shown in Table 5, Cronbach's Alpha was calculated for the main sections of the online survey (instructors' experiences of using mobile technology, the instructors' attitudes towards using mobile technology for teaching purposes, and the learning activities and course preparation done via mobile technologies in total, and within the four categories, reading, reflecting, displaying, and doing). Table 5 shows the details for the calculation of Cronbach's Alpha Coefficient for all sections and the number of items in each section. The Cronbach's Alpha Coefficient for the general experiences section with eight items was (.88), and for the attitude section with eight items was (.82), and for the learning activities section with 16 items was (.93). The consistency among the survey items is reliable as the values of Cronbach's Alpha were considerably high.

Table 5: *Reliability Coefficient*

Variables	N of Items	*Cronbach's Alpha (α)*
General Experiences of Using Mobile Technology	8	.88
Attitudes Towards Using Mobile Technology for Teaching Purposes	8	.82
Learning Activities and Course Preparation	16	.93
Reading Category	4	.92
Reflecting Category	4	.96
Displaying Category	4	.94
Doing Category	4	.94

Note. General corrections performed to calculate internal consistency ("α" represents "Cronbach's alpha") of each subscale: Reading, Reflecting, Displaying, and Doing.

Participants Profile

The targeted population was all instructors in the 25 public universities in Saudi Arabia. The characteristics and detailed description of the research sample is explained in this part. The following tables present the details and description of participants in this study (All of them were university instructors affiliated to Saudi public universities). This includes the instructors' age, gender, current academic level, academic majors, educational experience (years of teaching in higher education), locations of their universities by regions, the groups they fall in (for this study) (In-home group or Abroad group), whether they use mobile technology in their teaching, types of mobile technology used by instructors, experience of using mobile technology (in years), and previous formal training for mobile technology, if any.

The total number of participants in this study was 372 through the survey instrument, and six participants for the interview. Eleven participants chose not to complete the survey. 361 participants completed eight questions of the nine main questions for the demographic section. Some participants left the survey right after the demographic section and some

completed the other sections. It was reported to the researcher that there were some issues in Qualtrics software itself such as that the NEXT button didn't appear at all to participants. This was reported from participants who used smart-phones and iPads to complete the survey. Two-hundred forty-one (241) participants completed the whole survey (all questions) with no problems.

Summary of participants' age and gender

Through the survey tool, the participants were asked to identify their age and gender. Their responses were summarized using frequency distribution for better presentation as shown in Table 6.

Table 6: *Frequency Distributions: Gender and Age of Participants*

Gender and Age of Participants	Population	No. of Participants	Percent
Gender			
Male	36211 (57.49 %)	203	56.20 %
Female	26780 (42.51 %)	152	42.10 %
Prefer Not to Answer		6	1.70 %
Total	62991 (100 %)	361	100 %
Missing		0	0.0
Age			
20-29		156	43.20 %
30-39		162	44.90 %
40-49		36	10 %
50-59		5	1.40 %
60 and over		1	0.30 %
Prefer not to answer		1	0.30 %
Total		361	100 %
Missing		0	0.0

Figure 4: *Percentage of Participants' Gender*

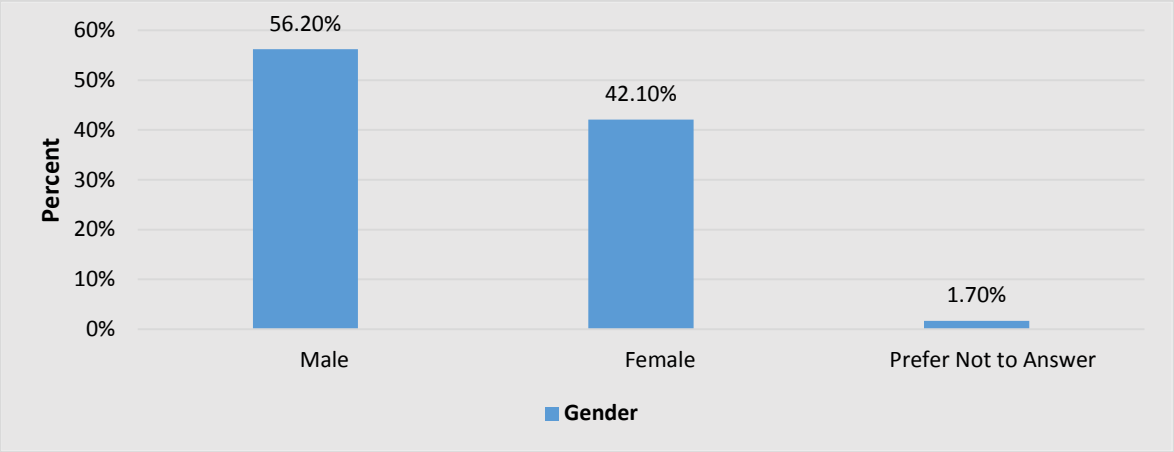


Figure 5: *Percentage of Participants' Age*

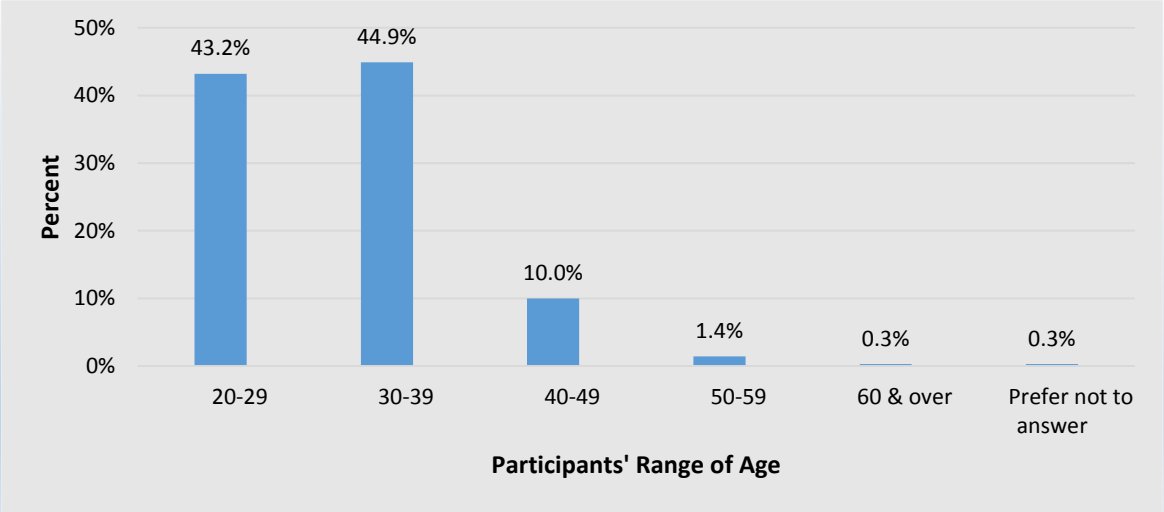


Table 6 shows that there were 203 male participants (56.2 %), and 152 female participants (42.1 %), where six participants (1.7 %) preferred not to declare their genders. The most recent statistics for higher education in Saudi Arabia (2013-2014) shows that the total population for all instructors in higher education was (62991) in their different ranks and in all disciplines and majors. This included both male instructors (n= 36211, 57.49%), and female instructors (n= 26780, 42.51%). (MOHE Statistics Center, 2015)

The results show that the instructors' age ranged from 20 to 62 years old. It is shown in Table 6 and illustrated in (Figure 4 and Figure 5) that 156 participants (43.2 %) indicated that their ages were between 20 and 29 years, 162 participants (44.9 %) indicated their ages to be between 30 and 39 years old, 36 participants (10 %) indicated that their ages were between 40 and 49 years old, five participants (1.4 %) were between 50 and 59 years old, and only one participant (0.3 %) was over 60 years of age. One participant (0.3 %) preferred not to indicate his/her age by choosing "prefer not to answer".

As shown in Table 6, the majority of participants were of younger age, and this is of no surprise to the new technologies and new trends such as using mobile technologies in teaching and learning. Another speculation for the lower participation from higher-rank instructors (Associate professors and professors) is that they are mainly into research more than teaching practices.

Summary of participants' current academic level

Table 7 shows the most recent statistics for instructors in higher education in Saudi Arabia for the 25 public universities (including both strata, In-home group, and Abroad group).

Table 7: *Recent Statistics for Instructors in Higher Education (2013-2014)*

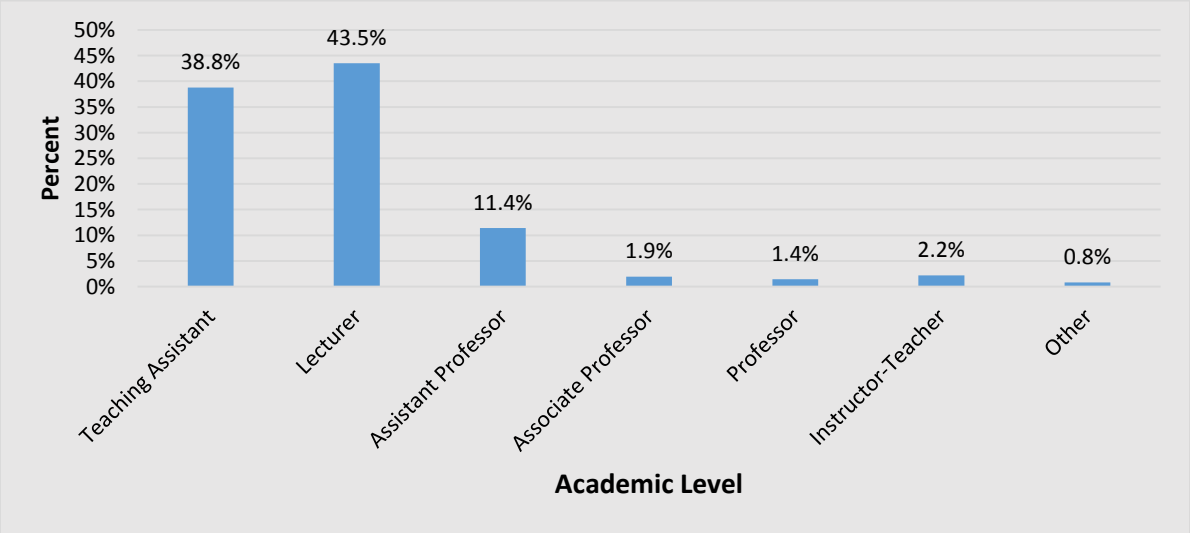
Teaching Assist.		Lecturer		Assist. Prof.		Assoc. Prof.		Professor		Teachers-Instructors	
Male	Female	M	F	M	F	M	F	M	F	M	F
8,131	9,852	6,489	7,211	12,821	6,906	4,863	1,548	3,012	480	895	783
17983		13700		19727		6411		3492		1678	

The participants were asked to provide their academic levels or ranks during the study which are presented in Table 8.

Table 8: *Frequency Distributions: Participants by Academic Level*

Current Academic Level	No. of Participants	Percent
Teaching Assistant	140	38.8
Lecturer	157	43.5
Assistant Professor	41	11.4
Associate Professor	7	1.9
Professor	5	1.4
Instructor-Teacher	8	2.2
Other	3	0.8
Total	361	100.0
Missing	0	0.0

Figure 6: *Participants by Academic Level*



As presented in Table 8 and illustrated in Figure 6, a hundred forty (140) participants (38.8%) reported that their academic level was teaching assistant, and the largest number of

participants (n = 157, 43.5%) indicated that they were lecturers in their different majors. Forty-one participants (11.4%) were assistant professors, and seven participants (1.9%) were associate professors. Five participants (1.4%) indicated that their academic ranks were full professors, with eight participants (2.2%) as university instructors-teachers. Three participants (0.8%) selected the (Other) option without declaring their academic ranks.

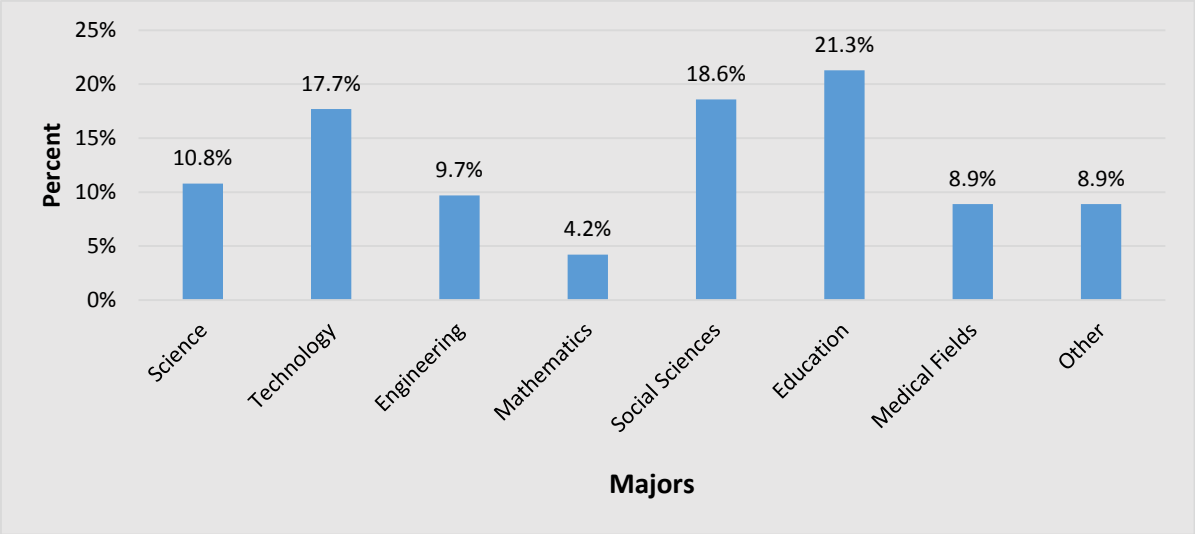
Summary of participants' academic majors

All participants were asked to select their academic majors from the main seven majors listed, or to select the (Other) option and report their majors. Their responses were summarized using frequency distribution for presentation as shown in Table 9.

Table 9: *Summary of Participants by Academic Majors*

Academic Major	No. of Participants	Percent
Science	39	10.8
Technology	64	17.7
Engineering	35	9.7
Mathematics	15	4.2
Social Sciences	67	18.6
Education	77	21.3
Medicine-Medical Fields	32	8.9
Other (Humanity majors- Religious studies and law, Design and Architecture majors)	32	8.9
Total	361	100.0
Missing	0	0.0

Figure 7: *Percentage of Participants' Academic Majors*



As shown in Table 9 and illustrated in Figure 7, thirty-nine of the participants (10.8%) indicated that their majors are within Science, and 64 participants (17.7%) selected the Technology major. Thirty-five participants (9.7%) indicated that their majors are in Engineering, and 15 instructors (4.2%) are in mathematics. The larger number of participants fall into Social Science (n = 67, 18.6%) and into Education (n = 77, 21.3%). Thirty-two instructors (8.9%) indicated that their major fall into the Medical Fields, and 32 instructors (8.9%) selected (Other) option and reported that their majors fall under Humanity majors (Religious studies and law) and Design and Architecture majors.

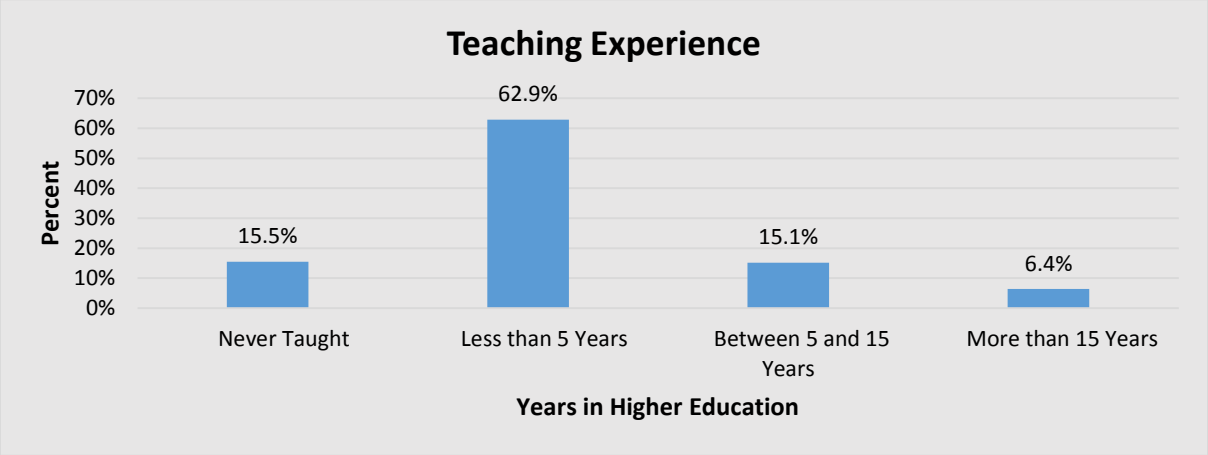
Summary of participants' educational experience

Participants were asked about their teaching experience in higher education. The details are presented in Table 10.

Table 10: *Summary of Participants by Teaching Experience*

Teaching Experience (In Years)	No. of Participants	Percent
Years in Higher Education		
Never Taught in Higher Education	56	15.5
Less than 5 Years	227	62.9
Between 5 and 15 Years	55	15.1
More than 15 Years	23	6.4
Total	361	100.0
Missing	0	0.0

Figure 8: *Percentage of Participants' Teaching Experience*



The largest group of participants (n = 227, 62.9%), as shown in Table 10 and illustrated in Figure 8, indicated that up to the time of this study, they have taught less than five years in higher education in Saudi Arabia. Fifty-five participants (15.1%) indicated that their experience of teaching in higher education is between 5 and 15 years, where 23 instructors (6.4%) indicated that they have more than 15 years of experience in higher education. Fifty-six of the participants (15.5%) indicated that they have never taught in higher education, but they are affiliated with Saudi public universities, and they are abroad completing their graduate

studies. Many of them reported that they had taught in K-12 schools, for some years, or worked in other government entities before joining their universities, depending on their majors.

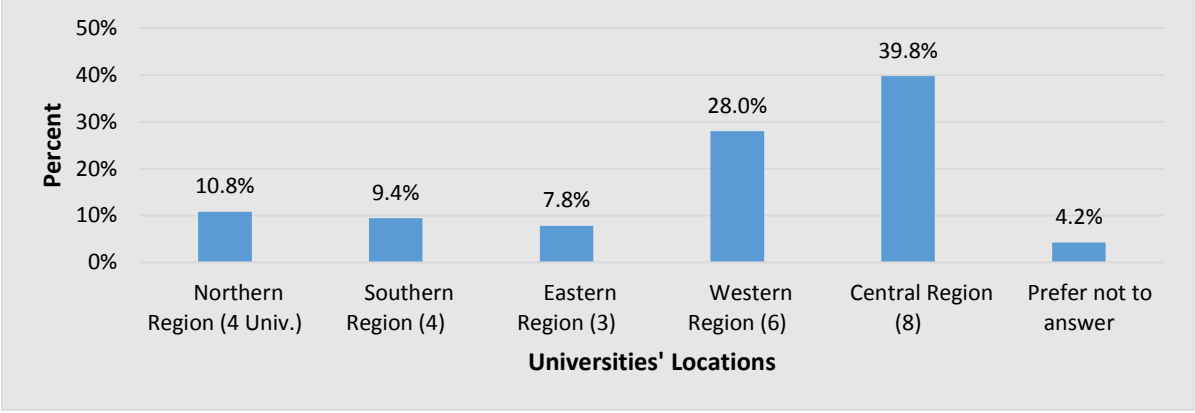
Summary of the locations of participants' universities

Participants were asked to select their universities from among the 25 public universities. Their responses were summarized using frequency distribution for presentation and according to the five regions of Saudi Arabia as shown in Table 11.

Table 11: *Location of the Participants' Universities (By Regions)*

Location of the University	No. of Participants	Percent
Northern Region (4 Universities)	39	10.8
Southern Region (4 Universities)	34	9.4
Eastern Region (3 Universities)	28	7.8
Western Region (6 Universities)	102	28
Central Region (8 Universities)	144	39.8
Prefer not to answer	15	4.2
Total	361	100.0
Missing	0	0.0

Figure 9: *Percentage of the Participants' Universities (By Regions)*



As presented in Table 11 and illustrated in Table 9, the largest group of participants (n = 144, 39.8%) identified their universities to fall into the Central Region of Saudi Arabia, which has eight public universities. The second largest group of participants by Academic Level (n = 102, 28%) indicated that their universities fall into the Western Region of Saudi Arabia, which has six public universities. Thirty-nine participants (10.8%) select universities which fall into the Northern Region, which has four public universities, and 34 participants (9.4%) selected universities that fall into the Southern Region, which has four public universities. The least group of participants (n = 28, 7.8%) selected universities that fall into the Eastern Region, which has three public universities. Fifteen participants (4.2%) preferred not to declare their universities' names by selecting "prefer not to answer" option.

Summary of the two strata (groups of this study)

All participants in this study were affiliated with the 25 Saudi public universities. As shown in Table 12, participants were asked to relate their status, during the time of the study, to one of the two main groups of this study (Two strata: 1- In-Home Stratum, which refers to instructors who were teaching and working at their Saudi universities during the time of the study, 2- Abroad Stratum, which refers to Saudi universities' affiliated instructors who were sent by their universities to complete their graduate studies abroad during the time of the study).

Table 12: *Frequency Distributions: In-Home and Abroad Participants*

In-Home or Abroad Participants	No. of Participants	Percent
1- Teaching at the Saudi Universities, In-Home Group	142	39.3
2- Completing Graduate Studies, Abroad Group	219	60.7
Total	361	100.0
Missing	0	0.0

Figure 10: *Percentage of the Study Strata (In-Home and Abroad Participants)*

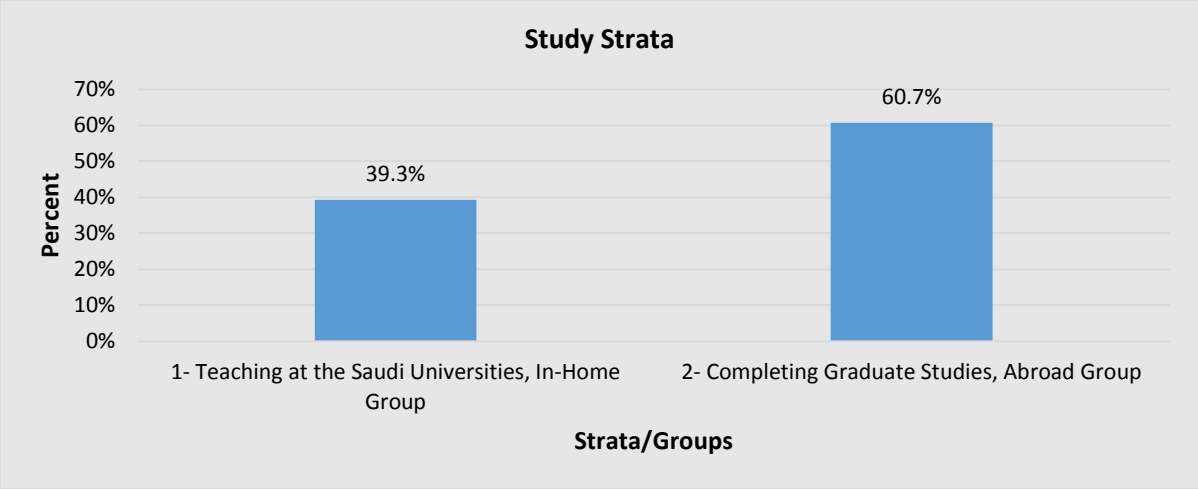


Table 12 shows the number of instructors, who participated in this study, according to the two strata (groups) of this study. The largest number of participants fell under the second stratum (Abroad Group) with (n = 219, 60.7%) while the first stratum (In-home Group) had 142 participants which represented (39.3%) of the study. (Illustrated in Figure 10)

Table 13 presents the central tendency measures (Mean, median), standard deviation and the range of the participants' age according to the two main groups.

Table 13: *Frequency Distributions: Participants Age By Groups (In-Home or Abroad)*

Strata (Groups)	No. of Participants	Mean	SD	Median	Range Min.	Range Max.
1- Teaching in Saudi Universities, In-Home	142	33.8	8.25	31.5	20	62
2- Abroad, Completing Graduate Studies	218	30.13	3.92	30	23	45
Total	360	31.58	6.26	30	20	62
Missing	1					

Note. Missing = One person chose "prefer not to answer" for Age Question, but identified the group.

As presented in Table 13, In-Home group had 142 participants with a range in years of 20 – 62 with only one participant identifying his/her age to be 20 years old, and only one instructor identifying his/her age to be 62, while the remaining number of participants fall between 22 and 56 years of age. The data analysis revealed that the mean age of participants, within the first group, was (33.8) years and the median age was (31.5) years and the standard deviation (SD) was (8.25). The second group (Abroad group) had 218 participants with a range in years of 23 – 45. The data analysis revealed that the mean age of participants, within the second group, was (30.13) years and the median age was 30 years and the standard deviation (SD) was (3.92). One participant preferred not to report his/her age by selecting “prefer not to answer” which is shown as missing in the table above.

Overall, the most common age group among participants (within the two groups) was 28 – 30 year old representing (29%) of the study. The second most common age group was 25

– 27 year old representing (20%) of the study. The third most common age group was 31-34 with (18%) of participants.

Summary of instructors' use of mobile technology in teaching

Participants were asked to report whether or not they use mobile technologies in their teaching. Table 14 presents the details.

Table 14: *Frequency Distributions: Using Mobile Technology in/for Teaching*

Mobile Technology in/for Teaching	No. of Participants	Percent
Do you Use Mobile Technology in/for Teaching?		
Yes	295	81.7
No	66	18.3
Total	361	100.0
Missing	0	0.0

Figure 11: *Percentage of the Uses of Mobile Technology in Teaching by Participants*

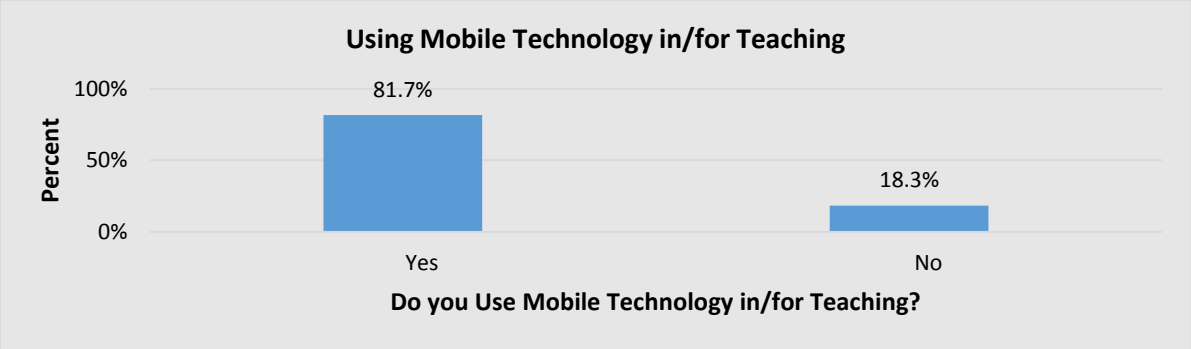


Table 14 shows that the majority (81.7%) of participants (n = 295) reported that they use mobile technology in their teaching. Sixty-six participants (18.3%) reported that they do not use mobile technology in their teaching or for their teaching preparation at all. (Illustrated in Figure 11)

Table 15 and Table 16 present the details of the two extra questions that were displayed only to participants who selected "yes" for this question (Do you Use Mobile Technology in/for Teaching?).

Summary of mobile technology types used by participants

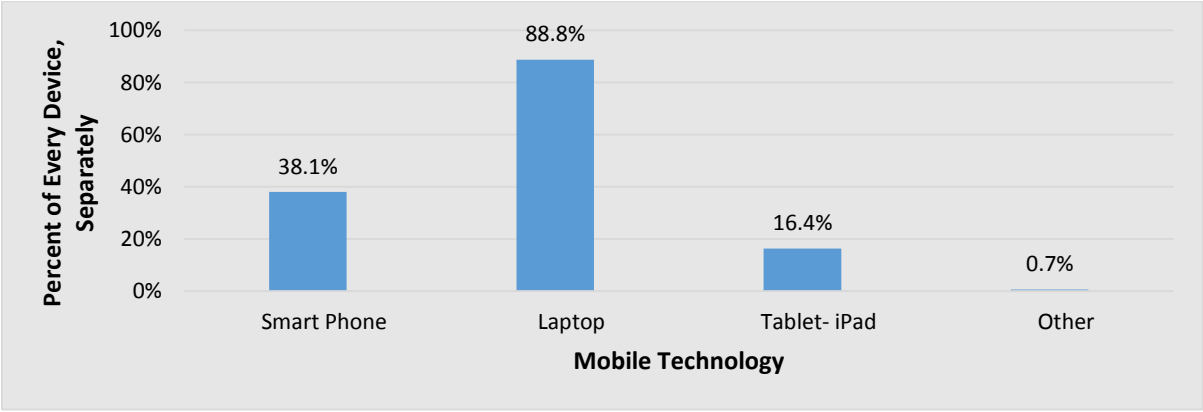
Participants who answered the previous question *Do you use mobile technology in/for teaching?,* (286 participants), were asked about the type of the mobile technology they use in their teaching. Table 15 presents the types of mobile technology and their frequencies.

Table 15: *Frequency Distributions: Types of Mobile Technology Used by Participants*

Types of Mobile Technology Used by Instructors in Teaching	No. of Participants	Percent
Smart Phone	109	38.1
Laptop	254	88.8
Tablet- iPad	47	16.4
Other	2	0.7
Total and Percent of Participants for This Questions	286 *	100 *
Missing	0	0.0

**Note.* Percentages for each device represent the percent of the 286 respondents who selected that device. Some respondents selected more than one device, resulting in a total percent greater than 100.

Figure 12: *Percentage of Mobile Technology Types Used by Participants in Teaching*



As shown in Table 15 and illustrated in Figure 12, the majority of participants (n = 254, 88.8%) selected the laptop as the mobile technology they use in their teaching. Laptops were included in this research of mobile technology to counter and avoid the limitation that smart phones are banned in some female colleges. A large number of participants (n = 109, 38.1%) reported that they use smart-phones in their teaching. Forty-seven participants (16.4%) indicated that they use tablets or iPads in their teaching. Two participants (0.7%) selected OTHER option as to refer to other types of devices they use in their teaching without explaining about them.

The total number of respondents to this question was 286 representing (100%) for this question, but they represent (79.2%) of the total participants who started the survey (361). This question was displayed to 286 participants only because they answered (YES) to whether or not they use mobile technology in their teaching. Seventy-five instructors out of the 361 were disqualified for this question because they answered (NO) to the previous question *Do you use mobile technology in/for teaching?* and (the question about the types of mobile technology was not displayed to them at all). This question was a multiple-answer question and many instructors selected more than one option (they use more than one device), so the total of percent for all devices was greater than 100.

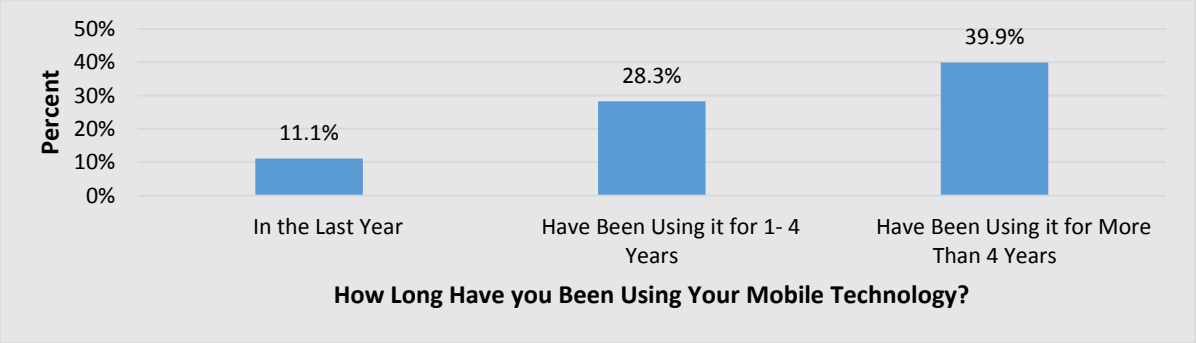
Summary of participants' experience of using mobile technology in their teaching

Participants were asked about their experiences of using mobile technology in their teaching. Results are explained in Table 16.

Table 16: *Frequency Distributions: Experience of Using Mobile Technology in Teaching*

Period of Using Mobile Technology in Teaching	No. of Participants	Percent
How Long Have you Been Using Your Mobile Technology?		
In the Last Year	40	11.1
Have Been Using it for 1- 4 Years	102	28.3
Have Been Using it for More Than 4 Years	144	39.9
Total	286	100
Missing	0	0.0

Figure 13: *Percentage of Participants' Experience with Mobile Technology in Teaching*



This question (How long have you been using your mobile technology?) was a follow-up question, and was displayed only to the 286 participants who answered *YES* to whether or not they use mobile technology in their teaching. As presented in Table 16 and illustrated in Figure 13, (144) participants (39.9%), who use mobile technology in their teaching, reported that they have been using them for more than four years. One-hundred-two participants indicated that they used mobile technology in their teaching for a range of 1-4 years. Forty

participants indicated that they started using mobile technology in their teaching just recently (in the last year).

The total number of respondents to this question was 286 representing (100%) for this question, but they represent (79.2%) of the total participants who started the survey (361). This question was displayed to 286 participants only because they answered (YES) to whether or not they use mobile technology in their teaching. Seventy-five participants out of the 361 were disqualified for this question because they answered (NO) to the previous question *Do you use mobile technology in/for teaching?* and (The question *how long have you been using your mobile technology?* was not displayed to them at all).

Summary of participants' previous formal training for mobile technology

Participants were asked about whether or not they had received any formal training about the uses of mobile technology in their teaching by their universities. Results are explained in Table 17.

Table 17: *Frequency Distributions: Formal Training for Mobile Technology*

Formal Training for Mobile Technology	No. of Participants	Percent
Has Your University Provided any Formal Training on How to Use Mobile Technology in Class or in Your Teaching?		
Yes	101	28.0
No	199	55.1
I Do not Know	51	14.1
Total	351	97.2
Missing	10	2.8

As shown in Table 17, the majority (55.1%) of participants (n = 199) reported that they had never received formal training about the uses of mobile technology in class and for

teaching, up to the time of this study. A hundred-and-one participants (28%) reported that they had received formal training, provided by their universities, about the uses of mobile technology in and for teaching. Fifty-one participants (14.1%) indicated that they do not know whether or not their universities provided any formal training on how to use mobile technology in class or for teaching.

Summary of the demographics for interviewees

Table 18 presents some demographic details (gender and age) of the six instructors who participated in the interviews and the groups they were related to during the time of this study.

Table 18: *Demographics for Interviewees*

	Gender		Age of Participants				Strata (Groups)	
	Male	Female	21-30	31-40	41-50	51-60	In-Home	Abroad
Interview # 1	X			X			X	
Interview # 2	X				X			X
Interview # 3	X			X				X
Interview # 4		X			X		X	
Interview # 5	X		X					X
Interview # 6		X		X				X

Interview recruitment emails were sent to 18 instructors, representing both strata, both genders, from different majors, and representing the four ranges of age, as shown in Table 18, but only six instructors agreed to participate in the interview instrument. Six personal interviews were conducted separately, through Skype software (Audio only), with six instructors, one hour each, after getting their verbal permissions to record the interviews.

Interviews for this research were conducted with six instructors-participants as shown in Table 18, four participants were males and two participants were females. One participant was between 21 and 30 years of age, and three participants were between 31 and 40 years of age, and the other two participants were between 41 and 50 years of age. Two participants fall into the first stratum (first group, In-home group), while the other four participants fall into the second stratum (abroad group). There was no representative for the age 51-60 year old instructors, and this is similar to the distribution of participants in the survey instruments. Table 6 and Table 7 show the distribution of instructors based on their age and their academic levels, where most instructors are assistant professors, lecturers and teaching assistants, and some associate professors, and a small number of professors.

Quantitative and Qualitative Analyses

This part of Chapter four covers and presents the results of quantitative and qualitative data analyses in regard to the main research questions.

Research Question 1: Instructors' general experiences in using mobile technology in higher education

Participants were asked about their general experiences with mobile technology in higher education, and the data were collected by using a Likert-Scale (1-5) for eight items as shown in Table 19. The Likert-Scale used for collecting the data was as follows: (1) *Never*, (2) *Rarely*, (3) *Sometimes*, (4) *Often*, and (5) *Always*. (Appendix D)

Table 19: *Percentages for Participants' General Experiences with Mobile Technology in Higher Education*

	Statements	Percentage of Responses (%)				
		Never	Rarely	Sometimes	Often	Always
1.	I use my mobile technology for collaboration with my students in and out of the class.	12.8%	12.8%	22.4%	23.2%	28.8%
2.	I use my mobile technology for storing and sharing some files/media related to my teaching.	10.4%	8.4%	15.1%	26.5%	39.6%
3.	I use my mobile technology to review assignments and respond to discussion forums.	19.8%	14.8%	19.5%	19.5%	26.5%
4.	I use my mobile technology for online meetings with my students.	49.3%	22.1%	8.4%	10.4%	9.7%
5.	I try to innovate and use mobile technologies to help me in my teaching.	13.8%	16.8%	27.2%	23.5%	18.8%
6.	I use my mobile technology to access the learning management system in my university (e.g. Blackboard, Canvas, or Webex, etc.).	23.2%	8.7%	21.1%	19.5%	27.5%
7.	I use my mobile technology to respond to my students' emails.	9.4%	6.4%	10.1%	17.1%	57.0%
8.	I ask my students to submit their assignments electronically, through email or Blackboard.	20.8%	11.4%	16.8%	18.8%	32.2%

Figure 14: *Percentages for Participants' General Experiences with Mobile Technology in Higher Education*

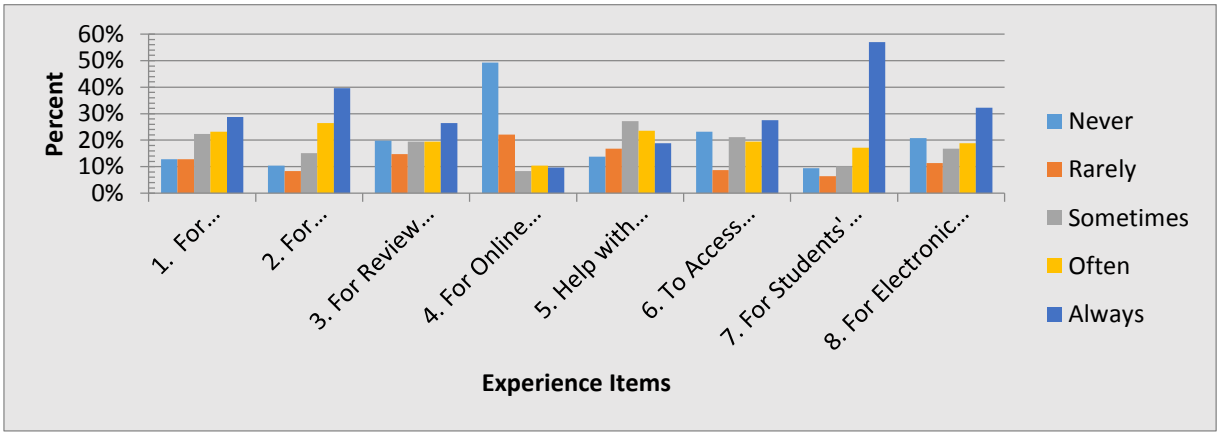
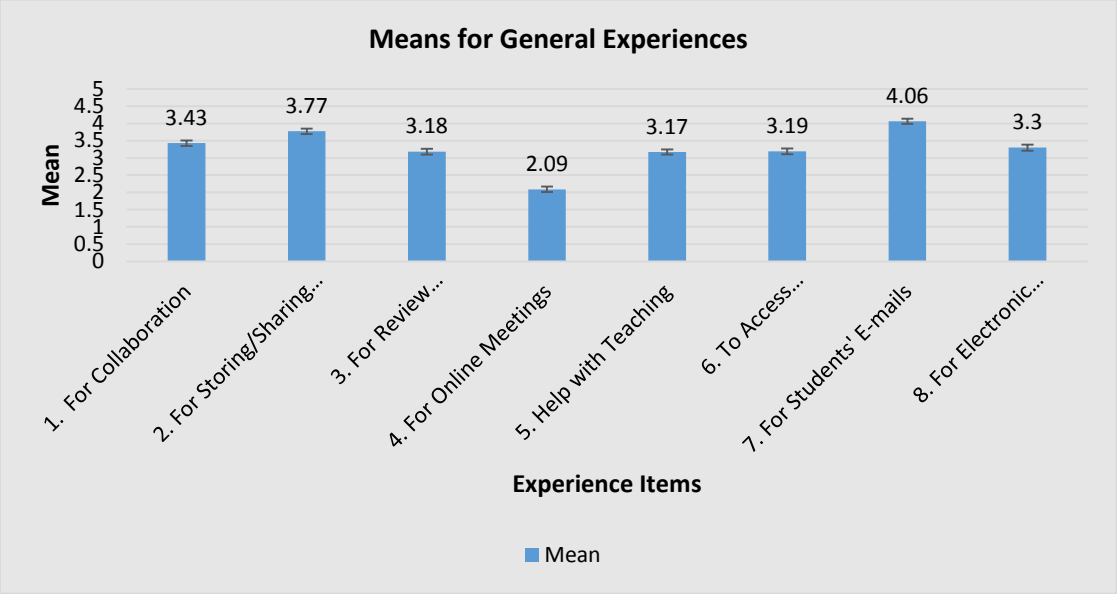


Table 20 presents the Mean, Median, Mode and Standard Deviation (SD) for all items about participants' general experiences with mobile technology in higher education.

Table 20: *Descriptive Statistics for Participants' General Experiences with Mobile Technology in Higher Education*

	Statements	Mean	Median	Mode	SD
1.	I use my mobile technology for collaboration with my students in and out of the class.	3.43	4.00	5	1.36
2.	I use my mobile technology for storing and sharing some files/media related to my teaching.	3.77	4.00	5	1.33
3.	I use my mobile technology to review assignments and respond to discussion forums.	3.18	3.00	5	1.47
4.	I use my mobile technology for online meetings with my students.	2.09	2.00	1	1.37
5.	I try to innovate and use mobile technologies to help me in my teaching.	3.17	3.00	3	1.30
6.	I use my mobile technology to access the learning management system in my university (e.g. Blackboard, Canvas, or Webex, etc.).	3.19	3.00	5	1.51
7.	I use my mobile technology to respond to my students' emails.	4.06	5.00	5	1.33
8.	I ask my students to submit their assignments electronically, through email or Blackboard.	3.30	4.00	5	1.53
	Average	3.27	3.5	5	1.03

Figure 15: *Descriptive Statistics (Mean) for Participants' General Experiences with Mobile Technology in Higher Education*



Summary of the university instructors' general experiences with mobile technology in higher education

As presented in Table 19 and Table 20, and as illustrated in Figure 14 and Figure 15:

The first experience item was *I use my mobile technology for collaboration with my students in and out of the class.* (298 participants responded; *Mean* = 3.43, *Median* = 4.00, *Mode* = 5, and *SD* = 1.36). The percentage of responses to *never* was 12.8%, *rarely* was 12.8%, *sometimes* was 22.4%, *often* was 23.2%, and *always* was 28.8%.

The second experience item was *I use my mobile technology for storing and sharing some files/media related to my teaching.* (298 participants responded; *Mean* = 3.77, *Median* = 4.00, *Mode* = 5, and *SD* = 1.33). The percentage of responses to *never* was 10.4%, *rarely* was 8.4%, *sometimes* was 15.1%, *often* was 26.5%, and *always* was 39.6%.

The third experience item was *I use my mobile technology to review assignments and respond to discussion forums.* (298 participants responded; *Mean* = 3.18, *Median* = 3.18, *Mode* = 5, and *SD* = 1.47). The percentage of responses to *never* was 19.8%, *rarely* was 14.8%, *sometimes* was 19.5%, *often* was 19.5%, and *always* was 26.5%.

The fourth experience item was *I use my mobile technology for online meetings with my students.* (298 participants responded; *Mean* = 2.09, *Median* = 2.00, *Mode* = 1, and *SD* = 1.37). The percentage of responses to *never* was 49.3%, *rarely* was 22.1%, *sometimes* was 8.4%, *often* was 10.4%, and *always* was 9.7%.

The fifth experience item was *I try to innovate and use mobile technologies to help me in my teaching.* (298 participants responded; *Mean* = 3.17, *Median* = 3.00, *Mode* = 3, and *SD* = 1.30). The percentage of responses to *never* was 13.8%, *rarely* was 16.8%, *sometimes* was 27.2%, *often* was 23.5%, and *always* was 18.8%.

The sixth experience item *was I use my mobile technology to access the learning management system in my university (e.g. Blackboard, Canvas, or Webex, etc.).* (298 participants responded; *Mean* = 3.19, *Median* = 3.00, *Mode* = 5, and *SD* = 1.51). The percentage of responses to *never* was 23.2%, *rarely* was 8.7%, *sometimes* was 21.1%, *often* was 19.5%, and *always* was 27.5%. The seventh experience item was *I use my mobile technology to respond to my students' emails*. (298 participants responded; *Mean* = 4.06, *Median* = 5.00, *Mode* = 5, and *SD* = 1.33). The percentage of responses to *never* was 9.4%, *rarely* was 6.4%, *sometimes* was 10.1%, *often* was 17.1%, and *always* was 57.0%.

The eighth experience item was *I ask my students to submit their assignments electronically, through email or Blackboard.* (298 participants responded; *Mean* = 3.30,

Median = 4.00, *Mode* = 5, and *SD* = 1.53). The percentage of responses to *never* was 20.8%, *rarely* was 11.4%, *sometimes* was 16.8%, *often* was 18.8%, and *always* was 32.2%.

The descriptive statistics from the analysis of participants' general experiences show that instructors use their mobile technology to respond to their students' emails with the highest mean (4.06). They use their mobile technology for storing and sharing some files or media related to their teaching with a mean (3.77). They use their mobile technology for collaboration with their students in and out of class with a mean (3.43), and they ask their students to submit their assignments electronically, through email or Blackboard with a mean (3.30). *Always* was the highest rating for all items of the participants' general experiences with mobile technology except the item of *I use my mobile technology for online meetings with my students* where the mean was (2.09) and the percentage for *NEVER* for this item was (49.3%). The statistics and descriptive results of the instructors' experiences with mobile technology show that instructors are very well experienced in using the different types of mobile technology in their teaching and with their students, for communication and collaboration (mainly asynchronous collaboration). The overall mean for all experience items (3.27) with SD (1.03) indicated that participants were using their mobile technology for most of their academic activities between often and always, and this is an indication that most instructors have good experience to deal with and use mobile technology.

All interviewees expressed their views on how their own levels of using mobile technology have changed and increased recently, through the last five to seven years, which ultimately enhanced their experiences of the different types of mobile technology and how

they started using them in their classes and even for preparing for the classes and courses. One of the interviewees explained that:

> *"The absolute presence and affordability of some mobile technology urged us, instructors, to obtain them and start using them and knowing their features… I started using my smartphone in my teaching gradually in the last 4-5 years. The numerous applications and tools available for me encouraged me to use them for different purposes, for example, preparing for my classes, recording notes, taking pictures, recording some videos or lectures, etc. or for using them inside the class where I used my smartphone along with the projector, sometimes, to present a video that was on my phone to my students. I use it for contacting and responding to students' inquiries and requests." (Interviewee 3, Line 310-319)*

Interviewee 1 supports this where he explained that his use of mobile technology was minimal when he started teaching in 2009, and he the use increased more and more through the following years. He explained his view behind his using of mobile technology in that "it gives the students more motivation to be active members in the classroom because we are in a technology age" (Interviewee 1, Line 59-60).

The findings show that the laptops were the most used among the other mobile technology, as shown in Table 15. Many instructors explained, in open-ended question #1 in the survey instrument, that they have good experience in using smart-phones and tables, but due to the ban of using smart-phones in most, if not all, female colleges, they (female instructors) use only laptops in their teaching and in their classes. Interviewee 4 supported that she only uses a laptop in her teaching inside the class. She uses a smart-phone for communication with her students outside the college by checking and replying to students' comments and questions that are posted on the instructor's forum or personal page on the Internet.

Overall, the findings reveal that most university instructors own and know how to utilize and function their mobile technology for general uses. Their experiences with most of the functions available in mobile technology are moderate to high (The younger participants were even more experienced). They indicated that different types of training should be offered to them and to their students, as well, in order to practically and efficiently, and somewhat officially, start using mobile technology in their teaching, giving the great benefits mobile technologies have brought to the learning environment and to the communication methods and channels. Participants from the interview instrument supported the need for training and for having technicians available for instructors at their different colleges. Female interviewees explained some social and cultural factors and some security reasons that hinder them from using smart-phones in their teaching practices.

Research Question 2: Instructors' attitudes towards using mobile technology for teaching purposes

Participants were asked about their attitudes towards using mobile technology for teaching purposes, and the data were collected by using a Likert-Scale 1-5 for eight items as shown in Table 21.

The Likert-Scale used for collecting the data was as follows: 1) *Strongly Disagree*, (2) *Disagree*, (3) *Neither Agree nor Disagree or Neutral*, (4) *Agree*, and (5) *Strongly Agree.* (Appendix D)

Table 21: *Percentages for Participants' Attitudes towards Using Mobile Technology for Teaching Purposes*

	Statements	Percentage of Responses (%)				
		(S.D.)	(D.)	(N.)	(A.)	(S.A.)
1.	Mobile technology is considered to be an aid tool for instructors and their students.	1.1%	1.1%	3.9%	26.4%	67.6%
2.	Mobile technology creates a better environment for teaching.	0.7%	2.5%	6.3%	33.5%	57.0%
3.	Using mobile technology in class helps in sharing more resources with students.	1.8%	2.1%	10.9%	29.9%	55.3%
4.	Using mobile technology in class saves the class time.	1.8%	4.9%	18.7%	30.3%	44.4%
5.	Using the various functionalities built in mobile technology helps the instructor to be more innovative and productive.	0.7%	3.5%	10.2%	35.6%	50.0%
6.	Using mobile technology in class improves content delivery (e.g. media, pictures, presentation, etc.).	1.8%	1.1%	5.6%	28.9%	62.7%
7.	The rapid changes and updates in mobile technology make it difficult to adapt to them.	8.8%	27.5%	24.6%	20.1%	19.0%
8.	There should be some rewards or incentives for using mobile technology to improve teaching, at the college or department level.	3.9%	4.6%	16.2%	29.9%	45.4%

Note. Strongly Disagree (S.D.), Disagree (D.) Neither Agree nor Disagree-Neutral (N.), Agree (A.), Strongly Agree (S.A.).

Figure 16: *Percentages for Participants' Attitudes towards Using Mobile Technology for Teaching*

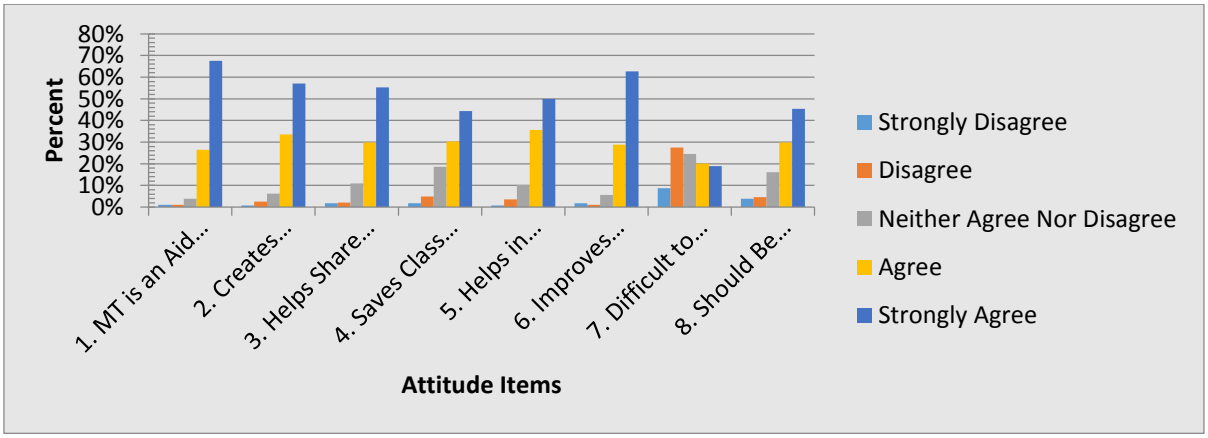
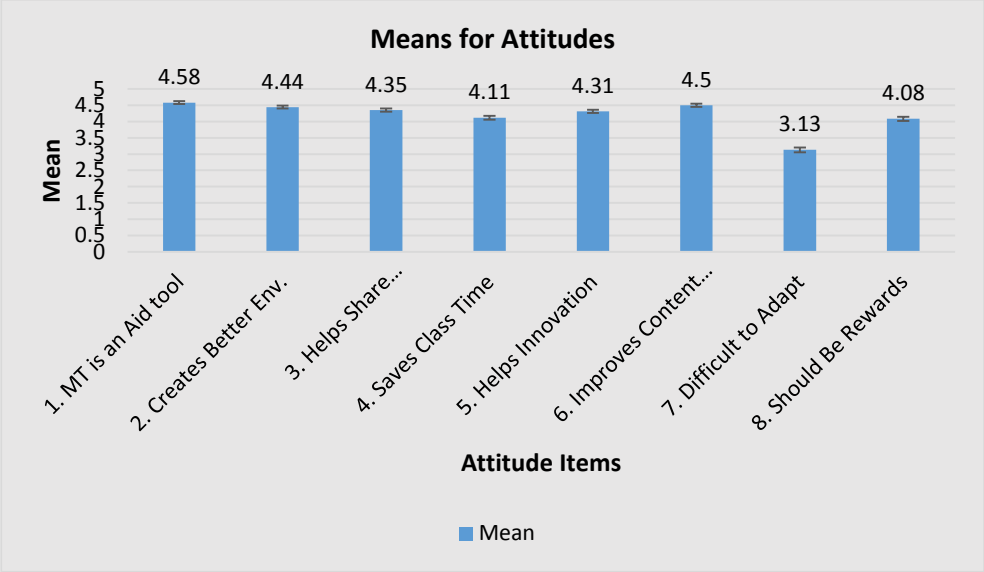


Table 22 presents the Mean, Median, Mode and Standard Deviation (SD) for all items about participants' attitudes towards using mobile technology for teaching purposes.

Table 22: *Descriptive Statistics for Participants' Attitudes towards Using Mobile Technology for Teaching Purposes*

	Statements	Mean	Median	Mode	SD
1.	Mobile technology is considered to be an aid tool for instructors and their students.	4.58	5.00	5	0.72
2.	Mobile technology creates a better environment for teaching.	4.44	5.00	5	0.78
3.	Using mobile technology in class helps in sharing more resources with students.	4.35	5.00	5	0.89
4.	Using mobile technology in class saves the class time.	4.11	4.00	5	0.99
5.	Using the various functionalities built in mobile technology helps the instructor to be more innovative and productive.	4.31	4.50	5	0.85
6.	Using mobile technology in class improves content delivery (e.g. media, pictures, presentation, etc.).	4.50	5.00	5	0.80
7.	The rapid changes and updates in mobile technology make it difficult to adapt to them.	3.13	3.00	2	1.26
8.	There should be some rewards or incentives for using mobile technology to improve teaching, at the college or department level.	4.08	4.00	5	1.07
	Average	4.19	4.75	5	0.62

Figure 17: *Descriptive Statistics (Mean) for Participants' Attitudes towards Using Mobile Technology for Teaching Purposes*



Summary of the university instructors' attitudes towards using mobile technology for teaching purposes

As presented in Table 21 and Table 22, and as illustrated in Figure 16 and Figure 17:

The first attitude item was *mobile technology is considered to be an aid tool for instructors and their students.* (284 participants responded; *Mean* = 4.58, *Median* = 5.00, *Mode* = 5, and *SD* = 0.72). The percentage of responses to *strongly disagree* was 1.1%, *disagree* was 1.1%, *neither agree nor disagree or neutral* was 3.9%, *agree* was 26.4%, and *strongly agree* was 67.6%.

The second attitude item was *mobile technology creates a better environment for teaching.* (284 participants responded; *Mean* = 4.44, *Median* = 5.00, *Mode* = 5, and *SD* = 0.78). The percentage of responses to *strongly disagree* was 0.7%, *disagree* was 2.5%, *neither agree nor disagree or neutral* was 6.3%, *agree* was 33.5%, and *strongly agree* was 57.0%.

The third attitude item was *using mobile technology in class helps in sharing more resources with students.* (284 participants responded; *Mean* = 4.35, *Median* = 5.00, *Mode* = 5, and *SD* = 0.89). The percentage of responses to *strongly disagree* was 1.8%, *disagree* was 2.1%, *neither agree nor disagree or neutral* was 10.9%, *agree* was 29.9%, and *strongly agree* was 55.3%.

The fourth attitude item was *using mobile technology in class saves the class time*. (284 participants responded; *Mean* = 4.11, *Median* = 4.00, *Mode* = 5, and *SD* = 0.99). The percentage of responses to *strongly disagree* was 1.8%, *disagree* was 4.9%, *neither agree nor disagree or neutral* was 18.7%, *agree* was 30.3%, and *strongly agree* was 44.4%.

The fifth attitude item was *using the various functionalities built in mobile technology helps the instructor to be more innovative and productive*. (284 participants responded; *Mean* = 4.31, *Median* = 4.50, *Mode* = 5, and *SD* = 0.85). The percentage of responses to *strongly disagree* was 0.7%, *disagree* was 3.5%, *neither agree nor disagree or neutral* was 10.2%, *agree* was 35.6%, and *strongly agree* was 50.0%.

The sixth attitude item was *using mobile technology in class improves content delivery (e.g. media, pictures, presentation, etc.).* (284 participants responded; *Mean* = 4.50, *Median* = 5.00, *Mode* = 5, and *SD* = 0.80). The percentage of responses to *strongly disagree* was 1.8%, *disagree* was 1.1%, *neither agree nor disagree or neutral* was 5.6%, *agree* was 28.9%, and *strongly agree* was 62.7%.

The seventh attitude item was *the rapid changes and updates in mobile technology make it difficult to adapt to them*. (284 participants responded; *Mean* = 3.13, *Median* = 3.00, *Mode* = 2, and *SD* = 1.26). The percentage of responses to *strongly disagree* was 8.8%,

disagree was 27.5%, *neither agree nor disagree or neutral* was 24.6%, *agree* was 20.1%, and *strongly agree* was 19.0%.

The eighth attitude item was *there should be some rewards or incentives for using mobile technology to improve teaching, at the college or department level.* (284 participants responded; *Mean* = 4.08, *Median* = 4.00, *Mode* = 5, and *SD* = 1.07). The percentage of responses to *strongly disagree* was 3.9%, *disagree* was 4.6%, *neither agree nor disagree or neutral* was 16.2%, *agree* was 29.9%, and *strongly agree* was 45.4%.

The descriptive statistics, from the analysis of participants' attitudes towards using mobile technology for teaching purposes, show that instructors strongly agree with the statement that *Mobile technology is considered to be an aid tool for instructors and their students* with the highest mean (4.58) and highest percentage of (67.6%), followed by the statement that *Using mobile technology in class improves content delivery (e.g. media, pictures, presentation, etc.)* with a mean (4.50), followed by the statement that *Mobile technology creates a better environment for teaching* with a mean (4.44), followed by the statement that *Using mobile technology in class helps in sharing more resources with students* with a mean (4.35). *Agree* and *strongly agree* were selected the most by participants and got the highest percentages for all attitude's items except the item that *The rapid changes and updates in mobile technology make it difficult to adapt to them* where participants' selection for *strongly disagree* was 8.8%, *disagree* was 27.5%, *neither agree nor disagree or neutral* was 24.6%. The overall mean for all attitude items (4.19) with SD (0.62) indicated that instructors strongly lean towards using mobile technology in their teaching and with their

students, and this is an indication that instructors are eager to integrate and use mobile technology in their teaching practices.

Earlier in Table 16, (Period of Using Mobile Technology in Teaching), it was shown that many participants (n = 144, 39.9%) have been using their mobile technology for more than four years, and that many other participants (n = 102, 28.3%) have been using their mobile technology in the last one to three years. This goes with their experiences along with their attitudes towards using mobile technology in their teaching that they have been continuously using mobile technology in their teaching throughout the recent and more recent years. The analysis of the previous question, research question 1, indicated that instructors are highly experienced in the general uses of the different types of mobile technology which apparently increased their attitude towards using them in their teaching, giving that they, instructors, have command and good knowledge of their mobile technology features, and they know their benefits and capabilities, and that there are no reasons to ban or avoid them from using the technology with their students, except for female instructors when using smart-phones.

Through the open-ended questions, many instructors expressed their views and the reasons behind their high attitudes towards obtaining and using mobile technology in their teaching practices. One participant reported "mobile technology is the fastest for communication, and using the free available tools helps me and my students without paying any charges or fees." Another participant explained "it enables better communication and it breaks the normal routine". Another instructor explained that "using the variety of educational tools helps and supports both the instructor and students and saves time and helps in research, and keeps the instructor and students in continuous communication outside the classroom."

Another said “using the laptop gives the instructors a better chance to deliver the information to their students in very good way”. It was really interesting to see some responses like this “it is not possible any more to avoid the strong presence of the Internet in our daily life, and in teaching specifically, and using mobile devices that can connect to the Internet has become very necessary, and not an option anymore.”

All interviewees showed their high attitude towards using mobile technology in their teaching and one interviewee explained that:

> *“Using those technologies has some advantages to me as an instructor and for the students. First of all, these technical tools would save the time of the instructor and the class… Using these tools and software helped me as an instructor to keep up with the new technology, and to be aware of the possibilities and benefits out there that are available for students as well.” (Interviewee 1, line 45-73)*

They urged universities to provide them with the newest mobile technology available, and make maintenance services and some technicians available for them in their colleges at all times. One interviewee reported that:

> *“Right now, there are no technicians or technical help for the technology we use in our colleges. If something goes wrong, we need to report it to the dean, and the report will be sent to another department, etc. which really takes time, but for the case of mobile technology, you really need, somewhat, instant help. I mean you need a technician or a person who knows it all and be available to instructors, like be in the college itself, in order to avoid small problems, or sometimes when new tools are updated with new versions, there will be some differences which hinder the smoothness of the class. For most cases, a technician is very necessary when more than one device is needed and extensions and adapters are needed as well.” (Interviewee 6, Line 821-828)*

Overall, and interestingly, the findings show that almost all university instructors, in their different majors and disciplines, have high attitude towards using mobile technology in their teaching for the many reasons mentioned above. Even most of those in mathematics and science majors, who in open-ended questions, explained that they mostly do not need the

technology for the actual teaching, where they prefer boards and papers, but they emphasized on that they use mobile technology for other educational purposes such as, emailing students, responding, getting up-to-date with the university news and responsibilities, etc.

Research Question 3: Mobile Learning by R2D2 Categories

This research question included two questions about the integration of R2D2 categories for course preparation and the learning activities, by instructors; and how frequently instructors use their mobile technologies in their teaching and for creating and conducting the learning activities.

Participants were asked about the learning activities and course preparation they do, or used to do, via or using mobile technologies, and the data were collected by using a Likert-Scale 1-5 for 16 items divided into four categories as shown in Table 23. The Likert-Scale used for collecting the data was as follows: (1) *Never*, (2) *Rarely*, (3) *Sometimes*, (4) *Often*, and (5) *Always*.

Table 23: *Percentages for the Learning Activities and Course Preparation Done via Mobile Technologies by Participants*

	Statements	Percentage of Responses (%)				
		Never	Rarely	Sometimes	Often	Always
Reading	1. Listening to educational podcasts or online webinars.	9.3%	14.6%	35.8%	23.5%	16.8%
		23.9%			40.3%	
	2. Accessing language lessons and applications.	19.0%	18.3%	21.6%	23.9%	17.2%
		37.3%			41.1%	
	3. Asking students to do discovery reading or read online news.	6.7%	16.8%	29.9%	23.5%	23.1%
		23.5%			46.6%	
	4. Doing any question and answer sessions with your students, through chat, emails, or Blackboard for example.	40.7%	22.4%	17.2%	11.6%	8.2%
		63.1%			19.8%	
Reflecting	5. Using manuscripts from previous chats with other lecturers or students in your teaching, if necessary.	42.5%	23.5%	17.5%	9.0%	7.5%
		66%			16.5%	
	6. Creating and managing online blogs and using them in your teaching.	42.2%	20.1%	15.3%	12.7%	9.7%
		62.3%			22.4%	
	7. Asking students to use discussion forums or group discussions.	36.6%	23.1%	18.3%	14.2%	7.8%
		59.7%			22%	
	8. Asking students to create blogs and reflect on the different topics in your course.	48.9%	16.8%	16.8%	10.4%	7.1%
		65.7%			17.5%	
Displaying	9. Creating instructional videos and showing them in your classes, or posting them to a YouTube channel for example.	54.1%	16.0%	14.6%	7.5%	7.8%
		70.1%			15.3%	
	10. Using your mobile technology in your class to create and show graphs and charts.	20.5%	10.8%	20.5%	20.5%	27.6%
		31.3%			48.1%	
	11. Asking students to view virtual tours and share them with their peers in class.	54.5%	17.9%	10.8%	10.4%	6.3%
		72.4%			16.7%	
	12. Allowing or asking students to view video-streamed lectures, conferences or events.	27.6%	26.1%	20.9%	16.8%	8.6%
		53.7%			25.4%	
Doing	13. Creating or completing surveys or questionnaires using the mobile technology.	29.5%	16.8%	21.6%	18.7%	13.4%
		46.3%			32.1%	
	14. Creating any simulation games or digital storytelling to be used in class via your mobile technology.	63.8%	12.3%	11.6%	7.8%	4.5%
		76.1%			12.3%	
	15. Asking students to work on wiki-books or wiki-sites as a project (for editing, modifying, etc.)	59.3%	14.9%	14.2%	7.5%	4.1%
		74.2%			11.6%	
	16. Mentoring students through mobile technology.	35.8%	19.8%	19.4%	12.7%	12.3%
		55.6%			25%	

Table 24 presents the Mean, Median, Mode and Standard Deviation (SD) for all learning activities and course preparation (within the four R2D2 categories) done by instructors via mobile technologies.

Table 24: *Descriptive Statistics for the Learning Activities and Course Preparation Done by Participants via Mobile Technologies*

	Statements	Mean	Median	SD
Reading	1. Listening to educational podcasts or online webinars.	3.24	3.00	1.17
	2. Accessing language lessons and applications.	3.02	3.00	1.37
	3. Asking students to do discovery reading or read online news.	3.40	3.00	1.20
	4. Doing any question and answer sessions with students, through chat, emails, or Blackboard for example.	2.24	2.00	1.31
Reflecting	5. Using manuscripts from previous chats with other lecturers or students in your teaching, if necessary.	2.15	2.00	1.27
	6. Creating and managing online blogs and using them in your teaching.	2.28	2.00	1.37
	7. Asking students to use discussion forums or group discussions.	2.34	2.00	1.31
	8. Asking students to create blogs and reflect on the different topics in your course.	2.10	2.00	1.31
Displaying	9. Creating instructional videos and showing them in your classes, or posting them to a YouTube channel for example.	1.99	1.00	1.30
	10. Using mobile technology in your class to create and show graphs and charts.	3.24	3.00	1.48
	11. Asking students to view virtual tours and share them with their peers in class.	1.96	1.00	1.28
	12. Allowing or asking students to view video-streamed lectures, conferences or events.	2.53	2.00	1.29
Doing	13. Creating or completing surveys or questionnaires using the mobile technology.	2.70	3.00	1.41
	14. Creating any simulation games or digital storytelling to be used in class via your mobile technology.	1.77	1.00	1.19
	15. Asking students to work on wiki-books or wiki-sites as a project (for editing, modifying, etc.)	1.82	1.00	1.17
	16. Mentoring students through mobile technology.	2.46	2.00	1.40

Summary of instructors' responses to the learning activities within R2D2 four categories

As shown in Table 23 and Table 24:

Reading category data analysis.

The first learning activity was *listening to educational podcasts or online webinars.* (268 participants responded; *Mean* = 3.24, *Median* = 3.00, and *SD* = 1.17). The percentage of responses to *never* was 9.3%, *rarely* was 14.6%, *sometimes* was 35.8%, *often* was 23.5%, and *always* was 16.8%.

The second learning activity was *accessing language lessons and applications.* (268 participants responded; *Mean* = 3.02, *Median* = 3.00, and *SD* = 1.37). The percentage of responses to *never* was 19.0%, *rarely* was 18.3%, *sometimes* was 21.6%, *often* was 23.9%, and *always* was 17.2%.

The third learning activity was *asking students to do discovery reading or read online news.* (268 participants responded; *Mean* = 3.40, *Median* = 3.00, and *SD* = 1.20). The percentage of responses to *never* was 6.7%, *rarely* was 16.8%, *sometimes* was 29.9%, *often* was 23.5%, and *always* was 23.1%.

The fourth learning activity was *doing any question and answer sessions with students, through chat, emails, or blackboard for example.* (268 participants responded; *Mean* = 2.24, *Median* = 2.00, and *SD* = 1.31). The percentage of responses to *never* was 40.7%, *rarely* was 22.4%, *sometimes* was 17.2%, *often* was 11.6%, and *always* was 8.2%.

Figure 18: *Percentages for the Learning Activities in Reading Category*

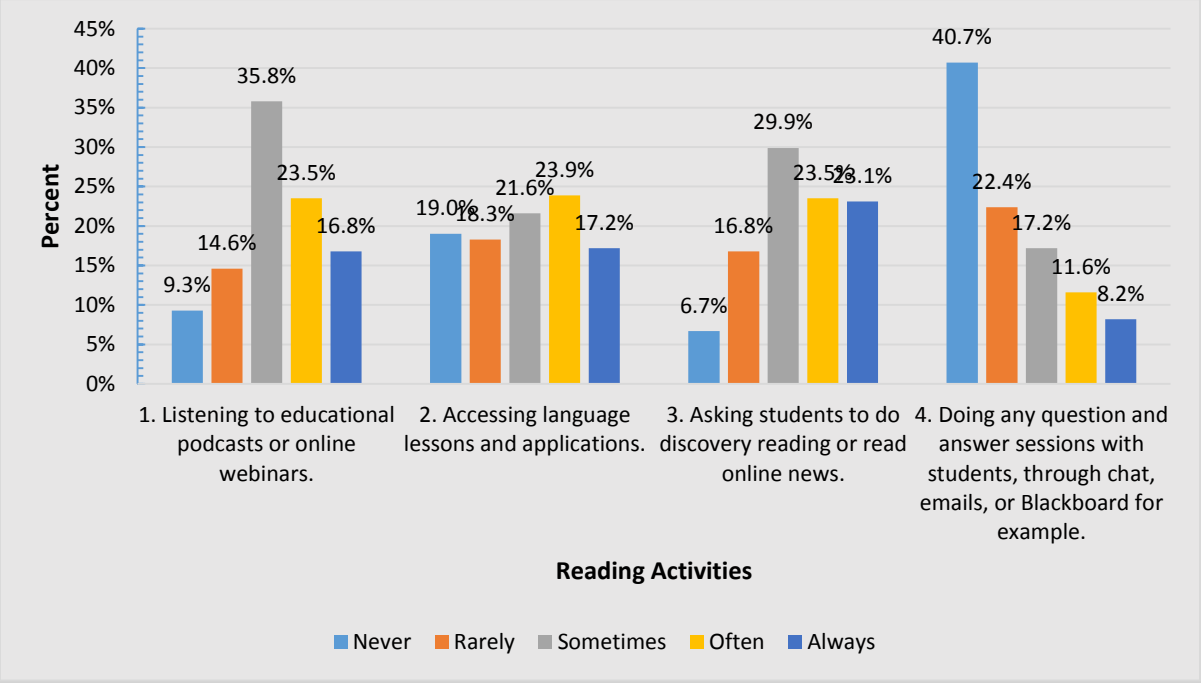
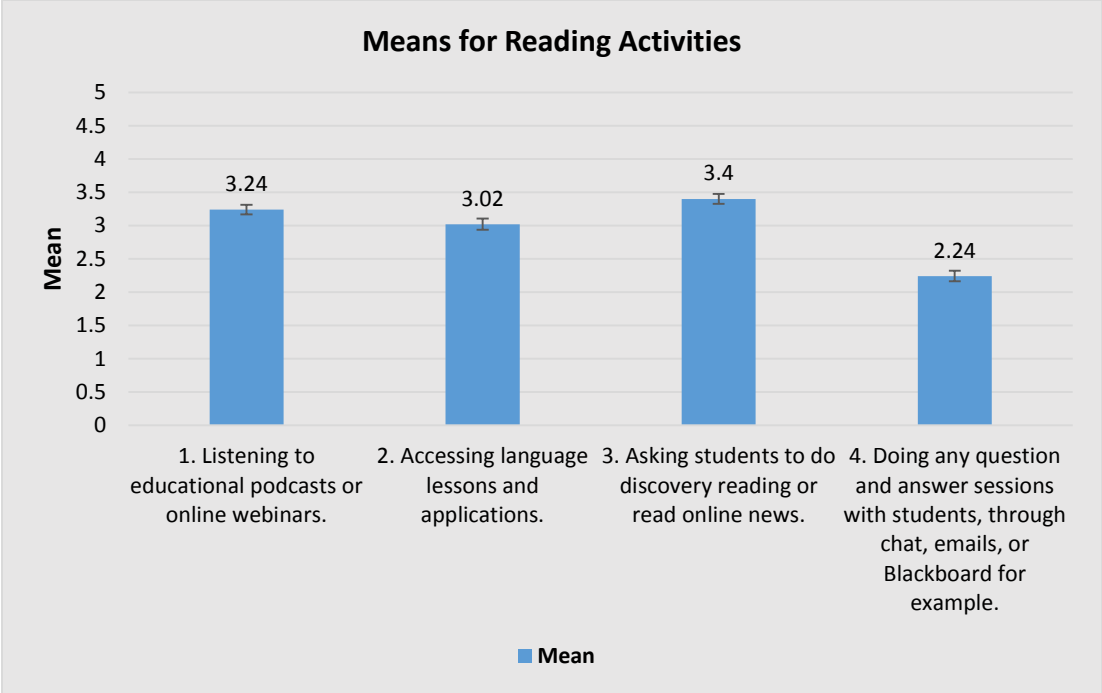


Figure 19: *Descriptive statistics (Mean) for the Learning Activities in Reading Category*



Reflecting category data analysis.

The fifth learning activity was *using manuscripts from previous chats with other lecturers or students in your teaching, when necessary.* (268 participants responded; *Mean* = 2.15, *Median* = 2.00, and *SD* = 1.27). The percentage of responses to *never* was 42.5%, *rarely* was 23.5%, *sometimes* was 17.5%, *often* was 9.0%, and *always* was 7.5%.

The sixth learning activity was *creating and managing online blogs and use them in your teaching.* (268 participants responded; *Mean* = 2.28, *Median* = 2.00, and *SD* = 1.37). The percentage of responses to *never* was 42.2%, *rarely* was 20.1%, *sometimes* was 15.3%, *often* was 12.7%, and *always* was 9.7%.

The seventh learning activity was *asking students to use discussion forums or group discussions.* (268 participants responded; *Mean* = 2.34, *Median* = 2.00, and *SD* = 1.31). The percentage of responses to *never* was 36.6%, *rarely* was 23.1%, *sometimes* was 18.3%, *often* was 14.2%, and *always* was 7.8%.

The eighth learning activity was *asking students to create blogs and reflect on the different topics in your course.* (268 participants responded; *Mean* = 2.10, *Median* = 2.00, and *SD* = 1.31). The percentage of responses to *never* was 48.9%, *rarely* was 16.8%, *sometimes* was 16.8%, *often* was 10.4%, and *always* was 7.1%.

Figure 20: *Percentages for the Learning Activities in Reflecting Category*

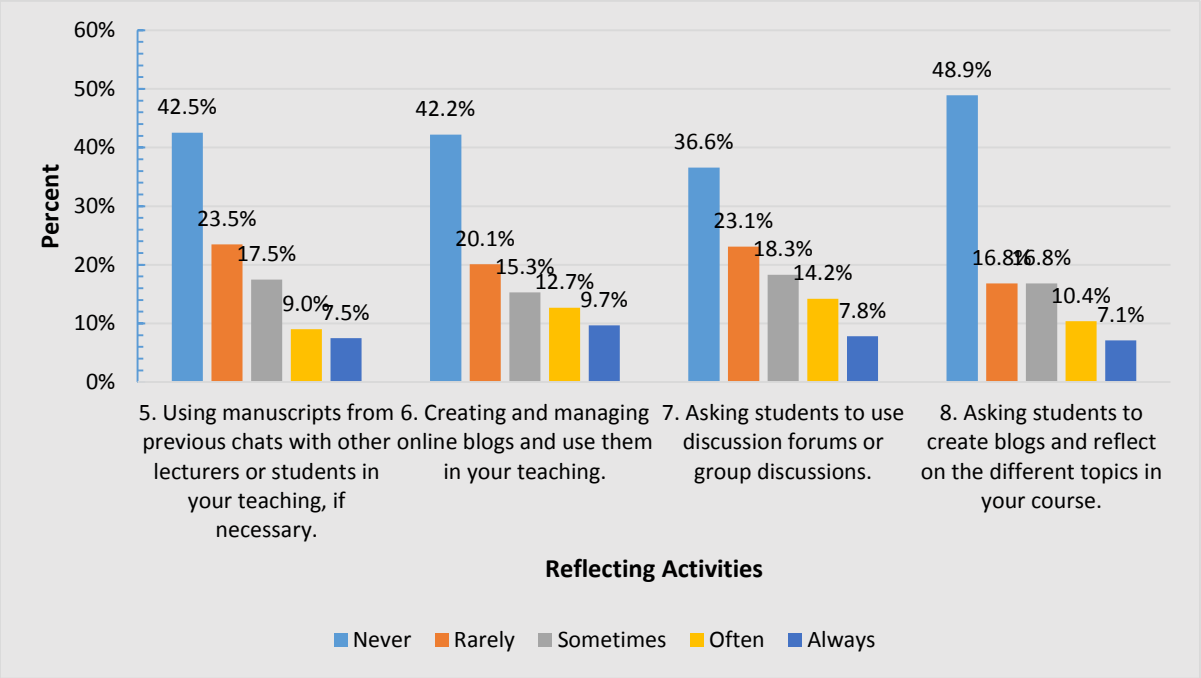
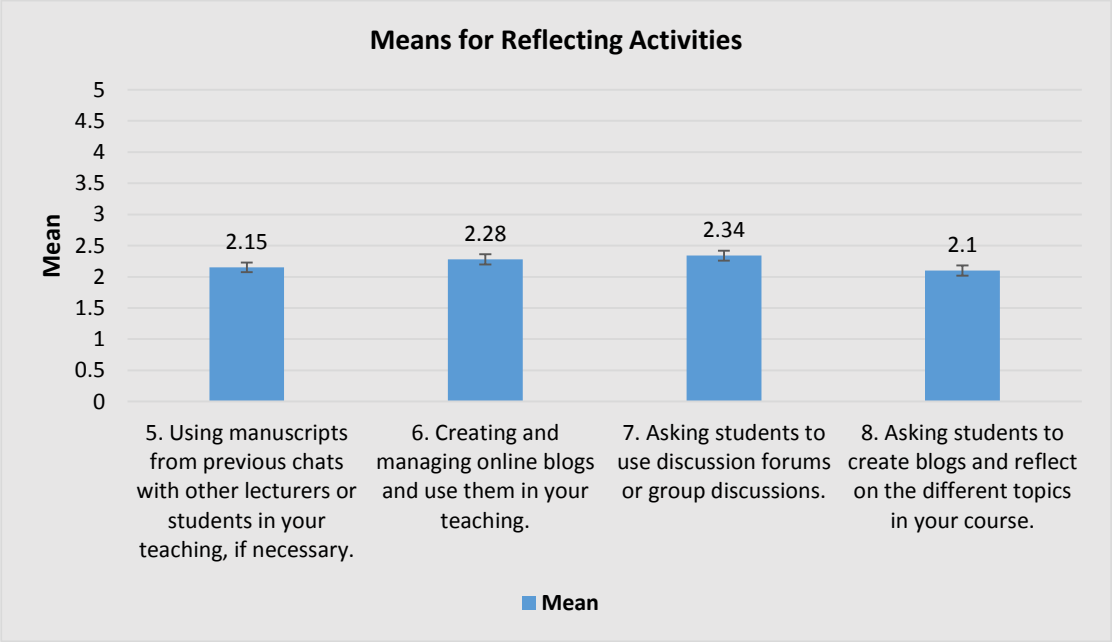


Figure 21: *Descriptive statistics (Mean) for the Learning Activities in Reflecting Category*



Displaying category data analysis.

The ninth learning activity was *creating instructional videos and showing them in your classes, or posting them to a YouTube channel for example.* (268 participants responded; *Mean* = 1.99, *Median* = 1.00, and *SD* = 1.30). The percentage of responses to *never* was 54.1%, *rarely* was 16.0%, *sometimes* was 14.6%, *often* was 7.5%, and *always* was 7.8%.

The tenth learning activity was *using mobile technology in your class to create and show graphs and charts.* (268 participants responded; *Mean* = 3.24, *Median* = 3.00, and *SD* = 1.48). The percentage of responses to *never* was 20.5%, *rarely* was 10.8%, *sometimes* was 20.5%, *often* was 20.5%, and *always* was 27.6%.

The eleventh learning activity was *asking students to view virtual tours and share them with their peers in class.* (268 participants responded; *Mean* = 1.96, *Median* = 1.00, and *SD* = 1.28). The percentage of responses to *never* was 54.5%, *rarely* was 17.9%, *sometimes* was 10.8%, *often* was 10.4%, and *always* was 6.3%.

The twelfth learning activity was *allowing or asking students to view video-streamed lectures, conferences or events.* (268 participants responded; *Mean* = 2.53, *Median* = 2.00, and *SD* = 1.29). The percentage of responses to *never* was 27.6%, *rarely* was 26.1%, *sometimes* was 20.9%, *often* was 16.8%, and *always* was 8.6%.

Figure 22: *Percentages for the Learning Activities in Displaying Category*

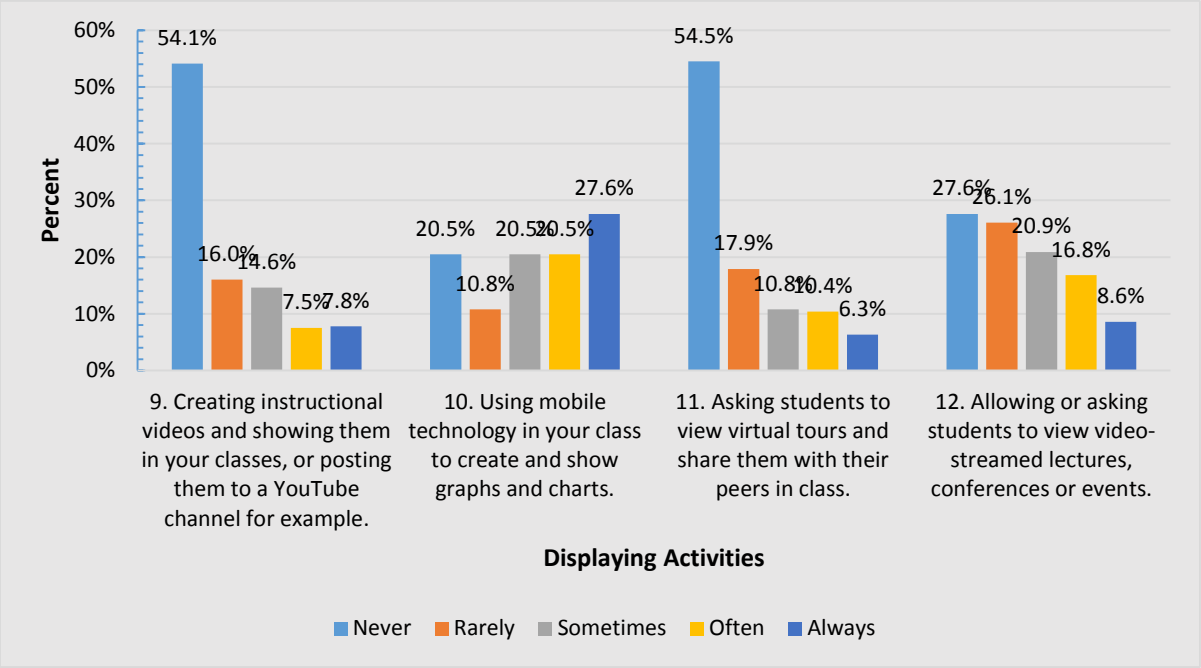
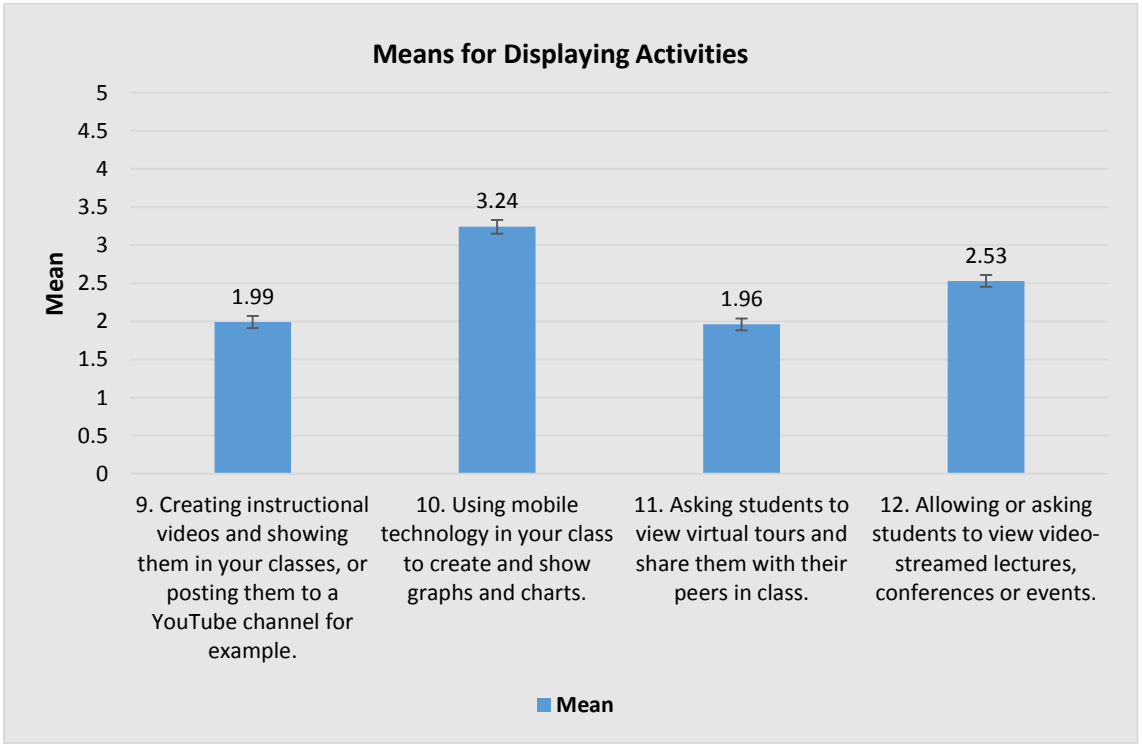


Figure 23: *Descriptive statistics (Mean) for the Learning Activities in Displaying Category*



Doing category data analysis.

The thirteenth learning activity was *creating or completing surveys or questionnaires using the mobile technology*. (268 participants responded; *Mean* = 2.70, *Median* = 3.00, and *SD* = 1.41). The percentage of responses to *never* was 29.5%, *rarely* was 16.8%, *sometimes* was 21.6%, *often* was 18.7%, and *always* was 13.4%.

The fourteenth learning activity was *creating any simulation games or digital storytelling to be used in class via your mobile technology*. (268 participants responded; *Mean* = 1.77, *Median* = 1.00, and *SD* = 1.19). The percentage of responses to *never* was 63.8%, *rarely* was 12.3%, *sometimes* was 11.6%, *often* was 7.8%, and *always* was 4.5%.

The fifteenth learning activity was *asking students to work on wiki-books or wiki-sites as a project (for editing, modifying, etc.).* (268 participants responded; *Mean* = 1.82, *Median* = 1.00, and *SD* = 1.17). The percentage of responses to *never* was 59.3%, *rarely* was 14.9%, *sometimes* was 14.2%, *often* was 7.5%, and *always* was 4.1%.

The sixteenth learning activity was *mentoring students through mobile technology*. (268 participants responded; *Mean* = 2.46, *Median* = 2.00, and *SD* = 1.40). The percentage of responses to *never* was 35.8%, *rarely* was 19.8%, *sometimes* was 19.4%, *often* was 12.7%, and *always* was 12.3%.

Figure 24: *Percentages for the Learning Activities in Doing Category*

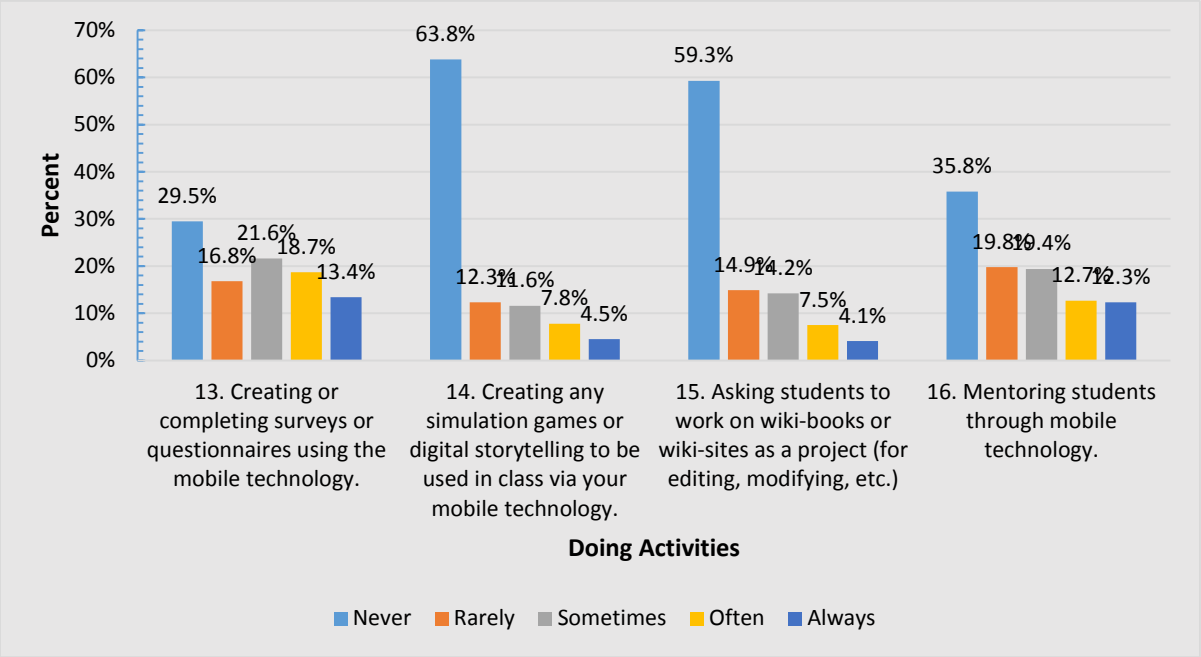
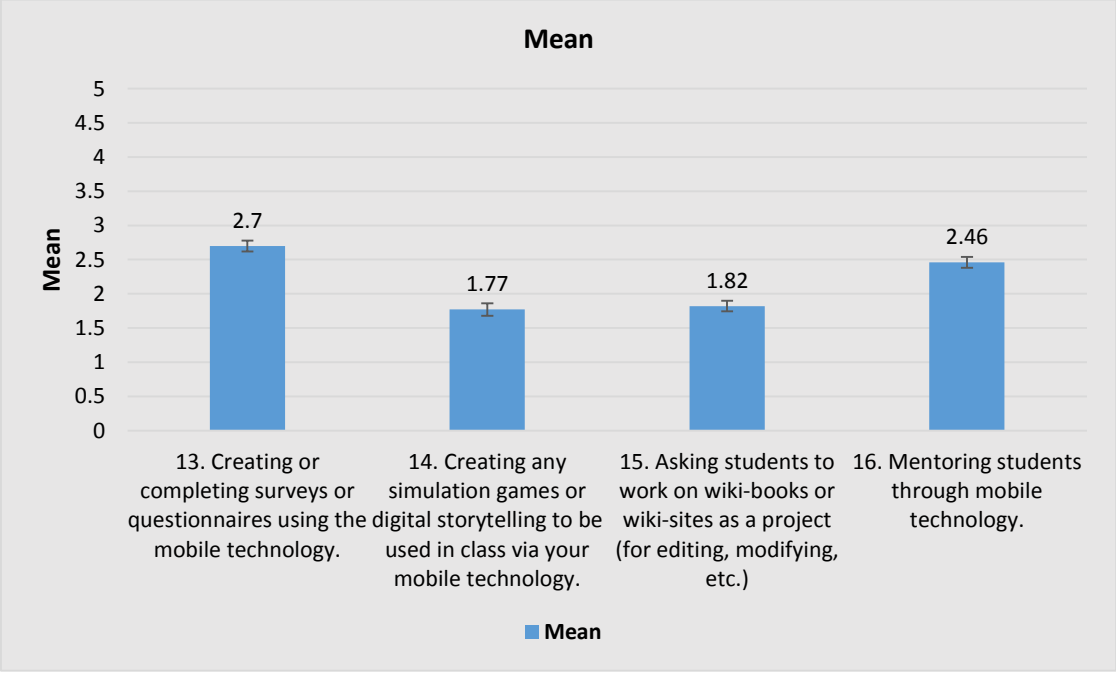


Figure 25: *Descriptive statistics (Mean) for the Learning Activities in Doing Category*



The analysis of the learning activities showed that the following learning activities, from the four R2D2 categories, has a mean of (2.5) or higher, starting with the highest. “asking students to do discovery reading or read online news” got a mean of (3.40), and “listening to educational podcasts or online webinars” with a mean of (3.24) from the reading category, “using mobile technology in your class to create and show graphs and charts” from the displaying category got a mean of (3.24). “Accessing language lessons and applications” from the reading category got a mean of (3.02), “creating or completing surveys or questionnaires using the mobile technology” form the doing category got a mean of (2.70), and “allowing or asking students to view video-streamed lectures, conferences or events” from the displaying category got a mean of (2.53).

Based on these results, the learning activities that fall into the reading category were selected the most by participants, followed by learning activities from the displaying category. None of the learning activities from the reflecting category received a mean higher than (2.5) although an interviewee reported that he asked his students to reflect on some online materials created by him like videos after watching them by saying “I used Blackboard, and I asked my students to watch video lessons online, created by me, for two hours every week, then reflect on them, and submit everything online, and it worked successfully” (Interviewee 1, Line 21). Learning activities from the doing category were among the least selected by participants as activities (to be done or that have been done) via mobile technology. The reasons behind that were mentioned and reported in the follow-up (open-ended) question that asked participants why they had selected *NEVER* for some of the learning activities. Participants’ responses were around the difficulties that accompany these learning activities when applied or conducted on mobile technology. Participants reported that the variety of types and models of the mobile

technology and mobile devices made it very difficult to use such technology for doing activities that require designing or developing or creating materials or games, etc. Students having different types of mobile technology is also a difficulty for the instructors to know them and be aware about their features and capabilities, etc., and therefore they didn't use them for such activities.

The results, in Table 23, indicate that instructors used mobile technology from *sometimes* to *often* for these learning activities: "listening to educational podcasts or online webinars", "accessing language lessons and applications", "asking students to do discovery reading or read online news", "using mobile technology in your class to create and show graphs and charts", and "creating or completing surveys or questionnaires using the mobile technology" as these learning activities got a median of (3.0).

One of the main objectives of this study is to find out the actual uses of mobile technology by university instructors in the Saudi public universities, no matter their majors or disciplines. The results, from Table 23 and Table 24, show that the reading category, which addresses the auditory and verbal learners, and the displaying category, which addresses the visual learners, were the most considered categories by university instructors in their courses through the use of mobile technology. The least category that was considered by participants was the doing category, which addresses the tactile and kinesthetic learners or hands-on learners. This category and its activities require more skills and experiences of the different types of mobile technology available to instructors and their students, and that hindered instructors from considering such activities in their courses (for some difficulties and obstacles). Some participants explained, in the open-ended questions, that there are a huge

number of tools and applications that help them to consider and conduct the learning activities from the reading and displaying categories. They indicated that there are plenty of mobile application and online tools for presentation, for listening, for reading different types of texts, books, news, etc., for viewing online lectures or videos, for taking pictures or creating graphs. Such activities can be done very easily through the now-available online tools and mobile applications (apps) by both instructors and their students.

The four R2D2 categories (reading, reflecting, displaying, and doing) and their different learning activities address the different types of the regular learners. Interestingly, the findings of this study found that not only regular students are benefiting from the use of mobile technology, but also students with special needs (handicapped or physically challenged) as well as instructors with special needs. One interviewee reported that the use of mobile technology has even helped the handicapped students that he usually encounters in his college. He explained that he didn't teach any of them, but through communication with his colleagues telling him that students with difficulties in hearing and one student with difficulty in his sight (visually impaired) are benefiting immensely from their mobile technology, when allowed to use them in class, and even out of the class. Another interviewee reported that a colleague instructor at his university, teaching Islamic studies, is blind. He explained:

> *"This blind instructor has a genius memory where he memorizes entire books and the whole Quran. His courses do not require much of presentation or any physical activities. All that is required consists of delivering speeches and reciting the Quran to students and listening to them and correcting them. This instructor started recently using his mobile phone for timing and recording students, and he encourages his students to record themselves while reciting, and then listen back to their recitation and find the mistakes, etc. This instructor usually has an assistant with him in his classes, but he, although blind, has found some benefits of using mobile technology for teaching and learning." (Interviewee 5, line 662 - 669).*

A study done by Arrigo and Ciprì (2010) concluded that "people with disabilities will benefit from the significant social, cultural, and economic benefits of ICT as long as the information and services are designed appropriately. Multimodality can play an important role in improving the accessibility of emergent technologies such as mobile devices." (p. 100). In their study, many techniques and considerations were presented and suggested to "increase the accessibility of mobile learning environment for people with special needs, in particular for the visually impaired." (p. 100-101).

Overall, the findings of this part reveal that the most considered categories were reading and displaying categories due to availability of the many tools and applications that help in conducting the learning activities from these two categories. The findings also suggest that the more applications, for reflective and hands-on learners, being developed and made available for instructors, the more instructors will consider the learning activities from the other two categories (reflecting and doing categories).

There were some variances among instructors from the different universities (old or newly-established universities) in their selection and application of the learning activities (due to the ready and well-equipped labs and classrooms and the availability of the newest technology, etc.). More variances are explained in more details in the following section, where instructors responded to why they had selected *Never* or *Always* for the learning activities.

Table 25: *Saudi Public Universities (Budget, Fiscal Year 2013) (MOE, 2015)*

Regions (5)	Universities	Est.	Revenues and expenditures (~US$) 2013
Northern Region	University of Tabuk	2006	343.364.000
	Al Jouf University	2005	384.142.933
	University of Ha'il	2005	354.800.533
	Northern Borders University	2007	248.711.200
Southern Region	Al Baha University	2006	251.018.133
	Najran University	2006	287.780.000
	King Khalid University	1998	961.360.000
	Jazan University	2005	472.410.400
Eastern Region	King Fahd University of Petroleum and Minerals	1975	358.909.866
	King Faisal University	1975	587.845.600
	University of Dammam	2009	775.401.600
Western Region	Taibah University	2003	554.130.666
	King Abdulaziz University	1967	1.522.679.466
	Taif University	2003	544.113.600
	Umm Al-Qura University	1981	717.493.866
	Islamic University of Madinah	1961	268.018.666
Central Region	Qassim University	2003	626.930.400
	Prince Sattam bin Abdulaziz University	2009	330.580.000
	Shaqra University	2009	239.151.733
	King Saud University	1958	2.513.068.266
	King Saud bin Abdulaziz University for Health Sciences	2005	-------
	Princess Nora bint Abdulrahman University	2007	585.583.733
	Majmaah University	2009	253.174.933
	Imam Muhammad Ibn Saud Islamic University	1974	1.017.538.666

The frequencies of the learning activities within the R2D2 categories

Participants who selected *Never* or *Always* for three learning activities or more (in the fourth section from the survey) were asked follow-up questions right after completing the learning activities' section, and here are their details:

Open-Ended Question 1

*You have chosen "**Never**" for three or more statements in the previous section (Section 4). Would you please explain your rationale behind not using your mobile technology for such activities? (Any problems, obstacles, risks, costs, etc.).* This question was a follow-up question and was displayed only to respondents who selected *NEVER* for three learning activities or more from the learning activities' section (fourth section of the survey).

This question was a semi-structured question where it referred to the previous section of the learning activities and was trying to find out why respondents had chosen *Never* for three or more learning activities. The themes were the main R2D2 categories (reading, reflecting, displaying, and doing) and some other themes were found such as major obstacles like the lack of experience from instructors' or students' side, the unavailability of devices for instructors and students, and the use of mobile devices was banned in some colleges around the kingdom.

The following learning activities were the least done or conducted by participants in class via mobile technology, starting with the very least: "creating any simulation games or digital storytelling to be used in class via mobile technology", "asking students to work on wiki-books or wiki-sites as a project (for editing, modifying, etc.)", "asking students to view virtual tours and share them with their peers in class", "creating instructional videos and

showing them in class, or posting them to a YouTube channel for example", "asking students to create blogs and reflect on the different topics in the course"

A hundred and sixteen (116) participants selected *Never* to three or more learning activities in the previous section, so this question was displayed to them and they responded to it. Forty-eight percent (48%) of participants who responded to this question indicated that there were many obstacles that prevented them from using mobile technology in their teaching or for communication with their students. The obstacles were as follows: the unavailability or the weakness of Internet in some colleges, the unavailability of devices in the different classrooms and that many labs were not well-equipped, the unavailability of mobile devices with students mainly in rural areas, and the many problems they often face while using Blackboard or the various learning management systems (LMSs) they use in their different universities without having maintenance available for instructors at all times. Twenty-two percent (22%) of respondents reported that the lack of experience by instructors to use the different mobile technologies prevented them from using mobile technology with their students or in their teaching but they showed their eagerness and motivation to learn and apply such activities in their courses, and 36% of respondents indicated that they have limited time to conduct such activities in their courses due to the many courses they already teach and need to prepare for as well. An instructor indicated that "the lecturer does not have the luxury of free time to design such activities using mobile technologies, and the tools are not available in all classrooms". Some instructors reported that they didn't need to use such tools (mobile technology) nor such learning activities because their majors do not require such activities, and that the traditional ways of teaching are better. Their majors were mathematics, chemistry, and some were engineering majors. Some instructors reported that the use of smartphones is

banned in female colleges, and they use laptops only for some of these activities, without more explanation about the ban of smartphones. Forty-two percent (42%) of respondents indicated that there is a severe lack in the training and workshops for instructors on how to use and adapt to the new technology and especially mobile technology, and that their universities should provide and offer them the necessary trainings periodically. They mentioned that they are somehow left behind especially those who teach in rural areas and remote colleges. A large number of instructors indicated that their students have mobile devices available with them, but unfortunately students use them for simple tasks such as chatting, social media, emails, etc., but when asked to do other tasks or activities such as creating educational videos, or managing blogs, or doing some virtual tours using their mobile technology, they seem to be not knowing how to use their mobile devices for such activities, and they seem to be not serious about using their mobile technology for real educational purposes.

Open-Ended Question 2

*You have chosen "**Always**" for three or more statements in the previous section (Section 4). Would you please explain your rationale behind considering and using your mobile technology for such activities? (Any motives, advantages, recommendations, or suggestions).* This question was a follow-up question and was displayed only to respondents who selected *ALWAYS* for three learning activities or more from the learning activities' section (the fourth section of the survey).

Thirty-nine (39) participants selected *Always* for three or more learning activities in the previous section (Section 4), so this question was displayed to them only. Some main themes were found in the participants' responses to this question such as that their fields required using

such tools and conducting such activities, the eagerness of some instructors drove them to use mobile technology in their teaching and for communication with their students and colleagues, and others indicated that the availability of the new technology in their colleges encouraged them to use them and benefit from them. Fifty-two percent (52%) of respondents to this question indicated that their fields (instructional technology, design, engineering, computer science, and Islamic studies) required the use of mobile technology and required conducting such or similar activities. Islamic studies majors required instructors to conduct activities from these categories (reading and displaying) such as listening to educational podcasts, reading online, creating instructional videos and using the YouTube channels, and asking students to view video-streamed lessons online. Other majors used mobile technology to conduct different activities from the four different categories. More than 90% of respondents reported that the use of mobile technology saves time and efforts in their teaching and in their dealing with their students along with some other advantages regarding better and easier communication, and course preparation where they use their mobile technology as scanners, cameras, recorders, etc. An instructor reported that the use of mobile technology "makes the learning experience effective, interactive, and enjoyable". Another instructor said "I always encourage students to take advantage of using these technologies and learn how to keep record of their files, emails, homework, and to develop new skills". Some participants reported that they sometimes try to help their students to use mobile technology from their own expenses. Forty-seven percent (47%) of respondents indicated that the use of mobile technology and conducting such new activities breaks the normal routine, and motivates students to be engaged and focused in their courses. One of the participants concluded his response by saying "it is not possible any more

to avoid the strong presence of the Internet in our daily life, and in teaching specifically. It is becoming a must and not an option any more".

A Kruskal-Wallis test was done to compare the learning activities according to the five regions, as shown in Table 26, to see if there were any significant differences among the instructors from the different regions.

Table 26: *Kruskal-Wallis (One-way Analysis of Variance): Comparing Learning Activities According to Regions*

	Statements	**Chi-Square**	**Sig.**
Reading	1. Listening to educational podcasts or online webinars.	1.72	.886
	2. Accessing language lessons and applications.	1.28	.936
	3. Asking students to do discovery reading or read online news.	3.03	.695
	4. Doing any question and answer sessions with students, through chat, emails, or Blackboard for example.	3.06	.691
Reflecting	5. Using manuscripts from previous chats with other lecturers or students in your teaching, if necessary.	3.31	.652
	6. Creating and managing online blogs and use them in your teaching.	10.42	.064
	7. Asking students to use discussion forums or group discussions.	5.20	.392
	8. Asking students to create blogs and reflect on the different topics in your course.	5.26	.384
Displaying	9. Creating instructional videos and showing them in your classes, or posting them to a YouTube channel for example.	3.10	.684
	10. Using mobile technology in your class to create and show graphs and charts.	4.01	.548
	11. Asking students to view virtual tours and share them with their peers in class.	4.01	.548
	12. Allowing or asking students to view video-streamed lectures, conferences or events.	3.62	.605
Doing	13. Creating or completing surveys or questionnaires using the mobile technology.	5.37	.372
	14. Creating any simulation games or digital storytelling to be used in class via your mobile technology.	4.44	.488
	15. Asking students to work on wiki-books or wiki-sites as a project (for editing, modifying, etc.)	1.41	.923
	16. Mentoring students through mobile technology.	2.56	.767

Note. (df = 5) for all items

As shown in Table 26, there was no statistical significance between the many learning activities among the different five regions and their universities (Northern- 4 universities, Southern- 4, Eastern- 3, Western- 6, and Central Regions- 8). This finding indicated that instructors in the 25 public universities, in the five regions, were almost the same (there was no significant difference) in their application and selection of the learning activities in their teaching and in addressing their students' preferences despite the earlier reporting of instructors, in the open-ended question, that some colleges in rural areas do not have the technology at all, rather than having the newest technology!

Summary of participants' responses to learning activities by groups

Table 27 presents the Mean, Standard Deviation (SD), and t-Test for the learning activities within the R2D2 four Categories (Reading, Reflecting, Displaying, and Doing) for the two study groups. The total number of participants for this section was 268 (In-Home = 110, Abroad = 158, missing = 93).

Table 27: *Mean, Standard Deviation, and t-test for the learning activities within all R2D2 Categories (Between groups)*

	Groups	N	Mean	SD	t-test	Sig.
Reading	In-Home	110	2.87	0.96	-1.46	.145
	Abroad	158	3.04	0.94		
Reflecting	In-Home	110	2.21	1.06	-0.03	.973
	Abroad	158	2.22	1.15		
Displaying	In-Home	110	2.35	0.99	-1.03	.303
	Abroad	158	2.48	1.08		
Doing	In-Home	110	2.11	1.01	-0.96	.336
	Abroad	158	2.24	1.05		

Table 28 presents the Mann-Whitney U Test for the different learning activities among the two strata/groups.

Table 28: *Mann-Whitney U Test for the Learning Activities among the two Groups (In-Home: 110, Abroad: 158 Instructors)*

	Statements	Groups	Mean Rank	Z	Sig.
Reading	1. Listening to educational podcasts or online webinars.	Home	123.79	-1.955	.051
		Abroad	141.96		
	2. Accessing language lessons and applications.	Home	120.91	-2.447	.014
		Abroad	143.96		
	3. Asking students to do discovery reading or read online news.	Home	137.08	-.469	.639
		Abroad	132.70		
	4. Doing any question and answer sessions with students, through chat, emails, or Blackboard for example.	Home	131.46	-.560	.575
		Abroad	136.62		
Reflecting	5. Using manuscripts from previous chats with other lecturers or students in your teaching, if necessary.	Home	132.93	-.292	.771
		Abroad	135.59		
	6. Creating and managing online blogs and use them in your teaching.	Home	134.17	-.061	.951
		Abroad	134.73		
	7. Asking students to use discussion forums or group discussions.	Home	136.39	-.346	.730
		Abroad	133.18		
	8. Asking students to create blogs and reflect on the different topics in your course.	Home	132.41	-.395	.693
		Abroad	135.96		
Displaying	9. Creating instructional videos and showing them in your classes, or posting them to a YouTube channel for example.	Home	125.05	-1.823	.068
		Abroad	141.08		
	10. Using mobile technology in your class to create and show graphs and charts.	Home	131.15	-.604	.546
		Abroad	136.83		
	11. Asking students to view virtual tours and share them with their peers in class.	Home	133.25	-.243	.808
		Abroad	135.37		
	12. Allowing or asking students to view video-streamed lectures, conferences or events.	Home	131.99	-.454	.649
		Abroad	136.25		
Doing	13. Creating or completing surveys or questionnaires using the mobile technology.	Home	125.57	-1.614	.107
		Abroad	140.72		
	14. Creating any simulation games or digital storytelling to be used in class via your mobile technology.	Home	129.22	-1.084	.278
		Abroad	138.17		
	15. Asking students to work on wiki-books or wiki-sites as a project (for editing, modifying, etc.)	Home	129.45	-1.006	.315
		Abroad	138.02		
	16. Mentoring students through mobile technology.	Home	136.38	-.343	.732
		Abroad	133.19		

The findings, as shown in Table 27 and Table 28, reveal that there is no significance between participants, from the two groups, in their selections for the learning activities except that participants who were abroad, during the time of the study, were more likely to use mobile devices to access language lessons and applications, and they appeared to use their mobile devices, as well, to listen to educational podcasts or online webinars more than In-home instructors. Evans (2008) concluded his study, about the effectiveness of m-learning and podcast tools in higher education, by stating that "coupled with the advantages of flexibility in when, where and how it is used, podcasting appears to have significant potential as an innovative learning tool for adult learners in Higher Education." (p. 491)

These findings indicate that all participants (in-home and abroad instructors) were similar in their selection of or rejection for the various learning activities, and that all instructors focused more on the learning activities that fall into the reading category of the R2D2 model, and secondly, they focused on the learning activities that fall into the displaying category.

Research Question 4: Instructors' views about the role of mobile learning in the next generation of learning in Saudi Universities

Participants were asked, in the interviews, about their views about the role of mobile learning and the use of mobile technology in higher education in the next generation of learning in Saudi Arabia, and many participants in the survey instrument directly answered the open-ended question 3, listed below, about whether or not they think mobile technology can be a major learning tool in the coming years, and indirectly expressed and explained their views

through the advantages of using mobile technology in their teaching and in the educational system in general, and how they see it happening.

All six interviewees agreed that mobile learning is happening and being implemented in their different universities, but somewhat by individuals' efforts. Two interviewees reported that their universities are so keen to integrate and use technology in education, that they have set a number of incentives for instructors who start to use technology in their teaching and with their students, while the other four instructors indicated that they have observed some changes within their universities, but in a smaller scale than they think should be. The six interviewees indicated that there should be even extra efforts from the different universities to integrate and accelerate the adoption of mobile technology in the different courses since they have seen great opportunities in them.

A large number of participants, in the survey instrument, indicated that the use of mobile technology should be integrated as soon as possible in order to be in line with the environment of students and with how excessively they use their mobile technology in their daily lives. One interviewee explained that "the new generation use it on a daily basis, every hour, from the moment they wake up in the morning until their bed-time they use it, so why not to use in academic life and activities." (Interviewee 1, Line 142). Some participants reported that there is no way for rejecting or refusing the use of mobile technology in their courses any more, as most educational activities can be done through mobile technology. They also reported that they always encourage their colleagues to start using the mobile technology especially in design, education, and science majors. They focused on the huge number of accessible resources to them and to their students, and the great flexibility in communication

among them, and how such technology has facilitated and supported their teaching to be more efficient and more enjoyable for students.

The following Open-Ended Question 3 is a continuation for the Research Question 4.

Open-Ended Question 3

This question was about whether or not mobile technologies could be major learning tools in coming years, especially for higher education in Saudi Arabia.

A hundred sixty-seven (167) participants responded to this question. Ninety-seven percent (97%) of respondents answered with confirmation (YES) for this question that they think mobile technology can be a major learning tool in the near future in higher education in Saudi Arabia. The three remaining percent were between (NO) and (I Do not Know) whether mobile technology will be a major learning tool or not as they have not fully experienced it, and they explained that they teach in colleges in remote/rural areas. Many participants agreed and expressed that this would highly depend on the different majors and whether mobile technology fits in their curriculum or not, but in general, they somewhat agreed that mobile technology helps significantly in teaching and learning. The majority of participants explained the reasons behind their thinking that mobile technology will be a major learning tool since mobile technology saves time for the instructor, for students, and for the educational system, and brings about great benefits for them. Mobile technology helps in sharing the information with and between students in a better way, and encourages better and greater collaboration among students and their instructors. Some participants reported that mobile technologies have a promising future in Saudi Arabia, and some stated that “mobile technology has invaded our lives” indicating that they cannot ignore using it. Other participants called mobile technology

as (the new face of education), and that mobile technology will move students from the old-fashioned learning to more interactive learning. Many participants reported that they think that mobile technology will be a major learning tool because of the new generation's addiction to the mobile technology by its various types in almost all daily activities, as if there is no way to abandon or ban the use of mobile technology in classes anymore. They mentioned that the new generation prefers this way of learning, and that the new generation is very keen to use such technologies everywhere.

The use of electronic books in universities, and the updates and advances in libraries and resources are some examples of the shift towards mobile learning throughout the various universities. As reported by many respondents that the Saudi Electronic University SEU is a clear example of the government's vision towards using and integrating mobile technology in education and towards shifting to mobile learning.

On the other hand, some participants emphasized that mobile technology is only as good as how the instructor uses it. They expressed some fear that instructors may depend totally on mobile technology and ignore the main parts of the class (mobile technology is a tool, and not the curriculum).

Research Question 5: Instructors' concerns regarding mobile learning

All participants expressed some types of concerns or worries that make them reluctant and hesitant about the integration of mobile technology in their courses and in their teaching practices. These concerns were mainly technical and security concerns, academic concerns, and social concerns.

Almost a quarter of participants reported their concerns about the technical issues and problems they sometimes encounter with the regular technology such as smart boards, projectors, camera if used, desktops and the internal network, etc., and that they fear more problems will occur when dealing with the newer technology (mobile technology). They mentioned the security issues, since they are not fully experienced in using technology (they use them for simple activities) and they were worried about students' personal data, grades and exams, etc. They mentioned the short-life of batteries of all mobile technology available nowadays although in fact this issue has been solved recently with the very new mobile technology, where batteries last for almost ten hours- more than the regular school's time.

Some participants expressed their worries about developing the curriculum and materials that will fit and will be compatible with the many types of mobile technology. They indicated that they are experts in their fields and in their teaching, but not necessarily in designing the new types of materials (to fit mobile learning, etc.). One participant frankly explained that "I can teach and I know my subject area, but I cannot develop the software, if needed, to deliver certain things. I am an instructional designer, but not experienced with software and programming. I will need help in that." (Interviewee 2, Line 217). These instructors stressed having some units with professional designers and programmers available for them along with providing the necessary workshops and training very frequently, especially for novices in technology.

Eighteen percent (18%) of participants, participating in the survey instrument, were worried about students and their relations to books and libraries. Participants reported that the frequent use and reliance on mobile technology and the complete switch (if done) to mobile

learning will distance students from books and resources and from visiting libraries which are considered the nerves of the educational systems. Participants believe that books and papers and the other materials are a must for real and authentic learning. They reported and mentioned many stories and incidents about their own learning and how they benefited from books and from visiting libraries, and they want to transfer such benefits and joy to their students. They are worried that they and their students will lean towards the easiness of mobile learning, and that they may forget about libraries or think about visiting them as a burden.

Half of the interviewees claimed that the easy access to materials and online resources through the use of mobile technology have brought new ways of cheating among students, and especially in the mid and final exams. Interviewee 5 reported that he has encountered some incidents where students were using their mobile devices, during exams, for cheating and copying the exam's questions.

Many participants were concerned about the large expenses to students to get new mobile technology, and they urged universities to find ways to help students get mobile technology (laptops, tablets-iPads, smart-phones, etc.) or provide them with ones. An instructor expressed his worries, which matched many other instructors' worries as well, that "in a rural area, some students may not be able to afford such devices for many reasons." (Interviewee 2, Line 222). Their concerns were about the high costs of smart-phones, iPads and the mobile technology in general. Although students get some allowances for their higher education, they may not be able to afford such costs, since they have many responsibilities and bills to take care of. These instructors suggested ways to be considered by universities to help their students and make them able to get the right mobile technology for their studies, if there is any commonality within the university itself, or if needed in rural areas, since many factors

will play in such as Internet signals and strength, students' skills and abilities to utilize such technology and devices, etc.

Half of the interviewees expressed their views about the real encouragement, from their universities, about the use of mobile technology in their teaching as very low and they were not satisfied about it. One instructor explained that "I think we have not reached that stage of encouragement to distribute devices like iPads or tablets and encourage instructors and students to use them." (Interviewee 1, Line 131) These instructors indicated that their universities are still focusing on the regular technology such as desktops, projectors, whiteboards, i-clicker, etc. that are somewhat available in classrooms but not exactly on the new mobile technology such as tablets, iPads, or smart phones. A large number of instructors expressed that they are afraid of using the new mobile technology and that their students are already way better than they are. They fear that their students are "digital natives" and that they use their mobile devices most of their times, and they are very experienced in the functions and features in them. These instructors demanded more and enough training before the integration of mobile technology in their courses, if going to happen. One interviewee pointed that "for students who already have the devices, I do not think they need training. They generally know how to utilize their devices very well. They won't have the problems, but instructors will absolutely need some training sessions." (Interviewee 2, Line 224).

Summary of the Findings from the Open-Ended Questions

The survey instrument had five open-ended questions in order to get deeper insights about the participants' responses of the fourth section (the learning activities section), and to answer some of the research main questions. The first two open-ended questions were

explained earlier as they relate to the learning activities and to why respondents selected *Never* and *Always* for the different learning activities. The third open-ended question was a continuation for the fourth research question, listed above.

Open-Ended Question 4

Please tell us about any additional advantages, not previously stated, that you feel could be gained from using mobile technology for teaching.

Here is a summary of the advantages that could be gained from using mobile technology for teaching or in the class as reported by 147 participants in the survey instrument. Almost 67 % of instructors, who responded to this question, agreed on some common advantages of using mobile technology such as saving time (instructors' and students' time), saving instructors' efforts in preparation and in teaching, enabling extra and better ways for communication among students themselves and between students and their instructors, enabling various ways for getting information from multiple resources at a very short time, portable and easy to carry around the university and almost everywhere, depending on the device, and their huge capacity of saving information and for storage, and enabling instructors to vary in their ways of presentation and content delivery. Instructors made lengthy statements explaining the great benefits that mobile technology brought to their classes and to their students, and how their teaching has been creative and innovative.

Almost twenty-seven percent of participants reported that the use of mobile technology in class and in their teaching enhances the educational experience between the instructor and students as they help for better clarification, for better collaboration when working on shared activities and tasks, for better presentation and organization, and thus better understanding and

comprehension. They reported, as well, that the use of mobile technology helps in increasing and enhancing the reading and discovery skills for both students and instructors. They indicated that the use of mobile technology encourages students more in comparison to traditional teaching.

Using mobile technology in teaching creates new environments for students to learn effectively and collaboratively with their peers, as reported by almost 11% of participants. They indicated that using mobile technology, besides saving time and effort, saves money and saves the content itself. Students would be able to refer back to the content and materials at any time and be able to access and read them and work on them.

As the prices and costs of some mobile technology are getting cheaper and more affordable by students, instructors find it to be the time to start integrating and using them in classes while having the suitable infrastructure and content that would be compatible to all devices and operating systems. Instructors mentioned the free applications and tools that are available on the different online stores that belong to the different operating systems (Apple store, Google Play, etc.) and that they will help students to get new skills and master the use and the various features of mobile technology very easily and effectively. Most instructors talked about the possibilities and the new ways of communication that are enabled through the use of mobile technology inside and outside of the class.

Open-Ended Question 5:

Please tell us about any additional disadvantages, not previously stated, that you feel could affect your teaching or disturb the class while using mobile technology.

Here is a summary of the disadvantages of using mobile technology that could affect teaching or disturb the class while using them as reported by 142 participants. In the beginning, almost 82% of participants agreed that the current status of Internet connection and the old available devices are considered the biggest hindrance and problem that usually distract and disturb the class along with the technical issues and frequent disconnection. Thirty-two percent of participants shared a common disadvantage of using or allowing students to use mobile technology in class which is that students are easily distracted when they receive new emails, or text messages to their phones or through the social media. They have the curiosity to check their emails and messages right away and they start losing concentration in their courses. 43% of participants mentioned that the lack of skills by students to use and utilize mobile technology hinders and wastes the time of the class. Some students still lack the basic skills of functioning the new mobile technology like iPads, smart phones, etc., and participants indicated that they cannot use mobile technology with some students and leave others. Although many instructors see mobile technology as innovative and creative tools, some participants reported that "mobile technology stops innovation in students, and limit the instructors from using various techniques".

More than 46% of participants indicated that most of the applications and features on mobile technology are Internet-based, and they need good and fast connection at all times to benefit of such applications. Therefore, if there was interruption in the Internet connection, the class will be interrupted and such tools and applications won't be available for use.

Thirty-three percent (33%) of participants, who responded to this question, reported that there is no way of controlling students' devices like they used to do so in labs and when using networks on laptops or desktops. They were discouraged of using mobile technology

because of the numerous applications on students' devices and their access to them during the class. They reported that it is difficult to tell, when students are using their devices, whether they are using them for the class or for fun.

Some participants indicated that they had used mobile technology previously in their courses, and they are confused on whether to continue or to stop using them as students started losing the spirit of the real classes and their hidden values such as respect, discipline, time management, real collaboration and cooperation among students and the physical activities in some classes. Their responses were around the easiness of getting information and; therefore, the easiness of cheating and copying others' work, and the waste of time while helping some students around using the mobile technology. Many participants believe in physical activities and physical skills, depending on their majors, like coloring, handing things, painting, repairing, creating some designs in reality, or the physical skills that are required in chemistry and medical fields, and instructors prefer to see students working collaboratively in reality and not on their mobile technology. The instructors dislike the need for some time, in every class, to start up the devices and have them ready for use especially laptops and their extensions, and the time wasted when technical issues occur during the class.

A number of participants were concerned about the health issues that are related to the excessive use of mobile technology, and some reported their fear of security issues and hacking and malwares especially when using different types of devices and different operating systems (Windows, Android, Apple, etc.). One interviewee expressed his concerns about security issues and hacking by stating:

> *"There are some security issues and the university should have a computer security department and make back-ups for the materials and content for all devices.*

Sometimes even from students, if one gets mad with the instructor, they may hack the system or try to damage it." (Interviewee 2, Line 239-242)

Sixteen percent of participants reported the issues with short life time of batteries, small screens, resolutions, and the need for adapters and sometimes electronic extensions in the class as concerns. Some ways to encounter the problems of small screens and the resolution of pictures were presented in a study done by Nedungadi and Raman (2012), where they explained the reduction of pictures' size and the use of suitable CSS styles (Cascading Style Sheets) to help for better visualization and the appearing of the text and contents on the different devices.

Summary

Again, the aim of this study was to investigate and explore the actual uses and experiences of university instructors, in Saudi Arabia, regarding the use of mobile technology in their teaching. Five research questions were developed and were answered in this chapter.

The final findings are drawn in the following chapter (Chapter 5), along with conclusions and some implications for university instructors who are considering integrating mobile technology in their different courses in the near future, along with some implications for the instructional technology field, in regards to mobile learning and the use of mobile technology in education.

CHAPTER 5

This chapter summarizes results and the findings of the analyses that were done in Chapter 4. Final conclusions about this research are drawn in this chapter, and some recommendations are shared and given here in hope to benefit future researchers and future studies that are related to mobile learning and to the use of mobile technology in higher education.

Summary

The research investigated and examined the actual university instructors' uses and experiences of mobile technology in their teaching. With extensive surveys and selected in-depth interviews, this study investigated university faculty's general experiences of mobile technology, their attitudes towards using mobile technology for teaching purposes, and more specifically, how such experiences align with the R2D2 model and with the incorporation of its various learning activities. In addition, semi-structured open-ended questions were developed as well to help get better insights and reflection of instructors' use of mobile technology in higher education.

Demographics and Findings

This research targeted all instructors in the 25 Saudi government-sponsored, public universities in all their academic ranks (teachers, teaching assistants, lecturers, assistant professors, associate professors, and professors), and in all their academic majors. Furthermore, in order to cover all instructors in Saudi public universities, this research also targeted instructors who were completing their graduate studies abroad during the time of the research and were sponsored by the 25 universities. This research focused on two strata-

groups. The first group, In-Home Stratum; those who were at their home universities working and teaching regularly during the time of the research. The second group, Abroad Stratum; those who were completing their graduate studies abroad during the time of the research and were sponsored by the 25 universities no matter how long they have taught before getting their scholarships to complete their graduate studies.

The online survey had 372 recorded participants, where eleven participants refused to participate by selecting (No, I do not agree to participate in this survey), and so they didn't have access to the survey, while 361 participants agreed to participate by selecting (Yes, I'm eligible and agree to participate in this survey) after going through the research information sheet which had all the details about the research and the survey contents. The participants' age ranged from 20 years old to 62 year old with 203 participants indicating their gender as male, and 152 participants indicating their gender as female and six participants preferred not to answer this question. Overall, the most common age group among participants (within the two groups) was 28 – 30 year old representing (29%) of the study. The second most common age group was 25 – 27 year old representing (20%) of the study. The third most common age group was 31-34 with (18%) of participants.

The majority of participants were of younger age, and this is of no surprise to the new technologies used and the new trends considered and integrated such as using mobile technologies in teaching and learning. Another speculation for the lower participation from higher-rank instructors (Associate professors and professors) is that they are mainly into research more than teaching practices.

The survey involved participants from all 25 Saudi public universities. The majority of participants indicated their fields and majors as follows (starting with the largest number): education (n = 77, 21.3%), social sciences (n = 67, 18.6%), technology (n = 64, 17.7%), science (n = 39, 10.8%), engineering (n = 35, 9.7%), and many other fields such as medical fields, Islamic studies, and design. A hundred-forty-two participants indicated that they were teaching at their Saudi universities while participating in this research, and 219 instructors indicated that they were abroad completing their graduate studies during the time of this research.

The majority of participants (n = 157, 43.5%) reported that their academic rank or level was a lecturer in their different majors, followed by teaching assistants (n = 140, 38.8%), followed by assistant professors (n = 41, 11.4%), followed by associate professors (n = 7, 1.9%), and finally followed by full professors (n = 5, 1.4%). In

Table 25, earlier, the different Saudi public universities and their years of establishment, and their revenues and expenditures were presented. Most of the universities were established in the last ten years, which explains the reasons behind having the majority of instructors as lecturers and teaching assistants. Many lecturers and associate professors got their job at the universities only after getting their degrees (Master or Doctoral Degrees) which explains as well the small number of experience years that some instructors have in teaching at the public universities. The majority of participants (n = 227, 62.9%) indicated that they have less than five years of teaching experience at their universities. Many indicated that they had taught at K-12 schools, or worked in different government entities before joining their universities. It was followed by (n = 55, 15.1%) who have teaching experience between 5-15 years in higher education, followed by (n = 23, 6.4%) having more than 15 years of teaching experience in higher education in Saudi Arabia. Fifty-six of the participants (15.5%) indicated that they have never taught in higher education, but they are affiliated with Saudi public universities, and they are abroad completing their graduate studies.

The largest group of participants (n = 144, 39.8%) identified their universities to fall into the Central Region of Saudi Arabia, which has eight public universities. The second largest group of participants (n = 102, 28%) indicated that their universities fall into the Western Region of Saudi Arabia, which has six public universities. Thirty-nine participants (10.8%) select universities which fall into the Northern Region, which has four public universities, and 34 participants (9.4%) selected universities that fall into the Southern Region, which has four public universities. The least group of participants (n = 28, 7.8%) selected universities that fall into the Eastern Region, which has three public universities. Fifteen

instructors (4.2%) preferred not to declare their universities' names by selecting "prefer not to answer" option.

The findings of the demographic information show that the majority (81.7%) of participants (n = 295) use mobile technology in their teaching, while 66 participants (18.3%) do not use mobile technology in their teaching or for their teaching preparation at all. Based on the 286 (79.2% out of 361,) participants who indicated that they use mobile technologies in their teaching (9 missing), they were asked some follow-up questions about the types of mobile devices and their experience in using them in their teaching, and the findings show that the majority of participants (n = 254, 88.8%) use the laptop as the mobile technology in their teaching. A large number of participants (n = 109, 38.1%) use smart-phones in their teaching. Forty-seven participants (16.4%) use tablets or iPads in their teaching. Two participants (0.7%) selected OTHER option as to refer to other types of devices they use in their teaching without explaining about them. The findings also show that (144 out of the 286) participants (39.9%), who use mobile technology in their teaching, have been using them for more than four years. A hundred and two participants used mobile technology in their teaching for a range of 1-4 years, while 40 instructors started using mobile technology in their teaching recently (in the last year).

Very importantly, the findings show that a large number (n = 199) of participants (55.1%) had never received formal training about the uses of mobile technology in class and for teaching, up to the time of this study. A hundred-and-one participants (28%) had received formal training, provided by their universities, about the uses of mobile technology in and for teaching. Fifty-one participants (14.1%) indicated that they do not know whether or not their

universities provided any formal training on how to use mobile technology in class or for teaching. This shows that some universities do provide training to their instructors who currently teach at the universities.

Interviews were conducted with six instructors-participants. Four participants were males and two participants were females. One participant was between 21 and 30 years of age, and three participants were between 31 and 40 years of age, and the other two participants were between 41 and 50 years of age. Two participants fall into the first stratum (first group, In-home group), while the other four participants fall into the second stratum (abroad group).

Major Findings

This section presents the findings of the analyses that were presented previously in Chapter Four. Different descriptive statistics were considered and used in order to help in analyzing the demographic data from this research which included: the instructors' age, gender, current academic level, academic majors, educational experience (years of teaching in higher education), locations of their universities by regions, the groups they fall in (for this study) (In-home group or Abroad group), whether or not they use mobile technology in their teaching, types of mobile technology (if) used by instructors, years of experience of using mobile technology, and previous formal training for mobile technology, if any.

Starting with the reliability for the survey instrument (all sections), the Cronbach's Alpha for the general experiences section with eight items was .88, and for the attitude section with eight items was .82, and for the learning activities section with 16 items was (.93). The consistency among the survey items was reliable as the values of Cronbach's Alpha were considerably high. So, more descriptive analysis, their frequencies, means, standard deviations

(SD), t-tests, and their significance were considered and used to answer the main research questions, above.

The findings reveal that most university instructors own and know how to utilize and function their mobile technology for the general uses. Their experiences with most of the functions available in mobile technology are pretty moderate to high. There were many indications that participants from technology and educational majors are using their mobile technology far more than participants from other majors, and another indication was that training is necessary for instructors from other fields and for all instructors who teach in colleges in rural and remote areas. In general, most instructors, regardless of their majors, indicated that different types of training should be offered to them and to their students as well in order to practically and efficiently, and somewhat officially, start using mobile technology in their teaching, giving the great benefits mobile technology has brought to the learning environment and to the communication methods and channels (Cavus & Ibrahim, 2009; Chuang, 2009; Santos & Ali, 2011; Valk, Rashid & Elder, 2010).

The findings show that almost all university instructors, in their different majors and disciplines, have favorable attitude towards using mobile technology in their teaching for the many reasons mentioned earlier. Even most of those with mathematics and science majors, who in open-ended questions, explained that they mostly do not need the technology for the actual teaching, where some preferred chalk-boards and some focused on the physical activities, but they emphasized that they, in fact, use mobile technology for other educational purposes and teaching practices such as, responding to students' emails, keeping up with the university news and responsibilities, for some storage and presentation purposes, etc.

The R2D2 model (reading, reflecting, displaying, and doing) was adapted and incorporated along with its various learning activities to help in investigating and examining the real uses of mobile technology, by instructors, specifically for the classroom preparation and for teaching and learning purposes. R2D2 model was used as a framework for this research study, in addressing the types of learners (Verbal and auditory, reflective and observational, visual, and hands-on learners), and as an instrument for this research, as well, where the researcher randomly selected four learning activities from each category (two learning activities from each category were addressed to the instructors' preparation for the class and for his/her teaching practices, and the other two learning activities from each category were addressed to the students' tasks and activities in and out-of-class, after being requested by the instructor to do so).

The findings showed that the learning activities that fall into the reading category, which addresses the auditory and verbal learners, were selected the most by instructors, followed by learning activities from the displaying category, which addresses the visual learners. None of the learning activities from the reflecting category, which addresses the reflective and observational learners, received a mean higher than (2.5). Learning activities from the doing category, which addresses the tactile and kinesthetic learners (hands-on learners), were among the least selected by instructors as activities (to be done or that have been done) using mobile technology. The reasons behind that were mentioned and reported in the follow-up (open-ended) question that asked participants why they had selected *NEVER* for some of the learning activities. Instructors' responses were around the difficulties that accompany these learning activities when applied or conducted on mobile technology. The learning activities within the doing category require more interactivity and hands-on actions

from the users which increases through practice and through learning the functions and features very well. Instructors reported that the variety of types and models of the mobile technology and mobile devices made it very difficult to use such technology for doing activities that require designing or developing or creating materials or games, etc. Students having different types of mobile technology is also a difficulty for the instructors to know them and be aware about their features and capabilities, etc., and; therefore, they didn't use them for such activities.

A Kruskal-Wallis (One-way analysis of variance) was conducted to compare the learning activities among the five regions and their universities (Northern- 4 universities, Southern- 4, Eastern- 3, Western- 6, and Central Regions- 8). This analysis indicated that instructors in the 25 public universities, in the five regions, were similar (there was no significant differences) in their application and selection of the learning activities in their teaching and in addressing their students' preferences despite the earlier reporting of instructors, in the open-ended question, that some colleges in rural areas do not have the technology at all!

A t-test and a Mann-Whitney U test were conducted to compare the learning activities between the two groups (In-Home and Abroad Instructors), the findings revealed that there was no significant difference between instructors from the two groups in their selections for the learning activities except that instructors who were abroad, during the time of the study, were more likely to use mobile devices to access language lessons and applications ($p = .014$),

and they appeared to use their mobile devices as well to listen to educational podcasts or online webinars more than In-home instructors ($p = .051$) with higher means for Abroad group.

In regard to university instructors and whether they think that mobile technology can be a major learning tool in the coming years (of if they have seen any shift towards using the different types of mobile technology, or towards mobile learning in their universities), ninety-seven percent (97%) of respondents answered (YES) for this question and explained that the many benefits and possibilities and capabilities of mobile technology are the reasons behind why they think mobile technology can be a major learning tool in the near future in higher education in Saudi Arabia. All six interviewees agreed that mobile learning is happening and being implemented in their different universities, but not really as it is supposed or as it should be. Two interviewees reported that their universities are so keen to integrate and use technology in education, and the administrations have set a number of incentives for instructors who start using technology in their teaching and with their students, while the other four instructors indicated that they have observed some changes within their universities, but in a smaller scale than they think should be. Omiteru (2012) suggested that "the Apple iPad is a mobile device that will surely revolutionize all aspects of pedagogies in the near future." (p. 739)

The findings showed that instructors have many concerns regarding using mobile technology in their teaching or allowing their students to use such technology in their classes. Many concerns were around the availability of such technology for instructors and their students and in different labs and classrooms. Instructors were concerned that if their universities do not provide them and their students with the necessary new technology, more

burden and expenses would be put on them and especially on their students. Some concerns were around security issues, and maintenance and the need for technicians to be available in the different colleges. Other concerns addressed the easiness of cheating and copyright issues, etc., but instructors explained that it would depend on the learning management system used within the university and the policies enforced within the university and the ministry to implement and consider such issues and their consequences.

Limitations of the Study

Sample vs. population

As shown in Table 6 and Table 7, the total number of population is 62991 which includes all instructors in the 25 Saudi public universities, including all academic ranks, and both groups (In-Home and Abroad instructors). The total number of participants in this research was 372 through the survey instruments and six instructors through the interview instrument.

The researcher was expecting to get more responses and participation from instructors who were teaching and working at their Saudi universities during the time of this research (group one) since they would reflect the reality more and in a clearer way as they are close to the very frequent updates and changes within the university and the whole ministry (Ministry of Higher Education) which emerged and joined the Ministry of Education during the time of this research. Since this research focused on two groups (In-home group/working and teaching at their Saudi universities, Abroad group/completing their graduate studies abroad and sponsored by Saudi public universities), the majority of participants were from the second group (Abroad group) with (n = 219, 60.7%) with 56 instructors (15.5%) indicating that they

had never taught in higher education before this study although they are employed as instructors in Saudi public universities. They were sent abroad right away, after their employment, to complete their graduate studies. The second group was necessary and important to be included as they may have had the experience of using mobile technology with more details and in a variety of environments and for more purposes in their abroad studies and international universities, so they could reflect more on the capabilities and the new possibilities of using mobile technologies in higher education, mainly for teaching.

Context limitation

It was planned and designed to conduct this study, using the survey and interview instruments, in English language only, but this was changed right after the many comments and suggestions from the pilot study. Instructors (especially non-users of mobile technology in their teaching, those who were not familiar with the different online tools and terms, etc.) had many questions and concerns about the different tools and learning activities they were asked about along with their definitions. Therefore, the researcher considered using a bilingual survey (Presenting the survey in both Arabic and English languages) for all instructors. This made the participation in the survey instrument smoother and better where the technology terms and some definitions, and guidelines for participation, were more explained in Arabic language. Some interviewees preferred conducting the interview in Arabic language, so the researcher took the extra time for transcription and translation and getting some help for content agreement check.

Recruitment methods

The online survey was sent via social media for the target population (Through the universities' main social media channels for the first group, and through Saudi Arabian Cultural Missions (SACM) for the Abroad Group). This may have left out some faculty members in higher education who are not using mobile technologies very frequently, and especially accessing their universities' social media.

Data collection instruments

The 16 learning activities, which were selected for the survey instrument (four learning activates from each of the four categories of the R2D2 model), were randomly selected by the researcher in order to avoid any bias, and in trying to cover and explore the different learning activities done or conducted by instructors in and out of their classes. Some of the 16 learning activities may have not worked well for the different instructors with different experiences of mobile technology.

Cultural limitation

The use of smart phones was banned in some female colleges and highly discouraged in other female colleges for some security reasons and cultural factors, which did not help in getting clear results of their actual uses of mobile technology-smartphones for teaching and learning. Some female participants and one female interviewee explained that they themselves don't allow the use of smartphone, by their students, due to recording and security reasons (Many female instructors explained that they used their smart-phones for course preparation in home and sometimes at the college, but they don't use them in class. They use laptops instead.)

Technical issues

Many participants left the survey instrument right after the demographic section and many completed the other sections- the entire survey. It was reported to the researcher that there were issues in the Qualtrics software such as that the NEXT button didn't appear at all at the end of some blocks (Each section of the survey was designed in one block in order to be presented separately to participants). This was reported from participants who used smart-phones and tablets to complete the survey. Two hundred forty one (241 out of 361) participants completed the whole survey (in its entirety) with answering all questions with no problems.

Practical Implications

Implications for Instructors

This section presents some implications for university instructors who are interested in mobile learning and willing to use mobile technology in their teaching or those who are confused on whether or not to use mobile technology in their courses at all. The findings of this study have drawn these implications for university instructors in all fields:

As the use of mobile technology has become very necessary for both teaching and learning, instructors should advance their knowledge and skills through reading, exploring, and training, and benefit of peer-support if possible. As many participants reported that their students are more aware and more advanced in the technology than they are; therefore, instructors, and especially those who don't use mobile technology at all or who use them at a minimal rate, should adapt some types of mobile technology and accelerate their learning to be able to use the technology very efficiently.

After receiving the appropriate and enough training about the different mobile technologies, instructors should decide and determine the most appropriate tools and devices that fit their courses, based on the availability of the devices, etc., and that they fit the learning activities planned for their courses. Instructors should be more aware of the great features and the educational tools, available in mobile technologies, in order for better utilization and application. Kukulska-Hulme (2012) emphasized this matter enough by stating that "for faculty members, there must be opportunities for concrete experiences capable of generating a personal conviction that a given technology is worth using and an understanding of the contexts in which it is best used." (p. 247)

As instructors, nowadays, are considered to be more of facilitators for their learners' acquisition of knowledge rather than giving and feeding them with the information, this R2D2 model is a great help for them, university instructors, to consider and apply when facilitating and moderating their new ways of teaching, and will be a great help for their students where they can take the steps on their own to follow and complete the learning activities.

The adaptation of R2D2 model and its four categories and including the many learning activities and their key instructional considerations should open new avenues for university instructors on the possibilities of using mobile technologies in their courses, for teaching and for conducting some learning activities in their classes and with their students. As the resources and capabilities available to instructors differ from one university to another and from one country to another, instructors should be able to select the most suitable learning activities, from the four R2D2 categories, and examine their application on the available mobile technologies to them and to their students, which is supported by Cartner and Hallas (2009),

where they explained that “the model has been easy to use as the cyclical learning process is one that occurs naturally in everyday life.” (p. 114)

In the future, some instructors may try to conduct some learning activities from the reflecting and doing categories, which were less-considered, and less-applied by university instructors. Future instructors may consider them and consider the time and capabilities needed for such activities, and report their results in future research.

Implications for decision-makers and university administrators

Administrators and decision-makers in Saudi universities and in higher education in general may consider the following suggestions and recommendations, which are supported by the findings of this study, for better integration and application of mobile technology in the different courses and fields within higher education:

- Universities should make the necessary efforts to encourage instructors to integrate the use of mobile technology in the different courses and majors, by providing the complete infrastructure and systems for that. Policy-makers and administrators should focus on the cultural and social aspects, and the differences in languages and demographics in the country to better plan for the integration of the mobile technologies in education as the notion that “one size fits all or ‘one technology for all contexts’ doesn’t practically work.” (Keengwe & Bhargava, 2014, p. 737)
- Administrators and decision-makers in higher education and in universities should conduct institutional evaluations and make strategic plans for integrating mobile technology in the different universities and link some promotions and incentives to that as necessary.

- The Internet should be available at all times, and technical maintenance for instructors should be available at all times as well. Classrooms and labs should be well-equipped with the necessary technology and tools that allow and enable mobile learning at its maximum.
- Instructors felt discouraged about the real integration of mobile technology into their courses. Some instructors did that individually with their own efforts and encouragement, and some from their own expenses, but this didn't last any longer as they faced many technical problems and sometimes faced some monetary issues with the devices' prices. Therefore, instructors should be provided with portable devices (laptops, tablets, smart-phones, etc.) to help them experience the new technology and utilize the tools and features built-in-them in their teaching.
- As Kukulska-Hulme (2012) stated "for faculty members, there must be opportunities for concrete experiences capable of generating a personal conviction that a given technology is worth using and an understanding of the contexts in which it is best used." (p. 247), instructors should be provided with enough and periodic training and workshops to learn more about the different mobile technology and their features and be updated about their possibilities and capabilities.
- Universities should find ways to provide students with the different mobile devices as loans, or buying them with installments, etc.
- Administrators and program coordinators may consider the application of some models, similar to R2D2 or others, to enhance the use of mobile technologies in their institutions and their different programs and majors, where programs may differ significantly in the consideration and the uses of mobile technology, if used.

- Overall, instructors are very eager and willing to learn more about the possibilities and capabilities of mobile learning and mobile technology and integrate them into their courses as soon as they have the necessary equipment and infrastructure. Incentives play a major role as well.

The target population for this research was all instructors from the 25 public universities in Saudi Arabia; however, this study might be applicable in other countries with similar characteristics and similar culture, especially in higher education (e.g. countries which always adapt the newest mobile technology for their instructors and students, countries that are looking for integrating mobile technology into their educational systems, countries which frequently send their instructors abroad to complete their graduate studies, etc.).

Such study should help in getting the bigger picture of the educated and less educated population of any countries and how they might use their mobile technologies in their daily lives. This should help in directing the country's or government's long-term plans for information and communication technology in general, or for integrating technology into the educational systems, and for boosting the technology development which will enhance the social, economic and cultural factors of the society.

Implications for Instructional Technology Field and research

This section provides some implications for the field of instructional technology in general, and especially for research in the area of mobile learning and the use of mobile technologies in education.

The R2D2 four categories (reading, reflecting, displaying, and doing) cover many learning activities that may be conducted online and through the use of mobile technologies. Although this model focuses on all categories evenly, and the selection of the learning activities in this study was randomly done; this research found that university instructors focused on the learning activities from the reading and displaying categories more than the learning activities from the reflecting or doing categories. Cartner and Hallas (2009) concluded their study about exploring the R2D2 model for online activities by explaining that "a strength of the model is that it magnifies two phases – reflection and doing, which are often overlooked in blended environments" (p. 114), and they were right again in this study as instructors overlooked or ignored the many activities in the reflecting and doing categories for some difficulties, as explained earlier. Future research may consider conducting some learning activities from the reflecting and doing categories, which were less-considered, and less-applied by university instructors, or focusing totally and primarily on the two categories (Reflecting and Doing categories) Future instructors may consider them and consider the time and capabilities needed for such activities, and report their results in future research.

The results and findings of this study should benefit the entire Instructional Technology (IT) Field, rather than only mobile learning. The different values and benefits, presented here, may impact any society through the real utilization of the technology available for its people. Mobile learning integration impacts and is impacted by the cognitive learning theory and the constructivist learning theory. The R2D2 model and its four categories focus on the cognitive learning theory and its reliance on the mental part and the memory of the human, and focuses on the constructivist theory through the various learning activities that help improve the course and the students' skills gradually.

The use of mobile technology in education and in higher education has been studied throughout the recent decade. Different studies have been conducted on students, teachers, systems, pedagogies, etc., in order to find the best ways of the integration and application for the different types of mobile technologies in the different learning environments. Some longitudinal studies were conducted, as well, to examine the trends and the previous studies on mobile learning such as the study by Hung and Zhang (2012) which covered the topics that have been studied by many researchers and the topics that should be covered in the future regarding mobile learning.

This research study, and by adapting the R2D2 model and its various learning activities to examine and explore the actual uses and experiences of mobile technology by university instructors, mainly in Saudi Arabia, will be an addition to the body of literature in the area of mobile learning, and in regard to the possible ways of using mobile technologies for teaching and for conducting the different learning activities in and out of the class.

Final Recommendations and Remarks

There are multiple recommendations for future research based on the findings and the limitations of this research study. This study shed some light on instructors' and the institutions' consideration and integration of mobile technologies in their educational systems and mainly teaching and learning.

The results of this research showed that almost all participants have their own smart-phones and only 109 participants use them in their teaching. The obstacles reported in the open-ended questions about the reasons behind not using mobile technology in teaching and for certain activities were the lack and weakness of Internet signals and connection within

universities' buildings. Participants showed their eagerness to use their mobile devices and smartphones in their teaching more than laptops and iPads or tablets because of the mobile devices' features like the small-size, portability and the personal applications and passwords that can be saved in a more secure place in comparison to laptops, but they asked for more training and that such technology be available to them and to their students. Future research may focus on mobile devices specifically and the different brands and types that are available to students and instructors. The focus on certain types of devices should help administrators and decision-makers in higher education to have a clearer picture about the integration and usability of mobile technology in the different majors and courses.

This research used the R2D2 model and its four categories (Reading, Reflecting, Displaying, and Doing) as a framework for this research and as an instrument where the researcher selected four learning activities from each category (two learning activities from each category were addressed to the instructors' preparation for the class and for his/her teaching practices, and the other two learning activities from each category were addressed to the students' tasks and activities in and out-of-class, after being requested by the instructor to do so). Sixteen learning activities were randomly selected by the researcher in order to have some variations based on the key instructional considerations (Risk, time, cost, learner-centeredness, duration of activity) provided in (Bonk & Zhang, 2008) for the R2D2 model. Each category or R2D2 model has 25 learning activities, so some other learning activities that were not selected in this research may work better in other environments or in other universities or even in the different majors and disciplines within universities. The key instructional considerations (Risk, time, cost, learner-centeredness, duration of activity) may play a major

role according to their level (low, medium or high), so other researcher may try to focus on low-risk and low-cost activities, or medium-risk and medium-cost, and so on.

Future researchers may examine the other learning activities through a replication of this study and keeping the focus on the uses of mobile technology in and out of class, or by focusing on the learning activities from one category at a time. This will help the researcher focus more on the type of learners, and how instructors address their preferences and needs. Future researchers may also focus on the two categories, reflecting and doing and their learning activities, which were less-conducted.

This research was targeting university instructors in Saudi public universities only, and so the results and findings were drawn from the Saudi higher education environment and perspectives only with having in mind that there were some huge variations among the Saudi public universities in budget, in university's age and thus experience and capabilities, in the ban of using mobile technology and smartphones in some universities. The researcher was trying to include all instructors from all Saudi public universities, as recommended by previous research, but because of the variations and differences among the universities, it may be better to target similar universities in budget or similar universities in age (old universities vs. newly-established universities) or one university at a time, etc.

This research focused on instructors in the different fields and majors in higher education in Saudi Arabia; future research could focus on students in the different fields and how they use mobile technology in their study and for their homework and projects, and the many other learning activities.

Since there were some technical issues in the survey instrument when using different mobile technology that forced participants to leave the survey; the researcher suggests trying the software on all possible devices (devices used by participants) and making sure of its compatibility with all devices, or maybe trying other survey tools that are available and making sure of their compatibility for all or most devices available to targeted participants and informing them clearly of the expected problems when using certain devices, if any.

Although the use of smart-phones was now allowed in some female colleges for some cultural and security factors, female instructors used their all mobile technologies to a very high extent for communication with their students and for class preparation, and mainly their laptops for in-class activities. Future research may focus more on the uses of mobile technologies by female instructors and students.

Finally, participants in this research were approached online only, through the major social media pages for Saudi universities (For In-Home group) and the Cultural Missions in other countries (For Abroad group) in order to reach the most users of mobile technologies in their general practices and in their teaching practices. The majority of participants were of younger generations as they use mobile technology more. Future research may consider approaching the older instructors a bit more through paper or manually (Distributing the instrument as a paper instead of online). Approaching instructors online was not to exclude those who are less experienced (less tech-savvy), but the reason was to find the real uses of mobile technologies in teaching in higher education. If instructors don't use, or have never used mobile technologies in higher education, then exploring their actual uses and experiences of mobile technology would have been more difficult.

Conclusions

In conclusion, this study focused on the national and somewhat international levels by exploring university instructors' experiences and uses of mobile technology in their teaching and with their students. The findings of this study provided some information and details on instructors' eagerness and willingness to integrate and use the different mobile technology and mainly the laptops and smart-phones in their teaching and in their classes for preparation and in their teaching practices, and with their students for communication and for the different learning activities. If classrooms and labs have the necessary tools and are well-equipped, and instructors are supported with portable devices and through incentives and recognition, the uses of mobile technology would be at its maximum and higher education would see new trends and new activities among students and instructors which all will boost the educational and learning system, and help in solving some communication, management and content delivery issues that are present in current systems.

This study focusing on the uses and the integration of mobile technologies in the different courses in higher education, and encouraging and allowing instructors and students to experience the various tools and features of the different types of mobile technologies would help in manifesting the ministry of higher education's plan for achieving excellence in technology, and would provide educators and their learners with a higher level of collaboration and communication among them, through the use of the private, interactive, convenient, smart phones and mobile technologies. As Chen (2015) concluded that "the disappeared urban–rural divide in mobile cultural participation suggest that it offers members of disadvantaged groups a more accessible venue for cultural participation." (p. 82). She also stated that "the stronger relationships between mobile Internet devices, in-person and mobile cultural participation

among the less educated support the mobilization thesis." (p. 82). This worked well for all and for the general population; therefore, the focus on the more educated population would be more beneficial, and is a kind of necessity in order to generalize it to the general public, later or afterwards. This goes very well with the future vision, a major section of the development strategy of the Ministry of Communication and Information Technology (MCIT) in Saudi Arabia, where it was stated:

> *"The transformation into an information society and digital economy so as to increase productivity and provide communications and IT services for all sectors of the society in all parts of the country and build a solid information industry that becomes a major source of income." (MCIT, 2005, p. 479)*

I, the researcher, hope that future researchers and others who are interested in mobile technology and in their uses and applications specifically in higher education find benefits in this research and continue working on all parts and aspects of mobile learning to help in better integration and application of mobile technology into education and make maximum use of the technologies which are and will be available.

APPENDIX A: SUMMARY OF ACTIVITIES FOR R2D2 WITH KEY INSTRUCTIONAL CONSIDERATION (TABLE 10.1) (Bonk & Zhang, 2008, 250-256)

Phase 1: Reading (Addressing Verbal and Auditory Learners)					
Learning Activity	**Risk**	**Time**	**Cost**	**Learner-Centeredness**	**Duration of Activity**
1. Online Scavenger Hunt	Low	Medium	Low	Medium	1-2 weeks
2. Web Tours and Safaris	Medium	Medium	Medium	Medium	1 week as needed
3. WebQuest	Low	Medium	Low	Medium	1-4 weeks
4. Guided Readings	Low	Medium	Low	Medium	4-15 weeks
5. Discovery Readings	Medium	Low	Low	High	1-2 or 4-12 weeks
6. Foreign Language Reading Activities and Online News	Medium	Medium	Low	Medium	1-2 or 4-10 weeks
7. FAQ and Course Announcement Feedback	Low	Medium	Low	Medium	Weekly or as needed
8. Question- and - Answer Sessions with Instructor	Medium	Medium	Low	Medium	Weekly or as needed
9. Online Expert Chats	Medium	Medium	Low	Medium	1 week as needed
10. Online Synchronous Testing	Medium	High	Low	Low to High	Weekly or as needed
11. Synchronous or Virtual Classroom Instructor Presentations	Medium	Medium	High	Medium	Weekly or as needed
12. Online Webinars	Medium	Medium		Medium	Weekly or as needed
13. Public Tutorials, Wizards, and Help Systems	Low	Low to High	Medium	Medium	1 week as needed
14. Expert Lectures and Commentary	Low	High	Medium	Medium	Weekly or as needed
15. An Online Podcast Lecture or Podcast Show	Medium	Medium	Medium	Medium	1-2 weeks
16. Audio Dramas	Medium	Medium	High	Medium	1-2 weeks
17. Posting Video - Based Explanations and Demonstrations	Medium	Medium	High	Medium	Weekly as needed
18. Online Sound or Music Training	Low	Medium	Low	Medium	Weekly as needed
19. Online Literature Readings	Medium	Medium	Low	Medium	Weekly as needed
20. Online Poetry Readings	Medium	Medium	Low	Medium	Weekly as needed
21. Posting Webliographies or Web Resources	Medium	Medium	Low	High	2-4 weeks
22. Text Messaging Course Notes and Content	High	Medium	Medium	Medium	As needed

23. Text Messaging Course Reminders and Activities	Medium	Medium	Medium	Medium	As needed
24. Online Language Lessons	Medium	High	Low to High	Medium	As needed, perhaps for the entire course
25. E - Book and Wikibook Reports and Critiques	High	High	Low	High	4-8 weeks
Phase 2: Reflecting (Addressing Reflective and Observational Learners)					
26. Post Model Answers	Low	Low	Low	Medium	As needed
27. Reuse Chat Transcripts	Low	Medium	Low	Medium	1-2 weeks for each activity
28. Workplace, Internship, or Job Reflections	Medium	Medium	Low	Medium	4-15 weeks
29. Field and Lab Observations	Medium	Medium	Low	High	4-10 weeks
30. Self - Check Quizzes and Exams	Low	Medium to High	Low	Medium	As needed
31. Online Discussion Forums and Group Discussions	Medium	High	Low	High	10-15 weeks of course
32. Online Portal Explorations and Reflections	Medium	Medium	Low	Medium	As needed
33. Lurker, Browser, or Observer in Online Groups	Medium	Medium	Low	High	4-8 weeks
34. Podcast Tours	Medium	Medium	Low	Medium	1-2 weeks
35. Personal Blogs	Medium		Low	High	8-15 weeks
36. Collaborative or Team Blogs	Medium		Low	High	8-12 weeks
37. Online Resource Libraries	Medium		Low	High	1-2 weeks or 6-12 weeks
38. Social Networking Linkages	High	Medium	Low	High	1-3 weeks
39. Online Role Play Reflections	High		Low	High	1-2 weeks
40. Synchronous and Asynchronous Discussion Combinations	Medium	Medium	Low	High	1-2 weeks for each instance
41. Self - Check Reflection Activities	Low	Low	Low	Medium	As needed
42. Electronic Portfolios	Medium	High	Medium	High	12-15 weeks (entire course typically)
43. Individual Reflection Papers	Low	Medium to high	Low	High	As needed; perhaps 1-4 weeks for each writing activity
44. Team or Group Reflective Writing Tasks	Medium		Low	Medium	3-8 weeks
45. Super - Summaries, Portfolio Reflections, and Personal Philosophy Papers	Medium	Medium to high	Low	High	3-15 weeks (might be ongoing for entire semester)
46. Online Cases, Situations, and Vignettes	Medium	Medium to high	Medium to high	Medium	1-4 weeks
47. Satellite Discussion or Special Interest Groups	Medium	Medium	Low	High	4-12 weeks
48. Small - Group Case Creations and Analyses	Medium	High	Low to medium	High	1-3 weeks
49. Small - Group Exam Question Challenges	Medium	Medium	Low	High	1-2 weeks
50. Reaction or Position Papers	Medium	Medium	Low	Medium	1-2 weeks

Phase 3: Displaying (Addressing Visual Learners)					
51. Anchored Instruction with Online Video	Medium	Medium to high	Low to high	Medium	As needed
52. Explore and Share Online Museums and Libraries	Medium	Medium	Low	Medium	1-2 weeks
53. Concept Mapping Key Information	Medium to high	Medium	Low to high	High	1-4 weeks
54. Video-streamed Lectures and Presentations	Medium	Medium to high	Low to high	Low	As needed
55. Video-streamed Conferences and Events	Medium	Medium	Low	Medium	1-2 weeks
56. Interactive News and Documentaries	Medium	Medium	Low	Medium	1-3 weeks
57. Interactive Online Performances	High	Medium to high	Low to high	Medium	As needed
58. Design Evaluation	Medium	Medium	Medium to high	Medium	1-2 weeks as needed
59. Design Generation	Medium	Medium	Medium to high	Medium	1-2 weeks as needed
60. Design Reviews and Expert Commentary	Medium	Medium	Low to medium	Medium	As needed
61. Online Timeline Explorations and Safaris	Medium	Medium to high	Low to medium	Medium to high	1-3 weeks
62. Virtual Tours	Medium	Medium	Low to medium	High	1-2 weeks
63. Visual Web Resource Explorations	Low	Low	Low	Medium	1-2 weeks as needed
64. Animations	Medium	Medium	Medium to high	Medium	1 week or as needed
65. Advance Organizers: Models, Flowcharts, Diagrams, Systems, and Illustrations		Medium	Low to medium	Medium	1 week or as needed
66. Virtual Field Trips	Medium	Medium	Low	Medium	As needed
67. Video Modeling and Professional Development	Medium	Medium to high	Low to high	Medium	3-5 weeks or entire course
68. Movie Reviews for Professional Development	Medium	Medium	Low	High	1-3 weeks
69. Whiteboard Demonstrations	Medium	Low	Low	Low to high	As needed
70. Online Visualization Tools	Medium	Medium to high	Low to high	Medium	As needed
71. Video Blogs and Adventure Learning	High	Medium	Low to medium	Medium	1-4 weeks
72. Charts and Graph Tools	Low	Low to medium	Low	High	1-2 weeks or as needed
73. Mashups of Google Maps	High	Medium	Low	High	1-3 weeks or as needed
74. Broadcast Events	High	Medium	High	Medium	As needed
75. Online Multimedia and Visually Rich Cases	Medium	Medium	Low to high	Medium	As needed
Phase 4: Doing (Addressing Hands-On Learners)					

76. Web - Based Survey Research	Medium	Medium	Low to high	High	3-4 weeks
77. Video Scenario Learning	Medium	Medium to high	High	Medium	As needed
78. Content Review Games	Low to medium	Medium	Low to high	Medium	1 week as needed
79. Online Review and Practice Exercises	Medium	Medium to high	Low to high	Medium	1 week or as needed
80. Mock Trial or Fictional Situations	High	High	Low	High	1-2 weeks
81. Online Role Play of Personalities	High	Medium	Low	High	1-2 weeks
82. Action Research	High	Medium	Medium	High	3-6 weeks
83. Interactive Fiction and Continuous Stories	Medium	Medium	Low (assuming free tools exist)	High	1-2 weeks
84. Real - Time Cases	High	High	Medium to high	Medium	1-2 weeks as needed
85. Course Resource Wiki Site	High	Medium to high	Low to medium	High	Throughout course or as needed
86. Wikibook Projects	High	High	Low to medium	High	4-5 weeks
87. Online Glossary and Resource Links Projects	Medium	High	Low	High	3-4 weeks
88. On - Demand and Workflow Learning	High	High	High	High	As needed
89. Digital Storytelling	High	High	Medium	High	3-4 weeks
90. Online Documentation of Internship, Field Placement, and Practicum Knowledge Applications and Experiences	Medium	Medium	Low to medium	Medium	6-8 weeks
91. Authentic Data Analysis	Medium	Medium	Low to high	Medium	1 week or as needed
92. Online Science Labs and Simulations	Medium	Medium	Low to high	Medium	As needed
93. Simulation Games	Medium	Medium	Low to high	Medium	1-2 weeks or as needed
94. Simulations and Games for Higher - Level Skills	High	High	Low to high	High	4-5 weeks or as needed
95. Client Consulting and Experiential Learning	High	High	Low	High	As needed
96. Online Tutoring and Mentoring	High	High	Low to high	High	As needed
97. Cross - Class Product Development and Creativity	High	High	Low to medium	High	1-4 weeks
98. Cross - Class Content Discussions, Analyses, Competitions, and Evaluations	Medium	Medium to high	Low to medium	High	2-8 weeks
99. Learner Podcast Activities, Events, and Shows	High	Medium	Low to medium	High	1-2 weeks or as needed
100. Design Course Web Site	High	High	Medium to high	High	As needed

Note. From *Empowering online learning: 100+ activities for reading, reflecting, displaying, and doing* (p. 250-256), by C. J. Bonk and K. Zhang, 2008, San Francisco, CA: Jossey-Bass.

APPENDIX B: COVER LETTER FOR SURVEY RECRUITMENT

Dear university instructor,

I would like to invite you to participate in an online survey about investigating university instructors' experiences and uses of mobile technology in teaching and learning in Saudi Arabia. This survey is available in both Arabic and English languages. It will take approximately 10 - 20 minutes to complete this survey.

In order to participate, you must be a university instructor affiliated to any Saudi government/public university (whether currently teaching at your university, or completing your graduate studies abroad 'Master or PhD'). If you fit the criteria, I would like to ask for your participation by following this link:

https://waynestate.az1.qualtrics.com/SE/?SID=SV_5BYr5VenYEn1y3H

This study is entirely voluntary, so you may withdraw at any time. Your responses will be kept confidential. There is no compensation for participation.

- Please note that this survey does not display properly on mobile devices, so please complete it on your tablets or computers, if possible. If you have any questions about participating in or learning more about this dissertation study, please reach me at alallii{at}yahoo{dot}com or (202) 621-4874.

Thank you in advance for your participation.

Ibrahim Alali
Doctoral Candidate- Instructional Technology Program
Wayne State University

عزيزي عضو هيئة التدريس:
السلام عليكم ورحمة الله وبركاته
أدعوكم للمشاركة في هذه الدراسة حول استخدامات اجهزة الجوال والمحمول (اللابتوب والآيباد) من قبل أعضاء هيئة التدريس بالجامعات السعودية.
هذه الاستبانة متوفرة باللغتين العربية والإنجليزية.
كي تشارك يجب أن تكون عضو هيئة تدريس في أحد الجامعات السعودية.
مشاركتك في هذا الاستبيان تطوعية، ويمكنك الانسحاب في أي وقت. جميع البيانات سوف تحفظ بكل سرية.

- يفضل استخدام اللابتوب او الكمبيوتر الشخصي او الايباد لاكمال الاستبيان.

إذا كان لديك أية استفسارات، يرجى التواصل من خلال الايميل alallii{at}yahoo{dot}com
للمشاركة في الاستبيان، يرجى الدخول من خلال الرابط التالي

https://waynestate.az1.qualtrics.com/SE/?SID=SV_5BYr5VenYEn1y3H

شاكر ومقدر تعاونكم.

إبراهيم العلي
تقنيات التعليم- جامعة وين ستيت الأمريكية

APPENDIX C: RESEARCH INFORMATION SHEET

Title of Study: Investigating university instructors' experiences and uses of mobile technology in teaching and learning in Saudi Arabia

Principal Investigator (PI): Ibrahim K. Alali

Instructional Technology

Purpose

You are being asked to be in a research study about the uses of mobile technology in higher education because you are an instructor in one of the Saudi Universities. This study is being conducted at Wayne State University. **Please read this form and ask any questions you may have before agreeing to be in the study.**

This research study aims to investigate and find out the actual uses and experiences of mobile technology by university instructors in Saudi Arabia. This will help in better integration and implementation of mobile learning into the curriculum, pedagogy and the learning activities in higher education.

Study Procedures

If you agree to take part in this research study, you will be asked to complete an online survey related to this study about the uses of mobile technology for teaching and learning in higher education.

This study is entirely voluntary, so you may withdraw at any time. Your responses will be kept confidential. There is no compensation for your participation. 10-20 minutes are needed to complete the survey (there are five sections).

- The questions will ask you to provide some basic demographic information (gender, age, current academic level and years of teaching, your expertise in using technology, etc.), and seek your opinions about mobile technologies for teaching specifically and in general,

- The survey must be completed in one sitting; it cannot be saved and returned to later,
- Mobile technology means a mobile phone, tablet-iPad, or laptop for Teaching.

Benefits

As a participant in this research study, there will be no direct benefit for you; however, information from this study may benefit other people now or in the future.

Risks

There are no known risks at this time to participation in this study.

Study Costs

Participation in this study will be of no cost to you.

Compensation

There is no compensation for participating in this research, but your information will help in this research as it will produce new results about the use of mobile technology in higher education.

Confidentiality

All information collected about you during the course of this study will be kept without any identifiers.

Voluntary Participation/Withdrawal

Taking part in this study is voluntary. You are free to only answer questions that you want to answer. You are free to withdraw from participation in this study at any time.

Questions

If you have any questions about this study now or in the future, you may contact Ibrahim Alali at the following phone number 202-621-4874 or through email alallii{at}yahoo{dot}com. If you have questions or concerns about your rights as a research participant, the Chair of the Institutional Review Board can be contacted at (313) 577-1628. If

you are unable to contact the research staff, or if you want to talk to someone other than the research staff, you may also call (313) 577-1628 to ask questions or voice concerns or complaints.

Participation:

By completing the survey you are agreeing to participate in this study. Participation in this research is for university instructors affiliated to any of the Saudi public universities; if you are not a university instructor affiliated to a Saudi public university, please do not complete this survey.

APPENDIX D: THE INSTRUMENT

Do you agree to participate in this research study?
هل توافق على المشاركة في هذا الاستبيان؟

Yes, I am eligible and agree to participate in this survey. اوافق على المشاركة في الاستبيان

No, I don't agree to participate in this survey and/or I am not a university instructor affiliated with a Saudi university. لااوافق على المشاركة في الاستبيان- أو أنا لا أعمل بأحد الجامعات السعودية

Section 1: Demographic Information (Instructors' characteristics)

Section 1: Demographic Information (Instructors' characteristics)

القسم الأول: معلومات أساسية

Please specify your age.
الرجاء تحديد عمرك

What is your gender?
الرجاء تحديد جنسك.

Male ذكر
Female أنثى
Prefer Not to Answer أفضل عدم الاجابة

Your Saudi University that you work in..
اسم الجامعة التي تعمل فيها أو تنتمي إليها في المملكة العربية السعودية

What is your Major?
التخصص الرئيسي

Science العلوم الطبيعية
Technology الحاسب والتقنية
Education التربية
Engineering الهندسة
Mathematics الرياضيات
Social Sciences العلوم الإجتماعية
Medicine الطب
Other أخرى

Please specify your years of experience in teaching in higher education.
سنوات خبرتك في التدريس في التعليم العالي

Never Taught- لم أقم بالتدريس بعد
Less than 5 years/ أقل من خمس سنوات
Between 5 years and 15 years/ مابين 5 سنوات الى 15 سنة
More than 15 years/ أكثر من 15 سنة

What is your current academic level?
الدرجة الأكاديمية

Teaching Assistant معيد

Lecturer محاضر

Assistant Professor أستاذ مساعد

Associate Professor أستاذ مشارك

Professor أستاذ

Instructor مدرس

Other- غير ذلك

Are you currently working-teaching at your Saudi university, or completing your graduate studies abroad?
هل تعمل حالياً بجامعتك في السعودية، أم مبتعث للدراسات العليا؟

Currently working-teaching at my Saudi University حالياً أعمل بجامعتي في السعودية

Currently abroad, completing my graduate studies. حالياً مبتعث للدراسات العليا- من قبل الجامعة

Do you use a mobile technology (A smartphone, an iPad or a laptop) in your teaching?
هل تستخدم أي من تكنولوجيا الهاتف الجوال/المحمول (الهاتف الذكي-الايباد-اللابتوب) في عملية التدريس

Yes نعم

No لا

Please specify the type of mobile technology that you have and use for TEACHING purposes.
الرجاء تحديد نوع الجهاز الذي تستخدمه في عملية التحضير والتدريس والتواصل مع الطلاب

Smart Phone هاتف ذكي

Laptop الكمبيوتر المحمول

Tablet- iPad الكمبيوتر الكفي

Other غير ذلك

How long have you been using your mobile technology?
منذ متى وانت تستخدم الهاتف الجوال/المحمول (الايباد-اللابتوب) الخاص بك

In the last year/ بدأت مؤخرا باستخدامه

Have been using it for 1-4 years / سنة إلى أربع سنوات تقريبا

Have been using it for more than 4 years / أكثر من 4 سنوات

Have you had any formal training, provided by your university, on how to use mobile technology in class or in your teaching?
هل سبق وأن وفرت لك جامعتك تدريب أو ورشة عمل حول استخدامات تكنولوجيا الهاتف الجوال /المحمول (الايباد-اللابتوب) في محاضراتك او للتدريس

Yes نعم

No لا

I don't know- لا أعلم

Section 2: Instructors' General Experience with Mobile Technology in Higher Education
This section asks about your general uses and experiences of mobile technology in regard to your courses and to your university.
Please rate the frequency with which you use mobile technology for teaching in each the following contexts:

القسم الثاني: خبرة أعضاء هيئة التدريس في استخدامات الاجهزة المتنقلة والمحمولة (الجوال-الايباد-اللابتوب) بشكل عام
هذا القسم يسألك عن الاستخدامات العامة للجوال والمحمول (الايباد-اللابتوب) فيما يتعلق بالمحاضرات والجامعة
يرجى تحديد الخيار الأنسب الذي يعكس مرات وتكرار استخدامك لجهازك (الجوال-الايباد-اللابتوب) للفقرات التالية

	Never 0 ابدا	Rarely 1/week نادرا مرة في الأسبوع	Sometimes 2-3 /week أحيانا أسبوع/2-3	Often 4/week غالبا أسبوع/4	Always Every day دائما كل يوم
I use my mobile technology to access the learning management system in my university (e.g. Blackboard, Canvas, Webex, etc.) استخدم الجوال والمحمول (الايباد-اللابتوب) للوصول إلى نظام إدارة التعلم في جامعتي (مثل نظام بلاك بورد)	○	○	○	○	○
I use my mobile technology for collaboration with my students in and out of the class. استخدم الجوال والمحمول (الايباد-اللابتوب) للتعاون مع طلابي داخل وخارج المحاضرة	○	○	○	○	○
I use my mobile technology for storing and sharing some files/media related to my teaching. استخدم الجوال والمحمول (الايباد-اللابتوب) لتخزين وإرسال بعض الملفات / الوسائل المرئية المتعلقة بالتدريس	○	○	○	○	○
I use my mobile technology to respond to my students' emails. استخدم الجوال والمحمول (الايباد-اللابتوب) للرد على رسائل البريد الإلكتروني من الطلاب	○	○	○	○	○
I ask my students to submit their assignments electronically, through email or Blackboard. اطلب من الطلاب تسليم الواجبات والمشاريع بطريقة الكترونية- من خلال البريد الالكتروني أو من خلال بوابة الجامعة مثل بلاك بورد	○	○	○	○	○
I use my mobile technology to review assignments and respond to discussion forums. استخدم الجوال والمحمول (الايباد-اللابتوب) لمراجعة الواجبات والمشاريع والرد على منتديات المناقشة	○	○	○	○	○
I use my mobile technology for online meetings with my students. استخدم الجوال والمحمول (الايباد-اللابتوب) للاجتماعات عبر الإنترنت مع الطلاب	○	○	○	○	○
I try to innovate and use mobile technologies to help me in my teaching. أحاول التجديد والتنويع في استخدام تقنيات الجوال والمحمول (الايباد-اللابتوب) الحديثة لمساعدتي في العملية التدريسية وإيصال المعلومة	○	○	○	○	○

Section 3: Instructors' Attitudes towards Using Mobile Technologies for Teaching Purposes

This section asks about your views concerning your past, current, or potential use of mobile technology for teaching. Please rate the extent to which you agree with the following statements in regard to the use of mobile technology:

القسم الثالث: نظرة أعضاء هيئة التدريس نحو استخدامات تقنيات الهاتف الجوال والمحمول للعملية التدريسية

يسأل هذا القسم عن وجهات نظركم حول استخدامات الجوال والمحمول (الايباد-اللابتوب) في التعليم بشكل عام

يرجى تحديد الخيار الأنسب الذي يعكس مدى موافقتك للفقرات التالية من خلال اسخدامك لجهازك (الجوال-الايباد-اللابتوب)

	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	neutral محايد/غير متأكد	Agree أوافق	Strongly agree أوافق بشدة
Mobile technology is considered to be an aid tool for instructors and their students. يعتبر الجوال والمحمول (الايباد-اللابتوب) أدوات مساعدة لأعضاء هيئة التدريس والطلاب	○	○	○	○	○
Mobile technology creates a better environment for teaching. يساعد الجوال والمحمول (الايباد-اللابتوب) في توفير وخلق بيئة أفضل للتعليم	○	○	○	○	○
Using mobile technology in class helps in sharing more resources with students. استخدام الجوال والمحمول (الايباد-اللابتوب) في المحاضرات يساعد في توفير المزيد من المراجع للطلاب	○	○	○	○	○
Using mobile technology in class saves the class time. استخدام الجوال والمحمول (الايباد-اللابتوب) يساعد في حفظ وتقنين وقت المحاضرة	○	○	○	○	○
Using the various functionalities built in mobile technology helps the instructor to be more innovative and productive. استخدام مختلف الوظائف والمزايا المتوفرة في الجوال والمحمول (الايباد-اللابتوب) يساعد عضو هيئة التدريس على أن يكون أكثر اداء وإنتاجية	○	○	○	○	○
Using mobile technology in class improves content delivery (e.g. media, pictures, presentation, etc.) استخدام الجوال والمحمول (الايباد-اللابتوب) في المحاضرة يساعد على تحسين تقديم المحتوى - مثل توفير الوسائل المرئية، والصور، والعرض، وما إلى ذلك	○	○	○	○	○
The rapid changes and updates in mobile technology makes it difficult to adapt to them. التغييرات والتحديثات السريعة في الجوال والمحمول (الايباد-اللابتوب) تعيق عملية التكيف معها والاعتماد عليها	○	○	○	○	○
There should be some rewards or incentives for using mobile technology to improve teaching, at the college or department level. ينبغي أن يكون هناك بعض المكافآت أو الحوافز لاستخدام الجوال والمحمول (الايباد-اللابتوب) لتحسين الانتاجية في العملية التدريسية، على مستوى الكلية أو القسم	○	○	○	○	○

Section 4: Learning activities and course preparation via mobile technologies

This section addresses the use of mobile technology for teaching and its various popular learning activities. Please rate the frequency with which you have, currently do, or would like to use mobile technology in the teaching of your courses/lectures:

القسم الرابع: الأنشطة الدراسية من خلال الجوال والمحمول في العملية التعليمية

يركز هذا القسم على الأنشطة التعليمية في محاضراتك وطريقة إعدادك لتلك الأنشطة

يرجى تحديد الخيار الأنسب الذي يعكس مرات وتكرار استخدامك لجهازك (الجوال-الايباد-اللابتوب) للفقرات التالية:

* من خلال استخدامك لجهازك (الجوال-الايباد-اللابتوب)، كم مرة تقوم بالآتي:

	Never 0 أبدا	**Rarely** 1-5/semester نادرا في الفصل 1-5 الدراسي	**Sometimes** 6-10 times/semester أحيانا في الفصل 6-10 الدراسي	**Often** 11-15 times/ semester غالبا في 11-15 الفصل الدراسي	**Always** Every day دائما كل يوم
Listening to educational podcasts or online webinars. الاستماع إلى البرامج التعليمية-الصوتية أو الندوات عبر الإنترنت	○	○	○	○	○
Accessing language lessons and applications. استخدام تطبيقات وبرامج تعلم اللغات	○	○	○	○	○
Asking your students to do discovery reading or read online news. الطلب من الطلاب القيام بالقراءة الاستكشافية أو قراءة معلومات معينة عبر الإنترنت	○	○	○	○	○
Doing any question and answer sessions with your students, through chat, emails, or Blackboard for example. القيام بعمل تمهيد للدرس من خلال الأسئلة والأجوبة مع طلابك، وذلك عن طريق الدردشة الالكترونية ورسائل البريد الإلكتروني، أو من خلال البلاك بورد	○	○	○	○	○
Using manuscripts from previous chats with other lecturers or students in your teaching, if necessary. استخدام نماذج/أمثلة من المحادثات السابقة مع الزملاء الآخرين أو الطلاب في تدريسك (للشرح الاضافي مثلا)، إذا لزم الأمر	○	○	○	○	○
Creating and managing online blogs and using them in your teaching. إنشاء وإدارة المدونات على الانترنت واستخدامها في التدريس	○	○	○	○	○
Asking your students to use discussion forums or group discussions. الطلب من الطلاب استخدام منتديات المناقشة أو المناقشات الجماعية من خلال الانترنت	○	○	○	○	○

Asking your students to create blogs and reflect on the different topics in your course. الطلب من الطلاب إنشاء المدونات واستخدامها في المواضيع المختلفة للمنهج	○	○	○	○	○
Creating instructional videos and show them in your classes, or post them to YouTube channel for example. إنشاء أو إعداد أشرطة فيديو تعليمية واستخدامها في محاضراتك، أو نشرها على قناة يوتيوب على سبيل المثال	○	○	○	○	○
Using your mobile technology in your class to create and show graphs and charts. استخدام الجوال أوالمحمول (الايباد-اللابتوب) الخاص بك في المحاضرات لإنشاء وعرض الرسوم البيانية	○	○	○	○	○
Asking your students to view virtual tours and share them with their peers in class. الطلب من الطلاب بعمل واستعراض بعض الجولات الافتراضية (للمتاحف والجامعات والاماكن الاثرية- عن طريق خدمة قوقل، أو التصوير الثلاثي الابعاد) من خلال الانترنت ومشاركتها مع أقرانهم في المحاضرة	○	○	○	○	○
Asking your students to view video-streamed lectures, conferences or events. الطلب من الطلاب متابعة المحاضرات أو المؤتمرات أو الأحداث من خلال الانترنت	○	○	○	○	○
Creating or completing surveys or questionnaires . إنشاء الاستبيانات واكمالها	○	○	○	○	○
Creating any simulation games to be used in class via your mobile technology. إنشاء ألعاب المحاكاة لاستخدامها في المحاضرات عن طريق الجوال أوالمحمول الخاص بك	○	○	○	○	○
Asking your students to work on wiki-books or wiki-sites as a project (for editing, modifying, etc.). الطلب من الطلاب عمل الكتب الالكترونية أو مواقع الويكي كمشروع -للتحرير أوالتعديل، الخ	○	○	○	○	○
Mentoring your students through the mobile technology. الاشراف على الطلاب من خلال استخدام الجوال أوالمحمول	○	○	○	○	○

You have chosen "**Never**" for three or more statements in the previous section (4). Would you please explain your rationale behind not using your mobile technology for such activities.
(Any problems, obstacles, risks, costs, etc.)

لقد اخترت **"لا-أبداً"** لثلاثة أو أكثر من الفقرات السابقة في القسم السابق (4)، يرجى توضيح الاسباب التي حالت أو منعت من استخدام الجوال أو المحمول لهذه الأنشطة.
(أي مشاكل، عقبات، مخاطر، تكاليف، الخ)

You have chosen "**Always**" for three or more statements in the previous section (4). Would you please explain your rationale behind considering and using your mobile technology for such activities.
(Any motives, advantages, recommendations, or suggestions,)

لقد اخترت **"دائما"** لثلاثة أو أكثر من الفقرات السابقة في القسم السابق (4)، يرجى توضيح الاسباب التي أدت إلى استخدام الجوال أوالمحمول الخاص بك لهذه الأنشطة. (هل يوجد دوافع، مزايا، توصيات، أو اقتراحات)

Section 5: Semi-structured questions and probes

القسم الخامس:أسئلة تكميلية

Do you think that mobile technology can be a major learning tool in the coming years? Explain your thoughts. (Do you see any shift towards using the different types of mobile technology, or toward mobile learning in your university)

هل تعتقد أن أجهزة التكنولوجيا المتنقلة والمحمولة يمكن أن تكون أداة تعليمية رئيسية في السنوات القادمة؟ الرجاء الايضاح
(هل ترى أي تحول نحو استخدام تقنيات الهاتف الجوال أوالمحمول ، أو نحو التعلم المتنقل في الجامعات السعودية)

Please tell us about any additional advantages, not previously stated, that you feel could be gained from using mobile technology for teaching

يرجى ذكر مزايا استخدام تقنيات الجوال أوالمحمول من أجل التعليم والتعلم، من وجهة نظرك - من غير المذكور مسبقاً.

Please tell us about any additional disadvantages, not previously stated, that you feel could affect your teaching or disturb the class while using mobile technology.

يرجى ذكر أي عيوب حول استخدام تقنيات الجوال أوالمحمول في المحاضرة أو الجلسة الدراسية، من وجهة نظرك- من غير المذكور مسبقاً

APPENDIX E: INTERVIEW RECRUITMENT EMAIL

Dear (Name),

I am a doctoral candidate in the Instructional Technology Program at Wayne State University, Michigan, USA. I am conducting this research focusing on *Saudi university instructors' experiences and uses of mobile technology in teaching and learning* in partial fulfillment for my doctorate. You have been selected because of your affiliation to a Saudi public university and because of your expertise and use of mobile and online technology. The interview will be conducted online- audio, and only once for approximately 30 minutes.

In the interview, you will be asked about your uses of mobile technology in your courses, your thoughts about mobile learning, the use of mobile technology for teaching from your own perspective, and if you have any concerns about it.

Participation in this study, through an interview, is entirely voluntary. Your information and answers will remain confidential at all times during and after the interview.

If you have any questions or concerns, please contact me at: alallii{at}yahoo{dot}com

- If you do not mind, please reply to this email with your confirmation for participation in this study again as an interviewee.

Thank you in advance for your consideration to participate in this study.

Sincerely,

Ibrahim Alali

APPENDIX F: INTERVIEW PROTOCOL

Online Interview- Audio

Interview Agenda

- Obtaining permission to record the interview,
- Introduction and the purpose of the study,
- Assuring confidentiality to interviewee,
- Expectation of Participation (Rights, withdrawal, benefits, etc.),
- Interview questions,
- Thanking participants for their participation.

Script

Thank you again for accepting the invitation to participate in this study. This interview is related to a study about the uses of mobile technology in higher education. This will take approximately 30 minutes of your time. The entire interview will be recorded, and in fact it is already on and recording. You have been selected because of your affiliation to one of the Saudi public universities, and because of your expertise in online and mobile learning. In this interview, I hope to obtain your insights about the real uses of mobile technology in higher education for teaching and learning – and specifically about your own program-major. I will ask you some questions and seek your deep insights and reflection about mobile technology. The questions will be the same questions I sent you through email recently. I will just go over them in order.

There is no cost to you to participate in this interview and no compensation for participation, but the information you provide in this interview will be very helpful for this research and future studies. If you have any questions while conducting this interview, you may stop me at any time and ask. Your answers will be completely confidential. Data from this interview will be reported in aggregate form without identifiers. The interview will be transcribed and the information you provide will be a part of this study. Please keep in mind that there are no right or wrong answers and that you have your own views on what's in reality about the uses of mobile technology, and we need that from your own perspective. Please explain your thoughts with examples, points, etc.

If you have any questions about this study now or in the future, you may contact me: Ibrahim Alali at the following phone number 202-621-4874. If you have questions or concerns about your rights as a research participant, the Chair of the Institutional Review Board can be contacted at (313) 577-1628. If you are unable to contact the research staff, or if you want to talk to someone other than the research staff, you may also call (313) 577-1628 to ask questions or voice concerns or complaints.

You have had a chance to look at the questions that I sent you through email, do you have any questions before proceeding and starting the interview?

As we have discussed the agenda and rules of this interview, we will get started with the questions, and please answer them with as much details as you can.

Background questions:

- What is your university?
- What is your major?
- What is your academic rank?
- Approximately, how long have you been teaching in higher education?

Interview Questions

1. First question: Do you use any electronic tools/equipment in your teaching such as computers, tablets, smart boards, mobile devices, etc.? If so, in what ways do you use them, and why?
2. Second question: How do you develop and maintain your own professional skills through the use of mobile technologies? Has the use of mobile technology helped you significantly in improving your professional skills in teaching, communication, work activities, etc.?
3. Third question: Do you have any concerns about using mobile technologies in your courses? Tell me more. In regard to content delivery, or to your students, etc.
4. Fourth question: Tell me about your thoughts and understanding of mobile learning.
5. Fifth question: Can you talk about the development and promotion of mobile learning courses and pedagogy, if any? Have you noticed any major efforts or changes within your university or within the ministry of education towards mobile learning?

6. Final question: What do you think about your university's responsibilities regarding the integration of mobile learning? For example, should there be incentives? Should the university provide mobile technology to instructors and students? Tell me more.

If you have any other concerns, suggestions, or comments about the uses of mobile technology in higher education, please share them with me before ending this interview.

Final comments

Thank you very much for your participation in this study. This was a very successful interview. Again, I really appreciate your contribution to this study. Have a great day.

Generic Probes

- Neutral agreement or acknowledgement:
- Okay.
- I see.
- Completing on some questions:
- Any problems, obstacles, risks, costs, etc.
- Any motives, incentives, or suggestions.
- Asking for more information:
- Could you please tell me more about …?
- Would you please explain this … a bit further?
- Would you please give an example of what you mean?
- Asking for clarification :
- It sounds like you're saying . . .
- What else happened?
- How would you do that?
- What were the consequences of …?
- Asking for an opinion
- What do you think about this…?

APPENDIX G: SAMPLE OF TRANSCRIPTED INTERVIEWS

INTERVIEW # 1

If you can start by telling me your major.

My major is Applied Linguistic.

What is our academic position?

I hold a master degree. A lecturer position.

How long have you been teaching in higher education?

Almost five to six years.

Do you use any electronic tools/equipment in your teaching such as computers, tablets, smart boards, mobile devices, etc.? If so, in what ways do you use them, and why?

Well, at the beginning, it was rare, when I started teaching English in 2009, I was confused whether to use or not to use paper at all, and I tried to design my curriculum and materials online, and I tried to use LMS, Learning management system, as much as I could, and I tried my mobile phone to take the absences. There were a number of applications that provided me with some tools to take the absences of students. I am using the email every single lecture. Once I finish the lesson, I send an email to students and then they would reply to me after they complete their reading and submit their assignments through LMS. Basically, I consider myself to be a semi-electronic person, not fully. I am trying to learn and improve myself to use technology in education. I consider myself to be, to a certain degree, a successful instructor in using these tools. I am using the LMS, Learning management system, and I tried to use the virtual classroom, Elluminate system. I used it for one semester, and it was good, then I used Blackboard, and I asked my students to watch video lessons online, created by me, for two hours every week, and to submit everything online, and it worked successfully, so I use LMS virtual classrooms. I have been using the email in all my classes, and I use the electronic questionnaires after finishing my courses, and the end of the semester.

I am using many major technical things. First of all, I use the email with my students. Every time, I send them a summary of the lesson and instructions for the next class to students, such as what we are supposed to cover next class, and if there is a change in the class room or whatever. Second, during the class, I use the LMS. I design and create the major lessons of the curriculum and put them in the learning management system, so the students can access them at their convenience, at home or wherever they are. I use the LMS as well for submitting the assignments and activities online, and I provide them with my feedback. I use my mobile phone to take the absences in the classroom. As there are absentees in the class, I have a couple of applications that support the Arabic language, I take the students' names, I put them in a list, and check the absences, and then send that list from my iPhone to my iPad. The iPad and iPhone are connected to each other. Then, I would upload the list to the LMS and their participations and absences would be marked automatically. During the class as well, I

definitely use the smart board and a computer. They help me to get rid of the paperwork that I carry with me every time. I do not consider myself to be fully-equipped with the technology but I try my best.

How do you develop and maintain your own professional skills through the use of mobile technologies? Has the use of mobile technology helped you significantly in improving your professional skills in teaching, communication with students and colleagues, work activities, etc.?

Yes, definitely. Using those technologies has some advantages to me as an instructor and for the students. First of all, these technical tools would save the time of the instructor and the class. In a traditional classroom, the instructor would spend too much time for taking the absences, reading the names, checking the students, especially in classes with large number of students, and at the same time, the instructor in traditional class tend to talk too much explaining and exerting his efforts to make sure students understand everything. However, using these tools would save the time and efforts. The students would be able to see, view the lesson and instruction on the screen from their computers, if were in a lab. Then, they can understand and digest the content and instructions, and they can post comments or ask questions or if they have any inquiries at their convenience online whether they are home or somewhere else. The instructor, then, can rely to them at his own convenience as well. So, it saves time and it gives the instructor more opportunities and more time to think and discuss the content with students. This is one of the major points and reasons why we use technology. The second point, we are in a society that has been using the traditional way of teaching for ages, and these technology break the monotony, and it gives the students more motivation to be active members in the classroom because we are in a technology age, and this generation use technology in every second of the day, so they would be able to carry these classes in their mobile phones, and they can check their emails every now and then. So using the technology from the side of the instructor would enable the students to be motivated enough to participate and get involved in the lesson. These are the two major reasons why using technology can really improve the learning-teaching process, in my view. Regarding communication, I used to have What's App groups with students and colleagues, and we used to discuss things out. What's application is one of the major tools of the social media. It is helpful and easy to use for sending pictures, audio or video clips, or their links that lead them to the exact video or website that is related to the next lesson that we are going to take. So, I am using my smart phone all the time, whether for sending them emails or sending normal announcements for class. I am using multiple applications from my mobile phone. Using these tools and software help me as an instructor to keep up with the new technology, and to be aware of the possibilities and benefits out there that are available for students as well. I would conclude that using mobile technology is helping me to improve my skills and my professional work.

Do you have any concerns about using mobile technologies in your courses? In regard to content delivery, or to your students using them in your class.. Tell me more.

The major concern that I have is that some students do not take that seriously. I mean, whenever you give them something through the What's App, for instance, or through email, back in their minds they have been using these application for chat and for fun, etc. in very informal way, so if you send them something formally and ask them to do something in specific, they do not really take that in a serious way, and sometimes they just ignore it because they have been using such applications and emails for friendly chatting and communication for a long time. So when you use them in a very formal and academic way, they still consider that friendly communication, and they do not take it seriously. That is the major concern I have. Other than that, it would in fact save the time and save money. Sometimes in a large city, where it is over-crowded by cars, when I do not arrive to class on time, or some students do not arrive on time, we just communicate through the mobile devices, and it helps us to figure things out. The other concern that I have is that we do not really have very solid and efficient infrastructure for using such technology. I mean, we always encounter disconnection problems that really waste the time of the class. Sometimes, when we start the lesson, and then we have an internet problem that really make us interrupted and force us to move to another classroom or another lab, or just continue using the book again. You know, it is not all the time efficient. Sometimes we have some problems. But if we have very solid and efficient infrastructure with very reliable connection, I won't have this concern. It is difficult to find very reliable connection in all the kingdom. This is another major concern I have as well.

Another matter, designing the test and exam online is a very good way to evaluate the students' progress level. I have designed many tests online and they really saved my time in grading them. The computer would compute the students' marks immediately. But there is an issue of cheating and copying the test and sharing it with other absent students or other classes when the number of students is large and there are multiple sections. To avoid that, students are asked and allowed to take the final and mid-term exams in specific time and specific place, like the lab, synchronously and the test/exam would be open only during that period. I do not worry much if students copy or cheat during the semester because their mid and final exam will reflect their actual levels.

Tell me about your thoughts and understanding of mobile learning.

I am not fully familiar with this expression/term (mobile learning or m-learning), but I believe that I have been using mobile learning in the last five years because I could access my students' progress wherever I go, even if I am off-campus or even outside the city or the country. It happened to me one day when I travelled to another city to attend a conference, and my students were supposed to be absent that day, I could not find somebody to fill in, so from the hotel, I just asked them to attend the online class from their homes or wherever they were, and then we took the class online. So I believe I have been using the m-learning in my last five years. If I am not mistaken, the m-learning means that you would be able to use or to give or to deliver the learning from multiple tools at your convenience whether you are in a class or

outside the class. That's what I understand from m-learning although it is a new expression to me.

Can you talk about the development and promotion of mobile learning courses and pedagogy, if any? Have you noticed any major efforts or changes within your university or within the ministry of education towards mobile learning?

At my university, they are good in using technology in education. They in fact set a number of incentives for the instructors and encourage them to use technology. There is a deanship for development and quality which takes care of development within courses and curriculum and research. So any instructor who uses technology in their courses and keeps developing their materials would be given like credits and would have priority to be sent for overseas seminars, conferences and training. My university is so keen to promote using technology in education and teaching. They mostly promote the LMS and blackboard and online learning. In regarding to promoting the use of mobile learning through the iPads or smart devices, not yet, and some consider it as a waste of time. As things to be taken seriously within a university, and the online software and tools help a lot in teaching and communication, many instructors try to avoid the use of mobile devices in their classes. Every instructor at the university is provided with a personal computer (PC) and some are provided with laptops as well. I think we have not reached that stage of encouragement to distribute devices like iPads or tablets and encourage instructors and students to use them. I think most university started earlier with smart boards laptops, but I do not think any has initiated or started using the tablets or mobile devices.

What do you think about your university's responsibilities regarding the integration of mobile learning? For example, should there be incentives? Should the university provide mobile technology to instructors and students? Tell me more.

Before reading your questions and before conducting this interview, I wasn't completely or fully aware of the importance of m-learning tools until I read about it, and until I heard from you. So, first of all, it is the responsibility of researchers like you to promote and to bring into consideration and to raise the awareness of the universities and organizations about the importance of these technologies. They have so many advantages, the new generation use it on a daily basis, every hour, from the moment they wake up in the morning until their bed-time they use it, so why not to use in academic life and activities. I think it is the responsibilities of researchers to raise the awareness and importance to the stakeholders within the ministry and within the universities, and convince them, and afterwards, believe me they will appreciate that and they will accept it and adopt it. Maybe no one has been able to convince the stakeholders about the importance of m-learning yet. If researchers in mobile learning and similar fields would do their best to show the benefits of m-learning to the stakeholders through research and its results, it would be easy to convince them and universities will adopt such types of learning.

INTERVIEW # 2

If you can start by telling me your major.

My major is Instructional technology.

What is your academic position?

I am a lecturer in my university, in the department of instructional technology, College of Education.

How long have you been teaching in higher education?

I have taught in higher education specifically about a year and a half, but I taught in K-12 for about 4-5 years. I'm currently completing my graduate studies in the US, a PhD. I worked in other sectors before starting teaching.

Do you use any electronic tools/equipment in your teaching such as computers, tablets, smart boards, mobile devices, etc.? If so, in what ways do you use them, and why?

Yes, I did. Mainly I was using my laptop, I bring it to my classes. The rooms that I was teaching in were not well-equipped, so I had to bring in my own laptop, and a few times I brought my router to connect to the Internet through Wi-Fi. A technician or a person from the technical support wasn't available at all times, and the signal was very weak or no signal at all, so sometimes I brought my own router. Sometime, during my preparation for classes, I have some YouTube videos, so I select them carefully to make sure they are related to the topic, and then show them to my students, also I have PowerPoint presentations that I usually create, and I ask my students to create some as well like projects. I bring my laptop and they bring their projects on Pin-drives, and they use my laptop to present their projects to the class. Also, I have shown them how to design a mind map in the classroom, and how this might be helpful to memorize things for the different subjects and exams. I ask every students to design his own mind map after choosing any topic he wants. This was done through showing students multiple software that are available online. I took them through the registration steps, and how to start creating and designing their own mind maps. I showed students how to use games for learning. Once, I showed them a 3D math game, where they need to complete a certain steps to go further to the next step. This was inside the classroom. I used the technology as well outside the classroom. I reply to students' email. I have asked my students to design wikis and blogs to collaborate among themselves. I put them in groups, and asked them to reply to one another. When I am home, I have access to the wikis and blogs, and I go online and check their work, and provide them with help and comments whenever needed. I remember by the end of the semester, I have replied to more than 500 emails for one semester. In regard to communication, I was planning to use Elluminate software, a virtual classroom software, with the class but I was unable to do so because I had the free version which allows three participants only. Other universities have contracts with the company and can have as many participants as they want. I could not pay from my pocket to have a virtual classroom. This is what I have mainly for this question.

How do you develop and maintain your own professional skills through the use of mobile technologies? Has the use of mobile technology helped you significantly in improving your professional skills in teaching, communication, work activities, etc.?

There are companies, even in our country, and they frequently send emails to educators for improving their skills by using these technologies. They offer online, virtual training sessions which you can attend while you are at home. But personally I have never taken these classes, the only thing that I did was during my master degree study, I took a totally online statistics course, and I was using my laptop, and I learned a great deal from that well-designed course. I believe they have a great potential for developing skills and saving money at the same time. I would like to give you an example, I think that mobile technology today is like glasses, so if you have difficulty in sight, you need your glasses. If you take them off, you feel there is something missing and you start looking for it. The same thing today, if you miss your mobile device and it is not in your pocket, you feel there is something important missing from you and you need to look for it. For my use, yes I use such technology and the available applications and software built into them for communication with students and colleagues in the university, and you can learn from the different available applications and use them in your lectures and classroom for your own professional development or for students' professional development. Such technology helps a lot in preparing for the class. Helps in finding materials and information, and helps in presenting and sharing them with students. Now if you ask me about my preference on whether to use book or e-book (pdf files) for reading, and my answer would be absolutely the pdf files through my laptop or mobile technology. So these technology have brought and enabled great opportunities for both students and instructors.

Do you have any concerns about using mobile technologies in your courses? Tell me more. In regard to content delivery, or to your students, or any.

About concerns, yeah I have some concerns about using mobile technology in my courses. First, I can teach and I know my subject area, but I cannot develop the software, if needed, to deliver certain things. I am an instructional designer, but not experienced with software and programming. I will need help in that. The universities should provide some services to create some applications and make sure that they are compatible for the different mobile devices. The infrastructure at the university must be good and efficient to allow content delivery for all types of devices, if used. Some students do not have the right devices such as that if you are in a rural area, some students may not be able to afford such devices for many reasons. This is my concern regarding students. For students who already have the devices, I do not think they need training. They generally know how to utilize their devices very well. They won't have the problems, but instructors will absolutely need some training sessions.

Some concerns are mainly about the development of the content, and technical support if needed and the infrastructure. If the use of mobile technology is mandatory in one of the courses- not elective or so, will the university help students in getting the devices through loans or contracts or distributing the devices to students and they return them by the end of the

semester. There are some concerns. There are always pros and cons. Sometimes if you have shy students in the class who hesitate to answer or so, such technology will be a great help for them where they will use the technology from distance, and will not feel shy any more, and they will do a great job. Using the technology will hinder me from the facial impression of students. When teaching in a class, you can see the faces, and you can tell if students understand or being bored, or what's going on, but if I'm using the technology and communication whether audio or video, you won't be able to figure this out especially with large number of students in one class, I will not be able to see all students at the same time like in a class. Also there are some security issues and the university should have a computer security department and make back-ups for the materials and content for all devices. Sometimes even from students, if one gets mad with the instructor, they may hack the system or try to damage it, etc. Content should be compatible to all devices, laptops, iPads, mobile devices.

Tell me about your thoughts and understanding of mobile learning.

Using mobile technology, either laptops, iPads, mobile devices, and whether in class or outside the classroom is considered within the mobile learning. If students have tablets, you may connect them to the smart board, and if you have a task, you may ask students to collaborate and complete the work together or divide them into groups to complete it. So collaboration can be at its maximum when using mobile technology whether inside or outside the classroom.

Can you talk about the development and promotion of mobile learning courses and pedagogy, if any? Have you noticed any major efforts or changes within your university or within the ministry of education towards mobile learning?

Let's start from the big picture, which is the Ministry of Education, especially after merging the Ministry of Higher Education to the Ministry of Education then we will go narrower to my university. There are some initiatives to use technology in education. I am aware that the ministry of education has done some pilot studies in K-12 schools to use the mobile technology and to have the virtual classrooms inside some selected classrooms and courses. The ministry has established the national center for online learning, and, in 2007, and they created their own learning management system which is called Jusur (bridges) and the plan was to use this LMS in all universities, but unfortunately some universities had already had contracts with other international LMSs. This center is to enhance and promote for the online learning. E-learning is mainly using the technology and mobile technology. Universities are not the same. Some universities are very old, and some are almost ten years old. The new ones might not have the experience and the infrastructure like the others. The old ones already have the labs, infrastructure, the high budgets, more students, more programs available, etc. they might have the potential and capability to go ahead and start the mobile learning, or using mobile technology. Like my university they still use Moodle and SCORM to make and have the online contents. In my university, we have around 10.000 students who are distance learners. They do not come to the campus to attend lectures, etc. and we have to offer them the content online,

but what has been done is that only copying the papers and materials and have them online as pdf files or pictures and word files. So they are not designed specifically for mobile technology nor for online learning. Personally, I think this is not right, because if you want to design content for mobile technology, you should design something specifically for mobile technology. You mentioned something important "Pedagogy", mobile learning has its own pedagogy which is not the same as face-to-face learning. So we need to design content for the pedagogy and curriculum of mobile technology. What works for F2F classes does not always work for mobile technology. We need visuals, videos, interactivity, etc. and not only the text to read. In fact, I have seen some initiatives in other universities, and the new universities are excused right now, because they still need more expertise, they do not have the complete and right infrastructure and the budget, and not enough human resources, etc.

You have mentioned that there are around 10.000 distance learners in your university, what were the consequences of using online learning and maybe mobile technology? Were the students encouraged, or were there noticeable dropouts from the university.

I will tell you an example of personal communication with one of the distance learners in my university. He explained that they used to come to the library of the university and get the books and handouts and they read them and only come for the exam based on their readings. This is old-fashioned distance learning without technology. Then the university incorporated learning with the technology and launched the SCORM with one of the providers and just made the text and books to be available online. Students preferred the previous way which was easier for them without technology as they usually work and are busy, etc. There were no interactive materials nor videos, nor visuals.

Regarding promotion, my university didn't provide any of the technology to students nor to instructors. Instructors have personal computers at their offices. Some instructor who teach the distance learners do get more salary and some incentives.

What do you think about your university's responsibilities regarding the integration of mobile learning? For example, should there be incentives? Should the university provide mobile technology to instructors and students? Tell me more.

There are some allowances/incentives for using technology in education, but not really activated or promoted. I would say there should be some supervision and encouragement to promote for using technology. The university should do a needs assessment to find out how they approach instructors and offer them training sessions. Some instructors are old and some are young, and I do not think the same training would fit all of them. Many instructors know how to send and receive emails, etc., but do not necessarily know how to design content or run virtual classrooms.

There should be more motivation whether through expectations of instructors or requirements from the departments or through extra incentives. There should be technical support available to all instructors in all buildings, or they will not use technology at all.

APPENDIX H: IRB's approval

WAYNE STATE UNIVERSITY

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CONCURRENCE OF EXEMPTION

To: Ibrahim Alali
College of Education

From: Dr. Deborah Ellis C. Zolondek/ RB.
for Chairperson, Behavioral Institutional Review Board (B3)

Date: March 31, 2015

RE: IRB #: 036615B3X

Protocol Title: Investigating University Instructors' Experiences and Uses of Mobile Technology in Teaching and Learning in Saudi Arabia

Sponsor:

Protocol #: 1503013883

The above-referenced protocol has been reviewed and found to qualify for **Exemption** according to paragraph #2 of the Department of Health and Human Services Code of Federal Regulations [45 CFR 46.101(b)].

- Social/Behavioral/Education Exempt Protocol Summary Form (received in the IRB Office 3/19/2015)
- Protocol (received in the IRB Office 3/19/2015)
- Research Information Sheet - English and Arabic versions
- Cover Letter for Survey Recruitment
- Interview Recruitment Email
- Data Collection Tools: Survey Questions - English and Arabic versions, and Interview Protocol

This proposal has not been evaluated for scientific merit, except to weigh the risk to the human subjects in relation to the potential benefits.

- Exempt protocols do not require annual review by the IRB.
- All changes or amendments to the above-referenced protocol require review and approval by the IRB **BEFORE** implementation.
- Adverse Reactions/Unexpected Events (AR/UE) must be submitted on the appropriate form within the timeframe specified in the IRB Administration Office Policy (http://irb.wayne.edu/policies-human-research.php).

NOTE: Forms should be downloaded from the IRB Administration Office website http://irb.wayne.edu at each use.

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ABSTRACT

INVESTIGATING UNIVERSITY INSTRUCTORS' EXPERIENCES AND USES OF MOBILE TECHNOLOGY IN TEACHING AND LEARNING IN SAUDI ARABIA

by

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August 2015

Advisor: Dr. Ke Zhang

Major: Instructional Technology

Degree: Doctor of Philosophy

The use of mobile technology in teaching and learning has become a worldwide phenomenon. Many university instructors in Saudi Arabia have also started using their own mobile technology in their teaching and for communication with students. But there is limited research on Saudi Arabian university faculty's experiences of using mobile technology in their teaching practices. This mixed-method study adapted the R2D2 (Reading, Reflecting, Displaying, and Doing) model (Bonk& Zhang, 2006, 2008) to investigate faculty's uses of mobile technology in Saudi Arabian universities, including both instructors' own teaching and learners' activities.

An online survey, with both Likert-scale items and open-ended questions, was conducted to collect data on university instructors' (a) general experiences in integrating mobile technology in their teaching practices as well as for learner activities, (b) their attitudes toward mobile learning, (c) the specific learning activities in different categories as per the

R2D2 model, in and out of class and for communication with students. A total of 372 instructors participated the survey, 241 of them completed the entire survey. Participants represented the 25 public universities in Saudi Arabia, with a highly diverse profile in terms of age, gender, academic major, geographic location, and years of teaching experiences. In-depth interviews were conducted with six selected participants, representing different age groups, academic majors and teaching experiences to further investigate instructors' experiences and contributing factors to their uses of mobile technology for teaching and learning in Saudi Arabian universities.

The results of this mixed-method research study (Qualitative and quantitative data were collected and used) concluded that the majority of instructors showed their eagerness and willingness to use mobile technology in their teaching practices. Many instructors were already using them in their teaching and for communication with their students. A number of universities already had the appropriate tools and applications that helped students and instructors to use their mobile technology for content delivery, assignment submission, communication, and more. Some university instructors expressed specific concerns regarding the use of mobile technology by their students, together with the needs for training and professional development to better understand the possibilities that mobile technology can bring to the class and to the university environment. The research has practical implications for university administration and policy-makers for better integration of mobile technology and better applications of mobile learning into the different courses and disciplines.

The R2D2 four categories (Reading, reflecting, displaying, and doing) cover many learning activities that may be conducted online and through the use of mobile technologies.

Although this model focuses on all categories evenly, this research found that university instructors focused on the learning activities from the reading and displaying categories more than the learning activities from the reflecting or doing categories.

Instructors nowadays are considered more as facilitators for their learners' acquisition of knowledge rather than giving and feeding them with the information. And this R2D2 model is a great framework for university instructors to consider, compare, choose and apply different learning activities via mobile devices, when they facilitate and moderate the new ways of teaching. Similarly, this model may be help students where they can take the steps on their own to follow and complete the wide range of mobile learning activities. The adaption of the R2D2 model and its four categories of varied learning activities, together with the key instructional considerations (Bonk & Zhang, 2008) opens new avenues for university instructors to integrate mobile technologies in their courses, for teaching and for students learning activities. The resources and technologies available to instructors differ from one university to another, and from one country to another, so instructors should select the most suitable learning activities from the four R2D2 categories. As Cartner and Hallas (2009) have found that "the (R2D2) model has been easy to use as the cyclical learning process is one that occurs naturally in everyday life" (p. 114). This study sheds light on future research on mobile learning, as well as mobile learning practices for university instructors, higher education administrators and national policy makers.

AUTOBIOGRAPHICAL STATEMENT

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