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Doctoral Thesis

Towards a framework for the expansion of mobile computing in learning in Kuwaiti higher education: challenges and opportunities

Author:

Abdullah Alturki

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Abstract

During the last few years, efficient mobile wireless communication devices have become widely available and easily accessible by a broad range of higher education students around the world in general and in Kuwait in particular. These devices offer the possibility of extending the boundaries of the educational process outside traditional classroom settings by providing communication and collaboration tools for students, instructors and staff members and by facilitating remote access to shared materials and tools. This learning arrangement is referred to as mobile learning or m-learning.

The purpose of this thesis was to study and improve the use of m-learning in Kuwaiti higher education so learning in general would improve. This study aimed to develop a conceptual framework for guiding Kuwaiti decision makers in the successful adaptation of mobile learning in the Kuwaiti higher educational system. One of the major focuses of this study was to use mobile learning in places where it was intrinsically valuable such as subjects involving field studies.

Three studies were conducted in Kuwait. In the first study, twenty-six instructors from three different Kuwaiti universities were interviewed to reveal the extent of the acceptance of the idea of mobile learning in Kuwaiti higher education. The second study was based on the results of the first study and used ninety-four students from five faculties at two universities to evaluate the trends of mobile learning amongst students and teachers. In the third study, there were forty participants from three faculties at two universities. This study tried to determine how beneficial it is to use a popular social media application as a learning tool under strict monitoring rules and instructions.

Based on the results of the three studies conducted in this thesis, a framework was built to address the challenges and barriers facing mobile learning in Kuwait. This framework provides an appropriate environment for the adaptation of successful mobile learning in Kuwaiti higher education. The outcomes of the studies and research conducted for this thesis demonstrated that Kuwait could be a very successful example of adapting mobile learning if the barriers were faced by implementing the appropriate framework. The proposed framework enables Kuwait to be the one of the leaders of mobile learning in the surrounding region.

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To My Family

This thesis is dedicated to the soul of my father, who always supported and encouraged me to succeed in my life and in my studies throughout his life until he left this world.

I also dedicate this work to my mother, who constantly inspires me to pursue my dreams and achieve my ambitions. May she be blessed with a long and happy life.

My thesis is also dedicated to my sister, who has always wished the best for me.

Chapter 1

Introduction

1.1 Background and Motivation

During the last few years, efficient mobile wireless communication devices, such as smart phones and tablets, have become widely available and easily accessible by a broad range of higher education students around the world. These devices offer the possibility of extending the boundaries of the educational process outside traditional classroom settings by facilitating the remote access to shared materials and by providing communication and collaboration tools for students, instructors and staff members (Khaddage et al., 2009). Moreover, the availability and accessibility to such shared resources provide students with the fascinating possibility of organising their learning time flexibly according to their other commitments. They can use their spare time to prepare for their lectures, coursework and exams (Virvou and Alepis, 2005). This new learning arrangement, whichis made possible through the availability and accessibility of wireless communications networks and the widespread use of mobile devices, is referred to as mobile learning or m-learning. This form of learning has been considered the fourth generation of electronic learning (e-learning) environments. (Salmon, 2004). Crompton (2013) suggested that m-learning is "learning across multiple contexts through social and content interactions, using personal electronic devices" in the form of distance learning (Crescente and Lee, 2011). O'Malley et al. (2005) stated that mobile learning occurs when the learner is not required to remain in a fixed location in order to learn and can take advantage of the learning opportunities that are afforded by mobile technologies. Similarly, Kukulska-Hulme and Traxler (2005) stated that mobile learning provides the learner with mobility without the constraints of a tightly delimited physical location.

Before we look at issues of concern when it comes to mobile learning, it may be beneficial to define what learning and education means and the aim of teaching as a basis for any type of learning, such as e-Learning and m-learning.

The difference between learning and education from a researchers'point of view is summed up by Prabhat (2011) as follows: "Education can be said to be a process through which a society passes on the knowledge, values and skills from one generation to another", while learning can be defined as "the acquiring of new skills, knowledge, and values". This means that both learning and education have a significant impact on the minds and characters of individuals.

As mentioned by Ramsden (2003), the aim of teaching is "to make student learning possible", which means that, teaching always looks for new methods to improve students'understanding, so they begin to conceptualise phenomena and ideas that improve students understanding of academic teachings.

Ramsden (2003) elaborates that, "a professional approach to teaching should be seen in the same light as a professional approach to law, medicine or engineering", which means that teachers must be professional as well in relation to their teaching methods.He/she must use an evidence based approach which would help students learn and understand course work. It is critical for university teachers to be effective and efficient when it comes to teaching students.

It's also useful to compare individual learning and group learning. From Grimm (2004)'s point of view, "there has been a great debate about which learning style is the best for all students", some of the research suggests that individual learning is the best learning style because students'can enhance their learning environment, while others propose group learning as a good inclusion in to the teaching methods for students when the learning is directly related to their peers.

The research conducted previously investigated the difference between group and individual learning styles from different viewpoints and their impact on a students'individual scores. The analysis and results showed a significant difference in students'grades between the two learning methods, the group learning style produced better results than the individual learning style (Grimm (2004)).

Traxler (2013) defined personalised learning as, "the learning that is customised for thepreferences and abilities of individual learners or groups of learners", he elaborated in Traxler (2007) that, "by personalised learning, we mean learning that recognises

diversity, difference, and individuality in the ways that learning is developed, delivered, and supported".

The benefits associated with m-learning are many, but they are accompanied by a long list of challenges, which many researchers have argued (Maniar et al., 2008); (Crescente and Lee, 2011). Because many of these challenges remain to be addressed, researchers have argued that m-learning has not achieved its full potential, and its development is still in its infancy. As the next chapter will discuss in detail, one of the main challenges facing the implementation of m-learning is the absence of sufficient research about the quality of the learning outcomes of both its forms, formal and informal, as well as the efficiency of the traditional method of assessing students through examination results.

Additionally, many technical challenges face the implementation of m-learning, such as the technical features of mobile devices, network availability, accessibility and security. Another important challenge in implementing m-learning is the extent to which the intended users would be willing to adapt to new technologies that require them to change their approach to learning. If users were not convinced or lacked the motivation to use the new technologies, then institutions would have invested heavily in systems that only a few people adopted.

Moreover, some researchers highlighted the importance of considering the socio-cultural context in the design of m-learning frameworks (Vavoula and Sharples, 2009). This is particularly important in contexts where there are legal, social or religious constraints on the concept of direct communication across age groups or genders. For instance, in some Arab countries such as Kuwait, there are strict social and religious constraints surrounding the direct communication between males and females, especially in higher educational settings (Al-Shehri, 2012). Such important constraints might hinder the implementation of m-learning frameworks in such Arab countries, despite the fact that some of these countries have very good mobile networks with high bandwidths and penetration rates as well as high living standards that enable most citizens to acquire state-of-the-art mobile devices (Al-shehri, 2012). In Kuwait for instance, the mobile telecommunication penetration rate is over 190%, and the gross domestic product divided by the mid-year population (GDP per capita) is among the highest five in the world (Hasan et al., 2015); (Adkins, 2013).

1.2 Statement of the Problem

Although Kuwait, like many other Arab countries, is one of the world's top countries with regard to mobile phone penetration and living standards, many factors hinder the implementation of e-learning technologies in general and mobile learning in the higher education in particular. Alkharang and Ghinea (2013) noted that because e-learning is a relatively new term and concept in Kuwait, only a small number of local suppliers are able to provide e-learning systems, which at present are mainly used by financial and energy organisations. However, as more organisations become keen to utilise e-learning to train their employees, educational institutions will be motivated to capitalise on the benefits of learning "on-the-go" through technology that is not only available at schools and universities but also in the home (e.g., computers). An increasing number of learners possess electronic technology, including computers and mobile devices. However, because of the newness of these technologies and their usage in learning, there is a significant lack of research on e-learning, particularly m-learning in Kuwait, which is a significant barrier to progress in this area (Aldhafeeri et al., 2006).

A few previous studies have investigated the success of implementing m-learning in many Arab countries, including Kuwait. However, according to Sawsaa et al. (2012), in general, these attempts have not been successful, and mobile learning has not been widely embraced in these countries. Alsanaa (2012) stated that despite the high levels of wealth and the advanced infrastructure, the sector of public higher education in Kuwait has not effectively adopted e-learning or m-learning initiatives. However, this phenomenon is not specific to the Arab world. In many countries across the globe, there is little understanding of the issues that surround the successful implementation of m-learning in higher education, as well as the lack of models and guidelines that facilitate this process (Litchfield et al., 2007). Furthermore, the specific conditions and constraints in each context must be considered separately.

Hence, there is a need for an integrated framework that considers the issues related to the use and adoption of m-learning in Kuwait. This framework would encourage university teachers to use m-learning. Therefore, the primary research question is the following: What constitutes a framework that would be a solution to promoting the implementation of m-learning in Kuwait?

1.3 Aim and Objectives

The main aim of this research is to propose a framework that fosters the use of mobile learning in the higher education sector in Kuwait. This aim will be achieved through focusing on the following objectives:

1. Undertake a comprehensive review of the literature on m-learning with a focus on studies relating to Kuwait in order to situate the present project within the context of previous m-learning research.
2. Study existing m-learning frameworks and identify their common features, objectives and shortcomings.
3. Explore the views of academic staff members in selected Kuwaiti universities in order to lay the groundwork for further studies.
4. Use appropriate mobile applications to design and conduct experiments to understand the real-world use of technology in Kuwaiti universities, the factors that affect the adoption and expansion of m-learning in the higher education sector and the extent to which m-learning could be successful in Kuwait.
5. Create as comprehensive and accurate a picture as possible of the current challenges and opportunities present in m-learning in the Kuwaiti higher education sector.
6. Propose a framework for the future implementation of m-learning in Kuwait to assist policy making aimed at expanding the use of m-learning in Kuwaiti higher education.
7. Based on the results, draw conclusions and make recommendations to inform and guide further research on this area.

A multi-stage plan was developed to investigate these objectives. The first stage consisted of meetings and interviews with academic staff members from three universities in Kuwait in both the public and the private sectors. The main purpose was to investigate the opportunities and the extent to which m-learning would be accepted and successful in the Kuwaiti higher education sector. The second stage consisted of conducting meetings and interviews with students and academic staff members at two universities by using two different software applications, Ourviews and WhatsApp. Quantitative and

qualitative research methodologies were used to analyse the data collected in this stage. In the third stage, the attitudes of the instructors toward using the mobile application WhatsApp as an m-learning software were measured and analysed using a qualitative research methodology.

1.4 Contributions of the Research

The main contribution or originality that thesis shows is, it provides a conceptual framework that is designed to enhance the implementation of m-learning in Kuwait and thus improve the educational experience of students and teachers. The framework will not only be an important contribution to the extant literature and future research on the factors that affect mobile learning in Kuwait but also provide clear guidelines for the successful implementation of m-learning in Kuwait.

As will be shown in this study, this conceptual learning framework will be the first in Kuwait and the other gulf countries which have the same traditional and cultural issues, and this framework should be a good addition to knowledge retention and understanding.

The studies conducted in this thesis have clearly shown a range of barriers and challenges that could affect the implementation of mobile learning and the development of a mobile learning framework for Kuwaiti higher education institutions. These factors include the lack of awareness, cultural barriers, specialised training requirements, specialised infrastructure readiness and opposition to change. These factors are some of the main reasons that show the need for developing a robust framework that helps solve the above problems. Study 1 showed that the students' perceptions of mobile learning were generally positive and reflected their willingness to embrace the concepts and the technologies of m-learning as part of their educational and learning processes. The results of Study 2 contribute to the literature and the understanding of the factors that affect mobile learning in Kuwait by demonstrating the significant effects of the cultural norms that govern the interactions among female and male students and teachers. The comparison of two different applications, WhatsApp and OurViews, showed that the participants approved of and accepted certain aspects of both applications.

Study 3 found that students in Kuwaiti universities were open to changing their perceptions of m-learning applications, especially those that were similar or were already being used in social communications, such as WhatsApp. However, Study 3 also demonstrated the need for systematic rules and instructions to govern the interactions through

social applications that were used in m-learning, particularly with regard to privacy and control. Without these rules, an application might fail to achieve the objectives of m-learning.

An important contribution is the finding that an application that not only "feels, smells and tastes" like WhatsApp but also provides features that maintain privacy and control by the module convenors and lecturers would be an appropriate solution that would meet the needs of the users of m-learning in the higher education sector in Kuwait.

Chapter 2

Mobile Learning in the Kuwaiti Context

The aim of this chapter is to investigate the existing literature pertaining to Mobile Learning (M-Learning), particularly in the Kuwaiti higher education context. The need to explore the existing literature stems from the need to better understand the state-of-the-art of M-learning and its application in Kuwait to situate this project within the context of wider M-learning research. This chapter also examines the main benefits, opportunities and challenges facing M-learning in Kuwait and an array of existing M-Learning frameworks to provide the basis upon which the current research takes place.

2.1 Introduction

Since midway through the 20th century, educators have used technology in multiple ways to improve learning outcomes (Nicholson, 2007). For instance, Alkharang and Ghinea (2013) noted that, in the early 1960s, a time-shared computer system was developed at the University of Illinois by Don Bitzer called PLATO, which enabled teachers and students to share graphics terminals. TUTOR, a programming language that allowed the sharing of electronic notes between users, was also created. Such computer-based educational systems constitute what is known as Electronic Learning (e-learning), which is defined by (Koohang and Harman, 2005) as the process of providing all educational activities, such as instructing and teaching, via electronic media, such as the Internet, satellite TV or tapes and CD ROMs.

E-learning, which enables learning to take place outside of the classroom, opened avenues for distance learning such as open access courses at a higher education level (Alkhalaf et al., 2012). Given the development of the Web and the ease of access to technologies such as laptops, desktop computers and content-sharing platforms (via social networking, programs such as Dropbox, peer-to-peer information and file sharing), and phenomena such as blogs, wikis, podcasts and virtual worlds (Alkharang and Ghinea, 2013), e-learning is currently fully integrated into the national curriculum of many countries.

In Kuwait, however, e-learning is still a relatively new term and concept (Alkharang and Ghinea, 2013). Even though the Ministry of Education in Kuwait announced its e-learning strategy in 2008, only a small number of local suppliers are currently able to provide e-learning systems, most of which are used by financial and energy organisations (Aldhafeeri et al., 2006). However, as more organisations become eager to utilise e-learning to train employees, educational institutions are also becoming motivated to capitalise on the benefits of learning on-the-go through technology that is not only available at schools and universities, but also in the home (such as computers). However, given the newness of these technologies, and the uses of these technologies for learning, there is a significant lack of research into e-learning in Kuwait, which provides a significant barrier to progress in this area (Aldhafeeri et al., 2006) and (Al-Fadhli, 2009a).

2.2 M-learning

The emergence of smart phones, tablets, portable notebooks and netbooks, the cloud and the readily available Wi-Fi systems introduced a new learning arrangement through which learning can occur at anytime, anywhere and on a multitude of platforms that are personalised to the individual learner. This new arrangement, known as Mobile learning or M-learning, has enhanced and improved e-learning by ensuring that learning can occur virtually anywhere a mobile signal can be found (Oller, 2012).

Considerable research has examined different aspects of M-learning, and many countries around the world, including the USA, Japan, South Korea, the European Union countries, Australia and Singapore, have successfully implemented M-learning (Khan et al., 2015).

This section discusses the various definitions suggested by different researchers for M-Learning and highlights the main components and ingredients necessary for successful M-Learning adoption. This section then provides a discussion about the opportunity

for M-learning in Kuwait based on the availability, or lack of the components and ingredients required for M-learning to highlight potential strengths and weaknesses that can facilitate or hinder the adoption of M-Learning in Kuwait.

2.2.1 Definition of M-learning

M-learning has been defined differently by different researchers based on various factors such as the learner's mobility, the mobile devices, the software applications (apps) used, the social contexts and the interactions that take place during M-learning. Wu et al. (2012) described M-learning as the process through which learners get involved in educational activities using technological tools that can access data and allow instant communication with others across wireless networks. O'Malley et al. (2005) stated that M-Learning occurs when the learner is not required to remain in a fixed location to learn and can take advantage of the learning opportunities afforded by mobile technologies. This is echoed by (Kukulska-Hulme and Traxler, 2005) who stated that M-learning means learners' mobility, without the constraints of a tightly delimited physical location. Motiwalla (2007) emphasised that M-learning integrates personalised learning with the ability to learn anytime and anywhere.

M-learning requires devices that enable transportable technology such as smart phones, tablet computers and laptops (Valk et al., 2010), MP3 players and hand-held computers (Trentin and Repetto, 2013). As Keegan (2005) suggested, portability is key, and M-learning should be 'restricted to learning on devices which a lady can carry in her handbag or a gentleman can carry in his pocket'. The very essence of M-learning is easy access to information and knowledge on personal devices that can be carried easily by an individual (Traxler, 2009a). Portable hand-held devices continue to be developed with increasingly powerful multi- media, communication, social networking and geo-location (GPS) capabilities. Thus, M-learning is afforded far greater opportunities than before. Ten years ago, text SMS notices were already being used on mobile phones for distance education or for those who had particularly mobile courses that required them to be on-the-go much of the time. Texts, email alerts and notifications can be used to inform students of venue and meeting time changes, share information about assignment deadlines and results, and enable teachers and students to contact one another easily. However, since the advent of the smart phone, there is a greater gamut of mobile phone uses, including camera and video creation and consumption, music and audio uses, the Internet and surfing the web, blogging, apps, and communications technology.

Researchers such as (Winters, 2007), (Cook et al., 2008) and (Pachler et al., 2009) have indicated that M-learning can be formal, where the learning materials are specifically developed for use in an educational context in a specific programme of instruction (Malcolm et al., 2003), or informal, where the learning happens in more relaxed environments, in unstructured ways and could very well be unanticipated or even unacknowledged by the learners (Halliday-Wynes and Beddie, 2009), (Marsick and Watkins, 2001) and (Jubas, 2011). Much learning takes place outside of formal educational settings in a ubiquitous manner (Billett, 2002), and thus it could be argued that informal learning should not be implemented only after formal learning has occurred but should be combined with formal learning for greater learning outcomes (Naismith et al., 2004). The use of mobile computing devices facilitates the process of blending these two forms of learning (Wu et al., 2012).

M-learning, which takes place across various contexts of social and content exchanges, is considered by many researchers to be context aware and authentic. For example, M-learning enables the learning to be more personalised and meaningful to the learner and more relevant to their immediate needs, abilities and barriers (Crompton, 2013), (Traxler, 2010) and (Sharples et al., 2010). Additionally, learning can take place in meaningful surroundings of the learners' choosing, generally outside the classroom and at a time suited to the learner (Motiwalla, 2007). However, some researchers have highlighted various downsides to M-learning, such as the idea that learning at different times in different contexts could result in an incomplete experience and fragmented knowledge (Wu et al., 2012) and (Traxler, 2010).

Considering the above, it could be concluded that M-learning (1) relies on (hand-held) mobile devices that have access to wireless communication networks (Traxler, 2009a); (2) involves formal and informal styles of learning (Quinn, 2011); and (3) is context aware and authentic from the learners' perspective (Traxler, 2010).

2.2.2 Benefits of Mobile Learning

Learning via M-learning platforms enables a variety of content to be accessed, generating a more rounded learning platform, which can be more rewarding and inclusive for learners. For instance, M-learning encourages students to collaborate on group projects through communication apps, interactive displays, videos, networking, and other methods (Murray and Olcese, 2011), and it can replace the more traditional, bulky or cumbersome resources such as visual aids (e.g. papers, leaflets, posters, wipe boards), textbooks

and presentation technology (e.g. large screens, overhead projectors) (Dahlstrom et al., 2013). In addition, having the ability to manipulate and add to information sources on electronic devices might encourage student participation in learning more readily than traditional methods, and Wi-Fi and phone signals (such as 5G) not only enable students to have updated information at their fingertips and obtain it on demand, but they also enable learning to take place inside and outside of the classroom (Naismith et al., 2004), which means that learning is not restricted to the hours that a teacher has with a student inside the classroom, but can be continued effectively at home for accelerated learning. Naismith et al. (2004) confirmed in a recent literature review that better communication and collaboration occurred in groups of students, and concepts were more readily understood because of the use of mobile devices within the learning process.

A teacher-led class means that a teacher is responsible for the learning process and the classroom is designed to suit the teachers'needs. Classrooms in this case may seem busy, but are generally quiet and controlled.

A major educational projects'purpose is to support teachers'instructions inside and outside of the classroom. Some of these projects which target students directly, usually include mobile technologies that students use in or out of the classroom, Taking into account the teacher-led instruction, "many include a teacher-training component to help educators incorporate mobile learning into their curricula and guide students through the learning process" (Hawkins (2016)). Sharples (2006) also states that, "Mobile technology has offered new opportunities for learning that extends beyond the traditional teacher-led classroom", however there are some technical and educational issues , as well as others that happen as a result of ethical and cultural issues. Some of these issues taken from examples given by Sharples (2016) from his point of view are as follows: How to interact with a mobile device when walking? How to coordinate small group learning in the classroom? Is it ethical for software on mobile devices to monitor and control children's learning activities outside the classroom? All these issues need to be addressed, and the role of teacher and his/her instructions are essential. The teacher needs to be able to assist with answering these sorts of questions, and thesewould be considered barriers to this mode of education until expert answers become available.

Given the different needs and barriers of various students, M-learning is advantageous because it caters to a wide range of learner requirements. M-learning is a beneficial means of reaching a large number of students effectively (Kahle-Piasecki et al., 2012), and because M-learning is being applied more frequently to the workplace, students in

the 21st century are being prepared for the demands of modern businesses when using M-learning inside and outside of the classroom. Even those outside of formal education or the workplace can improve their numeracy, literacy and language skills through informal M-learning, which could help them to impress more easily in job applications and interviews and get them back into the workplace or into more formal education (Horkoff and Kayes, 2007) and (Raftree and Martin, 2013).

The convenience of M-learning is often cited as its main advantage because content can be accessed anywhere at any time, and files and information can be shared instantaneously amongst those using the same content, which facilitates instant feedback, corrections and tips. M-learning is a highly active process that has many advantages when used in fieldwork learning activities, such as the effective use of time, accurate data recording and improved communication (Saylor, 2013) and (Kukulska-Hulme and Traxler, 2005).

Additionally, one of the main benefits of M-learning is its low cost. Although some devices such as smart phones and portable netbooks could be expensive initially, this capital expenditure is minimal compared to the costs involved in producing and purchasing textbooks and other materials, hiring rooms and buildings for teachers to teach within and for purchasing PCs and laptops, for example. Moreover, in terms of time constraints, M-learning has the advantage of reducing the travel time (and costs) necessary for students to travel to a place of learning (such as a classroom or library) because information (such as e-books) can be obtained from the comfort of a student's home (Abas et al., 2009) and (Dahlstrom et al., 2013).

Many researchers have sought to uncover the adoption rate of M-learning in the university context and examine how it is employed by teachers and students. It has been shown that communication between students and instructors can be fostered via social media and Web tools that promote communication to enhance learning (Rodriguez, 2011). The use of mobile devices and technology offers new teaching options for higher education students and new avenues for using social media and the concept of mobility for instruction (Shih, 2007), (Nihalani and Mayrath, 2010).

According to (Gikas and Grant, 2013), students are using M-learning, such as social networks and communication platforms, in higher education settings. Research completed by Oller (2012) suggests that university students are driving the use of mobile computing devices for learning, such as tablet computers and smart phones, and that 67%

of higher education students consider mobile devices an essential factor contributing to their academic success, given the academic activities that can be completed on them.

However, while much research into higher education students and mobile technology focuses on students' intention to use such devices or learning platforms (e.g. Cheon et al. (2012)), there continues to be a shortage of research regarding how tools and platforms on mobile devices are actually being used to support teaching and learning. This is especially concerning given the reservations that many higher education students have about learning outside of the classroom, which are mainly caused by fears that students' and teachers' work-life balance would be compromised. Additionally, many prefer to use a computer instead of a mobile phone because of the greater power and memory of a computer and the visual ease afforded by a bigger screen (Hyla, 2015).

2.2.3 Opportunity of Mobile Learning in Kuwait

The use and adoption of information and communication technologies in Kuwait – and in many neighbouring Gulf countries that are similar to Kuwait in terms of culture, traditions and economy – has been continually expanding.

Culture is defined as "the set of shared attitudes, values, goals, and practices that characterizes an institution or organization" Merriam-Webster, while Zimmermann (2015) defined culture as the characteristics and knowledge of a particular group of people, encompassing language, religion, cuisine, social habits, music and arts.

Hofstede and Jan (1991) arranged cultural values along five dimensions, one of these dimensions is what they called power distance, this means that "in cultures such as in Arabic countries, Mexico or India" the power distance is high, while in countries such as Japan, France or Greece they follow another dimension and tend to avoid uncertainty; "they prefer predictability and so develop strict hierarchies, laws and procedures".

Educational culture is one of the main cultures as it is concerned directly with learning and technology. Educational cultures is defined as "the framework in which educational activities take place" (Council of Europe), so currently the teachers and learners do not follow the same methods of educational practises. Different culture issues have been defined and this has changed many traditions and attitudes.

The uptake and use of technology in Kuwait is rapidly increasing across all sectors, including use of the Internet and social media. For instance, the Arab Human Development Report (United Nations Development Program, 2009) claimed that in 1990, the

number of Internet users was at 0%; this rose to 23% by 2003, and in 2009, it was reported that 37% of the Kuwaiti population used the Internet on a daily basis. Recently reports state that the mobile penetration rate in Kuwait grew to over 190% (Hasan et al., 2015).

Kuwait is therefore moving towards becoming an information-based society, with advanced learning technology-based systems being pushed to the foreground to generate a culture of knowledge improvement. This is supported by findings by Alkharang and Ghinea (2013) and Fayyoumi et al. (2013) who showed that the online education market in Arab countries in 2009 was worth $27.1 billion and was predicted to surpass $49.6 billion in less than ten years. Consequently, governments and organisations across the region are finding new ways to integrate new technologies, such as e-commerce, e-government, electronic and M-learning (Al-Fadhli, 2009b) into their systems.

However, despite this potential, Kuwait and many other Gulf countries are lagging behind in terms of their learning systems, and they continue to face numerous challenges regarding e-learning, particularly M-learning adoption (Khan et al., 2015). This raises the question about what is stopping Kuwait, and other countries in the region, from taking advantage of the opportunity to achieve their potential with regards to M-learning. Section 2.3.2 discusses some of the challenges facing the implementation of M-learning in Kuwait, and the studies presented in Chapters 4, 5 and 6 investigate other possible challenges and suggest potential remedies.

Countries are divided into two major categories by the United Nations.These are : developed countries and developing countries. Some people are wondering if this means rich and poor countries, or countries that have higher Gross Domestic Product (GDP per capita) than others but this is not the case. Other factors are considered when talking about developed and developing countries. “One difference between developed and developing countries is the variation in impact of economic status and school influences” Heyneman (1980).

Developed Countries can be defined as, the countries which are developed in terms of economy and industrialization, and they are self-sufficient nations. The countries which are have a high standard of living, high GDP, high child welfare, health care, excellent medical, transportation, communication and educational facilities, better housing and living conditions, industrial, infrastructural and technological advancement, higher per capita income, increase in life expectancy etc., these are considered to be developed

countries. Examples of these include: Australia, Canada, France, Germany, Japan, Norway, Sweden, Switzerland, and United States. (Key Differences Web page)

On the other hand, the developing countries are the countries who are going through the initial stages of industrial development and depend upon the Developed Countries to support them in establishing industries across the country. The developing countries do not enjoy healthy and safe environments to live in, they have lower Gross Domestic Product (GDP), higher illiteracy rates, poor education services, lack of public transportation, poor communication infrastructure and inadequate medical facilities.They might also have a very unequal distribution of income, as well as a high death and birth rate. Examples of developing countriesinclude: Colombia, India, Kenya, Pakistan, Sri Lanka, Thailand, Kuwait, Bahrain and U.A.E. (Key Differences Web page)

Khan et al. (2015) conducted a critical review of some educationally advanced countries that have successfully implemented M-learning, such as the USA, Japan, South Korea, the European Union, Australia and Singapore, and concluded the following list of five important lessons that the less educationally developed countries should learn:

1. National level initiatives and policies are critical to the success of M-learning adoption, since the M-learning objectives in the more educationally developed countries have been heavily supported and financed by the public sector.

2. Creating collaborations between public, private, NGOs and civil society entities is crucial because it affects many aspects surrounding M-learning such as the cost, the technology, and the social and cultural barriers.

3. It is important to analysing the characteristics of the audience including the cultural and social norms and traditions and the learning styles. A model that was shown to be successful in Japan, for example, might not necessarily work in a Gulf country such as Kuwait because of the social and cultural differences between the audience in the two societies.

4. The existing M-learning infrastructure should be analysed so that the required improvements can be made to eliminate all technical challenges.

5. Raising people's awareness about M-learning and the benefits they can gain from adopting it is as equally important as ensuring the availability of technological infrastructure and considering the above-mentioned factors.

While this list may not fully apply to Kuwait, it provides a road map and guide for the investigations and experiments presented in this thesis.

2.3 Challenges Facing M-Learning

There is a range of challenges and disadvantages surrounding M-learning. Based on previous M-learning implantations in many countries, researchers identified a set of common challenges that are likely to be found in almost any country related to M-learning adoption and implementation. This section discusses the common challenges identified in the literature, examines the extent of the effect of these common challenges in Kuwait and highlights other challenges that are specific to Kuwait. This discussion is essential to the present research since it identifies the main problematic areas that must be addressed for M-learning to become successful in Kuwait.

2.3.1 Common Challenges

Common barriers to M-learning include cost, time, and management awareness and support, and technical, social and cultural challenges.

2.3.1.1 Technical Challenges

There are many technical challenges to M-learning. First, the battery life of mobile devices can cause a problem for students; for instance, if a user is on-the-go and their battery dies, their learning must cease until they can find a location to charge their device. Students equipped with a textbook do not face this problem. Second, connection issues and technical glitches can interrupt learning, and third, the screen and key size of many mobile devices are not suited to visually impaired students or those with other disabilities (Maniar et al., 2008). A fourth problem is the need for a substantial bandwidth, which some Wi-Fi systems (especially public ones) may not provide, especially when there are multiple simultaneous users. Fifth, the number of files shared and stored, and the amount of information required to be stored by learners (such as large video or audio files, graphics and various software) might not be supported by certain mobile devices because they typically possess a lower memory capacity than PCs (Elias, 2011). Sixth, some technologies might suddenly become obsolete (Crescente and Lee, 2011) and

require effort and expenditure for students to update their technology. Finally, precautions must be taken to protect files and information to prevent them becoming lost if they cannot be transferred to newer technologies. This is already a consideration for e-learning files and materials that must be reworked for M-learning platforms.

Security is also an important factor that M-learning creators and users must consider. Students must not only ensure the security of their information but also ensure that the content is protected and they should avoid copyright issues surrounding who owns the material, files and media that are published on M-learning platforms. Many file sharing platforms share media illegally and hackers are becoming more proficient as users begin to have presence across different platforms (including social networking platforms), resulting in identities being stolen and other information being compromised. Results are not always easily tracked and information may not be properly used.

2.3.1.2 Theoretical Challenges

Because M-learning is a relatively new development, research surrounding the learning outcomes of learners who rely on M-learning is lacking. For instance, while exam results appear to be improved by M-learning (Masters, 2005), this might not be the case for all demographics because some students might not have access to M-learning. The digital divide also separates those that can afford and are willing and able to use digital media from those that are unable to do so because of financial difficulties, disabilities or lack of motivation (Masters, 2005). Educational inequality already exists between different demographic groups within a particular area, as does a global digital divide between developed and developing countries (Chinn and Fairlie, 2007). The cost of investing in mobile devices could also prevent some from participating in this kind of learning method (Cordock, 2010).

Kearney et al. (2012) suggested that M-learning developers tend to place more emphasis on the design of the tools and apps rather than the learning outcomes of the users. Thus, the extent to which they can actually assist in the learning outcomes for students is unclear, and a greater focus needs to be placed on the pedagogies (the methods of learning) that are most suited to M-learning. M-learning developers also need to theorise M-learning from the learners' viewpoint and experiences rather than the technical features of the devices or the apps (Kearney et al., 2012). Thus, an appropriate theory of learning for the mobile age is required if it is to be effectively utilised.

2.3.1.3 Personal, Social and Cultural Challenges

The work-life balance of students is another factor that could affect the efficacy of M-learning for some. Because learning can occur anywhere and at any time, some people believe that M-learning negatively impacts students' work-life balance and could encourage burnout if students are unable to escape from their teachers, fellow students and the learning process in general. Various researchers have already reported that the inability for many individuals and students to switch off from their devices can lead to elevated stress levels and disruption to the personal (and possibly academic) lives of students (Masters and Ng'ambi, 2007). However, because M-learning devices can access multiple platforms and programmes, such as the Internet and social networking sites, they can also distract students from their learning task (Crescente and Lee, 2011).

Another important challenge to M-learning is the degree of acceptance of M-learning by all stakeholders, including teachers and students and their families, which varies from one country or culture to another (Jairak et al., 2009) and (Ally, 2013). For instance, Isaacs (2012) mentioned that academic staff have many concerns about introducing M-learning to education because of cyber-bullying, cheating and accessing sexual content. This is an important insight, which suggests that implementing M-learning frameworks may require providing assistance to the teaching community to help them adapt their practices to the newly introduced M-learning environment. Additionally, in some cultures, parents prefer the traditional method of learning Hassan and El-Rify (2012).

2.3.2 Challenges Facing Mobile Learning in Kuwait

Alkharang and Ghinea (2013) compared the barriers to adopting M-learning in Kuwait by with those in developed countries to ascertain whether similar factors were irrelevant, relevant or important to different cultural locations. Drawing on existing literature on the topic (e.g. Murray (2001); Simmons (2002); Baldwin-Evans (2004)), and their previous qualitative studies, Alkharang and Ghinea (2013) found that the barriers to the use of e-learning (and by proxy M-learning) in developed countries was cost, time, technology, attitude, management awareness and support, and language, in order of importance, while the factors providing barriers to e-learning and M-learning uptake in Kuwait were found to be management support, language, technology, attitude, time and cost (Table 2.1).

TABLE 2.1: Importance and Relevance of Barriers to E-Learning and M-learning in Developed Countries and Kuwait. (Source: Alkharang and Ghinea (2013))

Barriers	Developed Countries	Kuwait
Cost	Important	Irrelevant
Time	Important	Relevant
Technology	Important	Important
Attitude	Important	Relevant
Management Awareness and Support	Relevant	Important
Language	Irrelevant	Important

Table 2.1 shows that, among all of the challenges, only technology shares the same level of importance between developed countries and Kuwait. The remaining factors had different levels of importance and relevance in the different regions and societies. For example, while the developed countries placed importance on factors such as cost, time and attitude, in Kuwait, time and attitude were only considered to be relevant (not important), and cost was deemed to be irrelevant. Moreover, while the factors of management support and language barriers were considered highly important in Kuwait, management support barriers were only considered relevant (not important) in developed countries, and language barriers were considered irrelevant.

Notably, cost is not considered a barrier to integrating e-learning and M-learning in Kuwait, suggesting that they perhaps have the finances and investment to do so. Moreover, while time and attitude were considered relevant to Kuwait, they were not deemed important. This could suggest that there is time to implement e-learning and M-learning into the workplace and the educational field, and that while there may be some resistance, the attitude of most individuals does not provide a significant or important barrier to e-learning implementation. The most important factors include management support (from head teachers of schools or those in management positions within the government), which may not be available because of hesitations or concerns that the management might have regarding e-learning and M-learning.

Language barriers were also a concern for Kuwaitis because much research and information on the Internet, and on many mobile devices themselves, is geared towards the use of a common language (in the developed world, this is English). Because different students (and instructors) have varying levels of English proficiency, the language in which e-learning and M-learning are adopted is an important factor that can impinge on the success of these ventures as learning tools. While English is typically used to deploy M-learning in developed countries, a country can choose to use the official national language for e-learning and M-learning activities.

Technology is of pivotal importance for Kuwait and developed countries because of the need for mobile computer devices and other devices, such as laptops and PCs, for undertaking e-learning and M-learning practices. However, greater focus is placed on the technology itself (including platforms and apps) rather than its pedagogical uses and effectiveness. Perhaps if a stronger focus was directed at the effectiveness of M-learning in Kuwait, those in management might be more open to integrating e-learning and M-learning.

2.3.3 Acceptance of M-Learning Technologies in the Gulf

Many researchers have recently studied the attitudes, perceptions and acceptance of students and instructors in Kuwait towards M-learning (e.g. Aldhafeeri and Alajmi (2016), Dashti and Aldashti (2015), Alsanaa (2012), AlHajri et al. (2017) and Al-hunaiyyan et al. (2016)). Similarly, many studies have been conducted in neighbouring Gulf countries, such as Saudi Arabia and United Arab Emirates (UAE), which are similar to Kuwait in terms of culture, traditions, social norms and economy (e.g., Fayyoumi et al. (2013), Al-Fahad (2009), Alsurehi and Al Youbi (2014), Chanchary and Islam (2011), Alkhalaf (2015), Mohammad (2015) and Al-Emran et al. (2016)). Table 2.2 summarises these studies.

Almost all of the existing studies concluded that students have positive perceptions towards M-learning. Al-Fahad (2009) showed that the majority of students have positive perceptions towards M-learning and that they believe that M-learning increases the flexibility of access to resources. The same conclusion was asserted by Chanchary and Islam (2011), who showed that the majority of their participants had positive attitudes towards M-learning because of the flexibility and capability to access learning materials any time. Similarly, Al-Emran et al. (2016) indicated that M-learning is a promising academic tool to be employed in higher educational within the Arab Gulf countries. Mohammad (2015) showed that M-Learning increases learners' productivity and helps learners to improve their tests performance, and Alkhalaf (2015) showed that students believe that M-learning is a crucial tool for learning that could be applied to a wide range of learning areas.

Students studying certain subjects proved to be more accepting of M-learning. For example, Aldhafeeri and Alajmi (2016) and Dashti and Aldashti (2015) pointed out that the subject taught affects academic staffs' perception towards M-learning, and both

TABLE 2.2: A summary of previous studies from the literature that focus on attitudes, acceptance and perceptions of students and teachers in Kuwait and neighbouring Gulf countries towards M-learning.

Reference	Country	Investigation
Aldhafeeri and Alajmi (2016)	Kuwait	investigate HE instructors' opinions about different aspects and obstacles of mobile learning use
Dashti and Aldashti (2015)	Kuwait	investigates students' attitudes towards mobile learning
Alsanaa (2012)	Kuwait	explore the students' acceptance of incorporating communication technologies in higher education
AlHajri et al. (2017)	Kuwait	study how students perceive the use of mobile devices in learning
Al-hunaiyyan et al. (2016)	Kuwait	study students and instructors perceptions towards the use of mobile devices in learning
Fayyoumi et al. (2013)	Saudi Arabia, UAE & Jordan	studied the perceptions of university instructors and teachers of mobile learning
Al-Fahad (2009)	Saudi Arabia	understand and measure students' attitudes and perceptions towards the effectiveness of mobile learning
Chanchary and Islam (2011)	Saudi Arabia	measure students' attitudes and perception towards the effectiveness of mobile learning
Alkhalaf (2015)	Saudi Arbia	examine the feasibility of applying m-learning and how the application of m-learning can provide more learning activities for students
Mohammad (2015)	Bahrin	measure the acceptance of mobile as learning tool in Arab Open University
Al-Emran et al. (2016)	UAE & Oman	study students and educators' attitudes towards the use of M-learning in higher educational universities

studies show that the majority of students favour the use of M-learning in the English language subject.

Conversely, some researchers highlighted areas that require improvements before M-learning can be officially adopted by educational institutions. For instance, Aldhafeeri

and Alajmi (2016) highlighted a lack of curriculum usefulness and usability in certain subject areas. The majority of students expect the colleges to provide a strong platform for M-learning in Kuwait (Dashti and Aldashti, 2015). Al-Emran et al. (2016) argued that significant differences exist among the students' attitudes towards M-learning with regard to their smartphone ownership, financial situation and age. Mohammad (2015) concluded that university commitment is one of the most important factors affecting learners' attitudes.

Fayyoumi et al. (2013) findings revealed that the perception towards M-learning is affected by many factors including computer competency, incentives and technological infrastructure. In terms of computer competency, Fayyoumi et al. (2013) found that the level of familiarity that individuals had with computers played an integral role in their attitudes towards M-learning and mobile examinations. The more computer literate or familiar a participant (instructor or teacher) was, the more likely they were to accept M-learning as a teaching and learning tool.

In a similar finding to Burgess (2008), Fayyoumi et al. (2013) also found that teachers can deliver their viewpoints to learners in less time and with greater clarification. Furthermore, especially in terms of tests and examinations, mobile learning was seen to be beneficial in reducing the time it takes for exam papers to be marked, checked and assessed, and could reduce the practice of cheating in examinations (also found by Patel and Aghayere (2006)). Moreover, given the fact that some of the countries in this study (Saudi Arabia, Jordan and the United Arab Emirates) do not allow females to be present in some universities, or may place restrictions on how females travel to these educational institutions (not being able to drive or the requirement of a male chaperone, as is the case with Saudi Arabia), some females in this study stated that both online and mobile learning provides an ideal system for them when they cannot attend university on a daily basis, for whatever reason.

An age factor was also found to relate with the acceptance of technology: faculty members and instructors younger than 45 were found to be more accepting of technology compared to those older than 45 Elango et al. (2008).

2.4 Frameworks for M-Learning

Many researchers have recently been focusing on M-learning implementation in an attempt to identify the factors that produce an effective M-learning framework for implementation in a specific context. As a result, a wide variety of proposed frameworks describe the principles of M-learning implementation. From the perspective of the present research, it is necessary to study the common features of the existing frameworks and determine their applicability to the Kuwaiti context.

Framework in language means, "a basic conceptional structure (as of ideas)" or "a skeletal, openwork, or structural frame" Merriam-Webster, however Minsky and Marvin (1974) defined a frame as, "a data-structure for representing a stereotyped situation, like being in a certain kind of living room, or going to a child's birthday party. Attached to each frame are several kinds of information". He elaborated that, some of this information is about how to use the frame, as well as what one can expect to happen next, and about what to do if these expectations are not confirmed. "The top levels'of a frame are fixed, and represent things that are always true about the supposed situation" Minsky and Marvin (1974).

There are many types of frameworks, some of them are theoretical and others conceptual. When researchers review the current mlearning studies, they have noticed that "a number of studies treat the issues of the technical design and the development of mobile technologies. Seldom do any of these studies elaborate on learning theories to support mlearning" (Peng et al, 2009). The conception of education and pedagogy are essential so that the conceptual framework is suitable for this study. However, Peng et al (2009) elaborated that, "a theory-based framework may provide 'functional guidelines' according to which researchers could carry out initiatives".

Frameworks can be valuable for many reasons such as facilitating transparency and comparability between related initiatives, and it can also play a role in addressing fragmentation and uneven developments.The framework can be valuable in its own right because it can be used by educational organisations (schools and higher education institutions) and/ or other cultures as in this research study Kampylis et al. (2015). The proposed framework will be valuable because it will help Kuwaiti higher education students as well as the decision makers to implement mobile learning technology in Kuwaiti institutions without any barriers and restrictions, taking into account the culture issue which is very important in a country like Kuwait as well as in some other countries such as Qatar and Bahrain.

Rycroft-Malone et al. (2002) state that, most successful framework's implementation occurs when the context is receptive to change with sympathetic cultures, strong leadership, and appropriate monitoring and feedback systems ("high" context), and when there are appropriate facilities with inputs from skilled facilitators ("high" facilitation). In this case, framework appears at its face validity and it will be more suited for people who are in the field and who are looking for quality improvements. Rycroft-Malone et al. (2002) stated that, "the context can be seen as infinite as it takes place in a variety of settings, communities, and cultures that are all influenced by, for example, economic, social, political, fiscal, historical, and psychosocial factors". In the proposed framework, this will be developed within a "cultural context" and there is no need to apply a new context. This framework will be within the scope/context of Kuwait and some of the countries nearby which have the same cultural and environmental issues, such as Qatar and Bahrain. The proposed framework will be developed in accordance with the education system in Kuwait and for this reason the culture of Kuwait is the main key point in this framework, and not in accordance with the other educational cultures such as the western culture. If this is the point then there is no need to develop a new framework and it will be easier to adopt an appropriate "ready" framework that was applied before in similar cisrcumstances.

While some of these frameworks are multi-layered models that attempt to address many aspects at once, others are smaller frameworks that focus on fewer elements and often omit the effect of some (important) factors, such as the socio-cultural characteristics of learning. One of these simple frameworks is that of Danaher (2009), which suggests three key principles of a M-learning framework: presence, engagement and flexibility. The most important of these is presence which they describe as the mutual consciousness and mindfulness of self and others, while considering the emotional dimension of being human. Danaher (2009) showed that presence has three sub-group interaction types: teaching (student-teacher), cognitive (student-content) and social (peer group). Their model, shown in 2.1, encapsulates an inherent discussion of pedagogy Danaher (2009).

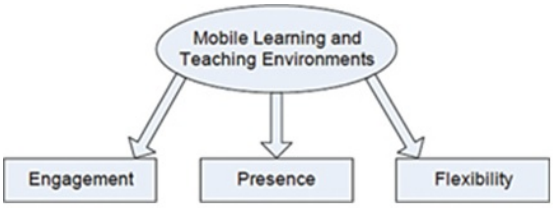


FIGURE 2.1: Danaher's et al. (2009) Model of M-learning.
(Source: Danaher (2009)).

Another popular framework is Koole (2009)'s FRAME model, which adopts socio-cultural views of learning, and suggests that the technical characteristics of the mobile device must be considered in conjunction with social and personal learning processes.Koole (2009) framework referred to information access, enhanced collaboration and the contextualisation of learning. Kearney et al. (2012) extended Koole (2009)'s model to insert a greater understanding of mobile pedagogy and socio-cultural influences.

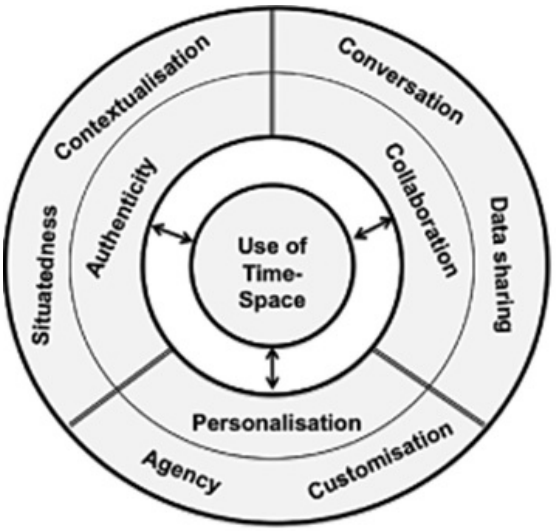


FIGURE 2.2: Framework for M-Learning with 3 Distinctive Characteristics (Source: Kearney et al. (2012)).

Other researchers have designed more complicated conceptual frameworks for M-learning. Parsons et al. (2007) created a framework for M-learning involving four perspectives: generic mobile environment issues, learning experiences, learning contexts and learning objectives, and Vavoula and Sharples (2009) created a three-level framework for evaluating M-learning, involving a micro-level focused on usability, a meso level focusing on the learning experience (and specifically on communication in context) and a macro level involving integration within existing organisational contexts.

Mostakhdemin-Hosseini and Tuimala (2005) proposed a model that identifies three domains as basic components of a framework for an M-learning system: mobile usability, wireless technology and availability of e-learning systems. The main focus of this framework is the technology, the usability and suitability of the mobile devices for M-learning in relation to the first component, and the quality and availability of the wireless network in relation to the second component.

Koole (2006)'s FRAME model was created not to guide the implementation of M-learning, but rather to help educators and leaders assess the effectiveness of various mobile devices used in distance learning and to guide the development of future mobile devices in a way that supports distance learning. FRAME, which was initially proposed by Koole in 2006 and further developed by Koole (2009), stands for 'Framework for the Rational Analysis of Mobile Education'. (Koole, 2006) considered not only the technological aspects but also the human learning abilities and the social interaction between the users of the system. The three main components of this framework are the device usability (technological aspect), the learner's capabilities (learner aspect) and the level of interaction between the users (social aspect).

Barker et al. (2005) created a conceptual framework for M-learning adoption that was targeted at developing countries, where there many technological challenges to the adoption and implementation of e-learning, particularly M-learning. Barker et al. (2005) argued that all stakeholders, including students and teachers, can benefit considerably from employing technology in educational purposes. The key elements the researchers identified in their model are the students, teachers and families (stakeholders); technology (wireless infrastructure and mobile devices); and factors such as the effect of motivation and collaboration.

Ng and Nicholas (2013) created a framework for sustainable M-learning in schools rather than higher education institutions. This framework is based on the results of a three-year study investigating the applicability and sustainability of M-learning in an Australian secondary school. The framework is human-centred and is created in a way that encompasses all relevant stakeholders including the management, teachers, students and the community. Notably, five months before the experiment started, Ng and Nicholas (2013) held a conference to share the experience, build the confidence between the users and train them on the technology. Then, during the experiments, Ng and Nicholas (2013) gathered and analysed data from the students, teachers, leadership and management using a mixed methods (quantitative and qualitative) approach. Ng and Nicholas (2013) identified five components for M-learning sustainability in Australian secondary schools. The first component is concerned with the economic sustainability, indicating that a sustainable source funding that is used to support M-learning financially is important. The second component is the social sustainability, which refers to the acceptance and support of the wider community to the M-learning. The third component relates to political sustainability, referring to the 'policies to deploy and sustain M-learning programmes' adopted by the schools. The fourth component refers to the technological

sustainability in terms of the decision that need to be made for the M-learning users to have continuous access to high quality technical services. Finally, the fifth component refers to the pedagogical sustainability and focuses on the policies that govern the teaching and learning process itself.

Many of the proposed frameworks focus on the social aspects of M-learning. For example, Traxler (2009b) stated that M-learning is 'noisy' and not without problems, and he focused on three key elements: personal, contextual and situational. By contrast, Klopfer et al. (2002) highlighted five features of M-learning frameworks: individuality, connectivity, portability, context sensitivity and social interactivity. Pachler et al. (2009) suggested that it is the interrelationship between learners and the cultural practices, structures and agency of what they dub the 'mobile complex'.

2.4.1 Cultural & Social Factors affecting the design of M-Learning Frameworks

Kearney et al. (2012) examined M-learning from a socio-cultural perspective, suggesting that learning is a situated, social endeavour, heavily influenced by social interactions between people (Vygotsky, 1980) and mediated using different tools (Shevtsova and Wertsch, 1993). M-learning is one such tool (or a collection of tools) that can alter the learning process for students and the teaching methods for teachers, who can critique and reflect on their teaching activities. Kearney et al. (2012) claimed that it is essential to foreground pedagogy rather than technology.

According to Kearney et al. (2012), learning as part of a formal setting is limited by two socio-cultural boundaries: time and space. In terms of space, formal learning takes place inside the confines of a classroom and other school buildings (in other words, boundaries that cannot necessarily be moved), while time slots of learning are generally allocated by schools and educators, and can be fitted into timetables or semesters. (Traxler, 2009b) suggested that M-learning can overcome these time and space restrictions and thus render obsolete 'the need to tie particular activities to particular places or particular times'.

M-learning offers a range of alternatives to the spatial constraints of the classroom, such as virtual world environments that transcend geographical spaces. Moreover, temporal restrictions are relaxed with M-learning because individuals can be more flexible about when they learn, instead of being required to learn in scheduled time spaces. Kearney

et al. (2012) stated that prior appointments or learning engagements can be rescheduled easily with M-learning, and time as a linear construct is increasingly being viewed as 'socially negotiated time' (Ling and Donner, 2013), where each party is able to generate and reschedule learning without the necessary detrimental effects to any of those involved. Kearney et al. (2012) therefore suggested that M-learning creates 'malleable spatial-temporal contexts for learning', where the lines between the concrete, physical schedules of formal, institution-based learning and the possibilities of time- and space-flexible M-learning are blurred, thus opening the avenue for new spaces for learning (such as public transport and coffee shops), driven by learners (Luckin, 2010) and new kinds of pedagogical frameworks.

Ling and Donner (2013) stated that the organisation of time and space in any learning environment severely affects the experience of the mobile learner. Kearney et al. (2012) concurred, stating that 'from a socio-cultural standpoint, insights into the organisation of "time-space" in a given learning environment is an essential part of understanding the nature of an M-learning experience' and they outlined a two-way relationship between time-space and M-learning experiences from a socio-cultural perspective.

Tarhini et al. (2015) found that social factors are among the main factors affecting students' acceptance of e-learning, and Arpaci (2015) found from his study on the impact of culture on adopting M-learning that cultural factors play a serious role in adopting the idea of using mobile devices in academia.

Rice (2003) indicated the significant influence of Islam culture on Arab countries, even though not all Arabs believe in Islam, and highlighted the influence of Islam's background on people's mentality, especially the Bedouin mentality values. Almaney (1981) found that all Arabs are influenced by the Bedouin values in different aspects of life such as religion, philosophy, politics, economy and education.

Mohamad and AlAmeen (2014) stated that a further study is needed to investigate the challenges that could appear when adapting M-learning to different cultures. The next section discusses some of the frameworks that currently exist on M-learning.

2.4.2 Successful Implementation of M-Learning: Case Studies

Several cases in existing literature presented examples of successful implementations of M-learning. For example, Ebner (2009) detailed how participants in his study successfully used Twitter at a professional learning conference. Any tweets made and received

in reaction to the presentations of various presentations were projected as a backdrop to the speaker. The speaker could respond to the comments or questions as necessary. As an M-learning device, this could only occur whilst the presentation was being given (or if the speaker decided to respond, via Twitter, after the presentation itself).

Buhagiar et al. (2010) conducted a study focusing on M-learning outside of the classroom. The student participants used an augmented reality app on their mobile devices, which responded to the learners' location within an art gallery and provided virtual information and images on their device screens, which were superimposed over the real art/object that they were observing. Thus, this informal setting within school hours gave the students the freedom to walk around the gallery at their own pace, discovering information as and when they were ready.

Gwee et al. (2010) study examined the use of games in the education of year 9 students. During their governorship class at school, the students used their iPhones to access the game Statecraft X, a multi-layered strategy game involving all students and teachers. The role-play scenarios shifted between the real world and the game world, and a variety of other activities included reflective blogs, online forums, debates and class discussions. The classroom confines where this game initially began and the informal world in which participants could continue with the game (public transport, home) created a hybrid of formal and informal settings, which enabled participants to complete the game levels at their own pace, albeit with occasional inputs from the teacher and other students.

Ng'ambi et al. (2010) detailed another successful usage of M-learning in higher education. These researchers examined how teachers used recording devices to broadcast their lectures on an existing online platform belonging to the institution. The students downloaded a variety of the resources available on the site, including podcasts, onto playback devices such as MP3 players or smartphones. Any questions that students had when listening to the podcasts could be typed within a Q&A tool on the site, anonymously, and answered by the teachers.

Overall, the above studies incorporated Kearney et al. (2012)'s framework containing the three main components of personalisation, authenticity and collaboration to varying degrees. The study involving the use of Twitter had high levels authenticity, because it was relevant (concerned with the task) to those that wanted to participate in the Twitter feed, and they were engaged in a real-world scenario (the speakers presenting on a topic). However, authenticity was not hugely present in most of the other studies because most of the M-learning platforms and activities were centred on a more contrived context

or simulated reality (such as the governance game, which was not based on a real-life scenario).

The personalisation element was most prominent in the governance game, which gave learners considerable control over their avatars and customisation abilities. Additionally, the collaboration element was present in those studies which encouraged groups of students to work together (such as in the mathematics example). Those studies involving social networking platforms, such as the Twitter example, also included elements of collaboration, and the study involving the podcasts with a Q&A function encouraged collaboration between the students and teachers, but not within student communities.

However, many researchers have noted the lack of authenticity, collaboration and personalisation in many M-learning activities: Cook (2010) addressed this issue by trialling a mobile activity within a museum which required students to work in pairs to create a video blog summarising their discussions within the museum. This sparked collaboration on many levels; for example, the video blog production, the conversations that occurred within the museum, and the comments that could occur as a result of the video. Other researchers such as Laine et al. (2009) highlighted that the authenticity of the museum learning experience can be enhanced by introducing a role-play scenario wherein users interact with the museum artefacts and fictional characters are introduced that provide more information about the artefacts. These authentic characters become part of a 'story-based, role-play game' with which learners can interact via their devices.

These examples highlight the need for greater development of M-learning activities and apps, which involve greater socio-cultural input to maximise the learning outcomes for users within different communities. One means of increasing social interaction within M-learning is to boost the level of social networking apps available within different M-learning activities. The use of social networking apps within M-learning will be discussed presently.

2.4.3 Frameworks for M-Learning in Kuwait

Because e-learning and M-learning began as an organisational activity began in the developed world, Alkharang and Ghinea (2013) suggested that any implementation models and frameworks for M-learning implementation should be taken as a benchmark for M-learning in Kuwait. However, the barriers and factors influencing the adoption of M-learning in Kuwait may be different to some developed countries, given that cultural

differences might exist. Alkharang and Ghinea (2013) therefore warned, 'Those available implementation models may not necessarily be followed in all stages and steps when used by different countries and societies. Accordingly, the implementation barriers and the influential factors may differ from one case to another'.

These researchers found that differences exist in terms of the implementation model used to implement e-learning in developed countries. While the implementation model follows a four-stage structure: (1) planning, (2) design, (3) integration and (4) improvements, Alkharang and Ghinea (2013) found that, in Kuwait, only the stage of integration was used because the organisations that these researchers studied in Kuwait (including higher education organisations and institutes) had little regard for planning, designing or evaluating the investments made into e-learning and M-learning.

This method is problematic because it is important to ensure that the implementation of a different way of working and learning is thoroughly and rigorously planned to allow for any eventuality. As time is not a major concern for Kuwait, it is essential that enough time be set aside to plan the use and integration of M-learning thoroughly in different organisations. Moreover, because cost is not an important barrier, taking the time to plan this implementation and assess all angles for possible failure makes good investment sense to ensure that an effective, well-thought out plan has been constructed.

Hence, the present research should endeavour to follow all four stages, placing greater emphasis on the planning and designing stages. To the best of our knowledge, no published studies have proposed an M-learning framework designed specifically for the Kuwaiti higher education context.

This is also true of the design for the apps, platforms and mobile devices to promote M-learning. Given the importance of technology as a barrier to implementing mobile and e-learning, it is essential that time and money is spent on creating the most attractive, effective, easy to use design for mobile computing devices and the apps that they use. The design of this service, coupled with the plan of how to market and integrate this service is critical because, if the design is too simple or complex, it is unlikely that users will be motivated to use the service.

Finally, evaluating the effectiveness of devices and apps is important because without this feedback, it is impossible to know what is working and why certain ventures are succeeding or failing. This makes it difficult to know how to improve M-learning apps and devices in the future, and thus integration can never fully occur.

2.5 Social Media Applications in M-Learning

According to AlHajri et al. (2017), 81.41% of the students in Kuwait show a positive attitude towards using social media in learning, and 67.9% of the students believe that social media enhances the learning process. These figures enforce the findings of other studies shown in Table 2.3.3. Therefore, the present research study employs social media apps in the experiments herein.

Social media, or social networking, refers to a collection of Internet-based websites or apps which provide platforms that enable users to create and exchange self-generated content (O'reilly, 2005), (Kaplan and Haenlein, 2010). The 'social' element of the term suggests that it exists in a social space (Rodriguez, 2011). This social element can be utilised for a range of purposes: individual, professional and entertainment, and capitalises on the specific social networks created by an individual. The term 'media' implies that any social interactions that occur do so via digital devices, networks and social networks (Gikas and Grant, 2013). Greenhow (2011) stated that there are five types of social media:

1. Social networking sites, such as Twitter, Facebook and LinkedIn.
2. Media content sharing sites, such as Flickr and YouTube.
3. Content creation and publishing sites and tools, such as blogs and wikis.
4. The use of RSS feeds for aggregation and republishing.
5. Tools used for remixing and republishing content.

Social media is increasingly becoming prevalent in M-learning, and a multitude of theories explain the role of social media and social networking for learning. For example, Siemens (2005) theorised that individuals learn through connectivity, while Sharples et al. (2010) stated that learning occurs through conversation. Both theories suggest that learning continues within the networks of which we are a part, including the formal learning that organised networks such as Facebook and Twitter can initiate, and any informal learning that occurs intermittently throughout the day, amidst pauses and disruptions (Ng et al., 2009).

The present research study employed several apps for the experiments presented in Chapters 5 and 6 including the following:

1. WhatsApp: A commercially available smartphone app launched in 2009 that allows users to exchange text and multimedia messages. Users can use WhatsApp to share images, video, audio and location. WhatsApp was devolved by Brian Acton and Jan Koum from Yahoo and was acquired by Facebook. WhatsApp is supported by many smartphone brands such as iPhone, Samsung, BlackBerry, Nokia, Google and Android phones. As WhatsApp associates each user account with a phone number, users can only contact other users if a phone number is accessible. This software tool was already accessible by users. Moreover, the app is available on a wide number of platforms (Lokesha, 2009).

2. OurViews/SharedWalk: OurViews is a dedicated online social network system created by the University of Nottingham that permits users to view and send multimedia content posted by OurViews users. As such, the OurViews/SharedWalk combination was developed as part of a single M-learning tool. All users must register OurViews on a pre-existing SharedWalk platform. Once the user takes a photo or video using the OurViews app, this content can be uploaded to his/her SharedWalk online file folder, where it can be made accessible to other users.

2.5.1 Impact of Using Social Networking on Educational Outcomes

Social media has been thought to positively impact learning for many people worldwide. For example, Greenhow (2011) stated that the use of social media tools in learning creates a more student-centred experience, enabling students to interact and collaborate with one another and with instructors to encourage 'personal choice, customization and student familiarity' (Hoffman, 2013). Thus, when creating with such tools, students can develop an understanding of content; however, as Light (2011) indicated, these tools must be used meaningfully because, left to their own devices, students might not benefit educationally from social media, and without structure, social media can have a detrimental impact on an individual's learning (Gikas and Grant, 2013).

Gikas and Grant (2013) presented three ways in which social media can assist with M-learning: (1) it engages learners with constant connectivity, (2) it fosters collaborative learning and (3) it enables authentic learning on-the-go. These factors relate somewhat to Kearney et al. (2012)'s framework which included collaboration, personalisation and authenticity.

2.5.1.1 Engaging Learners with Constant Connectivity

No matter where they are, students can use mobile devices to communicate with fellow students and their teachers or instructors at any time of day (Cavus et al., 2008); (Shuler, 2009). Moreover, Brown (2005) claimed that mobile technologies 'enable learners to find, identify, manipulate and evaluate existing knowledge' in ways that enable them to integrate new ideas and perspectives into their work. Similarly, social media platforms enable students to create learner-generated content (Agichtein et al., 2008). When content is generated by users, such as the creation of blogs, comments, wikis and social bookmarking tools, it supports acts of collaboration which promotes the idea that the efforts of a group or 'collective intelligence', as referred to by Lévy (2001) and Surowiecki (2005), is far superior to the efforts of an individual working alone (Kaplan and Haenlein, 2010).

2.5.1.2 Fostering Collaborative Learning

Learners have the opportunity to collaborate with one another through mobile devices, creating and discussing content with other students and teachers, and extracting new meanings and understandings from this content. Social media and social networking sites, in particular, enable this collaboration and participation to occur (Hoffman, 2013) and (Pang, 2009). Cochrane and Bateman (2010) analysed the use of instant messaging, sharing of photos and constant blogging about work progress using the Internet and social media sites on mobile devices and found that a project-based course generated a perpetual sense of collaboration and connectivity for both students and instructors on the course. Sharing and collaborating whilst learning has the benefits of enabling new ideas to surface, accessing the wealth of information available on the Internet, monitoring one's own progress and the progress of fellow students, helping to keep work on track and making students accountable for their learning process. Mobile devices that allow for social networking are an essential feature in 21st century learning, supporting the constructivist, collaborative approach to learning if implemented effectively (Cochrane and Bateman, 2010); (Liaw et al., 2010).

2.5.1.3 Enabling Authentic Learning on the Move

Authenticity in learning has been discussed previously as an important factor of effective M-learning. Ruta et al. (2009) claimed that this must go hand-in-hand with mobility

for effective M-learning, as it 'enables knowledge acquisition across context and environments, rather than simply exploiting handheld devices for the fruition of learning'. Accessing social media tools on mobile devices enables learners to contextualise their learning, create video or audio content, take photographs of a particular place or location, and even geotag them (use GPS to identify the location and share this knowledge with others). Students can microblog (a short blog which might include an image or embedded video) to receive instant messages and access social networking sites to communicate with peers and teachers (Vavoula and Sharples, 2009). Using social media tools specifically on mobile devices facilitates M-learning, creating a personalised, authentic experience that not only enables students to have greater agency and enjoyment of their learning, but can also enhance their memory of content created, shared and viewed (Archambault et al., 2010); (Shuler, 2009) and (Gikas and Grant, 2013).

2.5.2 Advantages of Social Media for M-Learning

Gikas and Grant (2013) conducted an in-depth investigation in the United States into the impact that mobile computing devices have on university student learning and the role of social media within that. Exploring the perspectives of students and teachers as well as the learning outcomes, they found that alongside the plentiful benefits and advantages associated with the use of social media in M-learning, there were also multiple frustrations. The main advantages were as follows:

1. Accessing information quickly.
2. Communication and content collaboration.
3. A variety of ways to learn.
4. Situated learning.

These findings corroborate and extend those found by researchers such as (Barbara et al., 2005) and Greenhow (2011). In terms of accessing information quickly, mobile devices are convenient because connection to the Internet is constant and generally quick. Mobile devices also ensure that course content can be accessed within seconds because students carry their mobile devices with them at all times and they are therefore always within reach, thus supporting findings by Sharples et al. (2010) and Traxler (2010). The course content in Gikas and Grant (2013) study related to discussion boards, course readings

and video clips that the students were required to access as part of their course. The students could use their mobile devices to upload and post content to relevant sites associated with their course and submit thoughts, ideas, feedback, and even coursework via their mobile. Students, therefore, viewed the ability to access information via mobile devices as highly beneficial.

Students also perceived the benefits of having course documents emailed directly by the instructors to the students instead of handing out hard copies as quicker, more efficient and better overall for the environment. Additionally, enabling the students to have course documents right in front of them so that explanation or discussion could begin immediately within a classroom was considered a better use of time.

Students in this study also claimed that the actual mobility of mobile devices was an advantage over less portable or heavier devices such as laptops. Thus, portability was essential to these students because a device they carried everywhere was 'friendly and personal' (Traxler, 2009a) and enabled the convenience of connectivity.

Communication was also considered an advantage relating to social networking because students could communicate constantly and instantly with classmates and teachers, thus enabling them to be 'fully productive'. Moreover, it leads to an out-of-class experience of instruction whilst socialising, meaning that learning could unfold informally from collaboration within a small group, with students gathering information from different classes, campuses, individuals and sources and sharing it with one another. Thus, in effect, a pooling of resources could occur. Gikas and Grant (2013) revealed that students communicated more with their mobile phones, using apps such as Facebook instant messenger, Twitter, WhatsApp, Skype or Oovoo (video conferencing tool), as well as text messages and the course website itself. One student in Gikas and Grant (2013) study claimed: 'I probably communicate more. Texting more with people. Capturing ideas more. Putting it to use quickly. I think, you know, I do see its advantages. I use it all the time now. I was never really a big cell phone user.'

The immediacy in the communication between students affects how they interact. The course content was leveraged, such as the course structure and the assignments set (formal learning), and coupled with the informal learning style afforded by social media, including the anytime convenience, and the learning and information that could be garnered from friends. Communication regarding the course and learning in general was more frequent than among those without M-learning facilities and took place usually in

smaller, easier to digest chunks. Moreover, the students suggested that posting comments to Twitter was much easier and quicker than logging into a University portal and then onto a password protected discussion board that was not easily accessible from a mobile device.

One student in Gikas and Grant (2013) study commented: 'I mean with (our course management system), it's the thing you check into just to do school work. Twitter - it's a social media tool that you are on all the time anyway. And to have the education, the class, be intermingled with the rest of our lives, it means it's ever present, and when those ideas, when they develop, they are there. And you are already with your classmates. You don't have to go, "Oh my God, I have to jump on Blackboard and post this right away". The thought is there and it's more permeated into your regular life'.

Whilst researchers such as Hrastinki (2008) have highlighted the value of discussion boards for learning, the students of Gikas and Grant (2013)'s study asserted a preference for the convenience and speed of social media tools that they already use on a personal and professional level for exchanging ideas related to their learning. The integration of communities within social media apps is key to this.

The students in Gikas and Grant (2013) study interacted with the course content in multiple ways because of mobile computing devices. Tools such as voice memos and video content were used on the course site and on social media sites to reinforce the course content and check ideas with classmates. The students provided feedback and took part in polls, which led to debates and discussions either on the mobile device or later in class. On some discussion sites, learners were able to remain anonymous, and this prompted more honest discussions than they might otherwise have been if the discussions had happened in person. This is because anonymity enables the focus to remain on the course content, not on social desirability bias or a feeling of being inhibited by answering a question wrongly. Immediate feedback to online discussions from instructors was also deemed useful.

Moreover, whilst online discussions were taking place, students could look up information to reinforce their opinions and access videos to enhance their arguments, which could then be posted to the discussion site. Interaction was constant and across a multitude of apps; some used Facebook but also published their thoughts on Twitter. The use of social media platforms to discuss course content whilst a live lecture or presentation is taking place is dubbed 'backchannel conversation' by various researchers (e.g. Kwak et al. (2010); Zhao and Rosson (2009)). Backchannel conversations enable students to

engage with those researchers, lecturers and writers who they might be required to learn about (or who may be hosting the live presentation or lecture) in a more informal way. Backchannel conversations also ensure that the content of the lecture or presentation is being engaged with fully, because students are likely to be listening intently to ensure that their questions are answered or that any comments that they post (which can usually be seen on the live feed behind the lecturer) are not redundant.

Moreover, using Twitter to 'follow' esteemed experts or researchers in a field enables students to have a more personal connection with them and to learn about these individuals' views regarding various news articles or what research they are working on. Students could informally contact the researchers, 'retweet' them, and asking them direct questions, which in many instances garnered responses from the individuals themselves. These activities fall outside of course requirements but can excite and motivate students' learning in a way that solely reading and discussing articles may not.

With mobile computing devices, Gikas and Grant (2013) found that learning is also situated and contextualised in a real world setting (Lave and Wenger, 1991). Thus, not only are social interactions important, but learning in situ is considered to be crucial to success. Marsick and Watkins (2001) claimed that learning does not necessarily need to take place in formal settings to be situated; rather, much learning occurs in one's daily life, subconsciously. However, informal learning generally includes a lack of structure, whereas situated learning is reliant on the learner's interpretation of the context and the authenticity of the scenario. Choi and Hannafin (1995) argued that 'situated learning methods attempt to induce everyday cognition by anchoring knowledge and skill in realistic contexts'.

Examples of situated learning via mobile computing devices were gained by Gikas and Grant (2013), who uncovered that at one institution (Lakeshore University), students were asked by their instructor (who was away) to work in groups and collaboratively collect examples of (their understanding of) 'community' within the campus. The teacher sent text message prompts with different activities, including asking each group to upload photos and videos of their examples. This media content was then discussed via social media and the course site. The learning was situated, because it involved capturing content from real communities within the context of the actual campus. Thus, Gikas and Grant (2013)'s study supports findings from other researchers who suggest that learning and knowledge acquisition is far more effective when placed within real-life environments (Ruta et al., 2009), and it encourages 'meaning making in everyday life' (Pachler et al., 2009).

2.5.3 Social Media Technology as A Teaching and Learning Tool in the Gulf

There is a scarcity of studies focusing on the application of social media for learning purposes in Kuwait in particular and the Gulf region in general. Al Fawareh (2016) observed, recorded and analysed the behaviours of a group of university students in Saudi Arabia who were added to a WhatsApp group and were given clear guidelines on how to use the group. The researchers found that such a social media app can be a useful tool for encouraging students to contribute to university activities. The researchers concluded that WhatsApp is a particularly effective tool for engaging students in learning outside the classroom. A similar study has been conducted by Alkhezzi and Al-Dousari (2016) on a group of English Language students in Kuwait who were added to a chat group in Telegram Messenger for 12 weeks to explore the students' behaviour in traditional and M-learning approaches. The study proved that the use of mobile phones for language teaching and learning is more effective than traditional methods of learning.

Barhoumi (2015) studied two groups of undergraduate students, one of which was a control group that only used a traditional normal learning aspect, and the second group used a blended learning method which incorporated traditional and M-learning tools. The aim of this study was to explore the effectiveness of using M-learning to support a blended learning course. The findings show a clear positive effect of the blended course firstly by the good test results achieved after the experiment and secondly by the positive attitudes of students in the experimental group compared with those of the students in the control group. The students believed that M-learning helped them to find solutions and easily construct and share information. The findings show that WhatsApp M-learning is more effective than the traditional way of teaching. Al-Omary et al. (2015) conducted a study which added the participants to a WhatsApp group for 14 weeks and asked them to complete a questionnaire at the end of the experiment. The aim of this study was to investigate the impact of Social Networking Services (SNSs) in higher education, establish how WhatsApp can be helpful in education and ascertain the effect of WhatsApp on student education. The main findings indicated that the students learning skills improved after using the WhatsApp chat group, suggesting that WhatsApp can create a positive effect, help the students to become better, and make learning more enjoyable when used in education.

2.6 Conclusion

The aim of this chapter was to investigate the existing literature pertaining to M-learning in the Kuwaiti context. This chapter explored the role that M-learning and social media have in educational institutions and provided a list of the benefits and disadvantages. This chapter also discussed the different frameworks for effectively implementing M-learning within education and the barriers currently faced.

In Kuwait, and its neighbouring countries, there is a drive towards integrating M-learning into some universities. However, as this technology is still in its infancy in Kuwait, there is a need for more research and national policies, more funding and facilities, and increased awareness and incentives to promote the uptake of M-learning and ensure its successful implementation in the future.

Chapter 3

Research Methodology

3.1 Overview

This chapter presents the specific methods used to address the aim and objectives of the current study. The research methodology serves as a means of finding the result(s) of a given problem (Novikov and Novikov, 2013). However, this 'means' is a multifaceted process that must be justified at each stage. First, an empirical study should be regulated by either the qualitative or quantitative paradigm Creswell (2013). Qualitative research involves an element of subjectivity in the analysis of some datasets, analysing variables that eschew an otherwise reductive, quantitative accounts Muijs (2010). In general, qualitative research is antipositivist, as ascertained by the anti-realist epistemic and ontological approach Punch (2013). Conversely, quantitative research is positivist in nature, seeking objective facts that are absolutely true and drawing upon a realist epistemic and ontological orientation Goertz and Mahoney (2012). This study will triangulate its research methods, drawing upon both qualitative and quantitative methods to enhance the credibility of the research – a phenomenon that will be discussed later Winter (2000). To complement this, attention will be given to the specific research philosophy that this study is adopting, as well as the specific research designs, research approaches, data collection methods and ethical considerations Bryman (2015). The foregoing discussion provides a summary of the study reports conducted in light of the research problem. The methods of research direct the study towards addressing the aim and objectives and the research questions.

3.2 Research Philosophies

It is important to understand why exploring the philosophy of the current study is necessary in light of the research methodology. First, the research philosophy aids the researcher to refine and identify the research methods that the study adopts; that is, it explains the overall research strategy being utilised in terms of the nature of evidence collected, the manner of interpreting such evidence and the way the evidence addresses the research questions. Second, knowledge of the research philosophy assists the researcher in evaluating a variety of methodologies and avoids unnecessary work by determining the limitations of specific approaches in the initial stages (e.g. Crossan (2003)).

Crossan (2003) stated that a clear quantitative approach is adopted by the positivist philosophy in an investigation of a phenomenon; this is opposed to a post-positivist approach, such as the interpretive philosophy, which describes and explores in-depth phenomena through a qualitative approach (Crossan (2003); Migiro and Oseko (2010)). The most commonly used methodological distinction between quantitative and qualitative approaches is that the former is generally associated with the positivist philosophical tradition, and the latter is associated with the post-positivist tradition (Polit-O'Hara and Beck, 2006). The present research comprises three studies. The choice of research philosophy for each study was based on the contexts of the studies and the nature of the questions being raised (e.g. Crossan (2003)). An essential underpinning for any research project is the consistency between the research aim and objectives, the research questions, the selected method of research and the researcher's personal philosophy (Shih, 1998) and (Migiro and Oseko, 2010). The alignment of all of these must be ensured in the research project; therefore, the adoption of a specific research philosophy must align with the overall research strategy of the study.

Lee (1991) mentioned that procedures associated with ethnography, phenomenology and case studies are referred by the interpretive philosophy; whereas, procedures relating to hypothesis testing, inferential statistics and experimental designs are referred to by positivist philosophy. The differences between the two are described as 'objective vs subjective', 'quantitative vs qualitative', 'outsider vs insider', and 'etic vs emic' (Takhar-Lail and Ghorbani, 2015). In the literature, it often appears that positivism and interpretivism have irreconcilable domains and that there is a 'widening gap' between these two orientations. However, Lee (1991) refuted the existence of such widely held notion about the gap and proved that the two paradigms can be reconciled. Hence, Lee (1991)

provided a framework showing the integration of positivism and interpretivism, which called for positivist and interpretive researchers to play an active role in strengthening each approach in a truthfully collaborative research pursuit.

The individual studies conducted in this research utilised either a qualitative (Studies 1 and 3) or a mixed approach (Study 2). The adoption of both quantitative and qualitative methods indicated the corresponding utilisation of either positivist and/or interpretive philosophies in the studies. The integration of quantitative and qualitative methods was indicated in mixed methods research in which these methods were embodied and which were likewise adopted for Study 2. It may be inferred therefore that Lee (1991) assertion is true: the positivist and interpretive paradigms could be strengthened in a truly collaborative research undertaking because this was clearly seen in the quantitative-qualitative combination (mixed methods research) in Study 2.

Moreover, interpretivism believes that reality is socially constructed (Takhar-Lail and Ghorbani, 2015), and this notion is seen in the way the participants in the studies 'constructed' their realities using WhatsApp and our view/Shared Walk and what's app; that is, through interviews, focus groups and observations. Conversely, positivism holds that a single reality governs the conduct of things, and it is influenced by absolute natural laws and mechanisms (Takhar-Lail and Ghorbani, 2015); (Sauer et al., 2015). This is seen in the use of survey questionnaire in the experimentation of Study 2.

3.3 Research Approach

While an inductive approach was used to obtain the qualitative data, such as interviews, focus groups and observations, a deductive approach was used for quantitative data, specifically the survey data in Study 2. An inductive approach allows the acquisition of an understanding of the meanings that individuals have attached to certain phenomena and suggests a close understanding of the research context as well as a flexible structure to enable changes of research focus during the progress of the research. Moreover, an inductive approach is involved in collecting qualitative data (Glaser, 2014).

Conversely, a deductive approach emphasises the scientific principles (Chang, 2014) and moves from theory to data. A deductive approach also provides an explanation for causal relationships between variables and is focused on collecting quantitative data (Wilson, 2014). Study 2 demonstrates the use of inductive and deductive approaches, Study 1 demonstrates the use of the deductive approach, and Study 3, having adopted

the observation method, demonstrates the use of the inductive approach to research. As clearly as the studies adopted both the positivist and interpretive philosophies, the adoption of both inductive and deductive approaches was also evident.

3.4 Research Design

Preparing the research design, which refers to the written plan of the study, is an important step in the research methodology because it allows the researcher to communicate the intentions, purpose and importance of the research. Research design is 'a specified pattern of framework' used in the accurate collection of data; it is the basic plan guiding the data collection and analysis phases, and specifying the type of information to be gathered, the sources of data to be utilised and the procedures for data collection Kumar (2008).

The research design establishes the specific direction of the study procedure to ensure an exact knowledge of what needs to be done and how to do them stage by stage. The research design thus provides a clear idea of the activities that could effectively assist in the decisions for specific data needs Kumar (2008).

Research designs can be descriptive, correlational, experimental and meta-analytic (Goodwin and Goodwin, 1996). The three studies herein (Studies 1, 2 and 3) followed the descriptive and semi-experimental designs. The descriptive characteristics of the studies were demonstrated by their use of the survey method, case study design and naturalistic observation, which comprise the descriptive design (Goodwin and Goodwin, 1996). The case study design of these reports was illustrated by their organisational focus, specifically Kuwait University (KU) and the Public Authority for Applied Education and Training (PAAET). According to Goodwin and Goodwin (1996), descriptive research helps to generate knowledge that describes something. A case study design, which is embodied in the descriptive design of the three studies, provides the suitable tools for studying a complex phenomenon within the contexts of these studies.

Yin (2003) stated that a case study design is used when the study is concerned with answering 'how' and 'why' questions, when the researcher cannot manipulate the behaviour of the participants in the study, when contextual conditions are believed to be relevant to the study or when unclear boundaries prevail between the phenomenon and the context of research. The studies herein focus on M-learning, and the experimental methods prevented the researcher from manipulating the behaviour of those involved in

the studies. The studies were focused on answering 'why' and 'how' questions in relation to the use of M-learning, and the applicability and adoption of M-learning were being tested at KU and the PAAET. Alongside determining the research questions was the consideration of what the case will be, which is referred to as the unit of analysis (Baxter and Jack, 2008).

As part of the descriptive design, the three studies employed naturalistic observation, which is the process of collecting data without environmental manipulation. Study 3 specifically used this design, wherein the goal was to examine the behaviours of the student-participants as they carried out the field tasks in their everyday environments. To ensure that the behaviour being demonstrated by the participants is 'natural', it is important that the presence of the researcher does not affect their behaviour (Goodwin, 2009).

The studies, specifically in Study 2, required a survey design. The advantages of using a survey include its low cost of administration and the easily accessible information it provides. Conducting an accurate and meaningful survey had been a challenge because this would spell the relevance of the responses in relation to the research questions (Groves et al., 2009). It was therefore imperative to ensure the survey questions were relevant and appropriate to ensure it measures what it is intended to measure (Gideon, 2012).

The studies used a semi-experimental design, specifically field experiments, to test the use of WhatsApp and OurViews apps for M-learning. In contrast to conducting 'pure' experiments which place emphasis on achieving various forms of experimental control, field experiments, such as the studies in this paper, often do not have full control over certain variations. As these field experiments lack the design of a 'full' experiment that employs a control group, pre-tests and post-tests, and test stimulus manipulation, the studies herein contain 'partial' experiments (**?**) and are thus considered 'semi-experiments'.

3.5 Research Strategy

The terms 'qualitative' and 'quantitative' are commonly used to depict the main research strategies. This distinction is explained by Denzin and Lincoln (2011), who stated that 'qualitative' indicates an emphasis on the processes, meanings and qualities of entities with the absence of an experimental examination or measurement. Reality is

seen by qualitative research as being socially constructed because this research strategy emphasises the intimate relationship between the research and the 'researched' as well as the situation-related constraints shaping the enquiry (Wilson, 2014). The value-laden nature of the enquiry is thus the focus of the qualitative researcher, who seeks answers to questions pertaining to how and why social experiences and their meanings are created.

On the contrary, quantitative studies focus on the measurement or quantification and analysis of causal relationships of variables rather than on processes. Quantitative research is commonly understood as having a value-free framework where the researcher is independent of the research process. Thus, whilst qualitative research is usually associated with ideas, language, texts, and narratives, quantitative research is linked to numerical analysis and is viewed as 'objective' in its examination of numerical data. Alternatively, qualitative research is commonly seen as subjective and examines narrative data (Denzin and Lincoln, 2011) and (Wilson, 2014).

Researchers are increasingly adopting mixed methods research which allows them to overcome single-method studies. Owing to the integration of positivism and interpretivism in this study, the corresponding research strategy reflects this integration through the mixed methods design. The qualitative aspect of this study mirrors this inductive nature, which means that theory is an outcome of research rather than an applied element from the outset (Wilson, 2014).

However, the quantitative strategy is emphasised by drawing a representative sample from a given population, measuring the characteristics or behaviour of the sample and constructing generalisations about the population in general. Quantitative research often takes on a deductive approach, with statistical analysis and results analysis that follow theoretical application (Creswell, 2013). The quantitative strategy is also adopted in the current research undertaking, as can be seen in Study 2, which employed the survey method.

Further, it has been asserted that qualitative research is more likely to tackle the issues of daily life and beliefs in the value of rich descriptions, whilst quantitative research is less concerned with such details. However, as shown in the studies (Study 2), qualitative and quantitative strategies do not have to be adopted in exclusivity. The studies employed qualitative data to demonstrate and clarify findings that were quantitatively generated, and demographic findings were quantified to validate qualitative findings. These were also emphasised by Wilson (2014).

3.6 Research Methods

The research methods used in this research are presented in the three studies involved herein, enumerated as Study 1, Study 2, and Study 3. WhatsApp and OurViews/SharedWalk were the two mobile apps used in examining an M-learning scenario in the experiment. The purpose was to obtain first-hand insights into the issues and challenges that deter the wider adoption of M-learning by students and lecturers of higher education in Kuwait. WhatsApp, a smartphone app launched in 2009, enables users to exchange text messages and multimedia messages. OurViews is a purpose-built M-learning-centred mobile app that allows users to take photos and videos and post them onto online personal accounts that was developed in the University of Nottingham. To download the OurViews app, the user must register to SharedWalk first. Users view multimedia content posted by OurViews users through SharedWalk. The development of OurViews/SharedWalk combination was part of a single M-learning tool.

3.6.1 Research Methodology for Study 1

The research methodology tackled in this section provided an overview of the research design, participant selection, data collection, procedures and ethical concerns, and data analysis (content analysis). These discussions provide clarification and a direction to the aims of the current study. Study 1 employed a research method that was chosen precisely based on the research objectives, thereby assisting the entire methodology in fulfilling the defined aim of the research project.

3.6.1.1 Research design

The specific research design that Study 1 employed was a qualitative method design, which is characterised by the epistemologically sound collection and analysis of qualitative data (Watkins and Gioia, 2015). These data were collected and analysed rigorously, which means that they underwent a predetermined and tested system. 'Epistemologically sound' indicates that the collection and analysis of data were organised in a manner that establishes how knowledge is gained.

3.6.1.2 Participants

The participants of the interviews were faculty members of three educational institutions in Kuwait, specifically KU, the PAAET, and the Arab Open University, Kuwait. The participants were chosen through introductions to the researcher by some interviewees, thus the method of snowball sampling, in which a research participant refers other potential participants to the researcher based on his/her knowledge of them Chambliss and Schutt (2015).

The focus groups comprised two groups of participants: professionals and academics. The focus groups were intended to perform an evaluation of the resultant M-learning framework. The professional group comprised professionals and management facilitating M-learning projects, while the academics were faculty and academic staff who served as direct users of the proposed M-learning system. Candidates from both groups were selected from developed and developing paradigms.

3.6.1.3 Data Collection

Kothari (2004) stated that the task of collecting the data starts when the research problem has already been defined and the research plan has been established. As the researcher decides on the specific data collection method to be employed for the study, he should keep in mind the two types of data, specifically primary and secondary data. The primary data are those which the researcher has collected for the first time and are therefore original data, whilst the secondary data are those which have been gathered by another and are being used by the researcher for his study. The researcher should decide on the sort of data to be utilised and collected for his study. The difference between collecting primary data and secondary data is that the former involves collecting original data, while the latter involves mere compilation of data (Kothari, 2004). There should be consistency between data collection methods and the overall intention of the research project. The data collection methods and the research sampling plan must both include various viewpoints and potential meanings (Drisko and Maschi, 2015).

The use of the interviews in Study 1 was based on its objective to identify the challenges faced by educational staff in the adoption and use of M- learning, such as cost, time, IT literacy and inclusion in the institutional teaching and learning framework. The interviews could reach and attract a wider number of research participants than could other methods. It is important that questions are communicated clearly in a way that

could be easily understood by interviewees; hence, avoiding any irrelevant responses or non-responses. The relevance of ensuring that the questions are easily understood by the participants is parallel to ensuring validity.

Study 1 was able to gather the initial findings to formulate a model for M-learning. These findings included such factors as cultural elements, institutional strategies, awareness, infrastructure, subject guidelines, training and incentives. The interview method enabled the study to reveal these factors for M-learning. Specifically, the study undertook an exploratory research interview, which was intended to answer some of the research questions emphasised in the hypotheses. The interviews questions were arranged in a sequential manner with room for flexibility to enable the participants to fully share their views and opinions.

3.6.1.4 Procedures and Ethical Concerns

The ethical concerns of the study involved the data collection and interaction with the participants. The ethical considerations were (1) the assurance of participants' anonymity and confidentiality of data, (2) disclosure of the purpose of the study, (3) allowing the participants to withdraw from participating at any point without incurring any losses or liabilities, (4) obtaining the participants' consent for the study, (5) assurance of data protection by storing the data in a password-protected database and (6) releasing the data to the participants upon their request.

3.6.1.5 Data Analysis

The data analysis for a systematic review was obtained through content analysis, which helps to identify relevant issues and aids in the presentation of the findings (Drisko and Maschi, 2015). This analysis technique begins with identifying and screening materials based on a given set of criteria. Selected materials undertaken with the collaboration of the teaching staff were thoroughly examined in the context of developed and developing systems. The purpose was to make an inference of common qualities to determine the success factors affecting M-learning. The systematic review was performed by identifying materials, conducting a content analysis, identifying developed and developing M-learning success factors and presenting the findings. According to Drisko and Maschi (2015), content analysis may draw on a set of existing texts of the interview data. When the views of large groups of people are being sought by content analysis, validity and

credibility can be established by finding potentially divergent views. Collecting varied and relevant data is vital to the data collection process of the content analysis (Drisko and Maschi, 2015). Furthermore, self-awareness must be applied by content analysts. Sampling and data collection methods shape the validity, credibility and generalisability of the findings of the study.

The data analysis involved assigning codes to themes, which were obtained by analysing the responses to each question at a time. After reading each response, the researcher classified the themes and likewise refined and modified them. The researcher then consolidated the themes, limiting the number as much as possible to avoid affecting the meaning of the responses. The researcher ensured that the arrangement of the theme worked well by comparing each response again using manual coding (Hargie and Tourish, 2000).

3.6.2 Research Methodology for Study 2

The research design of Study 2 was a mixed methods design. The participants were students and instructors of KU and the PAAET, and study's ethical concerns revolved around the collection and utilisation of primary and secondary data.

3.6.2.1 Research design

The study's research design was a mixed methods design, which means that it utilised a combination of quantitative and qualitative research designs. Specifically, the study used the experimental method from a field study to investigate the uses of M-learning apps in a Kuwaiti higher education setting. Questionnaire survey and interviews were conducted from these experiments. The use of the interviews and questionnaire in the study indicates the presence of research triangulation, a strategy aimed at increasing the validity of evaluation and research findings of a research report (Cheng, 2005) and (Oliver-Hoyo and Allen, 2006).

The questionnaire used for the study comprised of open and closed ended questions. The closed ended questions comprised three and five Likert-style questions (Albaum, 1997), for the analysis of the student's opinion, readiness and perception towards the expansion of M-learning in Kuwaiti Higher Education. The Likert scale provided options for the students to rate a particular variable on the scale of 1 (strongly disagree) to 5 (strongly agree) (Lee et al., 2002).

Table 3.1: Likert Scale (Albaum, 1997)

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
(1)	(2)	(3)	(4)	(5)

The primary advantages of the Likert scale are a high degree of reliability, low time-consumption, questionnaires that are easy to understand and the direct involvement of the research participants (Lee et al., 2002).

The open ended questions, which were included in the questionnaire, were left to the respondents' discretion to fill in according to their perceptions. The primary advantage of using open ended questions in the research study are that they give the respondents the freedom to choose the words for their reply. Open ended questions therefore provide rich quality of data for evaluation and interpretation purposes (Sandelowski, 2004).

3.6.2.2 Participants

The experimental process involved lecturers and undergraduate students (male and female) of KU and the PAAET. WhatsApp and OurViews apps were utilised to conduct a fieldwork activity devised by the module leader. Participants were drawn from five different subject areas: Photography, Introduction to Design (Civil Engineering), Media Educational Communication, Mechanical Field Training and Environmental Geology.

The study utilised purposive sampling, which is a form of non-probability sampling (Bryman, 2015), selective or subjective sampling, to involve distinctive subject matter of the research and its central concerns (Gray et al., 2007). For instance, the study needs to include students in its sample to consider the phenomenon of M-learning. Using a random selection of participants comprising students and non-students would have defeated the specific purpose of the study (Winter, 2000). The inclusion of lecturers was also vital to span the breadth of the educational environment and lend an added perspective to the research questions.

In addition, to enhance the credibility of the studies – specifically the transferability and ecological validity – the participants were sought from five different departments at the respective universities (Winter, 2000). This range of participants increases the likely transferability to other institutions in Kuwait, and in the Gulf Cooperation Countries (GCC) countries. A tentative transferability might also apply to countries outside the GCC, but with the requisite epistemic modesty that should be factored in (Winter, 2000).

Another aspect of the purposive, non-probability sampling was the deliberate inclusion of both genders in proportional amounts, an act that contributes to the likely credibility of the study (Neuman, 2002). An additional remark needs to be made, however, on the recourse to some elements of probability sampling, which is tempered by the above element of purposive sampling (Muijs, 2010). As mentioned above, non-probability sampling was necessary to focus the study in a university setting and meet the wider aims of the research (Muijs, 2010). However, to approximate probability sampling to some degree, variables such as age and socio-economic status were not considered to allow the selected cohort to comprise a breadth of these variables in an undetermined way (Goertz and Mahoney, 2012). The result of this is the relative enhancement of the research credibility (Goertz and Mahoney, 2012).

3.6.2.3 Data Collection

The primary data being collected were interview and survey data linked to the use of two M-learning apps, WhatsApp and OurViews/SharedWalk, which were used in the experimental design of the study. The primary research enabled the study to directly provide actual responses to the research questions, hence addressing them directly.

As a common and reliable method of data collection, surveys are typically analysed using either quantitative or qualitative methods, depending on the circumstances and research epistemology and ontology (Giere, 2010). A survey usually involves a standardised questionnaire, which is, in some cases, marked by differing gradations of response that are then subject to analysis (Black, 1999). Surveys have several strengths and weaknesses, as detailed in the following paragraphs.

A key strength of surveys is the primary nature of this form of data collection Bryman (2015). This means that, rather than making abstract claims on a set of research problems, the researcher moves into the real world of empirical data and is subsequently able to make a more grounded set of claims based upon evidence Bryman (2015). However, there are also important weaknesses of surveys as data collection instruments, and these need to be accounted for here to justify not only their inclusion in this study, but also the recourse to a triangulation of research methods and the eventual effect that this will have upon the credibility of the research (Black, 1999).

Despite being understood as gateways to proximally objective, positivist claims, surveys are also constrained by subjectivity (Black, 1999). For instance, a variety of variables

influence the inception of surveys, with the manner by which participant responses are deployed (Hoy and Adams, 2015). For instance, in designing the surveys, there is a certain amount of epistemic constraint on the researcher's part (Dörnyei, 2007). The researcher is aware of not only the central research questions they have devised, but also the current state of existent research in the field (Giere, 2010). It is arguably impossible to separate fact from value in this situation, where, despite the attempted objectivity of the researcher, some evaluations are also present in the survey questions (Giere, 2010). An example of this is pre-empting participants' responses by phrasing the questions in a certain way (Golafshani, 2003). If participants are allowed to provide degrees of acknowledgement, agreement or disagreement, the question might not be applicable to them at all, but they might feel compelled to reply (Harrison and Reilly, 2011). Such distinctive spontaneity impairs the objectivity of the eventual research findings. In addition, participants arrive at the instance of data collection under the influence of additional variables such as mood, which subsequently influences their distinctive responses (Punch, 2013). These limitations aside, surveys remain far superior to abstract deductive claims on some research issues, grounding, instead, a study in empirical data (Vogt, 2007).

More attention needs to be given, however, to the epistemic and ontological considerations that arise from an analysis of survey data (Giere, 2010). Where surveys are treated quantitatively and thus in a positivist fashion, this is premised on the extraction of numerical data, and it is held that numerical data has an a priori character (Hoy and Adams, 2015). This must be explained. The distinction between a priori and a posteriori claims has its roots in philosophy and bears upon contemporary empirical research in interesting and important ways (Giere, 2010). A priori knowledge refers to knowledge that is not indexed to human experience; it is true in a mind-independent way, serving in a way that renders it a universal law (Giere, 2010). It is on this view that quantitative research claims objectivity as part of its anti-realist, positivist agenda (Giere, 2010). Conversely, a posteriori claims are indexed to human experience and are only true in a way that is verified by empirical data (Giere, 2010). An example of a priori knowledge is a mathematical computation, and an example of a posteriori data is efficacy with respect to the usage of technology (Hoy and Adams, 2015).

As such, recourse to quantitative data grounds the study in a priori facts, but these a priori facts are also modified by way of a posteriori variables such as the aforementioned mood, as well as other factors such as confirmation bias, or a disposition to confirming what is already known (Hoy and Adams, 2015). This is the difficulty with simply

grounding a study in quantitative research only, as though it is of greater validity than qualitative research (Black, 1999).

3.6.2.4 Procedures and Ethical Concerns

The experimental process was undertaken by investigating adequate M-learning architectures through the selection of an experimental setup according to Location-Based Guided Tour M-Learning [1]. The components of the selected architecture were mobile devices (smartphones, tablets, tablet PCs and laptops), mobile communications network and learning management systems (LMS). This architecture allowed students to use the M-learning apps installed in their mobile devices during the fieldwork. The potential of the M-learning app was further enhanced by exploring the GPS location features of the mobile communication network, thereby enabling the integration of location-related information into the work of the students.

Devising the research questions was a necessary procedure in the study, as they provide the direction of the study and the methods of research that must be utilised to address the questions. The literature review was written in a way that would provide evidence to the research questions. As can be observed in the data collection method of the experimental settings for Study 2, the procedures involved initial contact with a key person, such as a lecturer or a department head, because the researcher was aware that obtaining the commitment of key persons was necessary for the target participants to participate in the experiments. This was followed by a presentation of the task to both the key persons and the target groups whereby the use of WhatsApp and OurViews was introduced regarding M-learning. Certain challenges that might unexpectedly arise were viewed objectively, such as the culture-related barrier that hindered female students from a conservative community to use WhatsApp. The results of the experiments were discussed in the findings and offered inferences to the research questions.

The ethical concerns of Study 2 involved clarifying to the target participants the exact purpose of the study whilst seeking their consent to participate and allowing the participants to withdraw at any stage of the experiment. An example of this situation was encountered in Study 1 where one participant withdrew from the experiment because of incompatible smartphones, and the researcher adjusted by focusing on the remaining participants. There were no instances of forcing participants to stay with the experiment or to offer some false promises just to sustain their participation. Similarly, the

researcher looked for someone else whenever a contact person of a specific department (e.g. Head of the Geology Department) declined from participating.

3.6.2.5 Data Analysis

SPSS software was used for the data analysis to reflect the quantitative nature of the study. The mean values of the responses that the OurViews/SharedWalk and Whats App participants provided were calculated.

The themes that emerged from the data were coded to reflect the qualitative aspect of the research project. In particular, a set of keywords and themes according to the aims and objectives of the study was used to analyse and classify the participants'comments regarding their experiences with the M-learning experiments. Thus, a thematic analysis was used, which is a qualitative theme-based method of analysis for identifying, analysing and reporting themes within the data (Braun and Clarke, 2006) and (Guest et al., 2011). Thematic analysis captures the important aspects of the data based on patterned responses or meanings, which comprise the theme. Thematic analysis, as shown in the data of Study 2, required the researcher's involvement and interpretation of implicit and explicit concepts (Braun and Clarke, 2006).

In addition to thematic analysis, coding was used to analyse the data, which involved signifying the identified themes and linking them to the raw data of the study. Tackling coding in the study addressed what could be considered a 'theme' or 'pattern'. The 'keyness' of the theme is not based on some quantifiable measures but on whether it represents something significant about the research questions as a whole (Guest et al., 2011). The following themes were constructed from the data:

- Motivating students through M-learning.
- Effectiveness of the app in terms of the successful use of the app to fulfil the tasks.
- Beneficial features of the app based on its delivery of advantages to the users.
- User's awareness of M-learning.
- Managerial and administrative aspects of Kuwaiti higher education institutions in relation to M-learning.
- Barriers encountered to the use of M-learning.

- Flexibility offered by the app.

In addition, charts and tables were used to provide a graphical illustration of the findings.

3.6.2.6 Z-Score

The standard score, Z-score, is a useful statistic because it allows us to calculate the probability of a score occurring within our normal distribution and enables us to compare two scores that are from different normal distributions. If 'mGT is an estimate of the expected frequency, XG+ is the sum of the observed frequencies in the given row G, X+T is the sum of the observed frequencies in the target column T , and X + + is the number of tallies in the table, then Z scores are computed as follows' (Bakeman and Quera, 1995):

$$Z_{GT} = \frac{X_{GT} - m_{GT}}{\sqrt{m_{GT}(1 - P_{G+})(1 - P_{+T})}} \tag{3.1}$$

"Where P_{G+} is $\frac{x_{G+}}{x_{++}}$ and P_{+T} is $\frac{x_{+T}}{x_{++}}$".

Z-Scores tell us whether a particular score is equal to the mean, below the mean or above the mean of a bunch of scores. They can also tell us how far a particular score is away from the mean. If a Z-Score:

- Has a value of 0, it is equal to the group mean.
- Is positive, it is above the group mean.
- Is negative, it is below the group mean.
- Is equal to +1, it is 1 Standard Deviation above the mean.
- Is equal to +2, it is 2 Standard Deviations above the mean.
- Is equal to -1, it is 1 Standard Deviation below the mean.
- Is equal to -2, it is 2 Standard Deviations below the mean.

Z-Scores can help us understand how typical a particular score is within bunch of scores. If data are normally distributed, approximately 95% of the data should have Z-score

between -2 and +2. Z-scores that do not fall within this range may be less typical of the data in a bunch of scores.

Z-Scores can also help us compare individual scores from different sets of data. We can use Z-scores to standardise scores from different groups of data. Then, we can compare raw scores from different sets of data. The values were chosen without any values less than 1 because the lower interaction number is not useful in the analyses. During the analyses of z-scores, only the number of high interactivity was considered and divided to three levels.

3.6.3 Research Methodology for Study 3

The research methodology for Study 3 specified the use of qualitative method for the research design in which an observation method was used to solicit primary data.

3.6.3.1 Research design

Study 3 utilised a qualitative research design, specifically the observation method. As described by Margot et al. (1991), qualitative research views 'events' needing to be seen in context. Thus, the qualitative researcher needs to immerse himself in the setting. Being qualitative, the context of enquiry was not 'manufactured' or predefined since they are natural and nothing must be taken for granted. As the study used this particular research design, the participants spoke for themselves by providing their viewpoints in words and other forms of action. The study is therefore an interactive process in which the participants being studied 'told' the researcher about their lives (Margot et al., 1991). In this case, the researcher of this study took a holistic view, as the purpose of the qualitative research design is to understand the experience as a unified whole. Being a qualitative research, Study 3 was conducted to understand the experience felt or lived by the participants (Margot et al., 1991); (Kincheloe, 2012).

The observation method adopted in Study 3 is a qualitative method of collecting primary data. Using this method, the information was obtained through direct observation without seeking the responses of the participant. When done accurately, subjective bias could be eliminated, which is the main advantage of the observation method (Kothari, 2004). In Study 3, the information obtained related to what was happening at the moment the event was taking place. This method was independent of the participants'

willingness to respond, thereby making active cooperation on their part less demanding. It is for these reasons that the study made use of this method.

However, some further reflection needs to be provided because it would be epistemically dangerous to presume the emergence of objectivity from such observational data (Johnson and Christensen, 2008). Rather, it is more plausible to mention here that observation is phenomenological, a process that needs to be explained, because it bears upon the delicate interaction between the subject and object in interesting ways (Maxim, 1999). The phenomenological method – deployed analogously in this study as observation – was coined by (Husserl, 2012) and (Heidegger, 2010), who argued that direct experience needs to be analysed by an eidetic reduction, minimising the imposition of theory upon the dataset (Husserl, 2012). The oxymoronic character of this claim is quite evident because the discipline and practice of phenomenology is, in itself, a set of theories. However, the philosophers phrase their methodological orientation in such a way that excuses phenomenology from the realms of theory, purporting instead to get to the things themselves as pure phenomena indexed to the structures of experience (Husserl, 2012). It is easy to see how this would apply to the specific case of observational data because the researcher, quite literally, observes the phenomena that lie before them. However, contributing to an even greater degree of credibility with respect to any claims inferred from the data is that the observations are unobtrusive, thereby resulting in an organic situation in which the participants are able to provide a pure and unmediated set of responses (Creswell, 2013).

Notably, it is impossible to fully escape the subjectivity of the researcher, given that any observation or analysis is indexed to the particular cognitions of the individual perceiving subject (Giere, 2010). This needs to be factored in with respect to any claims on the credibility of the research.

3.6.3.2 Participants

The participating groups at the PAAET were selected from Mechanical Engineering Field Training and Civil Engineering Field Training, and the students of the Civil Engineering Field Training were enrolled in Surveying. The participants from KU were enrolled in Environmental Impact Assessment EIA, where the module mark was comprised by classroom tasks and a lab component.

3.6.3.3 Data Collection

The observation method, which was discussed earlier, was used as a source of primary data. It was necessary for Study 3 to utilise primary data because this would usher the study towards concrete findings.

Data Collection with PAAET

The participating group of students specialising in Surveying under the Civil Engineering Field Training of the PAAET had the module fieldwork as a final graduation requirement. The student-participants examined locations using location tools on their mobile phones, prepared weekly reports and sketched location maps. Owing to staff shortages, only the instructor and the field supervisor evaluated the students' work.

Data Collection with KU

The Advanced Geology students were using a module that introduced them to the Environmental Impact Assessment (EIA), which included potential environmental impacts and environmental protection measures. One objective of the module was for the students to learn to perform an environmental cost-benefit analysis at the starting point of the project. Classroom tasks and a lab component comprised the module mark.

Open ended questions about the learning experience from the fieldwork were constructed for two samples of participants who were equally sized and were taken from each class. These questions were intended to (1) measure the motivation of the participants relating to the use of M-learning technology, (2) identify the traditional students' needs for mobile technology, (3) determine the students' viewpoints about their interaction with their instructors and (4) identify any barriers during the experiment. Open ended questions are the distinctive strength of the semi-structured interviews (Maxim, 1999) because they do not overly pre-empt or constrain the eventual responses and subsequent analysis and findings in such a way that is obscured by epistemic bias (Dörnyei, 2007).

As is also the case with surveys, the data can sometimes be tainted by undue influence (Dörnyei, 2007). Semi-structured interviews with open ended questions circumnavigate this problem, resulting in a dataset that is truer to the intentions of the participants (Winter, 2000).

However, the questions for the instructors were intended to find out their opinions about their students' degree of readiness for M-learning technology, whether there was a need

to use M-learning technology and to identify any barriers that they encountered during the experiment.

3.6.3.4 Procedures and Ethical Concerns

The first experiment carried out in September 2013 involved a comparative evaluation of WhatsApp and OurViews/SharedWalk. The conclusion to this experiment included a list of strengths and weaknesses about the two apps and suggestions for improvement. In relation, the second experiment, conducted in November 2014, attempted to determine specific solutions to the issues identified in the first experiment. Similarly, the query in the third experiment addressed how students and instructors could be best motivated to engage with M-learning as a widely beneficial educational tool. The third experiment also addressed whether it was beneficial to use social media software as a learning tool under a strict monitoring regulation regarding using M-learning.

In the second experiment, the study increased the number of students who failed to upload materials onto the OurViews server. The researcher returned to Nottingham in October 2014 to update the supervisor on the study and discuss how the experiment could be best carried out based on the previous findings. The researcher then returned to Kuwait to explore the possibility of using OurViews/SharedWalk. The results indicated that this experiment initially targeted instructors who expressed readiness and enthusiasm to participate in the study and interact with students using the app.

Owing to problems encountered in the app, the researcher looked for a suitable alternative apps to use in the study. However, apps such as Edmodo, Line, Studios and inClass were developed for Android operating systems only or for Apple devices and iOS only, and only some were found to be very similar to WhatsApp app, such as Edmodo. Since the WhatsApp software functions similarly to social media apps, the researcher and the DoS devised some rules and regulations for the target participants (students and instructors) of the experiment in terms of using the software. The regulations specified that the WhatsApp app should only be used in the experiment for educational and academic purposes.

In preparation for the second experiment, the researcher conducted visits to higher education institutions in Kuwait in September 2014 to look for lecturers who were willing to participate in the experiment and to instruct them on the nature of the task and the apps involved. He contacted the PAAET and KU, which he had approached during the previous year's experiment.

In terms of ethical considerations, the participating lecturers and students were asked to sign the ethics form to indicate their consent. The ethics form specified the purpose and methods of the experiment in Arabic. The experiment spanned three weeks; week 1 involved concrete components, tests and costs; week 2 involved identifying pipelines and buildings in the report; and week 3 involved identifying devices and building monitoring with the use of station devices' total range.

As with the previous studies (Studies 1 and 2), Study 3 took account of the importance of anonymity and data confidentiality, which could only be retrieved through the participants' request. Data were secured using a password protected database, and the participants were free to withdraw from the study at any time, for any reason, without incurring any liability or ill-effects.

3.6.3.5 Data Analysis

The data analysis was undertaken using thematic analysis and coding. Thematic analysis allowed the data to be arranged based on themes and patterns (Pope et al., 2007); (Guest et al., 2011). This method of data analysis aimed at identifying the key, recurrent and/or most important themes arising from the study. This also aligned with the qualitative nature of Study 3, because an inductive approach was used to develop an analysis from the given set of data. In this method, the researcher looked for what was prominent rather than develop higher-order explanations for findings. The narrative approach of thematic analysis enabled handling of the qualitative findings of Study 3 (e.g. Pope et al. (2007)). In addition, the Z-score analysis was carried out using the results obtained from the WhatsApp app.

The various claims above need to be considered in detail because they affect the credibility of the research in important ways. At the epistemic and ontological levels, a thematic analysis is premised on the principle of inductive reasoning (Bryman, 2015). As opposed to deductive reasoning, which moves from generalities to particulars, inductive reasoning moves from particulars to generalities (Giere, 2010). Inductive reasoning is also grounded in what is deemed in some contexts as a perspectivist approach to epistemology and ontology (Giere, 2010). This arises from the distinction between mind-independent objective claims, and ones that are subjectivist and indexed to human experience (Hoy and Adams, 2015). Even though much of this study is devoted to quantitative research, it is grounded in objective, positivist claims, but any such claims are also marked by problems (Giere, 2010). The history of the discipline of philosophy

was marked by the opposition of realism and anti-realism (Giere, 2010). Realism argues that human knowledge should attempt to conform to a mind-independent reality, with the latter is indicative of true, absolute and factual knowledge (Giere, 2010). However, this then attempts to move into an extra-perspectival space, where any attendant truth claims are purported to be outside of human experience and true in an absolute sense. However, the obvious problem that arises from this is that the researcher claims that they have accessed a place that is no longer indexed to their cognitive apparatus (Giere, 2010).

Conversely, a subjectivist approach to knowledge contends that the empirical claims of human beings are located solely in the realms of experience and human conversation, as a mass of exchanged subjectivities (Harrison and Reilly, 2011). However, a problem that is quite distinct arises here, namely that of relativism. Relativism arises in a situation where knowledge is regarded to be solely subjective, a situation in which all knowledge is regarded to be equally true (Giere, 2010). However, a means of mitigating this problem is where the opposing approaches of realism and anti-realism are resolved by the principle of perspectivism (Giere, 2010).

Originally coined by the philosopher (Nietzsche, 2003), perspectivism is articulated in a contemporary context by Giere (2010) in his seminal text on scientific perspectivism. Nietzsche (2003) argued that the problem of relativism is mitigated by the emergence of dominant truths at the intersection of numerous conflicting and sometimes intersecting perspectives. These are also strengthened by the force of an individual's conviction and their capacity to influence (Nietzsche, 2003). Perspectivism, in a contemporary scientific sense, draws heavily on the methods of contemporary academic research and discourse, where numerous positions are arrived upon in accordance with the design, strengths and weakness of particular studies (Giere, 2010). These are then thrust into the sphere of academic discourse and contribute to knowledge in an elliptical fashion by the public verification of the research claims. That is, perspectives are layered on top of one another, as it were, to arrive upon an aggregate perspective on the issues at hand (Giere, 2010). This also resembles the coherence theory of truth in the discipline of philosophy, where empirical claims become coherent in the public space (Mosteller, 2014).

Finally, a thematic analysis is premised on inductive reasoning that is perspectivist (Giere, 2010). For it centres upon the emergence of general claims not by way of their being indexed to some set of objective, mind-independent entities, but rather by way of the assignment of codes that eventually begin to assume the character of coherence

(Harrison and Reilly, 2011). The first stage of a thematic analysis is the transcription of the raw data, which involves the writing up of the data in a manner that is as faithful to the data collection process as possible (Black, 1999). This is then followed by the process of data reduction or the judicious elimination of any non-pertinent data (Black, 1999). This is a subjective process and gives reason to the earlier commentary on the potential pitfalls of qualitative research and the need to arrive upon a more cogent aggregate by considering multiple subjectivities; that is, those of other researchers and studies (Golafshani, 2003). Once the dataset has been reduced, the researcher must generate and assign codes to the data in accordance with the particular issues and variables that are being raised in the study (Dörnyei, 2007). Following the assignment of codes, themes can be generated (Dörnyei, 2007), which occur in the form of schemata or patterns, where codes are grouped together in chains (Black, 1999). These adopt the character of both semantic and latent themes, which must be explained.

While semantic themes appear at face value and at the top level of analysis (Harrison and Reilly, 2011), because they are superordinate and easily detectable, latent themes lie beneath the surface (Harrison and Reilly, 2011) and require probing to uncover which are subordinate – not on account of their bearing less value, but on account of their extraction by sustained analysis. The final stage of this process is member checking, which enhances the credibility of the study Winter (2000). Given the various stages of transcription, reduction and analysis, the final results might be quite abstract and divorced from the real-life context of the primary data Winter (2000). Thus, consulting with the participants about the data analysis process helps to orient the results within the stated intentions of the participants, while also mitigating any issues of validity that occur during the process and on account of the variables that impact on the instance of data collection Winter (2000).

Finally, this latter remark on member checking has been such that the qualitative validity of the data has been taken into account. It was earlier remarked that qualitative research is premised on the subjectivity of the enquirer, but this can result in weak plausibility or even relativist (Winter, 2000). Thus, to gain a particular perspective and set of claims that is stronger than other, qualitative validity needs to be taken into account (Bryman, 2015). Member checking and triangulation both contribute to the credibility of the study (Bryman, 2015). Triangulation also contributes to the transferability and ecological validity of the research findings (Bryman, 2015).

Chapter 4

Study one: investigate the challenges and opportunities of using mobile learning in Kuwait

4.1 Introduction

The aim of Study 1 was to analyse the data collected in interviews and further the discussion on the merits of mobile learning as a learning tool in Kuwaiti universities. The study attempted to evaluate the perceptions of mobile learning in order to determine the extent to which mobile learning has been implemented either to complement e-learning and other traditional methods or as a stand-alone tool. In particular, this study examined lecturers' perceptions of mobile learning, including overall attitude, expected barriers, motivations and incentives. This study employed a qualitative research method. Twenty-six participants who were lecturers at three educational institutions in Kuwait took part in the interviews conducted in the study.

The results of the study indicated that the implementation of m-learning technology as a pedagogical aid in Kuwait is limited. This finding was attributed to the lack of awareness, guidelines and specialised training, as well as cultural barriers, inadequate infrastructure and opposition to change. Based on the study's results, some recommendations are made with the goal of promoting the awareness and adoption of m-learning.

4.2 Objectives of Study 1

The main objectives of Study 1 were the following:

- Identify the barriers and challenges to the adoption of m-learning in Kuwait.
- Investigate the feasibility of adapting mobile learning in Kuwait.

4.3 Initial Exploratory Research Interview

An exploratory research method in the form of interviews was used to gather data that would address the research questions stated in section 1.3 of Chapter 1 and to compare these findings with the extant literature.

Twenty-six participants were interviewed, all of whom were selected from the three main educational institutions in Kuwait: Kuwait University (KU), the Public Authority for Applied Education and Training (PAAET) and the Arab Open University (AOU). The interviewees were drawn from a wide range of subjects and departments, and they represented various age groups and socio-economic backgrounds. Some interviewees were involved in management roles, including department heads and an assistant dean. One interviewee was a former member of parliament and a member of the national committee of education. The three institutions were selected because they are diverse and non-specialised. Thus, each institution offers a broad range of departments and disciplines. KU is a state university, and AOU is a private university. The educational structure of PAAET is different from that of KU.

Table 4.1: Number of participants from the 3 institutions

Institution	Number of Participants
Kuwait University	12
Arab Open University	7
Public Authority for Applied Education and Training	7

In order to encourage open dialogue and promote genuine responses, the participants were interviewed individually in their own offices. They were also given a consent form to sign before the interview commenced. Moreover, before the interview they were told that data would be collected and used for research purposes only and would remain

anonymous. The interview questions were asked in sequential order while allowing flexible discussion so that the interviews could share their views. The interview questions covered several different subjects:

- Technology: The participants were asked about the use of technology in learning/teaching.
- Electronic learning: This interview question attempted to establish if the participants used e-learning tools in their current teaching practices and if so which tools they utilised.
- M-computing and m-learning: The interviewees were asked to share their own views on m-computing and m-learning to ensure that they understood the terms, which would have affected their attitude.
- Barriers: The interviewees were asked to identify potential barriers to the adoption of m-learning by Kuwait higher education institutions, and to offer their opinion regarding whether such barriers could be overcome.
- Motivation: This question elicited the interviewees' views on aspects that could motivate lecturers to use m-learning.
- M-learning advantages and disadvantages: The interviewees were asked for their opinions about the most important advantages and disadvantages of using m-learning in education.

4.4 Interview Structure and Rationale for Each Section

4.4.1 Technology and education

This question was included to evaluate the general attitudes of the lecturers toward integrating technology in their teaching and to determine their perceptions of educational technology.

4.4.2 Experience with e-learning technologies

Because m-learning is still considered a new educational technology, the lecturers' were asked to describe their experiences using similar systems, such as e-learning. Their

responses were used to evaluate the current e-learning infrastructure and determine the degree of readiness to adopt m-learning.

4.4.3 M-computing

These questions were asked in order to determine the lecturers' attitudes toward the use of m-computing in different aspects of daily life and education.

4.4.4 E-learning and m-learning

A specific question that was related to the research topic was designed to elicit the lecturers' perceptions of using m-learning in teaching and learning. This question was followed by a series of questions directly related to mobile learning:

- Using m-learning in teaching and learning
- Barriers facing m-learning
- Advantages and disadvantages of m-learning

4.5 Interview Execution and Analysis Protocol

Prior to the analysis, the researcher reviewed several techniques used to analyse the data collected in interviews. The following protocol was adopted for Study 1 (Figure 4.1).

4.5.1 Pilot phase

Pilot interviews were conducted to develop familiarity with the responses and to refine and further develop the analytical method. Two pilot interviews were conducted at Nottingham University.

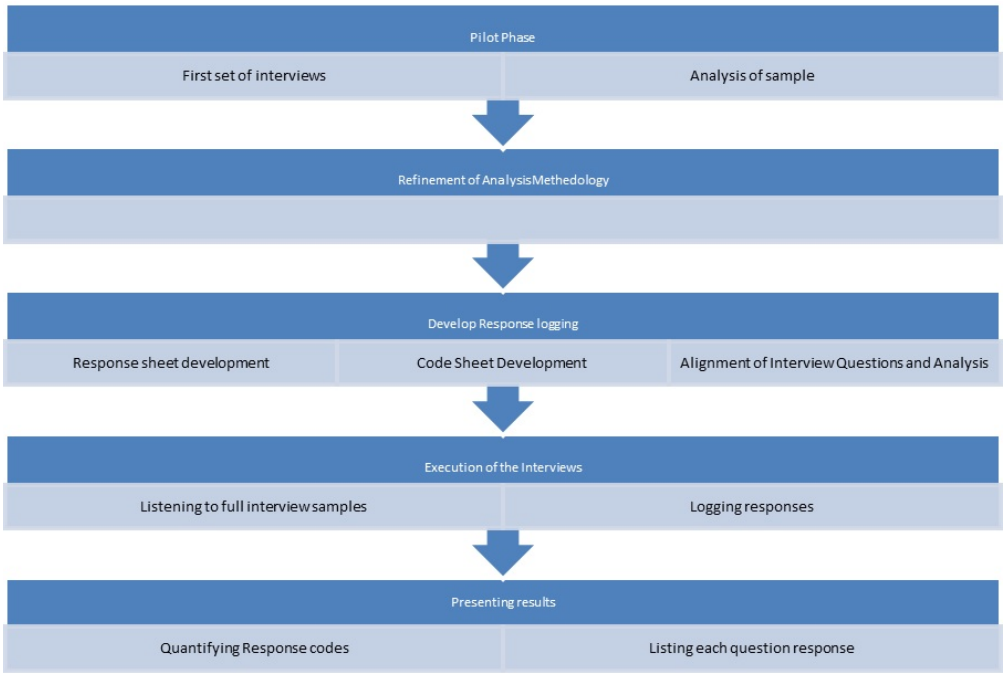


FIGURE 4.1: Interview analysis protocol.

4.5.2 Develop response logging

4.5.2.1 Response sheet development

A response sheet was developed in order to record the pilot interviews. A logging template was developed to record the responses of the interviewees to the interview questions.

4.5.2.2 Code sheet development

The code sheet was developed according to themes and categories to determine the level of uniformity among the interviewees' responses. The code sheet aided the quantification of the data into a simpler form for the analysis.

4.5.2.3 Alignment of interview questions and analysis

The data collected in the pilot interviews were analysed to test the analytical method. All ambiguities in the interview questions were corrected and improved. This intermediary phase also involved the structure and the wording of the questions. This dynamic process

depends on the findings of the analysis. The analytical method used to examine the data collected in the interviews was then finalized.

4.5.3 The execution of the interviews

All interviews were recorded. When the interview process was completed, the recordings were listened to and the general responses of the interviewees were evaluated. In the second round, the responses to each question were analysed in order to develop the response codes.

4.6 Presenting the Results

4.6.1 Quantifying the response codes

In order to provide critical comments on the results, the response codes were converted to a quantitative format according to the code frequency.

4.6.2 Listing question and response to each question

In the pilot phase, the questions were recorded to assist the interviewees in comprehending each question.

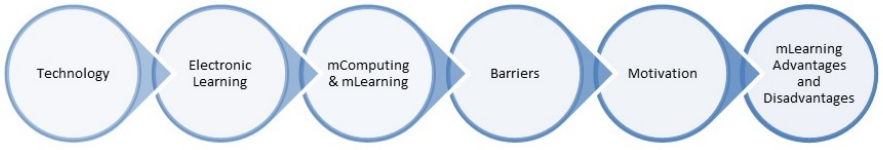


FIGURE 4.2: Reordering of the questions was undertaken in the pilot phase.

4.7 Interview Questions Template

*D*ear Participant:

Thank you for consenting to participate in this interview. Please find below examples of the questions I will ask in the interview. The form of the questions will vary according to your responses.

The following will be explained to make sure the participants understand the terms and the project.

- Brief explanation of e-learning, m-computing, m-learning and their applications.
- Very brief explanation of the project.

The Questions:

Question 1 - Technology

i Do you prefer the use of technology in the learning process to be banned, limited or fully engaged?

Question 2 - E-learning

i Use of e-learning: Do you use e-learning tools in your teaching?

ii E-learning application use: What tools do you use for e-learning?

Question 3 - m-computing and m-learning

i Attitude toward m-computing: What is your attitude toward mobile computing?

ii Attitude toward m-learning: What is your attitude toward mobile learning?

iii Student use of m-learning in the classroom: Do you agree or disagree that students should be allowed to use their mobile devices inside the classroom to facilitate the learning process?

Question 4 - Barriers

i Barriers facing m-learning: What barriers do you see in applying and using mobile devices in the learning process?

ii Can Barriers be overcome?

Question 5 - Motivation

i What motivates you to use m-learning? / What would motivate you to use m-learning?

Question 6 - Advantages and disadvantages of m-learning

i What are the most important advantages of using mobile computing in education?

ii What are the most important disadvantages of using mobile computing in education?

4.7.1 Question 1 - Technology

4.7.1.1 Use of technology in learning and the learning process

When the participants were asked about using technology in learning as an educational technology, the majority responded that technology was useful, and they would like it to be integrated in teaching and learning activities in a limited phase. Most interviewees were in favour of its use as a tool that would supplement traditional teaching. In addition, some interviewees emphasised that technology should be used sensibly in order to avoid losing the many benefits of face-to-face interactions with students. They responded that the educational process should not be based only a system that might be disrupted. Furthermore, some interviewees who voted for the limited option believed that students were not yet ready nor mature enough to be fully independent in using the system. Hence, they voted to adopt both mobile and traditional methods. Other interviewees hesitated in deciding the outcome. Hence, they also voted for the limited option because they did not have evidence or faith that a fully engaged system would be able to take over completely. Almost a third of the interviewees voted in favour of a fully integrated educational system, stating that because students nowadays are mature enough and sufficiently aware of technology, they could be trusted to use it responsibly, thus following in the footsteps of western mobile learning initiatives.

Interviewees who voted to ban the technology did not have confidence in the technology and did not believe that it would be beneficial for the educational process. Furthermore, they believed that the use of current technology could be disruptive. The results were as follows: 31% = fully engaged, 4% = banned and 65% = limited.

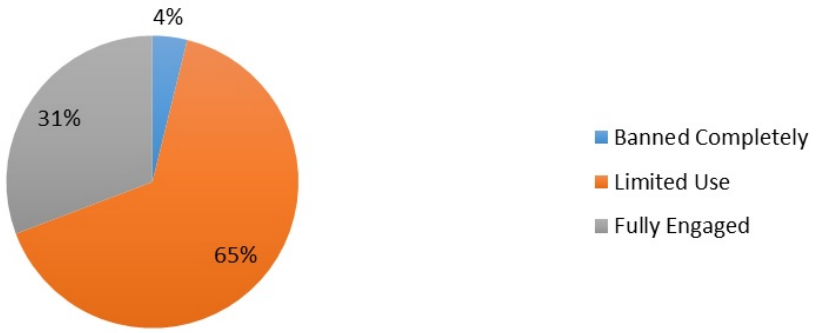


FIGURE 4.3: Opinion on the Use of Technology in Learning and the Learning Process.

4.7.2 Question 2 - E-learning

4.7.2.1 Use of e-learning

The interviewees voted as follows: 88% = Yes and 12% = No. This interview question was asked to determine whether the interviewees used e-learning tools in their current teaching practices. Many interviewees responded that they had used some e-learning applications, which was a positive indication of their readiness to adopt m-learning, especially if it were a self-initiative that was not enforced by the university. However, the application of e-learning is basic. In comparison, approximately one-third of the interviewees responded positively at KU, which mandates the use of e-learning as part of its learning management system (LMS). It is worth mentioning that the lecturers at the AOU had adopted e-learning because of the university's regulations; otherwise, they would not have used e-learning tools. Furthermore, the AOU interviewees pointed out that the Ministry of Higher Education had mandated that 80% of teaching must be face-to-face, which limited the development of e-learning and other activities beyond blended learning. Very few interviewees stated that they had extended the use of e-learning applications to mobile devices in basic forms (Figure 4.4), such as emailing students, taking attendance, making announcements over social media. Twelve per cent of the interviewees did not use e-learning for various reasons, the strongest of which were lack of training and infrastructure and the belief that it would not be beneficial in teaching their subject. Based on this finding, it is concluded that e-learning is premature in Kuwait.

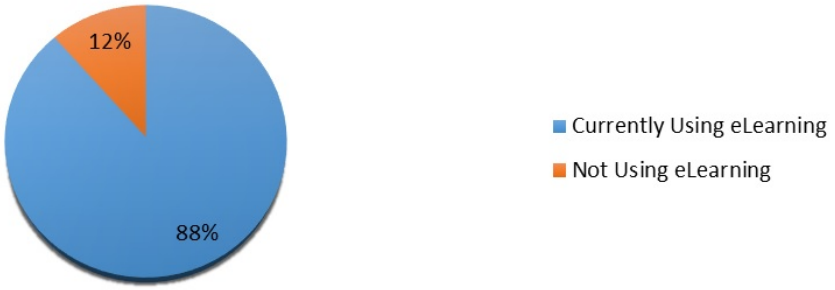


FIGURE 4.4: Current Level of E-learning Use by Academic Staff in Kuwait.

4.7.2.2 E-Learning application use

Figure 4.5 shows the most common uses of e-learning applications currently used in Kuwait at the time of these interviews. some LMS applications such as blackboard include multiple features, but this research attempted to identify the features used by the educators.

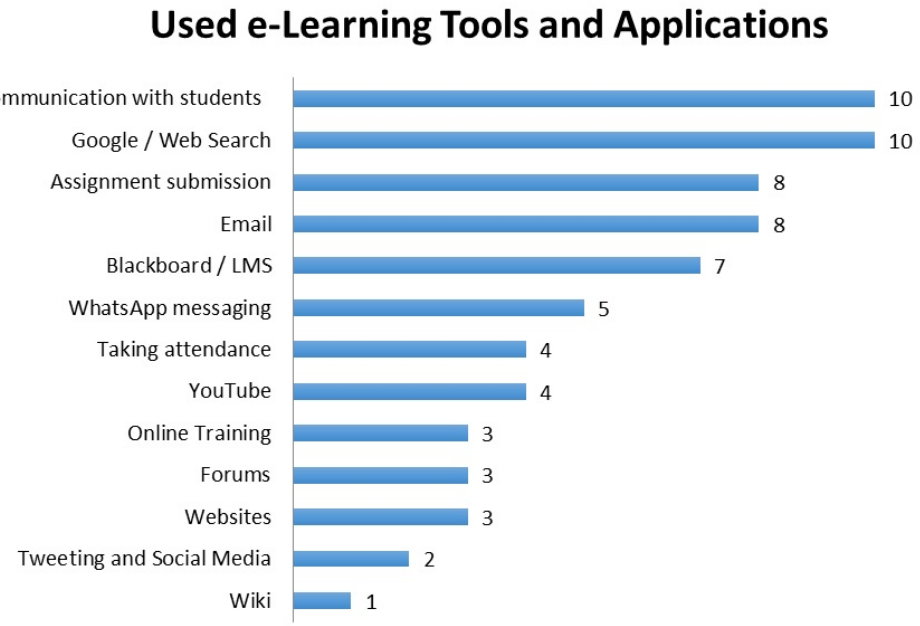


FIGURE 4.5: Used e-learning Tools and Application.

Table 4.2: Clarification of the used e-Learning tools and Applications

Application	Clarification
Communication with students	Mainly general announcement communications for class cancelations...etc.
Google / Web Search	Online web search
Assignment submission	Submission of assignments online
Email	Using email services
Blackboard / LMS	Use of a Learning management system or Content management system hosting educational materials and allowing other features.
WhatsApp Messaging	Mobile Internet Messaging for announcements and communication
Taking attendance	Using an electronic/mobile system to log and take attendance
YouTube	Using online video posting
Online Training	Providing online training (complex uses and simple training from a specific website)
Forums	Interacting with students in online Forums to address issues or questions
Websites	Building personal websites
Tweeting and Social Media	Sending Social Media announcements and interacting with students and their feedback
Wiki	Collaboration knowledge environment use

4.7.3 Question 3 - m-Computing and m-learning

4.7.3.1 Attitude toward m-computing

This question asked the interviewees to share their views on m-computing in order to ensure that they understood the term m-computing term and to determine their attitude toward it. Figure 4.6 shows that all responses (100%) to this question indicated a positive attitude toward m-computing. They were aware of the uses of m-computing beyond mobile phones as well as its classical uses. None of the interviewees responded negatively or inconclusively.

4.7.3.2 Attitude toward m-learning

This question asked the participants to share their views on m-learning to ensure that they understood the term and to determine their attitude toward it. As shown in Figure 4.6, 96% of the responses were positive. The remaining 4% of responses were negative, which is a negligible amount. These responses indicated that these interviewees

distrusted the use of technology in education, and they favoured traditional teaching methods. None of the interviewees' responses was inconclusive.

4.7.3.3 Student use of m-learning in classroom activities

A specific and critical question asked about expanding the use of mobile learning to the classroom. Approximately half of the interviewees were in favour of the limited or conditional use of mobile devices in classroom activities. They gave several reasons for their responses: avoiding student distractions, wasting time, enabling students to benefit from interaction with the lecturer, especially in face-to-face contact. Additionally, some interviewees favoured the limited use of m-learning until trials demonstrated that m-learning was useful in classroom activities and that students and the educational culture accepted this change. Twenty-seven per cent of the interviewees voted for the full use of m-learning in the classroom because of the benefits that could be gained from the appropriate use of mobile devices and related applications. They also responded that the students were mature enough not to be distracted by the misuse of the devices. Fifty-four per cent of the interviewees voted for conditional status, and 19% voted "No".

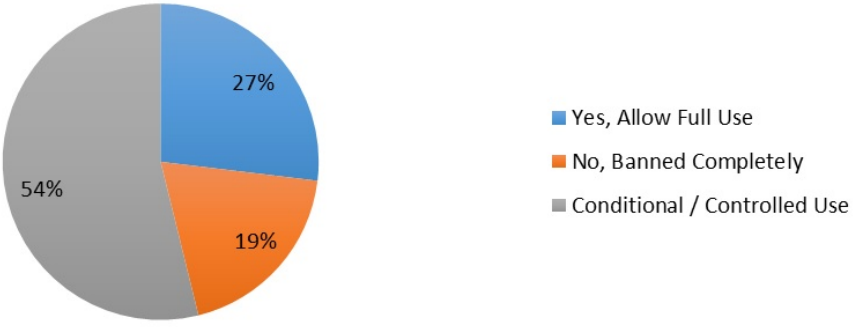


FIGURE 4.6: Opinions about the Use of Mobile Learning

4.7.4 Question 4 - Barriers

4.7.4.1 Barriers facing m-learning

The interviewees were asked to identify the possible barriers to the adoption of m-learning in Kuwaiti higher education institutions. Figure 4.7 clearly shows each challenge and its weighted responses.

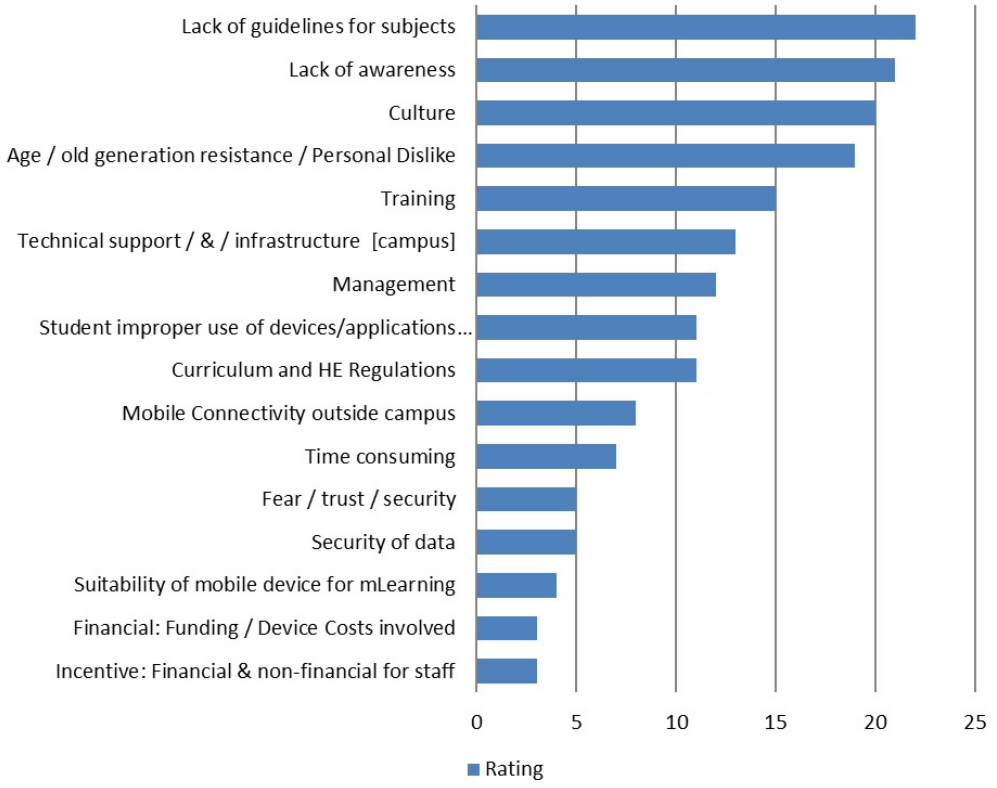


FIGURE 4.7: Opinion about the Barriers Facing the Mobile Learning.

Challenges	Justifications
Lack of guidelines for subjects	The absence of clear advice in where and how to implement mobile learning as an educational technology as part of teaching and learning strategy
Lack of awareness	The lack of efforts in promoting the potential uses and benefits in mobile technology in education across different levels; management, regulators, lecturer, students, and community
Culture	These are factors affecting the cultural interactions: such as: Male to female interactions;
	Misconception regards distance learning as low quality learning.
	Lecturers are reluctant in in falling into informal interactions with students outside educational topics [along with social and cultural pressures];

	Smart mobile Devices are viewed by the culture as entertainment devices and not as an educational tool.
Age / old generation resistance	Fear of using new technology and trying new approaches due to the efforts involved, lack of knowledge and due to the digital divide between student and lecturers which makes some lecturers avoid embarrassment and stick to traditional teaching methods.
Training	Lack of institutional training and availability of learning resources on how to know-how to use and manage m-Learning as part of the teaching and learning strategy.
Technical support / and / infrastructure [campus]	Availability of resources and infrastructure hosting, deploying and using the m-Learning initiative such as a LMS, networking, mobile applications, Internet or network connectivity. This infrastructure requires supporting the system and staff / students using the system
Management	Management lack of initiative propagation. Along with the management being composed from an older generation which are resistive to modern technology and are unaware of its potential.
Curriculum and HE Regulations	Curriculum design and regulations have not been modernised to suit current technological standards and teach styles
Student improper use of devices/applications	Availability of mobile data outside the campus
Time consuming	Feeling that trying to implement m-Learning will be very time consuming (all factors relating to m-Learning)
Security of data	The security of the data from improper access and or infrastructure unavailability / System crash
Fear / trust / security	Fear and distrust in the use of technology that it would undermine the teaching. E.g. a lecturer of politics unable to freely give examples from fears of his ideas being misinterpreted or exploited to label them as politically motivated or being upon the opposition.

Suitability of mobile device for m-Learning	Suitability of mobile devices for m-Learning: in general, and in particular to certain disciplines
Financial	Not having a financial capability to implement and higher funding furthermore the device costs concerns involved.
Incentive	Financial & non-financial for staff

TABLE 4.3: The top challenges identified by over 50% response of the sample size

4.7.4.2 Can barriers be overcome?

Despite the barriers shown in Table 7.1, the majority were optimistic that the barriers could be overcome and that m-learning could be implemented. A small number of interviewees did not answer this question, as they did not feel that they had enough knowledge about m-learning, or they were not interested in the topic. The results showed that 92% answered "Yes", 8% did not answer the question and 0% answered "No".

4.7.5 Question 5 - Motivation

What motivates you to use m-learning? / What would motivate you to use m-learning?

The findings indicated that the interviewees would likely want to overcome the major challenges mentioned earlier in order for them to be motivated to include m-learning in their teaching and learning strategies. They also wanted clear evidence that mobile learning would have a positive impact on the teaching and learning process. Moreover, the interviewees were likely to be encouraged to explore the possibility of including mobile learning if there were a demand from their students for it.

Additionally, most interviewees wanted the top management to decide that m-learning should be integrated in higher education. The interviewees felt that making m-learning optional would not improve the low adoption rates, especially in the early stages of the m-learning initiative, which the interviewees at AOU particularly emphasised.

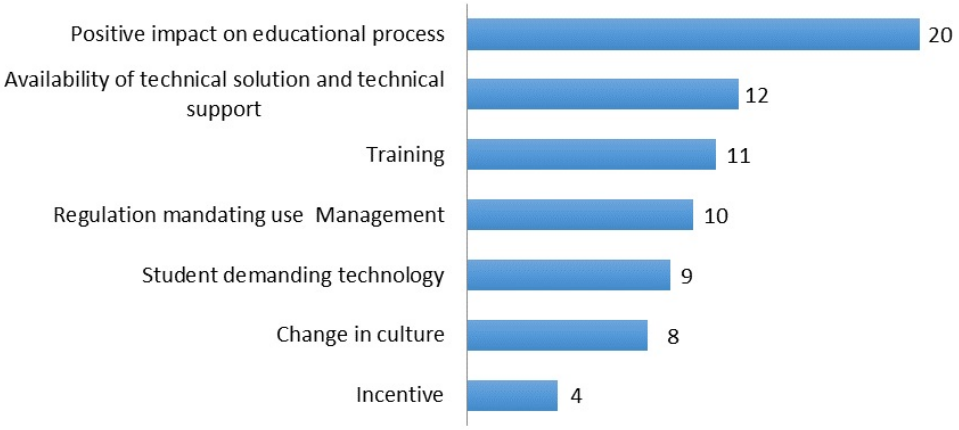


FIGURE 4.8: Opinion about the Barriers Facing the Mobile Learning.

TABLE 4.4: The rationale behind staff motivation for m-learning use

Staff Motivation	Justification
Positive impact on educational process	Being able to see and trial the effects of m-Learning on teaching and to recognize its positive impact
Availability of technical solution and technical support	Having the right tools, technical solution and technical support
Training	Being provided by training on m-Learning
Regulation mandating use Management	Having institutional regulations and management mandating the use of m-Learning from staff
Student demanding technology	Having students demand m-Learning from Academics
Change in culture	Culture being more accepting of mobile devices and mobile communication as m-Learning and as a learning tool.
Incentive	Being provided with incentives (financial and or non-financial)

4.7.6 Question 6 - Advantages and disadvantages of m-learning

Most of the interviewees were aware of the general advantages of m-learning, as shown in Figure 4.9. The disadvantages they cited are shown in Figure 4.10. The Figure clearly shows specific advantages of m-learning for specific subjects; moreover, the disadvantages reflected the lack of awareness of m-learning. For example, none of the interviewees, especially those in engineering disciplines, failed to highlight the use of mobile devices, such as a stopwatch, as a measurement tool or experimental apparatus.

4.8 Comparison With Findings From the Literature

A similar investigation was carried out in a recent study (Aldhafeeri and Alajmi, 2016), which explored the *"Current status of mobile learning at KU by providing data on the real use of mobile learning technologies by faculty members and the different aspects of such usage"*. According to the authors, their research was based on the fact that, despite the

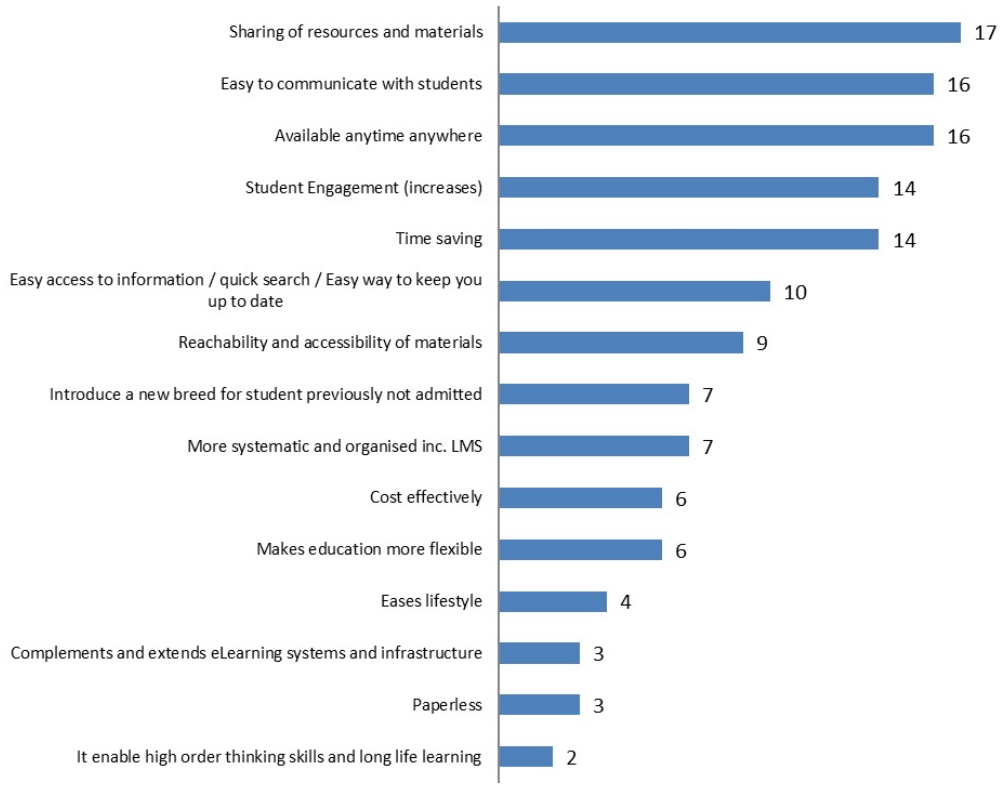


FIGURE 4.9: Advantages of Mobile Learning (Lecturers' Perspective).

big investment made by KU in technology to support the educational processes, *"there has been a clear retraction by faculty members and a lack of initiation and continuity in using the available electronic facilities for educational purposes which could cause a real waste of money and effort"*. According to Aldhafeeri and Alajmi (2016), only 15.6% of the academics at KU who participated in the study used some form of mobile content sharing with their students. The study also showed that only 4.3% of the participants used mobile devices to view students' work in progress. However, with regard to announcing grades, based on the students' preference to know their grades as soon as possible, 34.8% of the academics used some form of mobile communication for this purpose.

The study also provided evidence of the barriers and obstacles that face mobile learning at KU. Although the university provides all necessary resources and technology, 70% of the academics claimed that the university did not offer any motivation or incentives to encourage faculty to use mobile learning. In addition, most of the academics stated that they had the skills to use the provided technology; however, 57% of the participants pointed out that there was not enough training for students on how to use the technology.

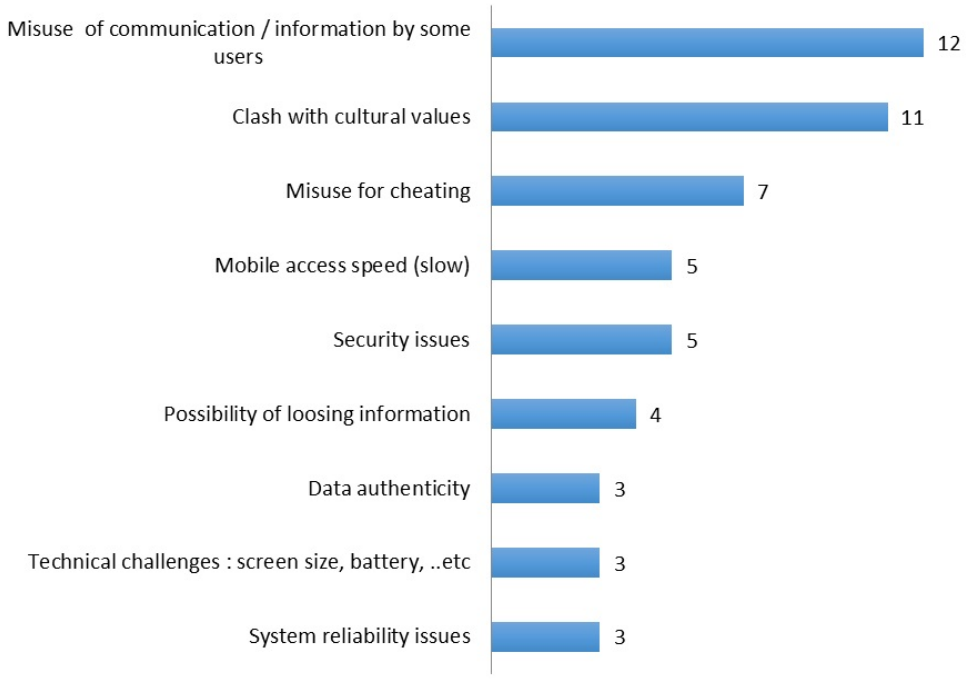


FIGURE 4.10: Disadvantages of Mobile Learning (Lecturers' Perspective).

Additionally, 47% of the participants responded that the university did not have clear policies regarding the use of m-learning, compared with only 20% who claimed that the university had some guidelines.

Another similar study was reported in (Al-hunaiyyan et al., 2016), which also investigated the perceptions of the students and the instructors toward the use of mobile devices in learning, and and the challenges associated with the implementation. A group of 132 instructors and 623 students from different Kuwaiti HE institutions were surveyed in this study. This study also concluded that there are positive perceptions from students and instructors toward m-learning, but highlighted the fact that there are some social and cultural issues that may act as barriers to m-learning implementation. The results of both studies confirm and align with the findings of Study 1, which are presented in this chapter. It is worth pointing out that the study presented in this chapter was conducted in 2012, whereas both of the studies shown above were conducted in 2016.

4.9 Discussion

The objective of Study 1 was to gather information from lecturers at Kuwaiti higher education institutions regarding the use of m-learning technologies and other information related to educational technologies and e-learning.

A limitation of Study 1 is that the small sample of lecturers was not sufficient to represent all opinions, particularly because most of the interviewees were selected through snowball sampling, and some interviewees were introduced by acquaintances of the researcher. However, the sample includes a wide range of age groups and subjects, which is representative of the ages and backgrounds of the academic staff teaching in Kuwaiti institutions.

The main findings of Study 1 showed that even e-learning applications were not implemented and practised on a wide scale and that the current applications used are basic with the exception of the AOU. Based on the results of this study, it could be concluded that mobile learning is not widely adopted in Kuwaiti universities. The lack of use is linked to several factors, including the lack of guidelines and awareness, cultural barriers, specialised training requirements, infrastructure readiness, and the opposition to change. The majority of the lecturers interviewed in Study 1, however, emphasised the need for national and institutional strategies for the implementation of m-learning, which they felt needed to be imposed by management.

The lack of awareness and training on how to implement m-learning in the classroom resulted in a lack of perceived benefits of m-learning in specific subjects by the lecturers interviewed. Furthermore, most of the lecturers who participated in this study viewed m-learning as a complementary to face-to-face teaching and learning.

It is worth mentioning that the majority of interviewees pointed out that both students and universities did not have issues with the cost of technology and infrastructure, particularly because Kuwait is a wealthy country. However, a budget has to allocate funds to support the implementation and utilisation of m-learning. The interviewees expressed that this could happen through improved awareness and support for m-learning by the management team.

4.10 Conclusion

Further recommendations are suggested to encourage the adoption of m-learning not only in Kuwait but also in other countries in the region. The regional adoption of m-learning could be facilitated by the following procedures:

1. Establishing m-learning centres inside each educational institution to provide training for faculty and students
2. Setting standards and criteria for the use of m-learning in different disciplines and subjects
3. Encouraging universities and higher education institutions to benefit from the availability of technological infrastructure.
4. Providing incentives to faculty members for the successful use of m-learning in their teaching
5. Promoting and supporting the use of mobile learning in subjects involving field work in particular.

Chapter 5

Study two: the comparative and field study

5.1 Introduction

The second year of the doctoral research project was focused on designing and conducting a set of experiments aimed at investigating the uses of m-learning applications in a Kuwaiti higher education setting in order to identify the main challenges to their implementation. Based on the findings of Study 1, in Study 2, students used the m-learning application installed on their mobile devices during their fieldwork activities to complete their assignments, to interact with their teachers and fellow students, and to use the GPS facility.

The system prototype adopted in this study was based on existing communication technology, which was easily installed. The type of m-learning application considered in the current research could be used on most commercially available mobile devices with either the OS X operating system (e.g., iPhones, iPads and MacBooks) or the Android OS. These operating systems ensured that real-world issues were addressed by the study. The experiments involved a close examination of an m-learning scenario using one of two mobile applications, WhatsApp and OurViews/SharedWalk.

5.2 Aim and Objectives

1. To evaluate the trends in m-learning among students and teachers.

2. To evaluate the flexibility of revolutionised learning techniques.

3. To determine whether the positive results favour WhatsApp or OurViews/SharedWalk.

5.3 Methods

5.3.1 Background

In May and June 2013, the researcher discussed possible options for conducting the experiment, particularly in terms of which academic departments and subjects to select for the purposes of testing the OurViews application. It was agreed to begin the experiment at the start of the 2013–2014 academic year on 24 September, partly to avoid clashing with the Muslim holy month of Ramadan, which was in July and August 2013.

Two institutions were considered as the experimental setting: Kuwait University (KU) and the Public Authority for Applied Education and Training (PAAET). It was agreed that the modules that included a significant element of fieldwork in their remit would be the most suitable for the purposes of this experiment.

The initial query was made in May and June 2013 at the Department of Architecture (part of KU's School of Engineering). Specifically, Teacher One, a lecturer in the department, was contacted by email regarding his participation in the experiment. He immediately expressed interest and suggested that the researcher approach him in September at the start of the 2013-2014 academic year.

Between May and September 2013, the OurViews application underwent further development, mainly the iPhone version of the application. The as Android version was relatively ready. The researcher travelled to Kuwait at the end of the summer to prepare for the experimental phase of Study 2.

On 24 September 2013, the beginning of the academic year in Kuwait, the researcher met with Teacher One. Despite his initial enthusiasm, Teacher One said he was no longer able to participate in the experiment, as none of the modules he was delivering included elements of fieldwork. However, he advised the researcher to contact Teacher Two, a lecturer colleague in the same department. A meeting was duly arranged, during which Teacher Two declared he would only be available to take part in the experiment

for two weeks. Because this period was not sufficient to train the students in how to use the application, the researcher decided to find another participant.

Because of these initial contacts, the researcher realised that it would be highly recommended to recruit as many lecturers with as many groups of students as possible to avoid issues of unreliability or changes in circumstances. The researcher made several enquiries that led to recruitment of five lecturers in five different departments in two institutions, KU and PAAET. The following subsection provides a detailed account of the experimental process in the Geology Department. To avoid excessive repetition, the equivalent processes conducted in the other four departments are summarised.

5.3.2 Geology Department, KU

After the initial setbacks encountered with Teacher One and Teacher Two, the researcher requested a meeting with Teacher Zero, the Head of the Geology Department (part of KU's School of Science), who expressed great enthusiasm for the project.

The researcher contacted many faculty members without success, as they declined to participate in the study. The researcher then requested another meeting with the head of department to inform him of the lack of progress. Teacher Zero again expressed his support and recommended the environmental geology module, which was ideally suited. He also suggested that he would consider integrating the use of the application into his course delivery on a long-term basis if the experiment was successful.

Consequently, a further meeting was arranged with the students, which was followed by a question and answer session. The students were intrigued with the OurViews application. The researcher highlighted that OurViews was the only application that allowed the user to integrate text, photo and video content) into a single posting, thus helping avoid the time lapses that sometimes arise in group conversations.

At the end of the session, 13 students indicated that they were willing to participant in the study. They then installed the software. However, at the next lecture, two students withdrew from the experiment because they did not have a compatible smartphone.

The researcher then asked the remaining participants to conduct a test run of OurViews. Unfortunately, of the 11 students in the class, only four managed to run the application successfully, while the remaining seven failed to run the application correctly, and they encountered technical issues. This issue seemed prevalent in the iPhone version of the application.

Activity: In the experiment, the students used OurViews or WhatsApp on their smartphones to document appropriate information about the site. After reflecting on how the experiment could be conducted in the geology class, Teacher Zero decided to split the students into five thematic groups, each of which would visit a different site for their field work activity. The sites included a landfill, a power station, a paper recycling unit and a sewage treating plant. The teachers were encouraged to check their SharedWalk accounts frequently to monitor the progress of their students and issue further instructions if necessary.

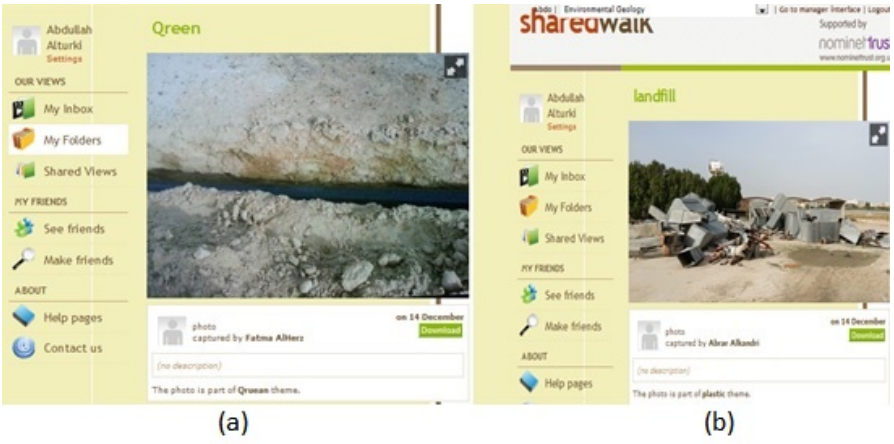


FIGURE 5.1: Fieldwork OurViews pictures posted by Geology class students on SharedWalk.

The screen shots shown in Figures 5.1 (a) and 5.1 (b) show images of the Qreen landfill site), which were posted by two students in the geology class to their SharedWalk online space.

Figure 5.2 shows some uses of WhatsApp by the geology students during the activity. In these images, the teacher is trying to provide the students with the necessary information in order to help them successfully conduct the task and receive the students' feedback.

Results: Interviews and a questionnaire were used in the experiment, which were conducted in the five departments. The results are shown below.

OurViews Group: The students expressed satisfaction with the OurViews application, but they also requested more interactivity between SharedWalk and OurViews.

WhatsApp Group: The WhatsApp students provided very little feedback on their experience of using the application during the site visit. Some students used WhatsApp to exchange technical information, and the teacher —who was visiting another site—replied with some pictures of his own.

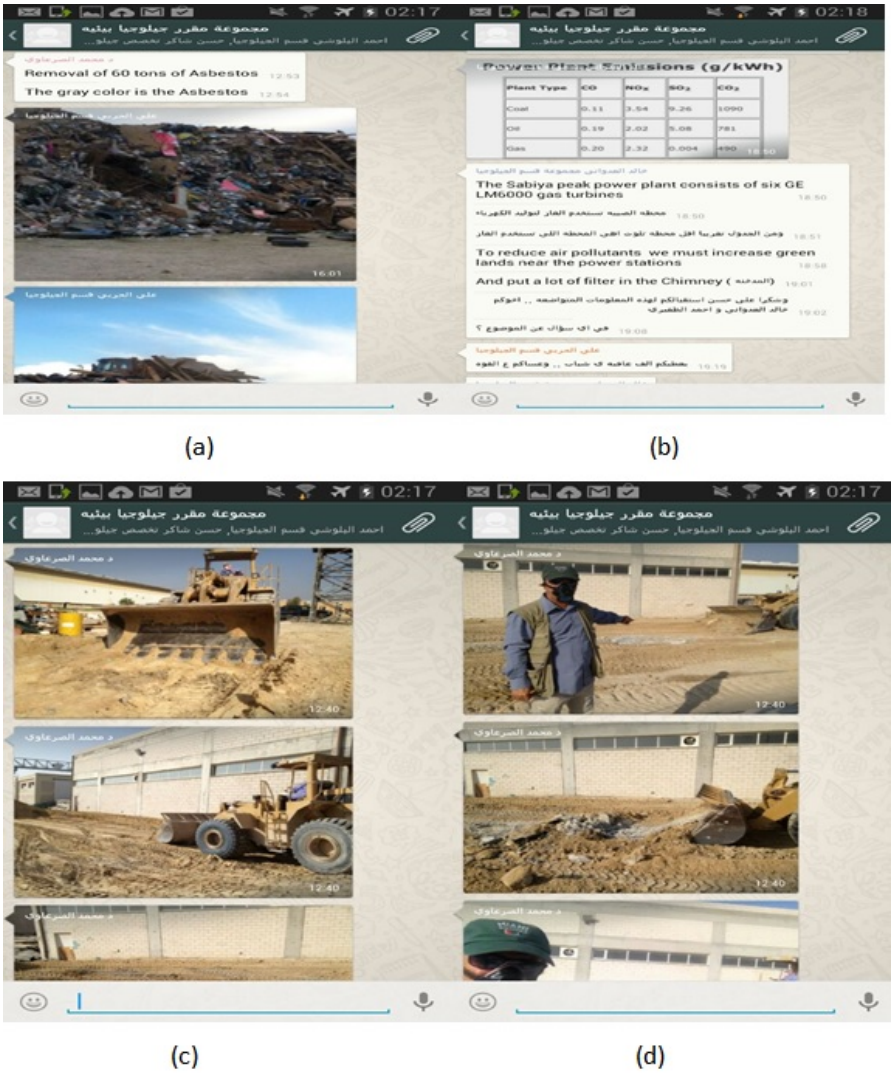


FIGURE 5.2: Examples of fieldwork by Geology students and teacher.

5.3.3 Media educational and communication class, Education Department at KU

The researcher approached Teacher Three, a lecturer in the Education Department at KU. In November, the researcher gave a PowerPoint presentation of OurViews. After Teacher Three's lecture, the researcher delivered the presentation to the students, who expressed enthusiasm for the experiment and the application.

Activity: For the purposes of Study 2, the teacher asked the students to visit the gardens in the university grounds and take photos and videos that were accompanied by observations that related the pictures to their particular study theme (Figure 5.3.

Results: Although the students were very enthusiastic about using OurViews, both the students and the teacher expressed that the use of WhatsApp would not be possible for the purposes of the experiment. This was attributed to the educational culture of privacy issues; the class included 21 female students. The lack of support in the Arabic language in OurViews was also highlighted by many participants.

FIGURE 5.3: Fieldwork pictures taken by media.

5.3.4 Mechanical engineering fieldwork (PAAET)

The researcher approached the Head of the Mechanical Engineering at PAAET, who forwarded the query to the Head of Fieldwork, Teacher Four. The researcher delivered the presentation, and one of the teachers, Teacher Five, volunteered to take part and invited the researcher to his class of five (male) students. Three students chose to use OurViews, and the remaining two students chose to use WhatsApp.

Activity: The students were asked to take photos and videos of various aspects of a desalination plant. Students were split into four groups, each of which focused on an aspect, or theme, of the station: the boiler, the intake area, the recarburation plant and the desalination plant.

Results: During the site visit, some students used WhatsApp to seek feedback from the teacher. The teacher also used WhatsApp to communicate instructions to the students. However, some students who had initially chosen to use OurViews eventually switched to WhatsApp because they encountered technical difficulties in using the former application.

The teacher asked the students to document their visit by identifying various units of the sites they had visited. Figure 5.4 illustrates two videos taken by students during the fieldwork visit to the water-treatment plant.

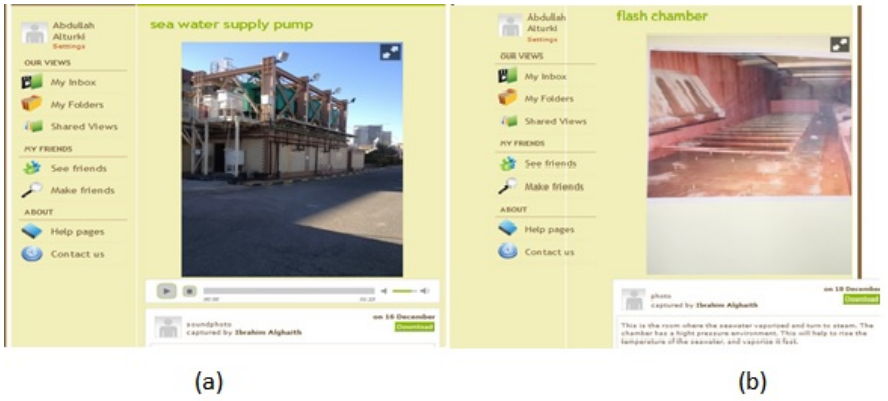


FIGURE 5.4: Fieldwork videos recorded using OurViews.

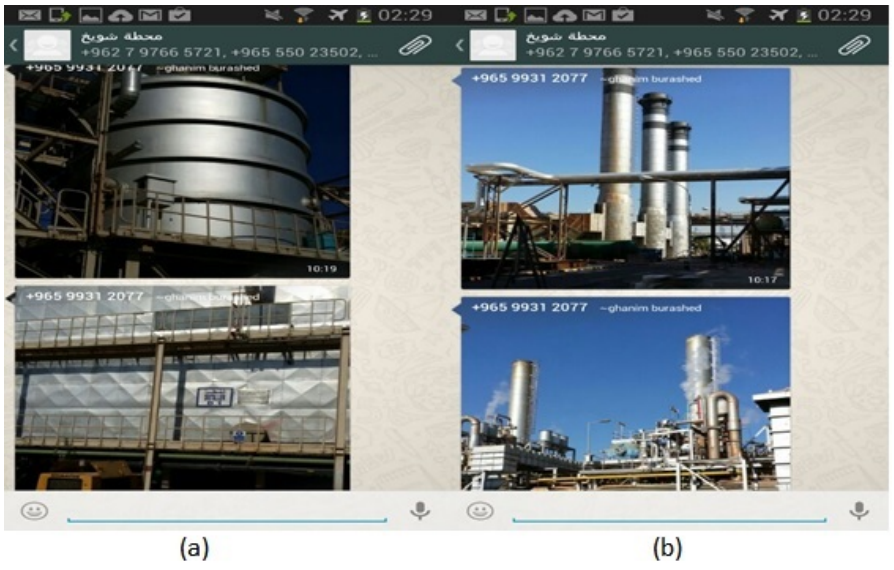


FIGURE 5.5: Photos documenting fieldwork visit taken by mechanical engineering students.

5.3.5 Photography (PAAET)

The researcher approached a personal acquaintance, Teacher Six, a lecturer in the Photography Department, who expressed enthusiasm for taking part in the experiment. The process was identical to that undertaken in the previous groups.

Activity: The students were split into two groups, each of which visited one of two locations: a traditional market and a beach. They were then asked to document their visit to the site using photos and videos, as shown in Figure 5.6.

Results: However, the students in both the OurViews and WhatsApp groups brought their professional cameras to take most of the photos because the applications were not

capable of producing professional photographs.

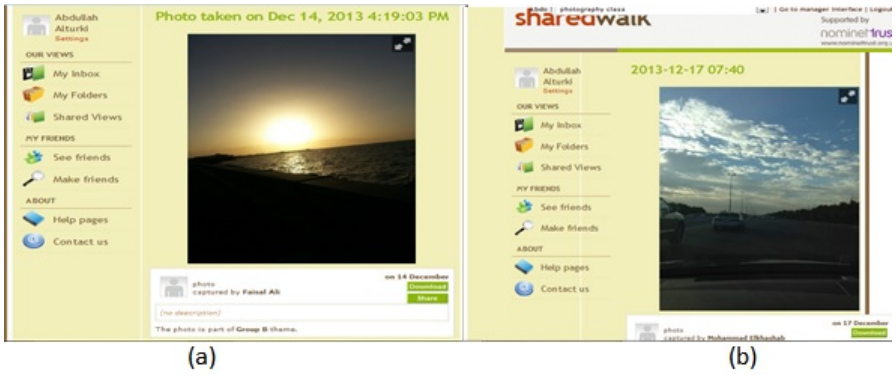


FIGURE 5.6: Fieldwork OurViews photos posted on SharedWalk.

Consequently, the students used WhatsApp mainly to communicate among themselves and comment on the photographs they took. Three students used WhatsApp to ask questions among themselves. Figure 5.7 illustrates some of these exchanges.

FIGURE 5.7: Examples of WhatsApp interactions between photography class students.

However, the teacher did not engage with the students through WhatsApp and did not join the WhatsApp group.

5.3.6 Introduction to Design - Civil Engineering (KU)

The researcher met with the Head of Civil Engineering Department, who recommended several colleagues as suitable participants in the experiment, all of whom declined because of personal commitments. However, Teacher Seven agreed to participate and his

class was then divided into a WhatsApp group (23 students) and an OurViews group (15 students).

Activity: The students were divided into seven groups. They were asked to document the exterior and interior design features of a building of their choice.

Results: The WhatsApp group used the application to ask questions among themselves but failed to forward any queries to the teacher. The teacher did not show motivation to engage with the students through the application. Moreover, the nature of the content posted by the students indicated their reluctance to share information about their work with their colleagues. This was attributed to the competitive nature of the activity and the fact that OurViews did not offer a private posting option.

5.4 Participants

In total, 94 male and female undergraduate students took part in the experiment. As explained above, all participants were at one of the two principal governmental higher education institutions, KU and PAAET. The participants were split into two groups as shown below. The students were invited to be interviewed. Of the 50 students who used the OurViews & SharedWalk application, 18 agreed to be interviewed. Only 10 students of 44 students who used the WhatsApp application agreed to be interviewed. In addition, all five lecturers in charge of the five groups agreed to take part in the interviews to share their reflections about the experiment and the uses of m-learning technology in general.

Table 5.1: Breakdown of participants according to Subject, Department, Group and Gender.

Subject	Department (Institution)	OurViews/SharedWlak Group			WhatsApp Group		
		Students	Male	Female	Students	Male	Female
Photography	Educational Technology (PAAET)	7	7	0	12	12	0
Introduction to Design	Civil Engineering (KU)	15	0	15	23	0	23
Media Educational Communication	Education College (KU)	21	0	21	0	0	0
Mechanical Field Training	Mechanical Engineering (PAAET)	3	3	0	2	2	0
Environmental Geology	Geology and Environment (KU)	4	2	2	7	1	6
Total		50	12	38	44	15	29

5.5 Results

The data were analysed using both quantitative and qualitative methodologies. All the comments provided by the participants regarding their experiences were analysed and classified according to selected criteria. The following keywords were used in the participation discussions: motivation or motivating referred to whether m-learning motivated students; effectiveness referred to whether the application successfully fulfilled the tasks; beneficial referred to whether the application delivered advantages to the user; awareness referred to whether the application increased the user's awareness of m-learning; management or administration referred to the managerial and administrative aspects of Kuwaiti higher education institutions; barriers referred to the obstacles encountered while using the m-learning application; flexibility referred to the various ways in which the application could be used. Table 5.2 presents the feedback provided by the five teachers regarding m-learning technology in general.

The following feedback was provided by five teachers:

- Four teachers believed their students had the required motivation and enthusiasm to adopt new technologies in their daily lives.
- Four teachers believed that mobile phones were appropriate devices for use in m-learning applications.
- Three teachers believed that knowledge acquisition by students was enhanced by m-learning compared to the traditional process.
- Four teachers believed that blended learning was the most suitable approach in the Kuwaiti context.
- Three teachers believed that the WhatsApp application needed modifications, particularly in terms of its privacy and anonymity features, before it would be suitable for m-learning in Kuwait,
- Four teachers believed that OurViews was more suitable for the learning process than WhatsApp was, but they also thought that it required modifications.

Table 5.3 summarises the views of students and teachers in different subject areas and stages of their academic courses regarding the use of m-learning technology in general. This sample included 33 participants (5 teachers and 28 students). The bar chart in

TABLE 5.2: Summary of teacher feedback on m-learning indicating the themes and nature (agree/disagree) of the answers.

Main Keyword/themes	Total No. of Respondents	Agree	Disagree
M-learning is Motivating, Effective, Useful, Beneficial	4	3	1
Mobile devices are suitable for learning purposes	5	4	1
M-learning technology enhances the learning process	3	2	1
Technology plays an important role in education	5	4	1
M-learning increases knowledge	4	3	1
M-learning saves time	4	4	0
No financial problems faced by students to acquire devices	5	5	0
M-learning increases awareness	3	3	0
M-learning faces challenges	5	5	0
More training and practice required	5	5	0
Need for technical Support	3	3	0
Need for administrative changes	4	3	1
There are social barriers to m-learning	5	4	1
M-learning should be a support tool (part of blended learning)	5	4	1
WhatsApp needs more privacy and security features.	4	3	1
Focus should be on quality of learning and not quantity	2	2	0
OurViews more suitable for fieldwork than WhatsApp	5	4	1
WhatsApp has more features and flexibility	5	5	0
WhatsApp is more suitable for group work	4	4	0
Decision makers are a barrier to m-learning success	5	3	2
OurViews is better for categorising/organising content	3	3	0
WhatsApp has a gallery	4	3	1
WhatsApp can be used on most modern devices	4	4	0
WhatsApp is a more stable application	5	4	1
Internet connectivity issues in Kuwait	2	2	0

Figure 6.8 shows the number of participants that agreed or disagreed with the items shown in Table 5.3.

TABLE 5.3: Summary of student and teacher feedback on m-learning indicating the themes and nature (agree/disagree) of the answers.

Main Keyword/themes	Total No. of Respondents	Agree		Disagree	
		Mentions	Percentage	Mentions	Percentage
M-learning is Motivating, Effective, Useful, Beneficial	33	22	76%	7	24%
M-learning technology enhances the learning process	33	19	79%	5	21%
Technology plays an important role in education	33	21	78%	6	22%
M-learning increases knowledge	33	30	97%	1	3%
M-learning saves time	33	9	56%	7	44%
No financial problems faced by students acquiring devices	33	8	100%	0	0%
M-learning increases awareness	33	6	60%	4	40%
M-learning faces challenges	33	18	69%	8	31%
More training and practice required	33	17	59%	12	41%
Need for technical Support	33	15	79%	4	21%
Need for administrative changes	33	14	82%	3	18%
There are social barriers to m-learning	33	11	79%	3	21%
M-learning should be a support tool (part of blended learning)	33	21	68%	10	32%
M-learning technology enhances the learning process	33	24	86%	4	14%

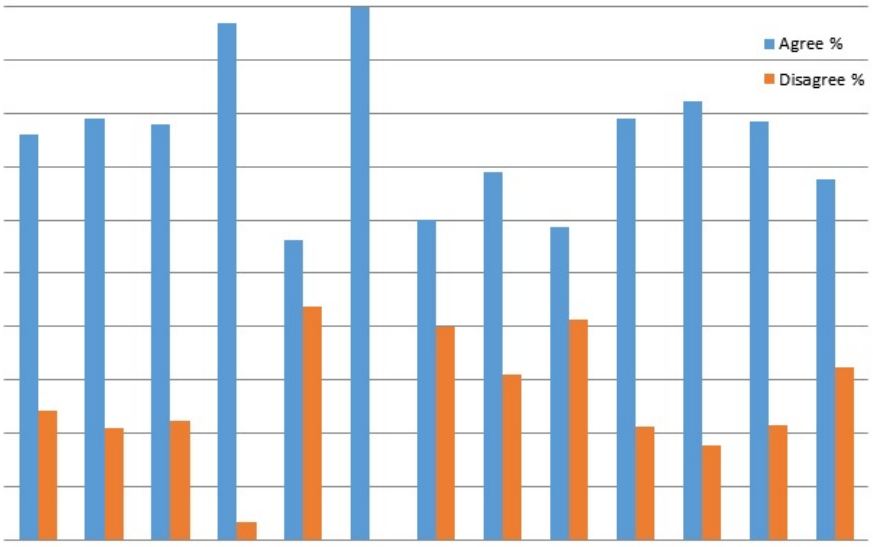


FIGURE 5.8: Bar chart illustrating the breakdown of participant responses with regard to various aspects of m-learning.

The views of 28 students and five teachers in different subject areas and stages of their academic courses were analysed regarding the use of m-learning technology. The findings were as follows:

- 29 participants mentioned "motivation" and 22 agreed that m-learning helped motivate students.

- 27 participants mentioned m-learning in the context of "enhancing attitudes toward learning; 21 participants agreed.
- 29 participants mentioned challenges to m-learning; 17 agreed that these existed, specifically Internet access and social and financial barriers; 12 participants disagreed.
- 14 participants mentioned the importance of better management of higher education in Kuwait; 11 participants agreed and 3 participants disagreed.

5.5.1 Interview responses: OurViews/SharedWalk

Data were collected in interviews with 18 of the 50 students who used the OurViews and SharedWalk applications. The findings were as follows:

- 17 students mentioned "user-friendliness and simplicity" in relation to OurViews; the majority agreed.
- "Usability" was defined in terms of the extent to which the application was considered to be easy to use and to offer useful features; 16 participants specifically highlighted the lack of an "automatic save" option in the OurViews application.
- 11 students agreed that interactivity was a key aspect of OurViews.

Table 5.4 shows the data collected from the interviews with the students who used the OurViews and SharedWalk applications. As mentioned above, 18 students took part in these interviews.

The following quotes is a sample of real value of interview studies: section B.5 shows more details about interviews quotes.

The interview with Student 1 about Ourviews/Sharedtalk

Q1: **How do you see the mobile phone in general and why do you use it?**
It's a very good device and it's indispensable these days, I can use it for entertainment and for formal issues.

Q2: **What about Ourviews/SharedWalk?**
It's good but I faced some problems in changing the username and password, and you can't take a picture from your archive system, and the pictures are not clear enough after I take them.

TABLE 5.4: Summary of OurViews/SharedWalk group interview responses regarding the application's features.

Main Keyword/themes	Secondary Keyword	Agree	Disagree
User-friendly and Simple to use		9	8
Usability	Automatically saves work	2	16
	Allows users to edit content	3	13
	Saves time	14	4
	Ability to resize objects	4	3
	Library and Gallery features	0	18
	Ability to save work	16	2
	Offers timeline/chatting features	0	16
	Access on one device	0	15
Is interactive		11	7
Enhances learning experience		15	3
Encourages reflection		13	5
Improves learning outcomes		11	7
There are social barriers		10	8
There are challenges		10	8
Need for more training		11	7
Need for technical support		7	6
Works on all types of devices		6	12
Supports privacy		13	5

Q3: **What does the Ourviews/Sharedwalk need, to be a perfect application?**
The application is not bad but solve the problems which I mentioned before and that will help.

Q4: **Do you think we should take the gender issues into consideration when we use social or mobile application such as Ourviews/Sharedwalk or Whatsapp?**
I think sometimes, yes, in our country and region; however, some other people don't care and it's okay for them regardless of the genderof the person. I might use the application sometimes regardless of the gender norms just for formal issues such as learning but not for social issues or for daily use.

Q5: **Please honestly, do you think the Ourviews/SharedWalk application is suitable as a mobile learning application or not?**
I need more practice on it to be more useful with my advice. Our professor should be more available to help us because this application is not easy and it will take more practice to get used to it. In the future if I have no another choice I will use the Ourviews/SharedWalk for some field modules but not for all. For taking

photos it's okay but for the other iaspects it is difficult to use. Our society does prefer it though.

The interview with Student 2 about WhatsApp

Q1: **Did you expect to solve all your problems by using WhatsApp for learning purposes?**
Yes, we solved all our problems and without any difficulties. The mobile application with WhatsApp was very good.

Q2: **Have you felt that there are some restrictions and barriers when using WhatsApp for learning purposes?**
I felt shy sometimes when I used WhatsApp to contact my teacher and colleagues. Sometimes the times were not suitable to answer the teacher or colleagues questions because we have exams and we want to study and so on. Teachers should give us a specific time and day to be ready for their questions .
The advantages of the mobile learning platform is if someone asks a question the answer from the teacher or a colleague will be useful for all the students in the group. It is important from a cultural perspective totakeinto account that I felt shy to interact sometimes and this is due to my culture. The mobile technology experiment was useful for us and we will be happy to use a mobile device for learning purposes.

5.5.2 Interview responses: WhatsApp

Data were collected from 10 students who used the WhatsApp application. The data analysis yielded the following findings:

- 80% of the students found WhatsApp to be user-friendly and simple to use.
- "Usability" was defined as the extent to which the application was considered easy to use and have useful features. All interviewees said that the "timeline and chatting" feature was very important and desirable.
- 80% of the students believed that the WhatsApp application could be used with a wide range of devices.

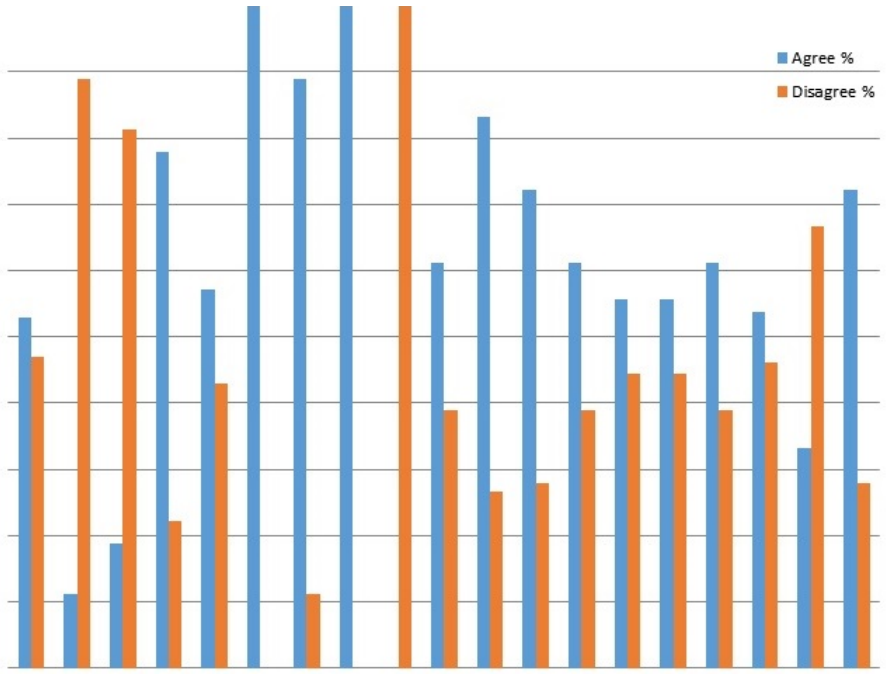


FIGURE 5.9: Bar chart illustrating the breakdown of OurViews/SharedWalk group interview responses with regard to various aspects of the application.

The following quotes are samples of real value interview studies: section B.5 shows more details about interviews quotes.

The interview with Student 3 about WhatsApp.

Q1: **How do you see the mobile in general and why you use it?**
It's a very good device and we can't live these days without mobile phones and mobile technology.

Q2: **What about WhatsApp and its use in mobile learning?**
WhatsApp is a good solution from more than one aspect, and we found it very easy and useful. We didn't face any problems while using it, maybe because we know the application from using it as social media application.

Q3: **Do you think we should take the gender issues into considerations when using WhatsApp?**
I think there are culture issues and some restrictions.We should perhaps make separate groups for females and for males if we wuse WhatsApp for learning purposes.It is not allowed in our culture to have males and females in the same groups.

The interview with Student 4 about WhatsApp

Q1: **How do you see the mobile in general and why you use it?**
It's a very good device but we should not depend on it all the time.

Q2: **What about WhatsApp and its use in mobile learning?**
WhatsApp is a good application but at the same time it has some problems such as the delay in receiving some of my colleagues'messages, also when I have many groups the gallery will become full due to the automatic downloads of photos which most of time we don't need and are useless. Our mobile phone memory becomes full of these unneccessary things.

TABLE 5.5: Summary of the WhatsApp group interview responses regarding the application's features.

Main Keyword/themes	Secondary Keyword	Agree	Disagree
User-friendly and Simple to use		8	2
Usability	Automatically saves work	7	3
	Allows users to edit content	8	2
	Saves time	9	1
	Ability to resize objects	7	1
	Library and Gallery features	10	0
	Ability to save work	9	1
	Offers timeline/chatting features	10	0
	Access on one device	8	1
Is interactive		9	1
Enhances learning experience		4	6
Encourages reflection		5	4
Improves learning outcomes		7	3
There are social barriers		8	2
There are challenges		6	4
Need for more training		7	3
Need for technical support		5	3
Works on all types of devices		8	2
Supports privacy		3	7

5.5.3 Questionnaire responses: WhatsApp group

When the questionnaires were completed and collected, the data were analysed. Every answer was assigned a value from 1 to 5 according to the level of agreement with the question. The mean and standard deviation of the results were calculated. The following results were derived.

- 25% had occasionally heard of mobile learning before the current experiment.

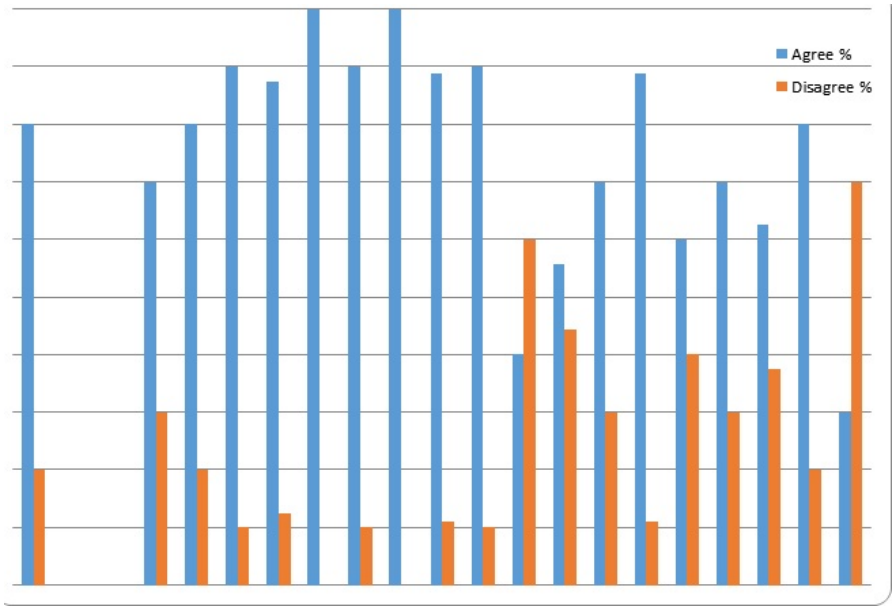


FIGURE 5.10: Bar chart illustrating the breakdown of WhatsApp group interview responses with regard to various aspects of the application.

- 36% had occasionally used m-learning educational programmes.
- 14% had never received encouragement from their lecturers to use mobile devices for learning purposes.
- 61% thought that WhatsApp's screen features and accessibility were excellent.
- 75% found that taking photos or videos and the registration process via WhatsApp were excellent.

The following results indicate the percentage of agreement with the statements.

- 34% believed that using WhatsApp was better than using traditional education methods alone.
- 48% thought that using WhatsApp made the curriculum easier.
- 66% thought that WhatsApp supported interaction among students.
- 5% found difficulties in using the additional features of the WhatsApp application.
- 5% found difficulties in writing comments to their colleagues.
- 8% were of the opinion that WhatsApp supported interaction between students and their instructors.

- 27% thought WhatsApp increased students' knowledge of the curriculum.
- 27% thought that using WhatsApp improved their performance.
- 38% found WhatsApp to be effective in saving students' time while performing in-class curricular tasks.
- 16% thought that mobile education technology could not only enhance but also replace traditional education methods.
- 10% needed more training to improve their skills in using m-learning tools.
- 27% did not approve of contact between males and females to exchange educational information in the context of m-learning applications.
- 16% experienced financial difficulties in acquiring new mobile devices, such as iPads, iPhones and Galaxy phones.
- 32% said they would use this application in the future especially for educational purposes.

Table 5.6 provides a detailed breakdown of these responses. Table 5.7 shows the mean values of the responses provided by the participants in the WhatsApp group.

These results are illustrated in Figure 5.13. The numbering of the answers (A1-A20) corresponds to that in Table 5.6.

5.5.4 Questionnaire Responses: OurViews/SharedWalk Group

The data collected from the responses to the questionnaire by the OurViews/SharedWalk group were analysed. The results showed the greatest level of agreement. Positive responses were given for encouragement, accessibility and taking photos. The responses to the questions about previous use, additional features and making comments showed the greatest level of disagreement and negative ratings. These results indicated the greatest prevalence of neutral and least favourable responses. These results confirmed that the students generally found that OurViews was less suitable than WhatsApp. Table 5.8 provides a detailed breakdown of these responses. Table 5.9 shows the mean values of the responses provided by the participants in this group.

These results are illustrated in Figure 5.13. The numbering of the answers (B1-B20) corresponds to that in Table 5.8.

TABLE 5.6: Breakdown of questionnaire answers by WhatsApp group participants.

		Breakdown of Answers				
No.	Question	Often	Occasionally	Twice	Once	Never
A1	How often have you heard of mobile learning before the current experiment?	5%	25%	16%	7%	50%
A2	How often have you previously used m-learning educational programmes?	20%	36%	27%	11%	5%
A3	How often have you received encouragement from your lecturers to use mobile devices for learning purposes?	18%	29%	18%	20%	14%
		Excellent	Very Good	Good	Fair	Bad
A4	How do you rate the WhatsApp screen features and its accessibility?	61%	23%	14%	2%	0%
A5	How do you rate taking photos or videos and the registration process via OurViews/SharedWalk?	75%	16%	7%	2%	0%
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
A6	I believe that using WhatsApp is better than using traditional education methods alone.	34%	41%	23%	2%	0%
A7	Using WhatsApp has made the curriculum easier.	48%	27%	16%	10%	0%
A8	WhatsApp supports interaction among students.	66%	21%	9%	5%	0%
A9	I find difficulties in following the additional features of the WhatsApp application.	5%	7%	43%	45%	0%
A10	I find difficulties in writing comments to my colleagues.	5%	18%	20%	57%	0%
A11	WhatsApp supports interaction between students and their instructors.	48%	32%	16%	5%	0%
A12	WhatsApp increases students' knowledge of the curriculum.	27%	41%	23%	9%	0%
A13	Using WhatsApp improved my performance.	27%	34%	25%	14%	0%
A14	WhatsApp is effective in saving students' time while performing in-class curricular tasks.	38%	14%	48%	0%	0%
A15	Mobile education technology can not only enhance but replace traditional education methods.	16%	30%	20%	32%	2%
A16	I would recommend the use of WhatsApp as a helpful tool within this class curriculum to my friends.	36%	40%	20%	5%	0%
A17	I need more training to improve my skills in using m-learning tools.	10%	16%	30%	43%	2%
A18	Kuwaiti society does not approve of contact between males and females to exchange educational information in the context of m-learning applications.	27%	32%	32%	7%	2%
A19	I experience financial difficulties in acquiring new mobile devices such as iPads, iPhones or Galaxy phone.	16%	7%	41%	30%	7%
A20	I will use this application in the future especially for educational purposes.	32%	48%	16%	5%	0%

5.5.5 Student Feedback: Comparative Summary of OurViews/SharedWalk vs WhatsApp

The participants also provided helpful responses about their experiences in m-learning in general and in Kuwait in particular. A selection of these responses is provided:

1. Both students and teachers in Kuwaiti higher education had the inspiration and ability to embrace m-learning in their instructive experience.

2. A mixed (or blended) learning approach, which joins versatile learning with conventional methodologies, was seen as the most appropriate for a Kuwaiti higher education setting.

3. There are various monetary barriers to m-learning, especially the students' ability to purchase cell phones. This issue is particularly pronounced when there is a need or inclination for students to utilise the same sort of device in m-learning, such as the iPhone.

TABLE 5.7: The mean values and standard deviations of the answers provided by the participants in the WhatsApp group.

No.	Question	Mean	Standard Deviation
A1	How often have you heard of mobile learning before the current experiment?	2.32	1.41
A2	How often have you previously used m-learning educational programmes?	3.57	1.09
A3	How often have you received encouragement from your lecturers to use mobile devices for learning purposes?	3.18	1.33
A4	How do you rate the WhatsApp screen features and its accessibility?	4.43	0.82
A5	How do you rate taking photos or videos and the registration process via OurViews/SharedWalk?	4.64	0.72
	Do you agree with these statements		
A6	I believe that using WhatsApp is better than using traditional education methods alone.	4.07	0.82
A7	Using WhatsApp has made the curriculum easier.	4.14	1.00
A8	WhatsApp supports interaction among students.	4.48	0.85
A9	I find difficulties in following the additional features of the WhatsApp application.	2.70	0.79
A10	I find difficulties in writing comments to my colleagues.	2.70	0.93
A11	WhatsApp supports interaction between students and their instructors.	4.23	0.89
A12	WhatsApp increases students' knowledge of the curriculum.	3.86	0.93
A13	Using WhatsApp improved my performance.	3.75	1.01
A14	WhatsApp is effective in saving students' time while performing in-class curricular tasks.	4.25	0.69
A15	Mobile education technology can not only enhance but replace traditional education methods.	3.25	1.14
A16	I would recommend the use of WhatsApp as a helpful tool within this class curriculum to my friends.	4.07	0.87
A17	I need more training to improve my skills in using m-learning tools.	2.86	1.03
A18	Kuwaiti society does not approve of contact between males and females to exchange educational information in the context of m-learning applications.	3.75	1.01
A19	I experience financial difficulties in acquiring new mobile devices such as iPads, iPhones or Galaxy phone.	2.95	1.14
A20	I will use this application in the future especially for educational purposes.	4.07	0.82

4. Several social and instructional barriers were noted with regard to the utilisation of m-learning by female students. For example, the customary societal ban of unsupervised communications between males and females would hamper the use

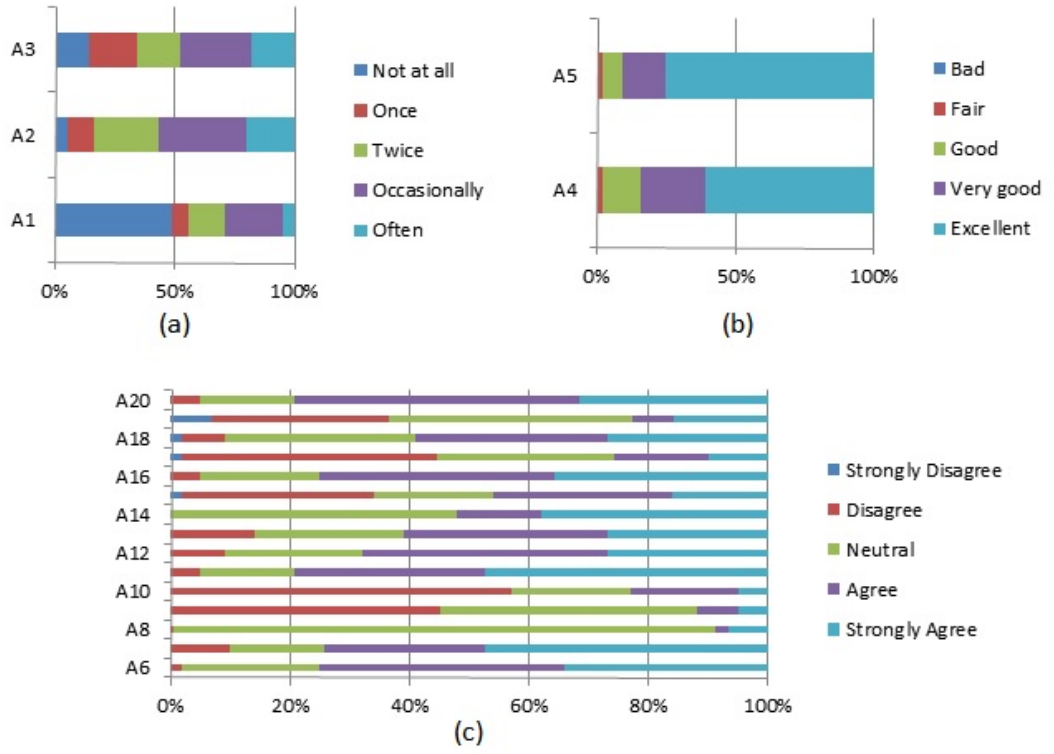


FIGURE 5.11: Chart showing breakdown of answers to questions (a) A1-A3, (b) A4-A5, (c) A6-A20 provided by WhatsApp group participants.

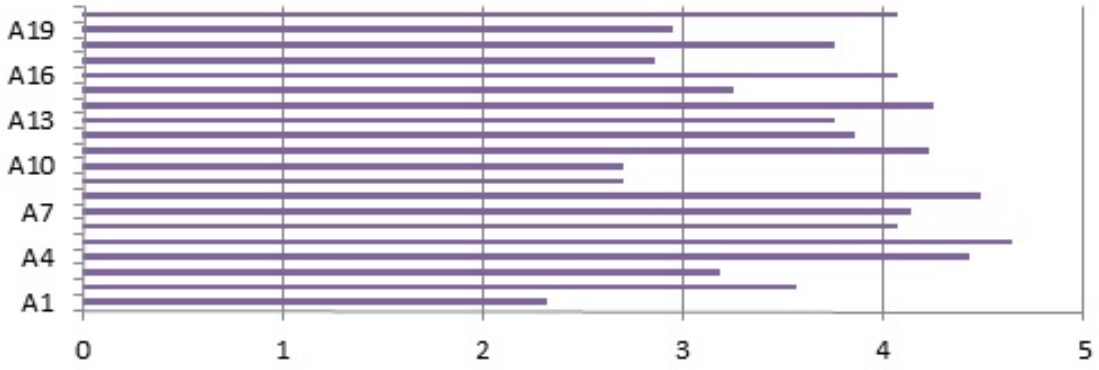


FIGURE 5.12: Chart illustrating the mean values for the answers [A1-A20] provided by WhatsApp group participants.

m-learning apparatuses. In the present study, female students, who were mainly Bedouin, declined to utilise the WhatsApp application because they were concerned about the protection of their identity. The users were required to disclose their telephone number before they could interface with other users).

5. Another issue was at the institutional level, specifically the current lack of emphasis

TABLE 5.8: Breakdown of questionnaire answers by OurViews/SharedWalk group participants.

		Breakdown of Answers				
No.	Question	Often	Occasionally	Twice	Once	Never
B1	How often have you heard of mobile learning before the current experiment?	18%	22%	10%	18%	32%
B2	How often have you previously used m-learning educational programmes?	16%	50%	16%	12%	6%
B3	How often have you received encouragement from your lecturers to use mobile devices for learning purposes?	38%	50%	6%	0%	6%
		Excellent	Very Good	Good	Fair	Bad
B4	How do you rate the OurViews/SharedWalk screen features and its accessibility?	28%	40%	28%	4%	0%
B5	How do you rate taking photos or videos and the registration process via OurViews/SharedWalk?	36%	36%	18%	10%	0%
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
B6	I believe that using OurViews/SharedWalk is better than using traditional education methods alone.	14%	36%	28%	20%	2%
B7	Using OurViews/SharedWalk has made the curriculum easier.	12%	26%	42%	20%	0%
B8	OurViews/SharedWalk supports interaction among students.	32%	28%	32%	8%	0%
B9	I find difficulties in following the additional features of the OurViews /SharedWalk application.	18%	12%	52%	16%	2%
B10	I find difficulties in writing comments to my colleagues.	12%	16%	42%	28%	2%
B11	OurViews/SharedWalk supports interaction between students and their instructors.	28%	40%	24%	6%	2%
B12	OurViews/SharedWalk increases students' knowledge of the curriculum.	12%	24%	42%	20%	2%
B13	Using OurViews/SharedWalk improved my performance.	12%	22%	38%	28%	0%
B14	OurViews/SharedWalk is effective in saving students' time while performing in-class curricular tasks.	18%	36%	30%	14%	2%
B15	Mobile education technology can not only enhance but replace traditional education methods.	18%	30%	32%	16%	4%
B16	I would recommend the use of OurViews/SharedWalk as a helpful tool within this class curriculum to my friends.	14%	44%	28%	12%	2%
B17	I need more training to improve my skills in using m-learning tools.	6%	36%	34%	22%	2%
B18	Kuwaiti society does not approve of contact between males and females to exchange educational information in the context of m-learning applications.	14%	38%	30%	16%	2%
B19	I experience financial difficulties in acquiring new mobile devices such as iPads, iPhones or Galaxy phone.	4%	8%	6%	74%	8%
B20	I will use OurViews/SharedWalk in the future especially for educational purposes.	12%	34%	28%	18%	8%

on the need for m-learning by Kuwaiti administrators of higher education. There is also a focus of quantitative educational targets rather than quality-based ones.

6. The participants found that the OurViews application was more suitable for m-learning purposes than WhatsApp, as the latter is focused on social association and has fewer security features. The capacity of OurViews for group m-learning in the classroom was observed to be extremely valuable.

7. However, WhatsApp was considered to offer a steady platform, a large number of components and noteworthy adaptability. WhatsApp also improved the communication among the students and their teachers.

8. For Kuwaiti colleges to implement m-learning, huge amounts of preparation would be required, including specialised expertise and changes in the educational culture.

9. Some Kuwaiti higher education leaders are reluctant to see the need for innovation in instruction, inclining toward antiquated conventional learning methods.

TABLE 5.9: Questionnaire answers provided by OurView/SharedWalk group participants.

No.	Question	Mean	Standard deviation
B1	How often have you heard of mobile learning before the current experiment?	2.76	1.55
B2	How often have you previously used m-learning educational programmes?	3.58	1.09
B3	How often have you received encouragement from your lecturers to use mobile devices for learning purposes?	4.14	0.99
B4	How do you rate the OurViews/SharedWalk screen features and its accessibility?	3.92	0.85
B5	How do you rate taking photos or videos and the registration process via OurViews/SharedWalk?	3.98	0.98
	Do you agree with these statements		
B6	I believe that using OurViews/SharedWalk is better than using traditional education methods alone.	3.40	1.03
B7	Using OurViews/SharedWalk has made the curriculum easier.	3.30	0.93
B8	OurViews/SharedWalk supports interaction among students.	3.84	0.98
B9	I find difficulties in following the additional features of the OurViews /SharedWalk application.	3.28	1.01
B10	I find difficulties in writing comments to my colleagues.	3.08	1.01
B11	OurViews/SharedWalk supports interaction between students and their instructors.	3.86	0.97
B12	OurViews/SharedWalk increases students' knowledge of the curriculum.	3.24	0.98
B13	Using OurViews/SharedWalk improved my performance.	3.18	0.98
B14	OurViews/SharedWalk is effective in saving students' time while performing in-class curricular tasks.	3.54	1.01
B15	Mobile education technology can not only enhance but replace traditional education methods.	3.42	1.09
B16	I would recommend the use of OurViews/SharedWalk as a helpful tool within this class curriculum to my friends.	3.56	0.95
B17	I need more training to improve my skills in using m-learning tools.	3.22	0.93
B18	Kuwaiti society does not approve of contact between males and females to exchange educational information in the context of m-learning applications.	3.46	0.99
B19	I experience financial difficulties in acquiring new mobile devices such as iPads, iPhones or Galaxy phone.	2.26	0.88
B20	I will use OurViews/SharedWalk in the future especially for educational purposes.	3.24	1.13

10. The students were prevented from taking photographs) or recording in certain open or private locations for regulatory and legitimate reasons.

11. The fundamental issue that was highlighted concerning the OurViews application concerned the difficulty experienced in introducing and running the application, especially the iPhone variant.

12. Several proposals were made by the OurViews users regarding the portion of the elements that could be added to the application, most remarkably the incorporation of a photography exhibition and a course of events. The participants also recommended a feature that would allow them to resize pictures, save work, post content and so forth.

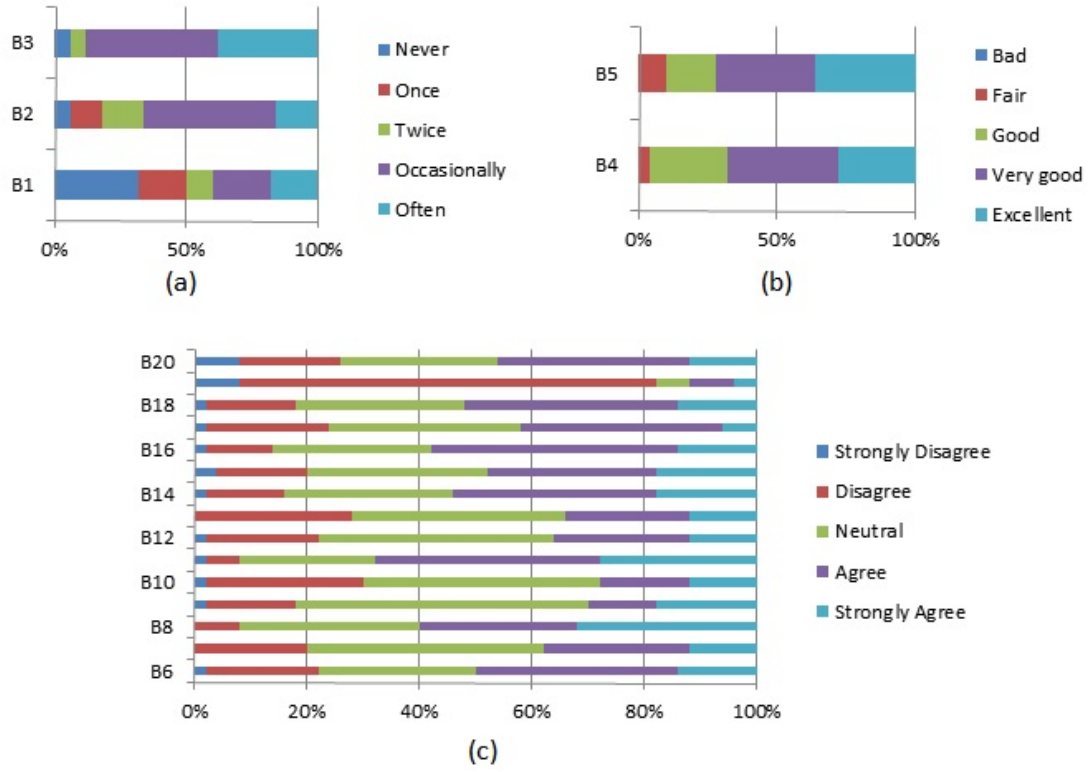


FIGURE 5.13: Chart showing breakdown of answers to questions (a) B1-B3, (b) B4-B5, (c) B6-B20 provided by OurViews/SharedWalk group participants.

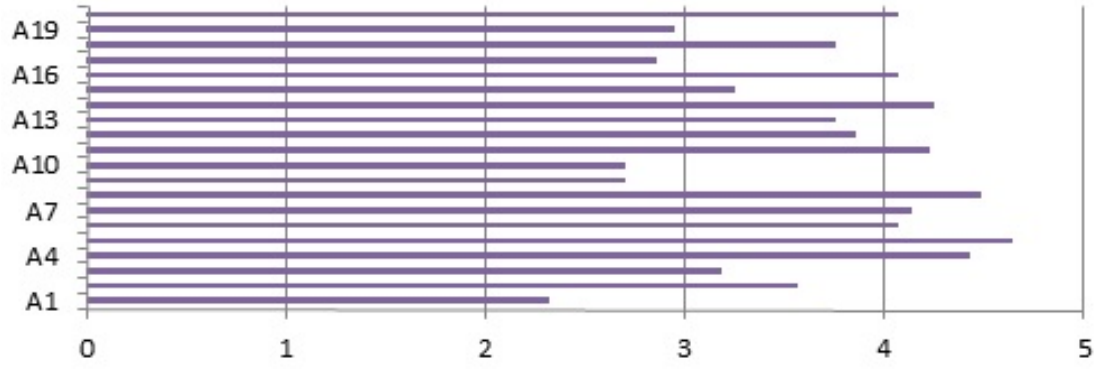


FIGURE 5.14: Chart illustrating the mean values for the answers [B1-B20] provided by OurViews/SharedWalk group participants.

13. This suggestion was at the top of the list of priorities. Kuwaiti higher education leaders need to take positive measures to involve qualified teachers and advisers in the utilisation of innovation in instruction, especially with regard to creating curricular changes. Similarly, these leaders should to give teachers and students the opportunity to participate in international conferences and courses on educational

technology with the objective of improving their skills and gaining experience in the implementation and utilisation of m-learning.

14. In Kuwaiti universities, there is a lack of regulatory and administrative staff who are skilled in the fields of e-learning and m-learning.

15. The participants highlighted the absence of the Arabic language in the OurViews application. This is a genuine disadvantage considering that Arabic is the predominant language used in Kuwait. However, in WhatsApp users can exchange messages in Arabic.

16. The participants expressed that they would use a modified version of OurViews in m-learning exercises. The modifications should include the issues and constraints experienced in using the present application. The participants suggested the modified application would be better than WhatsApp and other interpersonal interaction programmes in conducting m-learning exercises.

Table 5.10 presents a comparative summary of the two applications based on the comments and suggestions provided by the participants regarding their experiences in using WhatsApp and OurViews/SharedWalk during the experiment.

5.6 Discussion

The SharedWalk/OurViews application was proposed to provide the teachers and students, who were arranged as "companions", with a common online class space.

Nevertheless, as the results showed, the field study attempted in Kuwait University did not succeed in creating the ideal utilisation of m-learning. Although the findings indicated that issues and restrictions were key aspects of the students' m-learning experiences, it could be argued that the unsatisfactory aspects of the experimental process can be traced to three principal reasons:

5.6.1 Technical issues and limitations

The students' responses that identified specialised restrictions or issues could be considered substantial, such as OurViews' inability to save content or the inability of users to send short content messages about brisk input demands or inquiries. These issues should

TABLE 5.10: Comparative summary of key participant comments relating to WhatsApp and OurViews/SharedWalk features.

WhatsApp	OurViews/SharedWalk
Simple to connect with other users since all that is needed is their phone number.	In order to connect with other users a user account and password are required.
Allows user to easily monitor online/ offline presence of others.	The user cannot see the online/ offline status of others.
The application automatically saves conversations, including text or image/video data, so that they can be retrieved after a sudden Internet disconnection or device shutdown.	All non-saved data is lost when there is a power cut or a device shutdown.
Easy to conduct exchanges with individuals as well as part of group conversations.	It is difficult to contact a single individual as the application is geared towards group interaction.
The application provides reliable message delivery notifications.	The application doesn't provide users with any message delivery notifications.
The power of the application is in its social aspects.	The power of the application is in the context of academic field work.
The application is vulnerable to abuse. For instance, students can send photos/videos from the fieldwork that are in fact archival images taken from an earlier visit or by someone else.	The application is excellent for ensuring photos/videos are posted from the field and thus prevents attempts at cheating.
It is easy to create, edit and remove groups	It is difficult to add new group members.
It is not possible for the user to send different text, image and video information as part of a single message. This can result in misunderstandings and confusion when such sets of messages are exchanged.	The user can post a photo/video with corresponding text comments as a single package which will be easier for other users to access and understand.
The application is easy to download on most mobile devices.	The application currently doesn't work on a number of devices.
The Application has many control features, giving the user greater flexibility.	The application currently has a very limited set of features and options for the user.
The application offers lower privacy because it depends on the telephone number of the user (leading to cultural issues).	The application offers greater privacy, especially as it doesn't require users to provide phone numbers and only allows access to registered users.
The Application is more conductive to user interactions, due to its numerous features such as the timeline.	The Application provides lesser interactivity,due to its limited features and absence of timeline.
The Chat option is a central feature.	There is no live text chat option.
The user can send a text comment when he/she receives a photo/video.	Users cannot add a comment when he/she receives a photo/video on their SharedWalk account.
The application has GPS capability which is important for fieldwork.	The application doesn't have a GPS option.
The application supports Arabic Language writing.	The Application does not support Arabic Language text.
A user cannot easily use the application on more than one device, since a separate phone number is required for each additional device	Registered users can use the application on a number of devices provided they log out and in accordingly

be addressed by the development team before further experimental fieldwork could be completed.

5.6.2 Misunderstanding of the OurViews/Shared concept

Some of the feedback seems to suggest a level of misunderstanding by the students of the features the OurViews application is intended to provide. Based on the experimental results, this is probably due to assumptions stemming from the students' established experiences of social networking applications such as WhatsApp. For instance, their focus on the need to be able to engage in chat messaging with other users seems more to do with recreating a social networking experience rather than genuine m-learning needs. This issue can be addressed in future experiments through better presentation and training by the researcher when introducing the experiment to the participants. A better designed introductory PowerPoint presentation, for instance, would help ensure the students' expectations are not based on an inaccurate notion of what an m-learning application is supposed to do.

5.6.3 A lack of engagement by the teachers

Even though interactivity during fieldwork was highlighted to the participants at the outset of the experimental process, there was little teacher-student interaction during the fieldwork experiments. It seems this is largely the result of a lack of engagement by the teachers. This is probably the most critical factor underlying the unsatisfactory aspects of the experimental process and addressing it will be at the core of the experimental field study due to be conducted in the third year.

5.7 Interactivity Analysis

Jeong (2003)'s coding system was adapted for use in Study 2. The coding system was modified to suit the purposes of the research and to answer the research questions. The coding system was used to understand the interactivity between the groups of participants. Using the coding system, the z-score was calculated from the z-score values. A response interactivity transfer diagram was plotted, which was used to compare the findings of Study 1 and Study 2 to determine whether the change in strategy was successful.

5.7.1 Coding scheme

The following codes and definitions of the reactions and behaviours were used in Study 2:

1. C - Comment: A verbal or written remark expressing an opinion or reaction
2. Rq - Requesting: A statement to request more information about the questions or responses
3. P - Posting: Input new data
4. Q - Questioning: A statement that queries another answer
5. A - Answering: The first statement used to answer the question
6. Ag - Agreement: A statement of agreement
7. D - Disagreement: A statement of disagreement
8. R - Reinforcement: The action or process of reinforcing or strengthening
9. Av - Alternative view: A statement used to answer the question but does not relate to the previous answer.
10. E - Extension: A statement used to extend and complement another answer.
11. Cr - Criticism: The expression of disapproval of someone or something based on perceived faults or mistakes
12. Ev - Evaluation: A statement that judges the accuracy, likelihood, validity, logic, relative importance or value of an argument or claim by (1) making an explicit judgement in words such as “good”, “true” and “not likely”; (2) raising alternative viewpoints from which to make judgements.

5.8 Transitional Probabilities

The system was utilised based on a strategy proposed by Bakeman and Gottman (1997), which is known as the sequential analysis method. This method focuses on the relationships between observations rather than individual observations.

Table 5.11 demonstrates every line with the reaction showing a specific code, such as Pos for Posting and Agr for Agreement. The sections demonstrate the accompanying reaction that was quickly taken after the behaviour in the line. The probability can be determined by finding each interactivity transitional probability values. Each cell of the matrix contains the transitional probability for each possible pairing of the given and the target events. For example, when the student's response was in a posting, it was followed 50% of the time by an answer.

5.8.1 Z-Score Analysis

During the second group first examination in the geology group particularly, the z-scores indicated that the most grounded relation was Post to Answer. Similarly, no z-score was higher than 3, which is the reason that there are no red indicators in the chart shown in Figure 6.22. The z-scores in the chart indicate that interactivities were higher than the mean. The figure shows values between 1-2 as green, 2-3 as blue, and values above 3 as red. In the photography group, although the instructor did not participate, the students showed high z-scores in Request to Answer. The students were confident in utilising versatile skills as a part of instruction, so they utilised the application as a device to convey and trade data.

A diagram of the z-scores of the mechanical engineering group could not be constructed because there was not enough support among the groups' individuals, and it was unrealistic to determine the z-scores without an adequate number of responses.

In Study 2, the aggregate diagram shows that no scores agreed in the red zone (more than 3). The most grounded connections were between Comments after Post, Answer after Request and Extension after Comments.

It is critical to clarify that in Study 2, the teacher of one of the groups (photography) did not show an interest, and the instructor of the mechanical engineering group did not use a reasonable procedure to coordinate the group.

Table 5.12 shows the comparison of the responses in the same group with the responses among the three groups (the geology group, the mechanical engineering group and the photography group). The total number of responses was calculated as shown in Table 5.12.

The percentages of the total responses were then calculated. An example of how the percentages were calculated is shown below. Extension was chosen to show how the

TABLE 5.11: Example for coding scheme (Geology group).

No.	Participant's Name	Date	Participation	Participation Description	Students' interactions about the same participation	Students' Interactions descriptions
1.	Teacher Zero	06/12/2013	Welcome Professor Peter, welcome all students, we are at the field and would like to discuss some topics like the environment and pollution which is related to the Environmental Geology Module **P, C**	A welcome message from T Zero and a request shows which topics students should discuss.	Student AD attached a table and wrote: Dr this table shows usthe amount of Gas which is emitted from the electricity station if it uses Coal or Gas or oil. **A**	An answer from a student regarding the pollution.
2.	Teacher Zero	06/12/2013	T Zero attached 6 pictures and wrote: Second stage for Asbestos removal **P, C**	The teacher asked for a new request of six GE LM6000 gas turbines	Student AD: The Sabiya peak power plant consists **C**	Student AD added a new comment.
			Student AD wrote: To reduce air pollutants we must increase green lands near the power stations and put a lot of filter in the Chimney **E**	Student AD elaborated	Student AH wrote: Well done all **Ev**	This student is evaluating his colleagues work.

TABLE 5.12: The frequencies of different responses.

Given	Geology	Mechanical Engineering	Photograph
Comm	2	0	0
Req	0	0	2
Pos	3	6	10
Ques	0	0	3
Ans	3	0	3
Agr	0	1	0
DisA	0	0	1
Reinf	0	0	0
Alter	0	0	0
Ext	7	0	1
Crit	0	0	1
Eva	1	0	0
Total	16	7	21

percentage was determined. There were seven responses to extension. The total number of responses was 16: $\frac{7}{16} \times 100\% = 43.8\%$

The graph in Figure 6.20 shows that the percentage of responses to posting in the mechanical group was very high at 85.7%. The reason was that there were very few responses in that particular group; six posting responses and one agreement response. The participants did not show interest in using the different features of the application. In the geology group, there was a variety of interactions. The highest percentage of responses was to extension at 43.8%.

TABLE 5.13: Each category percentage of all reactions.

Given	Geology	Mechanical Engineering	Photograph
Comm	12.50%	0.00%	0.00%
Req	0.00%	0.00%	9.50%
Pos	18.80%	85.70%	47.60%
Ques	0.00%	0.00%	14.30%
Ans	18.80%	0.00%	14.30%
Agr	0.00%	14.30%	0.00%
DisA	0.00%	0.00%	4.80%
Reinf	0.00%	0.00%	0.00%
Alter	0.00%	0.00%	0.00%
Ext	43.80%	0.00%	4.80%
Crit	0.00%	0.00%	4.80%
Eva	6.30%	0.00%	0.00%

In the photography group, the main response was posting at almost 50%. Although the teacher was not in the group, it had the highest number of interactions among the students. The students expressed the importance of the application in enhancing the academic experience. They used the features available, such as GPS, and they sent photos and shared records. They helped each other to share information with students in different locations. Figure 6.23 clearly shows that in the second experiment, the reinforcement response did not play a role in any of the three groups.

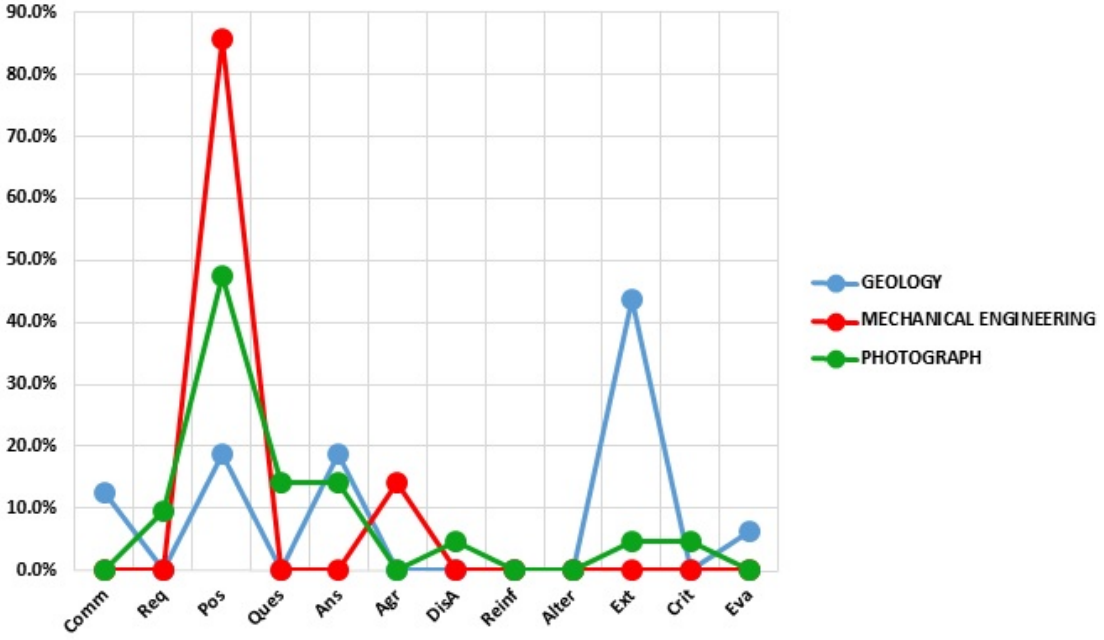


FIGURE 5.15: Graph showing each category preference of all reactions.

TABLE 5.14: Observed frequency transition table (Geology - Group 1).

Given	Target												
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva	Total
Comm	0	0	0	0	0	0	0	0	0	2	0	0	2
Req	0	0	0	0	0	0	0	0	0	0	0	0	0
Pos	2	0	0	0	3	0	0	0	0	1	0	0	6
Ques	0	0	0	0	0	0	0	0	0	0	0	0	0
Ans	0	0	0	0	0	0	0	0	0	0	0	0	0
Agr	0	0	0	0	0	0	0	0	0	0	0	0	0
DisA	0	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	0	0	0	0
Alter	0	0	0	0	0	0	0	0	0	0	0	0	0
Ext	0	0	3	0	0	0	0	0	0	3	0	1	7
Crit	0	0	0	0	0	0	0	0	0	0	0	0	0
Eva	0	0	0	0	0	0	0	0	0	1	0	0	1
Total	2	0	3	0	3	0	0	0	0	7	0	1	16

TABLE 5.15: Transitional probabilities for responses (Geology - Group 1).

Given	Target											
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva
Comm	0	0	0	0	0	0	0	0	0	1	0	0
Req	0	0	0	0	0	0	0	0	0	0	0	0
Pos	0.3	0	0	0	0.5	0	0	0	0	0.2	0	0
Ques	0	0	0	0	0	0	0	0	0	0	0	0
Ans	0	0	0	0	0	0	0	0	0	0	0	0
Agr	0	0	0	0	0	0	0	0	0	0	0	0
DisA	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	0	0	0
Alter	0	0	0	0	0	0	0	0	0	0	0	0
Ext	0	0	0.4	0	0	0	0	0	0	0.4	0	0.1
Crit	0	0	0	0	0	0	0	0	0	0	0	0
Eva	0	0	0	0	0	0	0	0	0	1	0	0

TABLE 5.16: Z-Score table (Geology - Group 1).

Given	Target											
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva
Comm	-0.57	0	-0.73	0	-0.73	0	0	0	0	**1.71**	0	-0.39
Req	0	0	0	0	0	0	0	0	0	0	0	0
Pos	**1.95**	0	-1.49	0	**2.48**	0	0	0	0	-1.69	0	-0.8
Ques	0	0	0	0	0	0	0	0	0	0	0	0
Ans	0	0	0	0	0	0	0	0	0	0	0	0
Agr	0	0	0	0	0	0	0	0	0	0	0	0
DisA	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	0	0	0
Alter	0	0	0	0	0	0	0	0	0	0	0	0
Ext	-1.33	0	**2.18**	0	-1.69	0	0	0	0	-0.06	0	**1.17**
Crit	0	0	0	0	0	0	0	0	0	0	0	0
Eva	-0.39	0	-0.5	0	-0.5	0	0	0	0	**1.17**	0	-0.27

The z-scores showed that the geology group had the highest number of responses to Post to Answer. No z-score was higher than 3, which is the reason that there are no red indictors in the graph. The z-scores in the graphs represent interactivities that were higher than the mean. The scale is constructed as follows: 1-2 are shown in green,

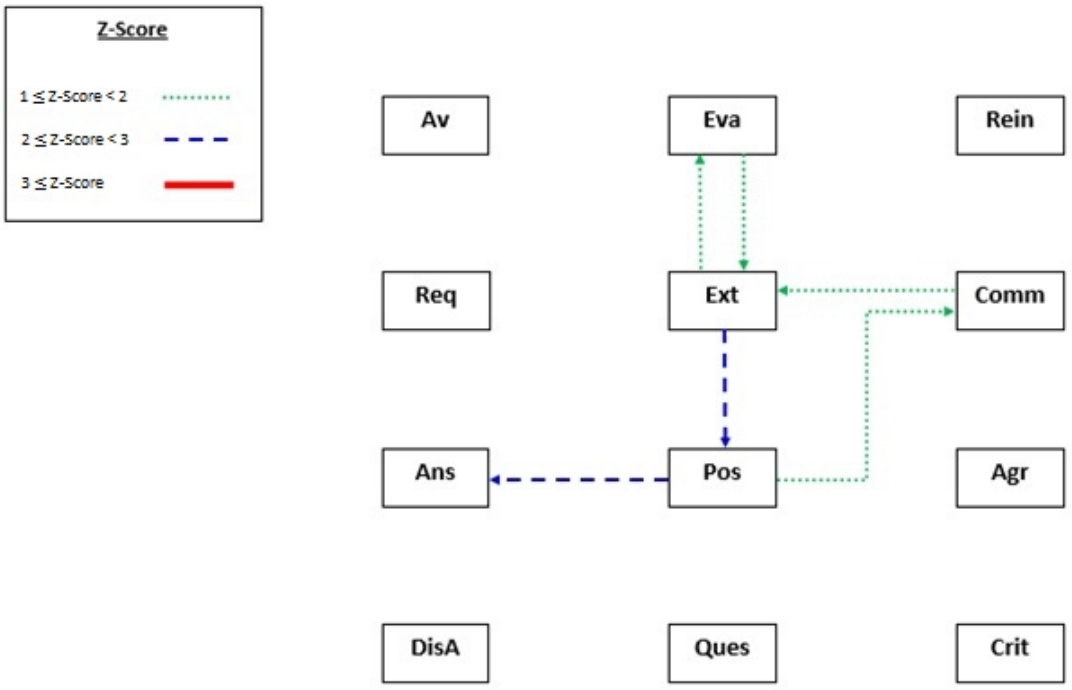


FIGURE 5.16: Z-Score of environmental geology (study 2).

TABLE 5.17: Observed frequency transition table (Mechanical - Group 2).

Given	Target												
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva	Total
Comm	0	0	0	0	0	0	0	0	0	0	0	0	0
Req	0	0	0	0	0	0	0	0	0	0	0	0	0
Pos	0	0	6	0	0	1	0	0	0	0	0	0	7
Ques	0	0	0	0	0	0	0	0	0	0	0	0	0
Ans	0	0	0	0	0	0	0	0	0	0	0	0	0
Agr	0	0	0	0	0	0	0	0	0	0	0	0	0
DisA	0	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	0	0	0	0
Alter	0	0	0	0	0	0	0	0	0	0	0	0	0
Ext	0	0	0	0	0	0	0	0	0	0	0	0	0
Crit	0	0	0	0	0	0	0	0	0	0	0	0	0
Eva	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	6	0	0	1	0	0	0	0	0	0	7

2-3 are shown in blue; above 3 is shown in red. In the photography group, although the teacher did not participate, the students participated regularly with a high number of responses to Request to Answer. The students agreed with in the idea of using m-learning in education, so they used the application as a tool to communicate and exchange information.

A graph of the z-scores of the mechanical engineering group could not be constructed because there was not enough participation between the group members. It was not

Table 5.18: Transitional probabilities for responses (Mechanical - Group 2).

Given	Target											
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva
Comm	0	0	0	0	0	0	0	0	0	0	0	0
Req	0	0	0	0	1	0	0	0	0	0	0	0
Pos	0	0	1	0	0	0	0	0	0	0	0	0
Ques	0	0	0.5	0	0	0	0	0	0	0.5	0	0
Ans	0	0.2	0.2	0.3	0	0	0.2	0	0	0	0.2	0
Agr	0	0	0	0	1	0	0	0	0	0	0	0
DisA	0	0	0	1	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	0	0	0
Alter	0	0	0	0	0	0	0	0	0	0	0	0
Ext	0	0.5	0.5	0	0	0	0	0	0	0	0	0
Crit	0	0	1	0	0	0	0	0	0	0	0	0
Eva	0	0	0	0	0	0	0	0	0	0	0	0

Table 5.19: Observed frequency transition table (Photography - Group 3).

Given	Target												
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva	Total
Comm	0	0	0	0	0	0	0	0	0	0	0	0	0
Req	0	0	0	0	1	0	0	0	0	0	0	0	1
Pos	0	0	6	0	0	0	0	0	0	0	0	0	6
Ques	0	0	1	0	1	0	0	0	0	1	0	0	3
Ans	0	1	1	0	0	4	1	0	0	0	1	0	8
Agr	0	0	0	0	0	0	0	0	0	0	0	0	0
DisA	0	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	0	0	0	0
Alter	0	0	0	0	0	0	0	0	0	0	0	0	0
Ext	0	1	1	0	0	0	0	0	0	0	0	0	2
Crit	0	0	1	0	0	0	0	0	0	0	0	0	1
Eva	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	2	10	0	2	4	1	0	0	1	1	0	21

Table 5.20: Transitional probabilities for responses (Photography - Group 3).

Given	Target											
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva
Comm	0	0	0	0	0	0	0	0	0	0	0	0
Req	0	0	0	0	1	0	0	0	0	0	0	0
Pos	0	0	1	0	0	0	0	0	0	0	0	0
Ques	0	0	0.3	0	0.3	0	0	0	0	0.3	0	0
Ans	0	0.1	0.1	0	0	0.5	0.1	0	0	0	0.1	0
Agr	0	0	0	0	0	0	0	0	0	0	0	0
DisA	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	0	0	0
Alter	0	0	0	0	0	0	0	0	0	0	0	0
Ext	0	0.5	0.5	0	0	0	0	0	0	0	0	0
Crit	0	0	1	0	0	0	0	0	0	0	0	0
Eva	0	0	0	0	0	0	0	0	0	0	0	0

possible to find the z-scores without a sufficient number of responses. The teacher participated with the group, but instead of using the application as an m-learning tool, he used it to coordinate the students' activities, which led to very few responses. Although he agreed with m-learning, he was inexperienced in using the application in an

TABLE 5.21: Z-Score table (Photography - Group 3).

Given	Target											
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva
Comm	0	0	0	0	0	0	0	0	0	0	0	0
Req	0	-0.33	-0.98	0	**3.16**	-0.5	-0.23	0	0	-0.23	-0.23	0
Pos	0	-0.94	**3.04**	0	-0.94	-1.41	-0.65	0	0	-0.65	-0.65	0
Ques	0	-0.61	-0.54	0	**1.52**	-0.91	-0.42	0	0	**2.51**	-0.42	0
Ans	0	0.36	-2.53	0	-1.17	**2.83**	**1.31**	0	0	-0.8	**1.31**	0
Agr	0	0	0	0	0	0	0	0	0	0	0	0
DisA	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	0	0	0
Alter	0	0	0	0	0	0	0	0	0	0	0	0
Ext	0	**2.05**	0.07	0	-0.48	-0.72	-0.33	0	0	-0.33	-0.33	0
Crit	0	-0.33	**1.07**	0	-0.33	-0.5	-0.23	0	0	-0.23	-0.23	0
Eva	0	0	0	0	0	0	0	0	0	0	0	0

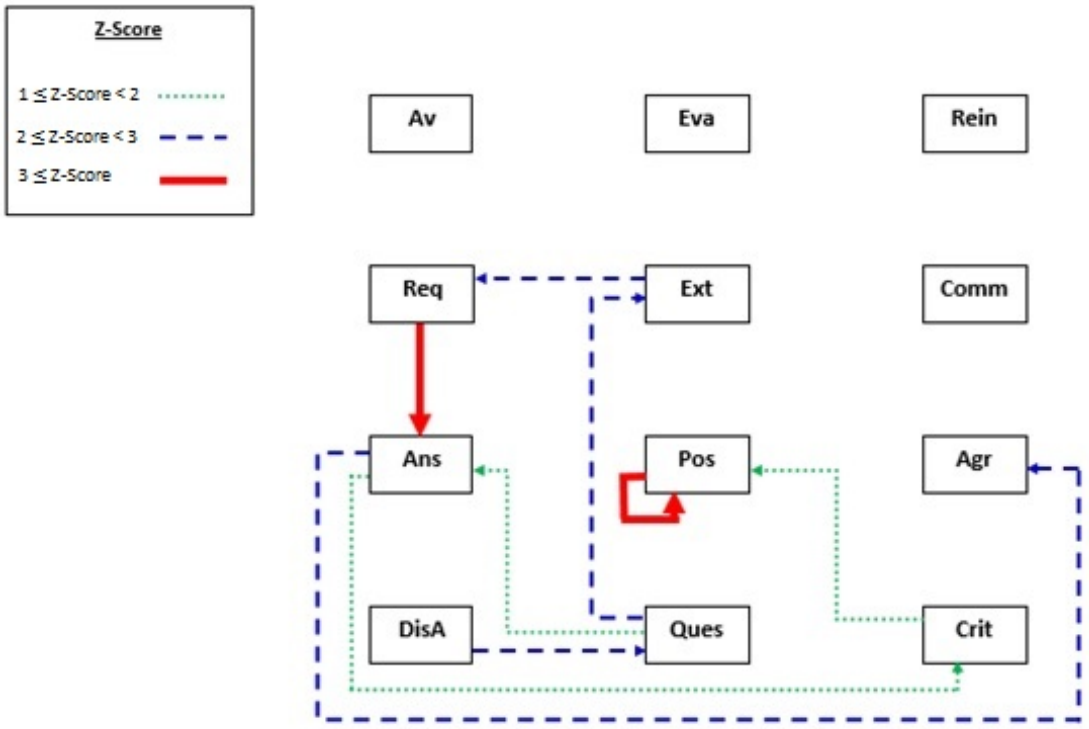


FIGURE 5.17: Z-Score of photography (study 2).

educational context.

The graph of the findings of Study 2 shows that no score exceeded the red zone (higher than 3). The strongest relationships were Comments after Post, Answer after Request and Extension after Comments. It is important to clarify that in Study 2, the teacher of the photography group did not participate. The teacher of the mechanical engineering group did not have a clear strategy for directing the group.

TABLE 5.22: Observed frequency transition table (Total).

Given	Target												
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva	Total
Comm	0	0	0	0	0	0	0	0	0	2	0	0	2
Req	0	0	0	0	1	0	0	0	0	0	0	0	1
Pos	2	0	6	0	3	0	0	0	0	1	0	0	12
Ques	0	0	1	0	1	0	0	0	0	1	0	0	3
Ans	0	1	1	0	0	4	1	0	0	0	1	0	8
Agr	0	0	0	0	0	0	0	0	0	0	0	0	0
DisA	0	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	0	0	0	0
Alter	0	0	0	0	0	0	0	0	0	0	0	0	0
Ext	0	1	4	0	0	0	0	0	0	3	0	1	9
Crit	0	0	1	0	0	0	0	0	0	0	0	0	1
Eva	0	0	0	0	0	0	0	0	0	1	0	0	1
Total	2	2	13	0	5	4	1	0	0	8	1	1	37

TABLE 5.23: Transitional probabilities for responses (Total).

Given	Target											
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva
Comm	0	0	0	0	0	0	0	0	0	1	0	0
Req	0	0	0	0	1	0	0	0	0	0	0	0
Pos	0.2	0	0.5	0	0.3	0	0	0	0	0.1	0	0
Ques	0	0	0.3	0	0.3	0	0	0	0	0.3	0	0
Ans	0	0.1	0.1	0	0	0.5	0.1	0	0	0	0.1	0
Agr	0	0	0	0	0	0	0	0	0	0	0	0
DisA	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	0	0	0
Alter	0	0	0	0	0	0	0	0	0	0	0	0
Ext	0	0.1	0.4	0	0	0	0	0	0	0.3	0	0.1
Crit	0	0	1	0	0	0	0	0	0	0	0	0
Eva	0	0	0	0	0	0	0	0	0	1	0	0

TABLE 5.24: Z-Score table (Total).

Given	Target											
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva
Comm	-0.35	-0.35	-1.07	0	-0.57	-0.51	-0.24	0	0	**2.77**	-0.24	-0.24
Req	-0.24	-0.24	-0.75	0	**2.56**	-0.35	-0.17	0	0	-0.53	-0.17	-0.17
Pos	**2.1**	-1.01	**1.31**	0	**1.42**	-1.47	-0.7	0	0	-1.36	-0.7	-0.7
Ques	-0.43	-0.43	-0.07	0	**1.05**	-0.63	-0.3	0	0	0.51	-0.3	-0.3
Ans	-0.76	**1**	-1.51	0	-1.26	**4.03**	**1.93**	0	0	-1.68	**1.93**	-0.53
Agr	0	0	0	0	0	0	0	0	0	0	0	0
DisA	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	0	0	0
Alter	0	0	0	0	0	0	0	0	0	0	0	0
Ext	-0.82	0.87	0.67	0	-1.36	-1.2	-0.57	0	0	0.98	-0.57	**1.79**
Crit	-0.24	-0.24	**1.38**	0	-0.4	-0.35	-0.17	0	0	-0.53	-0.17	-0.17
Eva	-0.24	-0.24	-0.75	0	-0.4	-0.35	-0.17	0	0	**1.93**	-0.17	-0.17

Although the z-score in the geology group was not in the red zone, and the teacher was inexperienced in using the application in an educational context, it was one of the most successful groups. The reason could be that the teacher participated actively in the geology group. Based on the results, a further study should be conducted to improve the z-scores.

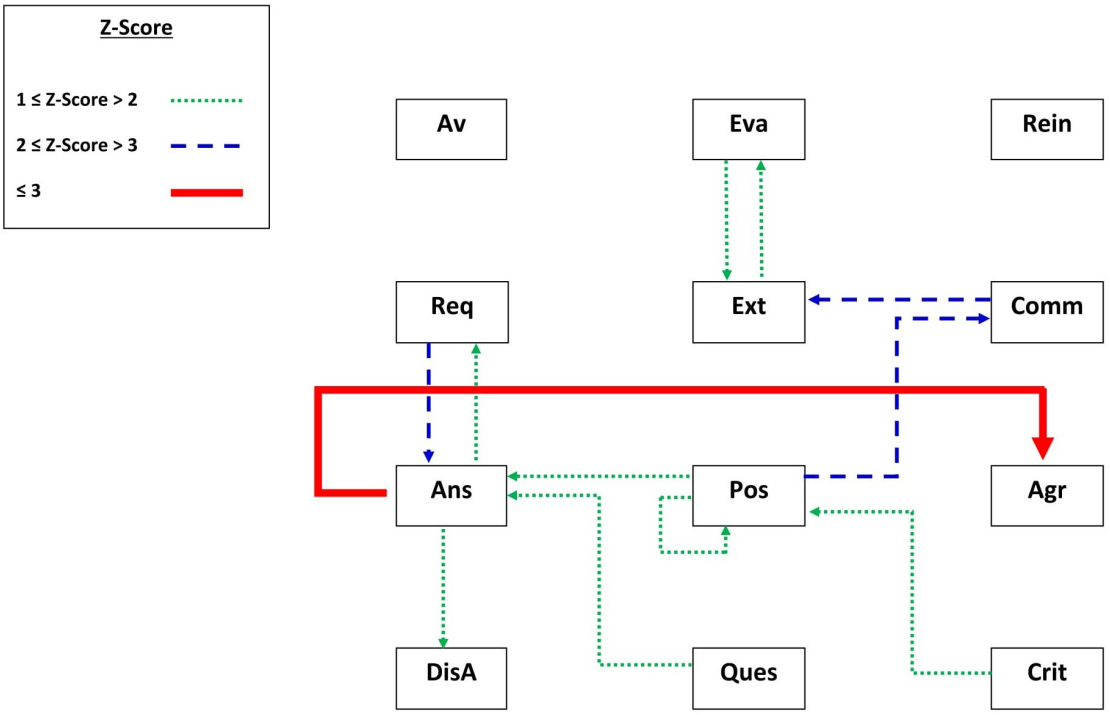


FIGURE 5.18: Z-Score Total (FIRST EXPERIMENT).

5.9 Comparison of the Findings with the Literature

A similar study was discussed in (Alsurehi and Al Youbi, 2014). The study investigated the extent to which social media applications were used in Saudi Arabia, the main purpose for their usage and their effectiveness. The study also investigated the concerns that the students had with regard to the use of social media applications in academic contexts in Saudi Arabia. In this quantitative study, a questionnaire was completed by a randomly selected sample of 42 undergraduate students at prominent universities in Saudi Arabia.

The study concluded that although the use of social media in major universities in Saudi Arabia was prevalent, it was limited to the most popular platforms, such as Facebook. The findings showed little awareness of other platforms, such as WhatsApp, Google Hangouts and Instagram. The social media were mainly used for general communication and file sharing between the students. In terms of effectiveness, most students were satisfied. Moreover, the study revealed that the biggest challenge cited by the students, especially female students, concerned privacy and security. These findings clearly support the results and conclusions we presented in this chapter.

Another similar study was reported in (Al-Omary et al., 2015). This study was conducted with 18 undergraduate and five postgraduate students at the University of Bahrain. The study investigated the impact of SNSs on higher education. Specifically, the study aimed to determine whether and how WhatsApp had a positive effect when it was used in the context of education. The study was conducted during the 14 weeks of one academic semester. A WhatsApp group was created for the students and instructors to support the traditional face-to-face learning environment. The students' feedback was collected using a questionnaire comprising 22 statements about WhatsApp and its effects on learning skills. The findings of this study support the conclusions and findings presented in this chapter. They showed that WhatsApp could improve the students learning skills and the teaching process by allowing the teachers to establish friendly environments in which they helped their students outside the classroom in completing assignments and in studying the course materials.

5.10 Conclusion

The outline, technique and procedure of the test study conducted in Kuwait from October to December 2013 were described, and the results were discussed. The results indicate that further exploratory work is required to address the various issues raised in the participants' responses.

Specifically, a further study should be conducted to analyse how students could take advantage of the various features offered by portable devices applications to better communicate and collaborate with each other during fieldwork.

The tests that were carried out in Study 2 highlighted reluctance by educators who do not want to end up required in direct communications with their students. This reflects the predominant top-down unidirectional hierarchy of the instructing procedure that keeps on ruling Kuwaiti educational society.

Moreover, a key task of the following study would be to develop the architecture for an m-learning system specific to higher education in Kuwait. This structure could provide guidelines for the developers of the higher education curriculum in Kuwait and other key partners. An effective m-learning methodology is crucial to guarantee innovation in higher education in Kuwait. It is vital to achieve a more extensive educational experience as it is in numerous different nations.

The z-score of the geology group was not in the red zone. The first run through, the instructor utilised the application only for training, and it was a standout among the best groups. The results of the geology group were better that the results of the photography group. The potential reason is that the teacher of the geology group participated, whereas the teacher of the photograph group did not participate. Therefore, based on the z-scores found in Study 2, further studies should be conducted to enhance the outcomes.

Chapter 6

Study three: Measuring the effectiveness of the new rules upon the WhatsApp to be an m-learning application

6.1 Introduction

The first experiment, which was conducted in September 2013, involved a comparative evaluation of two applications that were used in m-learning: the social network application WhatsApp and the new application OurViews/SharedWalk. At the conclusion of the experiment, a list of strengths and weaknesses characterising both applications was produced, including suggestions for enhancing the OurViews/SharedWalk application. In this regard, the second experiment, which was conducted in November 2014, was conducted to identify solutions to the issues encountered in the previous experiment, such as the interactivity between instructors and students and vice versa as well as the interactivity between the instructors and students and the software. The main question that Study 3 sought to answer was the following: How can we best motivate students and instructors to engage with m-learning as a hugely beneficial educational tool? Moreover, is social media software beneficial as a learning tool if it is used under strict monitoring rules and instructions and if students and instructors are familiar with this software?

In the second experiment, the number of students who were unable to upload material onto the OurViews server increased. Moreover, the instructors who were willing to offer comments and feedback could not send these comments to a group of students but to individual students in one-to-one communication.

The researcher travelled to Nottingham on 10 October 2014 to report the progress of the work to the supervisors and discuss with them the best means of conducting this experiment based on the findings of Study 2. The researcher then returned to Kuwait on 18 October to explore the interest in using OurViews/SharedWalk in its current form. Consequently, this experiment targeted instructors who showed the willingness and readiness to participate and interact with students, particularly via the OurViews/SharedWalk application. The researcher tried to use the Ourviews/SharedWalk application with eight groups, but problems occurred in using this application. For example, a group from the Environmental Geology Department was led by Teacher Zero, and a group from the Civil Engineering Department was led by Teacher Eight and Teacher Nine. They were interested in using the OurViews application. This issue will be discussed in detail in this chapter.

To replace the Ourviews application, a search was then conducted to identify a suitable application for this experiment. During this process, applications such as Edmodo, Evernote, Line, myU, Studious, inClass and others were considered. However, some of these applications, such as Studios, were developed for Android OS only, and others, such as inClass, were developed for Apple devices and iOS. MyU was developed by universities for special purposes, and a username and password are required to gain access to this application. Others, such as Line and Edmodo, are similar to WhatsApp. Therefore, it was decided that the most suitable and familiar application to instructors and students was WhatsApp. However, WhatsApp presented a challenge because it is a social media application. For this reason, rules and instructions were established by the researcher and the thesis supervisor for the students and instructors who would use WhatsApp for educational and academic purposes. These rules and instructions were as follows:

1. WhatsApp is a social media not a learning application; however, it was only used for learning purposes after adding rules and instructions and after asking instructors to monitor is use for academic and educational purposes.

2. The researcher informed the instructors that they would be sharing their account information (i.e., phone number) with their students. Some instructors used a

phone number that was specific to this activity, and others used their usual phone number. It depended on the instructors' attitudes and relations with their students.

3. The instructor needed to set up the group for the activity.
4. They then invited the students to join the group.
5. The instructor needed to make sure that they monitored the students' activity.
6. When chats were taking place between group members, the instructors needed to filter this activity and remove the student if necessary.
7. If inappropriate comments were made by one student about another student's work, the instructor would be responsible for censoring these comments.
8. Otherwise, the students could upload any data. However, the instructors had the right to ask their students to focus on a special activity, such as their locations, recording their voices and so on, depending on the task.
9. The instructors needed to use WhatsApp to provide feedback.
10. The teachers could communicate with an individual student via email about problems pertaining only to that student.

Therefore, another objective of Study 3 was to determine whether the social media tool used under strict rules and instructions helped to increase the engagement of students and instructors.

Similar to Study 2, the second experiment was focused on fieldwork modules. In preparing for the experiment, the researcher visited higher education institutions in Kuwait in September 2014, one month prior to the start of the first semester. Specifically, the researcher contacted the same two institutions that were approached in the previous study: The Public Authority of Applied Education and Training (PAAET) and Kuwait University (KU). The purpose of the visits was to identify instructors who were willing to take part in the study and to inform them about the nature of the experiment and the application involved.

6.2 Methodology

A qualitative experimental methodology was selected for Study 3. In preparing for the experiment, pre-research visits were conducted to higher education institutions in Kuwait in September 2014, a month prior to the start of the first semester. The instructors at the selected institutions and the researcher's observation were then used to collect the primary data about the students' attitudes every week.

6.2.1 Groups and Participants

Forty students in different fields of engineering were selected (refer to table below). As the table shows, of 40 students, 18 males were in civil engineering, 12 males were in mechanical engineering and a group of 10 males and females were in the environmental geology. In selecting the participants for the current investigation, it was ascertained that no student was simultaneously enrolled in more than one subject.

Table 6.1: Breakdown of participants according to Subject.

Subject	Number of participants	Gender
Civil engineering	18	Male
Mechanical engineering	12	Male
Environmental geology	10	Male and Female

6.2.1.1 The Public Authority of Applied Education & Training (PAAET)

At PAAET, the researcher contacted Teacher Ten, Head of Fieldwork at the College of Technological Studies. The researcher met with Teacher Ten and explained the purpose of the experiment. Teacher Ten put the researcher in touch with the following fieldwork training groups:

1. Mechanical Engineering Field Training
2. Electronic Engineering Field Training
3. Petroleum Engineering Field Training
4. Vehicles Technology and Vessels Engineering Field Training
5. Civil Engineering Field Training

6.2.1.2 Kuwait University (KU)

The researcher re-established contact with the same instructor who participated in Study 2, Teacher Zero, Head of the Geology Department. Teacher Zero showed a huge support and cooperation with this study, and he was key to its success, hence, he will also be referred to as "the key academic person". Teacher Zero agreed to cooperate with the researcher in Study 3 through taking part in two groups:

1. Environmental Impact
2. Natural Hazards (Master's degree programme).
3. Media Educational Communication (the Learn with Nature activity).

At KU, the researcher also asked Teacher Three to take part in the same module he used in Study 2.

6.2.2 Identification and Formation of Groups

After meeting the instructors of the selected eight groups (five at PAAET and three at KU), the following configuration was adopted:

1. The Mechanical Engineering Field Training group (PAEET): Teacher Eleven, Field Coordinator, put the researcher in touch with Teacher Twelve, the fieldwork instructor, who expressed his willingness to participate. The researcher made a presentation to this groups and their instructor. This particular group of students, according to their instructor, lacked motivation and were not open to new ways of learning, such as using OurViews for educational purposes. WhatsApp was therefore adopted as a more familiar alternative. It must be noted that the fieldwork experiment was paused for a short period during examinations and Teacher Twelve's family bereavement.
2. The Electronic Engineering Field Training group (PAEET): Teacher Ten put the researcher in touch with Teacher One, Head of the Electronics Department. At a meeting conducted on 23 September, Teacher One directed the researcher to Teacher Thirteen, a fieldwork instructor. The researcher made a presentation to this group and their instructor. Following a meeting with Teacher Thirteen on 29

September, and after communicating with the work site's management (the National Guard), several difficulties became apparent concerning security restrictions because the fieldwork would take place in a military location. Consequently, this group did not participate in Study 3.

3. The Petroleum Engineering Field Training group (PAEET): Through Teacher Ten, contact was established with Teacher Fourteen, a fieldwork supervisor, who was briefed about the purpose and methodology of the experiment. However, unlike his colleagues in other departments, Teacher Fourteen explained that the management protocols for petroleum worksites would prevent the usage of mobile phones on the site because of security concerns. He also explained that the decision to take part in the experiment was complex and would require months of deliberation. Consequently, this group did not participate in the experiment.

4. The Vehicles Technology and Vessels Engineering Field Training group (PAEET): Through Teacher Ten, contact was established with Teacher Fifteen, a fieldwork coordinator. The researcher made a presentation to this group and their instructor. After consulting with the department's training crews, Teacher Fifteen advised that they were unwilling to participate because the module content was not suitable for m-learning, and the field staff with the training sides were not willing to help. Consequently, this group did not participate in the experiment.

5. The Civil Engineering Field Training group (PAEET): Through Teacher Ten, the researcher contacted Teacher Sixteen, Head of the Civil Engineering Department. At a meeting on 17 September, Teacher Sixteen arranged a meeting with all the department's fieldwork instructors. After the researcher briefed them about the experiment's goals and methods, Teacher Eight agreed that his group of students would participate in the experiment, and he put the researcher in contact with the direct field supervisor, Teacher Nine, who, with his students, was informed about the experiment. However, only one student succeeded in using OurViews to upload material from the server, whereas all remaining 17 students experienced the same technical problems observed in Study 2. Consequently, they were instructed to use WhatsApp.

6. the environmental impact group (KU): The researcher met with the key academic person, who had participated in the 2013 experiment, on September 17th, 2014 and briefed him regarding the new experiment and its goals and objectives. In the UK, a telephone conference was held with the researcher, the supervisor and the key

academic person to discuss the best procedure for the experiment. Agreement was reached with regard to the procedures that would be used. When the researcher returned to Kuwait, another meeting was held with the key academic person and his students on 1 October, at which the researcher made the final presentation and explained the experiment in detail. Unfortunately, only three of the class of 10 students were able to use OurViews, so the group was instructed to use WhatsApp instead. In this particular group, the experiment was paused for a period to allow for examinations and module registration.

7. The Natural Hazards group - Master of Science in Environmental Geology (KU): This module also was offered by the key academic person. The researcher made a presentation to this group and the instructor regarding the experiment. As a postgraduate module, it represented a significant addition to the scope of the experiment. Unfortunately, only two students enrolled, which was below the researcher's minimum for a valid test. This group was therefore eliminated from the experiment.

8. The Media Educational Communication ("Learn with Nature") group (KU): On 16 September 2014, a meeting took place with Teacher Three, who had recognised students' willingness to interact via OurViews during the first experiment. The researcher made a presentation to this group and their instructor regarding the experiment. Teacher Three was eager for his students to interact using the same application in the new experiment. However, the technical issues encountered in using OurViews meant that this application was not an option. Teacher Three was confused because he could not send comments and feedback to the group of students at the same time but only to one student at a time. Furthermore, the issues raised in the previous experiment, regarding cultural issues relating to the students' Bedouin cultural background and attitudes towards the use of WhatsApp, precluded the use of that alternative. Consequently, this group did not participate in the experiment.

6.3 The three Participating Groups Module Syllabus and Tasks

The experiment was conducted with the three groups listed below. All participating instructors and students indicated their consent to participate by signing the ethics

form, which detailed in Arabic (the official language of Kuwait) the purpose of the experiment and the methods that would be used.

6.3.1 Participating Group One: The PAAET Civil Engineering Field Training

The fieldwork in this module was a final graduation requirement for this group of students, who specialised in surveying. It was based on the Jaber Towers Project in the Doha area. The aims of this module included improving students' knowledge of fieldwork, such as their ability to identify a location. The module included the full surveying process from sketching the blueprint to the final execution. The tasks performed by the participants included the following: examining locations; using their the location tool on their mobile devices; preparing graphics-enhanced weekly reports; and sketching location maps for the benefit of the engineering, fire safety and electric wiring crews.

The fieldwork task accounted for 50% of the module mark, which was equally divided among attendance, completing daily field tasks (25%) and daily student reports to the field supervisor (25%). The other 50% was awarded when the student submitted the final project report. The campus instructor then designated a day for the overall discussion of the student report with three departmental instructors and one field supervisor. Each member of the panel awarded a mark out of 25 for the student's performance in the report and discussion, which were then averaged. However, because of staff shortages, only the instructor and the field supervisor were involved in evaluating this part of the students' work.

The experiment involving this group of students was initiated on 10 November when the application group was created by the field supervisor Teacher Nine. The group comprised 18 students. The experiment was completed on 1 December when the fieldwork tasks were completed. According to the instructor, the use of the application facilitated the students in completing of the module more quickly than usual.

Specifically, the experiment took place while the students complete the following tasks in the three-week period:

- Week One: Concrete components, tests and costs.
- Week Two: Identifying the pipelines, chambers and buildings in the project

- Week Three: Identifying devices (level, total station and GPS) and monitoring buildings using the total range of station devices.

The experiment enriched the module's fieldwork activities, as students used the application to discuss the lab material. The m-learning application facilitated the students in being methodical and systematic in completing their tasks. After an in-class theoretical discussion, the instructor assigned specific tasks to be accomplished in the fieldwork. The students used the application to send and document the completed tasks and to receive the instructor's feedback. The field supervisor Teacher Nine indicated that the application brought a valuable element of organisation to the students' achievement of the learning objectives. The application was also very helpful in meeting the challenge of supervising and following up the progress of two student groups in two separate locations.

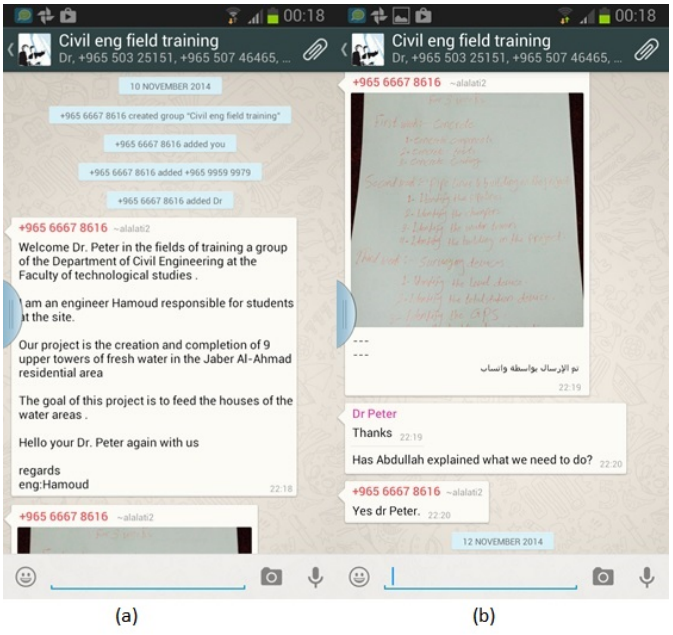


FIGURE 6.1: (a) Greeting message from instructor Teacher Nine to the Civil Engineering WhatsApp group, (b) photo showing the strategy of the experiment been posted by the instructor.

Figure 6.1(b) shows that unlike in the first experiment, Teacher Nine used an organised strategy. In the first experiment, there was nearly no clear strategy for using and benefitting from the application in the context of education. Figure 6.2 shows the interaction between the instructor and the students, which was clearly more positive than in the first experiment.

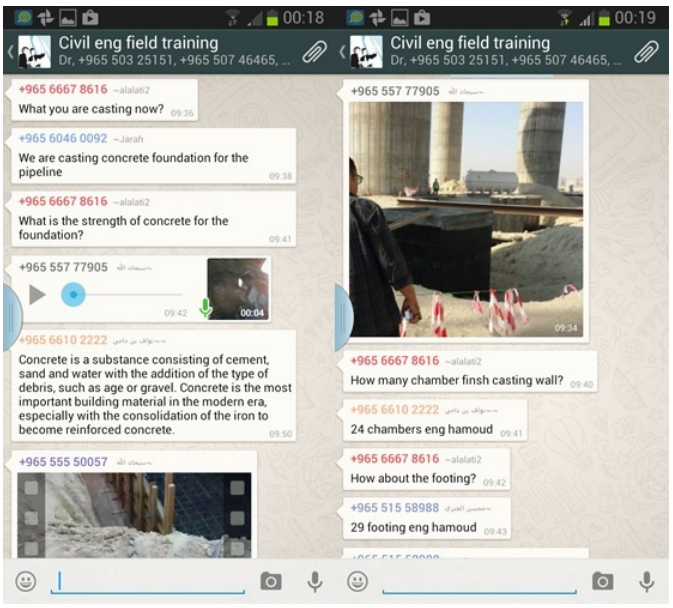


FIGURE 6.2: Interaction between the instructor (Teacher Nine) and the students in the Civil Engineering group.

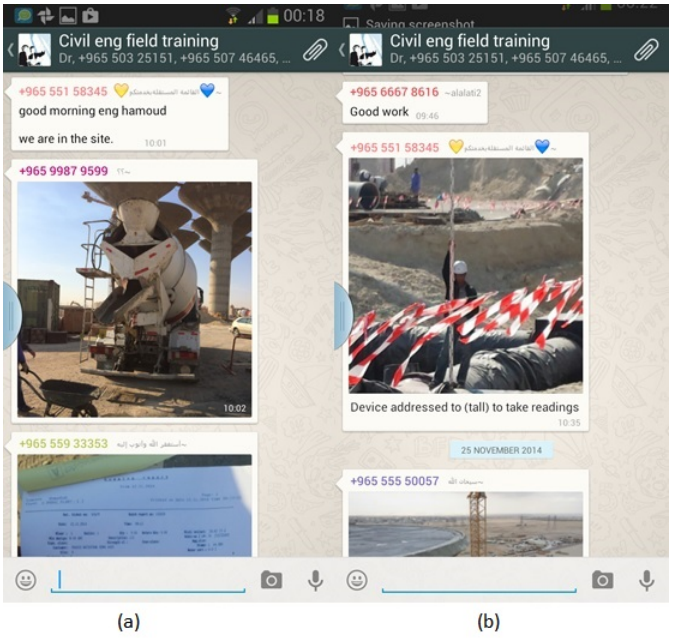


FIGURE 6.3: Example of students posting photos related to the strategy planned by the instructor.

As Figures 6.3, 6.4 and 6.5 show, the students posted different kind of information (i.e., photos, videos and voice recordings), which indicated the ease of communication among the students in sharing ideas and knowledge. Unlike in the first experiment, in this

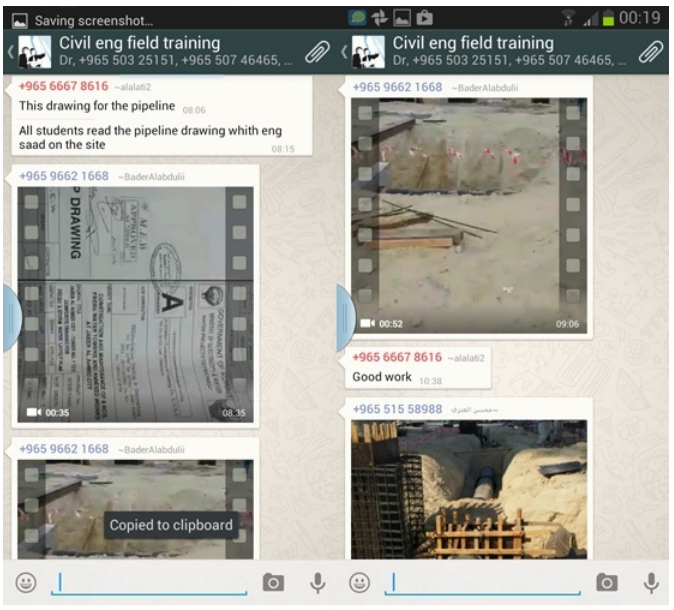


FIGURE 6.4: Example of posting useful videos from the students.

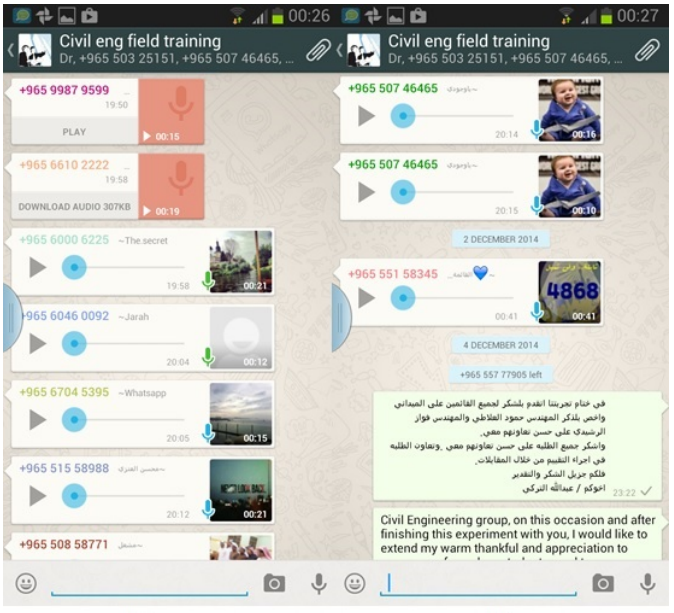


FIGURE 6.5: Example of posting useful voice recordings from the students.

experiment, the students used the recording feature to communicate, possibly because they were all male. As previously emphasised, in Kuwaiti culture, male students might feel shy when females are present.

This group used almost all the features in WhatsApp, which indicated the ability of

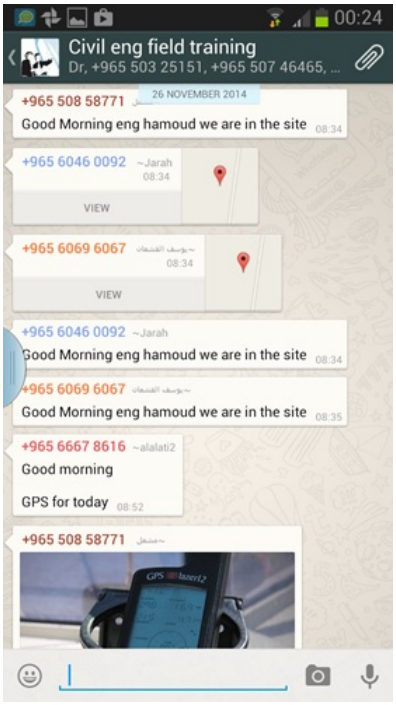


FIGURE 6.6: Example of using location share (GPS) feature by the students to identify few locations.

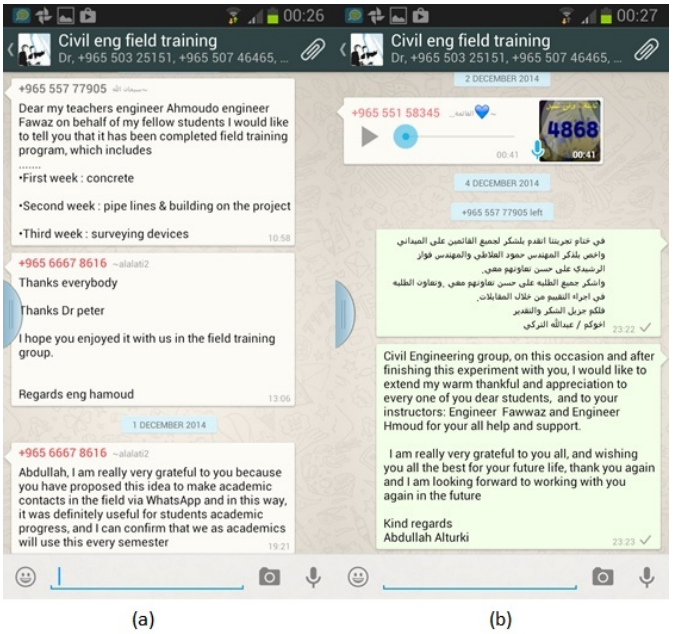


FIGURE 6.7: The instructor thanking the participants at the end of the group.

the students to benefit from the application in communicating with each other and the instructor.

6.3.2 Participating Group Two: The PAAET Mechanical Engineering Field Training

One learning objective in this group required students to demonstrate written, oral and graphical competency in both technical and non-technical environments. Another objective was to adhere to the standards of quality, timeliness and continuous improvement. Another competency was the ability to identify the components, facilities, equipment and tools used at the work site. The module mark was divided equally between the two sites covered. Each 50% was divided as follows:

- Fieldwork report: 10%
- Written exam: 10%
- Location evaluation: 20%
- Supervisor evaluation: 10% (The credit for the tasks completed in the experiment was grouped under supervisor evaluation.)

The 12 students enrolled in the module were divided into two groups of eight and four who worked on two different worksites (Shuwaikh and Subhan) in two phases, switching sites after each phase. The experiment started on 10 November when an application group was created by the field instructor, Teacher Twelve, for the four students in Shuwaikh and another for the eight in Subhan. The experiment was concluded on 19 December.

At the beginning of the experiment, the instructor Teacher Twelve explained the objectives of the module (Figure 6.8). The instructor was engaged with the experiment, and he tried to get the students to participate in the group by asking questions (Figure 6.11).

Figures 6.12 and 6.13 show that the students participated and answered some of the instructor's questions.

The instructor posted a voice recording, which demonstrated that he used different features of the application.

FIGURE 6.8: The beginning of the experiment Mechanical Group (Sabhan).

FIGURE 6.9: The beginning of the experiment Mechanical Group (Shuwaikh): a greeting message from instructor Teacher Twelve to the Mechanical Engineering WhatsApp group participants

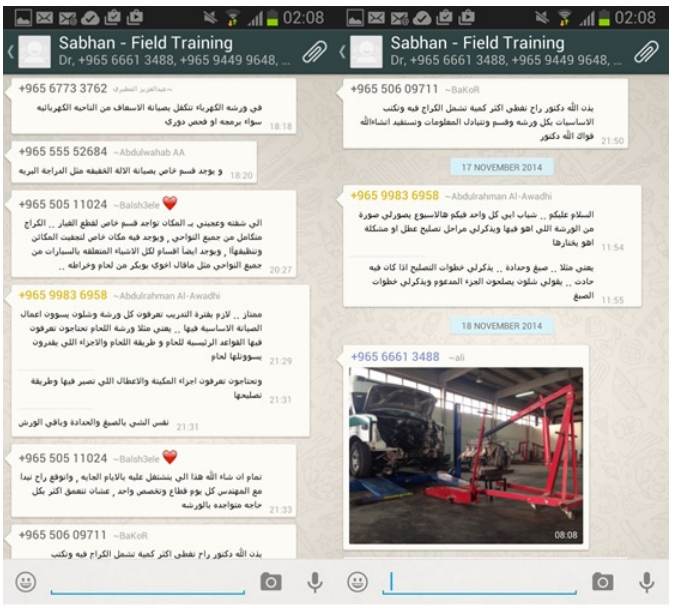


FIGURE 6.10: Interaction between the instructor and the students (Sabhan).

FIGURE 6.11: Interaction between the instructor (Teacher Twelve) and the students in the Mechanical Engineering group.

6.3.3 Participating Group Three: The KU Environmental Impact

This module introduced advanced geology students to the environmental impact assessment (EIA). The elements of the EIA include the potential environmental effects of any

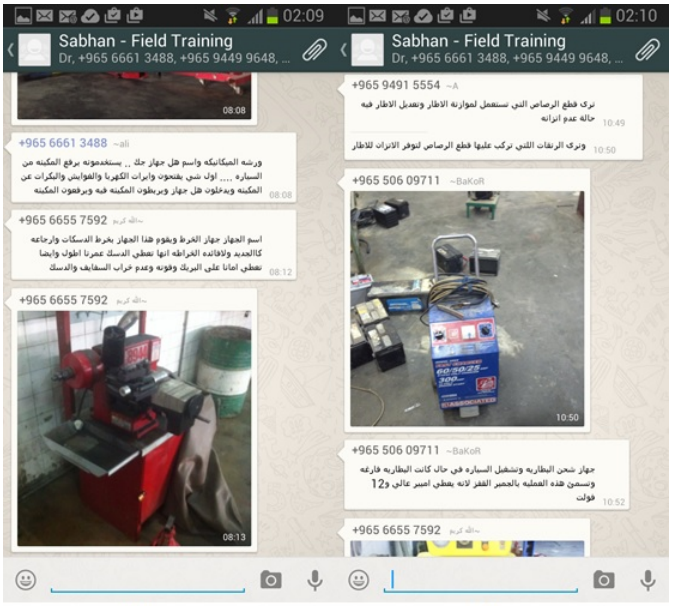


FIGURE 6.12: Example of students posting photos (Sabhan).

FIGURE 6.13: A further example of students posting photos (Sabhan).

project in terms of topography, soil, climate, surface water, ground water, geology and seismology. The EIA also includes identifying environmental protection measures during construction, operation and maintenance. One object of the module was that students learn to carry out an environmental cost-benefit analysis of the project in the initial

FIGURE 6.14: Example of students posting photos and voice recording (Sabhan).

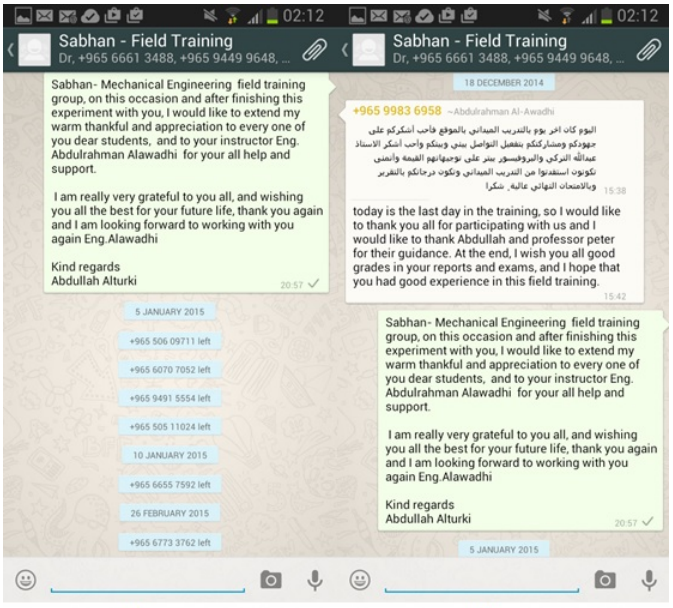


FIGURE 6.15: At the end of the experiments (Sabhan).

stage in order to identify regulatory measures and the roles of the agencies concerned with efficient environmental management.

The module mark was divided between the classroom tasks and the lab component. This experiment began on 10 November when the application group was created, which

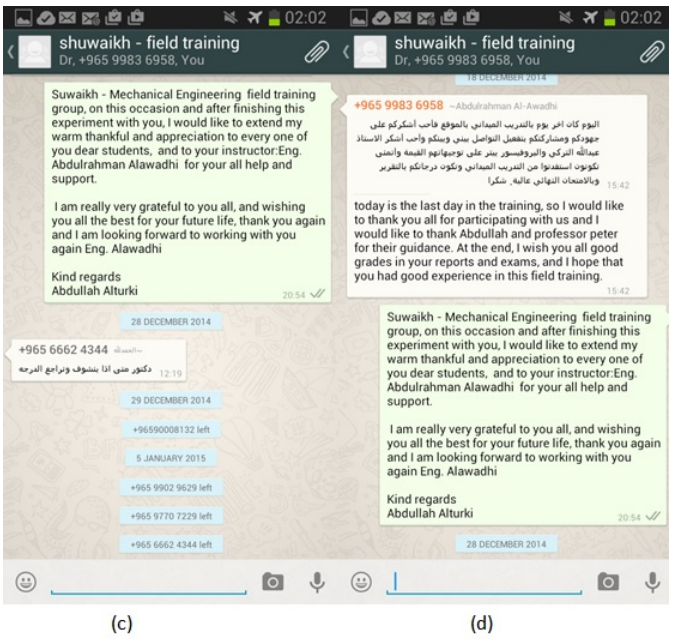


FIGURE 6.16: At the end of the experiments (Shuwaikh): The instructor thanked the student for their contribution and interactivity.

included all 10 students in the class. The experiment ended on 17 December when the fieldwork tasks were completed. The students were then left to focus on preparing for their final examinations. Classroom tasks accounted for 70% of the total module mark (first exam 15%, second exam 15%, final exam 30% and assignments 10%). The lab component was worth 30% of the total mark, which was divided between an EIA study on the Jaber Bridge Project and another EIA study on a coastal project of the students' choice.

In each project, the students carried out an EIA study—that is, a baseline study—that included a brief description of the project and the existing environment, the likely impact of the project, as well as mitigation and protection measures, alternatives, a summary and conclusions drawn from the results of EIA study. The researcher's experiment was deemed by the instructor to have enriched this activity, as students used the application to discuss the lab material. Using the application in m-learning systematised the students' approach to completing the module. After an in-class theoretical discussion, the instructor assigned specific tasks to be covered in the fieldwork. The students used the application to communicate and document their completed tasks and to receive the instructor's feedback. The experiment also ensured the continuation of the course while the instructor, the key academic person, attended the 5th International Symposium on

Energy from Biomass and Waste (Venice, 17-20 November). Indeed, course-related interactions between the instructor and the students continued through the application. The instructor even shared some conference material with the students, and he used the application to conduct a discussion on the theme of the conference.

The key academic person, who had taken part in the 2013 experiment, offered a new module titled "Environmental Impact", which required students to visit plastic and gasket factories, wells, fisheries and forests as well as marine biology parks, wildlife reserves and endangered species reserves. Students were expected to report on the status of the environment, the probable impact of specific projects and their alternatives, as well as the effects of mitigation and protection measures.

The following figures shows photographic images of interactions between the instructor and the students and among the students.

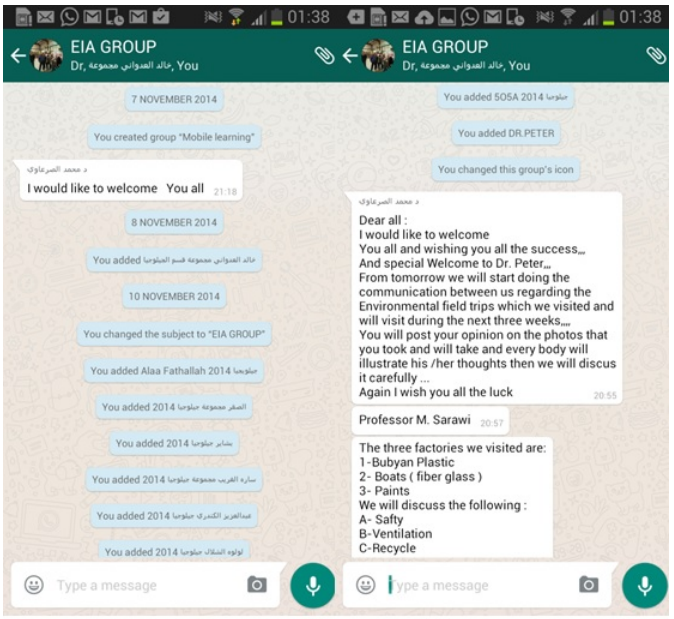


FIGURE 6.17: The start of the experiment the professor welcoming the group and explaining the purpose of the experiments.

6.4 Evaluation Methodology

Two equally sized samples of student participants were drawn from each class to answer open-ended questions about their fieldwork learning experience. These questions were aimed to measure the following: the students' motivation regarding the use of mobile

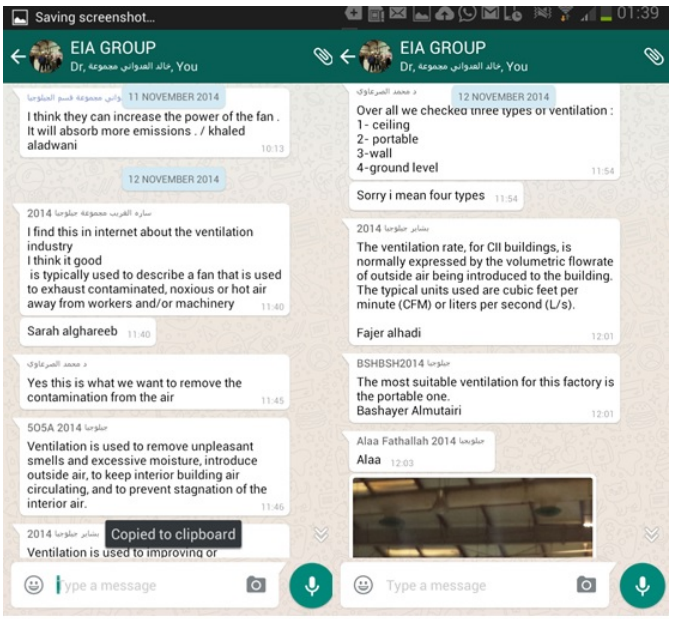


FIGURE 6.18: Interaction at the start of the experiment.

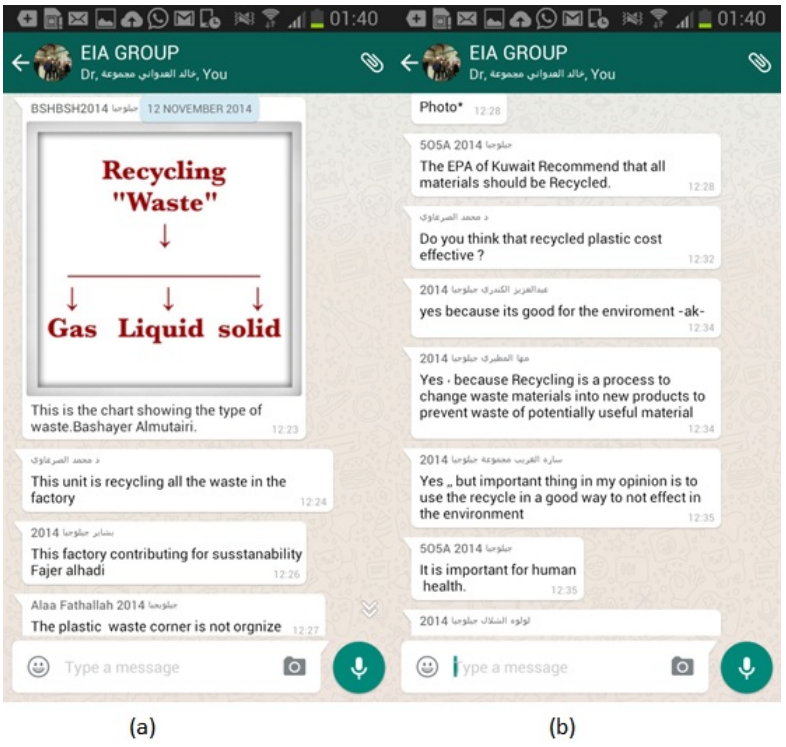


FIGURE 6.19: Example of the interaction between the doctor and the students (feedback).

technology; the needs of the traditional group of students regarding mobile technology;

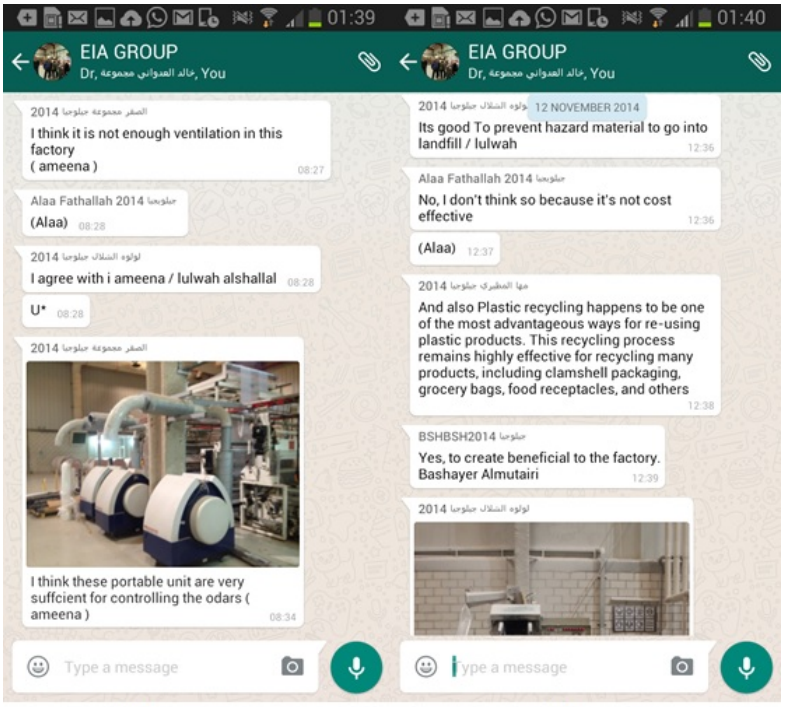


FIGURE 6.20: Example of the interaction between students.

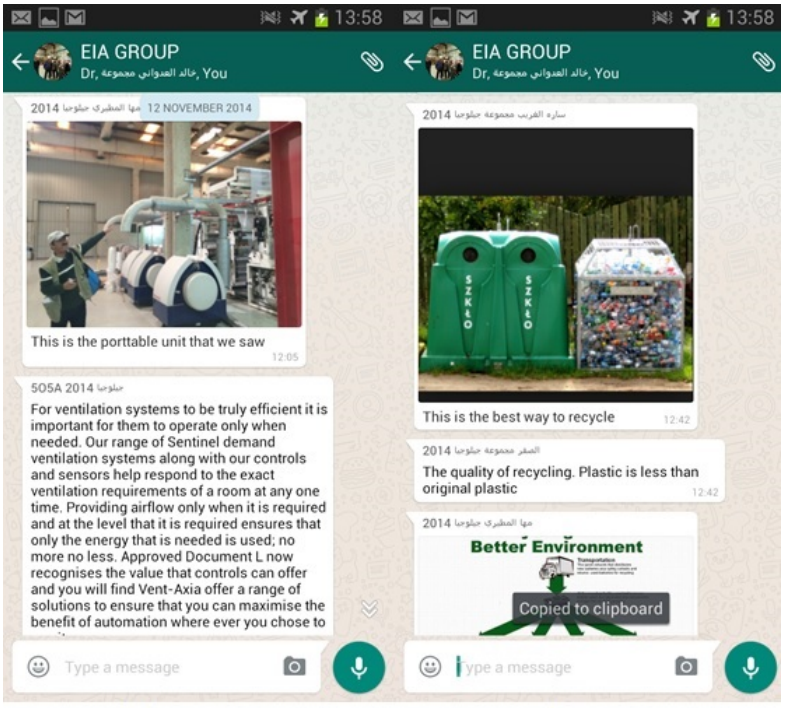


FIGURE 6.21: Example of the interaction between students.

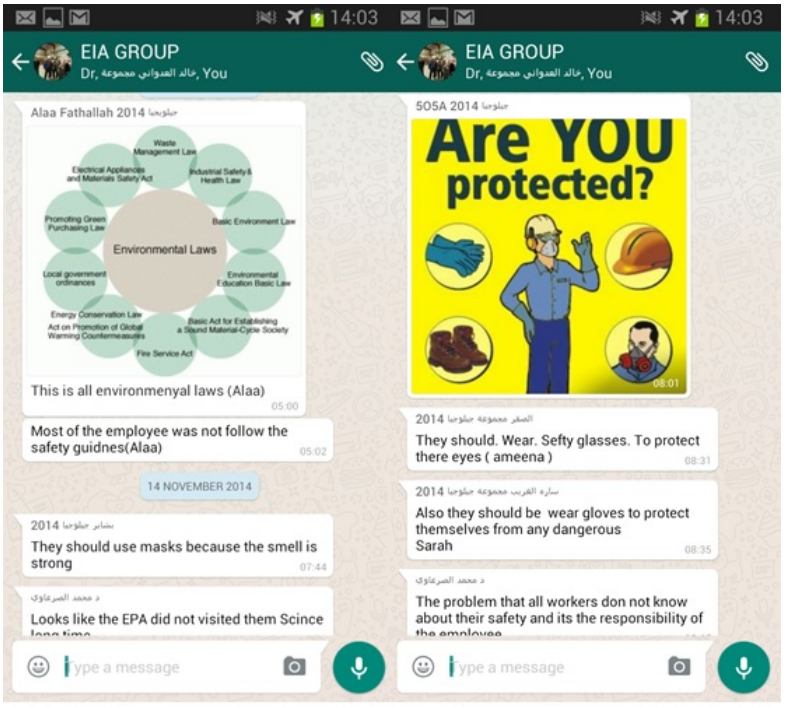


FIGURE 6.22: Example of posting photos related to the experiment from students.

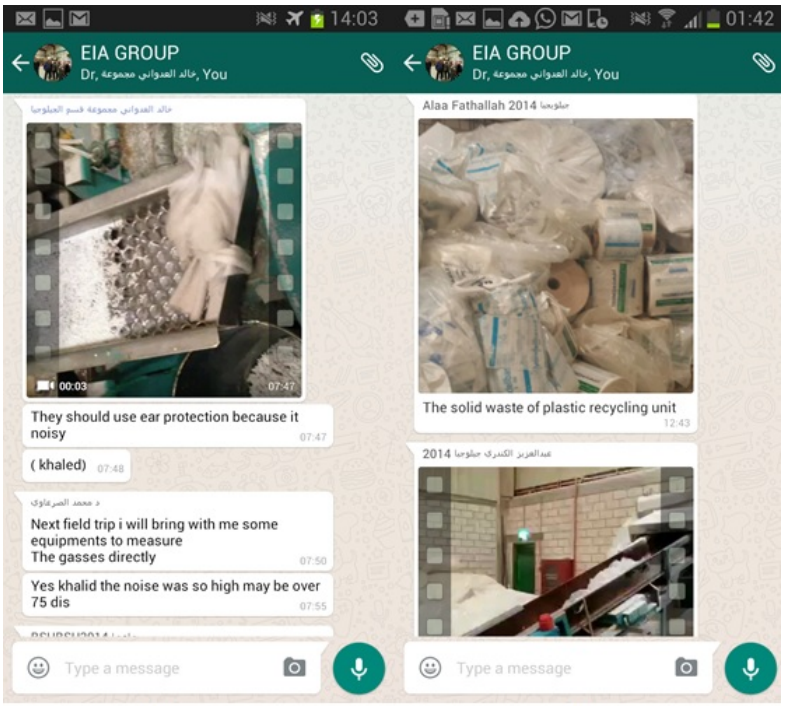


FIGURE 6.23: Example of posting videos related to the experiment from students.

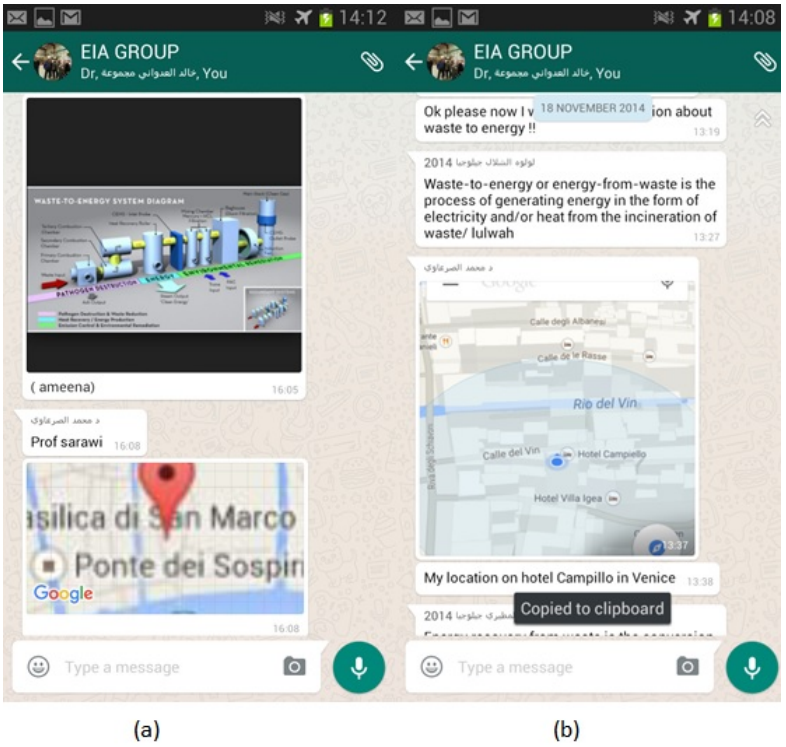


FIGURE 6.24: Example of posting location using GPS.

the students' points of view regarding their interaction with their instructors; and the barriers (if any) that arose during the experiment.

1. "Did you receive confidential and reasonable answers from your instructor by using this method, and have you found the quality of answers as needed?"
2. "Do you think there was an activity that you preferred to be done in another way or by another method?".
3. "In some cases, did you fear critical situations while using this method? When you were in class, did you prefer not to talk about them?".
4. "In your opinion, what are the positive and negative aspects of using this method? Do you want the experiment to be done in the same way in the future? Why?"
5. "Would you like to add anything regarding this matter?"

The instructor's questions were designed to elicit the following: the students' motivation to use m-learning technology; their opinions regarding their readiness to use the m-learning technology; their opinions regarding the need to use m-learning technology; any barriers they faced during the experiment.

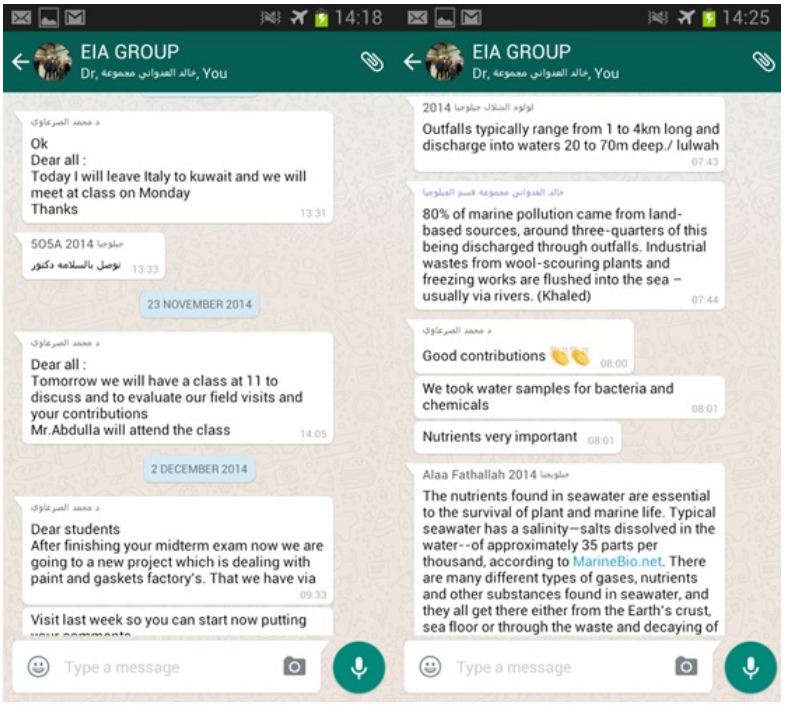


FIGURE 6.25: At the end of the experiment the doctor thanking the students for their contributions.

1. "How you have managed and administered the field academic activity before and after the m-learning technology existence?"

2. "Which of the m-learning activities that you applied did you find exceptional (if any) in this experiment and why?"

3. "Did you observe students who were attracted to the software and got hooked to it?"

4. "Do think that the students found the experiment interactive or intrusive?"

5. "Did you find a problem in assessing students' participation (by feeling that quantity of some students' participations were more than other students' ones, while sometimes the quality of the participation were weak)?"

6. "In your opinion, what are the advantages and disadvantages of the experiment?"

7. "If there was any pause during the experiment, what was the reason for that pause?"

8. "Do you have the motivation to do the same experiment and use the m-learning technology with your students in the next term or during the next academic year?"

9. "Would you like to add anything else?"

By traditional learning, the researcher means that the students and instructors used WhatsApp prior to the experiment or during the experiment but for social and general purposes with no academic restrictions, rules or monitoring. By m-learning technology, the researcher means the use of WhatsApp under restrictions, rules and monitoring.

From the civil engineering group, 10 students of 18 were selected to answer the questions: five students answered the questions about their m-learning-enhanced experience after the researcher added the educational and academic rules and after the instructors monitored them. The remaining five students answered the same questions before the educational and academic rules were explained. This group had used WhatsApp traditionally for social communication before the experiment. Both groups participated in the same experiment. The application was based on the instructor's recommendation that all students use the application. The same procedure was used for 10 students of the 11 in the mechanical engineering group, and 10 students of the 10 in the environmental impact group.

6.5 Qualitative Data Analysis

The following are the keywords and their frequencies. These data were extracted according to the research needs and the sample of participants. These keywords were classified into three parts: positive, negative and other. The main keywords are the following:

- **Positives:** Interest, engagement and interaction, understanding, save time, increase confidence, accurate and systematic, increase performance and competition
- **Negatives:** Confused, boredom, risky and intrusive.
- **Others:** Collaboration and mutual support, control and simplicity.

The data was collected in interviews held with various students and instructors. Sample of these interviews as follows and you can find more details about other interviews in section B.5:

Interview with Teacher nine (Civil Engineering from PAAET).

Previous work: -the field work was to lecture students and apply in the field and before the experiment we were concerned about using the application. We have used Whatsapp just a bit in the past, but now we are using it widely during this experiment and to contact students. I can stay in contact with students better and, I can give instructions easier to all students. We can prepare before and after course lessons and include video recording for watching later, which was not done before this experiment. We are able to use WhatsApp for education as it provides a very good link between students, course leaders and teachers in the field.

- Before the advent of this system, I always had to be there in person but using this sytem I can be away from the classrooms and still be involved with my students. Their participation and activity can be monitored and this also increases my performance as I can be on-hand without being physically present.
- In my opinion the most beneficial issue for groups is knowing the group chat and the field chats, so they can choose which is most beneficial for themselves. When the students were surveyed, there were no critical issues in understanding on using the applications on their mobiles.

Interview with students

– **Have you felt shy or stressed when use the mobile technology?**

Student 5: No, I didn't feel that way because when I ask it doesn't matter what it is and if any one is laughing at it , the question will be answered for me there is no problem.

Student 6: No stressfull situations and we discussed everything without any problem.

Student 7: Nothing.

Student 8: I see there is noreal issue and we can ask questions normally because we all learn.

Student 9: With mobile technology, no stressfull situation but id it's face to face sometimes I feel stressed.

– **Your ideas on mobile learning,the negatives and positives?**

Positives: There is more contact, it is easierand there is more informationdue to more answers,opinions and discussions. If there is a problem and the instructor is absent it will be useful to contact him this way.

Negatives: It takes more time, if some one with me to give the answer straight away this will save time. If you loose the mobile you will loose all the information and there will be no other options. When the instructor is available it may be very good. If there is no internet connectivity it will be unhelpful.

– **Do you think sometimes the instructor will ask questions at inconvenient times or out of your usual study times?**

Yes, sometimes after normal working hours, which can be inconvenient.

Positives Sometimes we need to have something repeated more than once to understand it, which is easier to do via mobile technology.

The total number of participants in this experiment was the following: 44 students and instructors; 40 students and 4 instructors. When the data collected from every group using the keywords above (focus group) were analysed, the following results were found:

6.5.1 Mechanical Field Group

Table 6.2 shows the data in relation to the keywords. The data were collected from students in group one (Mechanical field students) after they used the application for learning purposes in this experiment.

TABLE 6.2: Summary of the feedback of the participants who used the m-learning settings categorised based on selected keywords (Mechanical field group).

Main Keyword/themes	Total No. of Respondents	Agree		Disagree	
		Mentions	Percentage	Mentions	Percentage
Interest	5	5	100%	0	0%
Engagement & interaction	5	4	80%	1	20%
Increase understanding	5	3	60%	2	40%
Save time	5	4	80%	1	20%
Accurate & Systematic	5	4	80%	1	20%
Confused	5	2	40%	3	60%
Risky & technical problems	5	2	40%	3	60%
Expensive	5	1	20%	4	80%
Critical and cultural issues	5	1	20%	4	80%
Collaboration & Mutual Support	5	5	100%	0	0%
Increase Confidence	5	3	60%	2	40%
Increase performance & Competition	5	4	80%	1	20%
Increase control & flexibility	5	5	100%	0	0%
Simplicity	5	4	80%	1	20%

Table 6.2 shows the qualitative data that were collected from five students in the first group who used the mobile application for learning purposes in the experiment. This part is the treatment of this group. As also shown in Table 6.2, not all participants added comments about all the key words because the questions were open-ended. the participants talked about using the mobile for learning purposes via the WhatsApp application. Table 6.3 shows another group of five students in the same module (mechanical field), who used only traditional (face-to-face) learning (i.e., the control group). The results of the two parts were then compared.

TABLE 6.3: Summary of the feedback of the participants who used a traditional face to face approach categorised based on selected keywords (Mechanical field group).

Main Keyword/themes	Total No. of Respondents	Agree		Disagree	
		Mentions	Percentage	Mentions	Percentage
Interest	5	3	60%	2	40%
Engagement & interaction	5	2	40%	3	60%
Increase understanding	5	2	40%	3	60%
Save time	5	1	20%	4	80%
Accurate & Systematic	5	2	40%	3	60%
Confused	5	2	40%	3	60%
Boredom	5	1	20%	4	80%
Risky & technical problems	5	1	20%	4	80%
Critical and cultural issues	5	1	20%	4	80%
Collaboration & Mutual Support	5	2	40%	3	60%
Increase performance & Competition	5	3	60%	2	40%
Increase control & flexibility	5	2	40%	3	60%
Simplicity	5	3	60%	2	40%

From the students' points of view, there was a big difference between using the mobile technology and using the traditional technology. As shown in Table 1, the students in this group became interested in using mobile technology in their learning (5 of 5). The students were interested in using mobile technology for learning purposes. They were interested in using their mobile devices, which they always carried, for educational purposes, especially because their module took place in the field. In contrast, the students in the traditional group (Table 6.3) were less interested in using the traditional method of learning. The results of this experiment showed that three of five students were still interested in using the traditional method in their learning, and two five students were not interested in using traditional learning.

Regarding the keywords engagement and interaction, Table 6.2 shows that the students in the group that used mobile technology were motivated to use it and to engage with it. The results showed that four of five students found this technology to be interactive, which indicates that most students were happy with this technology. In contrast, Table 6.3 shows that two of five students (40%) found that the traditional method was interactive, which means that only two students were engaged with the traditional method.

Table 6.2 shows that three students of five (60%) found that using mobile technology for learning purposes increased their understanding. However, this percentage was not high enough. A potential reason is that the students did not have enough experience in using the mobile for learning purposes. Over time, they would become much better in using their mobile devices for learning purposes. Furthermore, the English language is problematic for many students. Hence, several students did not understand the information that was written in English. However, this problem would be solved with experience and practice. In contrast, Table 6.3 shows that two of five students (40%) increased their understanding by using the traditional method, and three of five students (60%) did not improve their understanding by using the traditional method.

Regarding the next keyword, Table 6.2 shows that four of five students (80%) considered that the use of m-learning technology saved time. Table 6.3 shows that only one of five students found that the traditional learning method saved time. This big difference in the results indicates that most students were convinced that using mobile technology saves time.

The next keywords were accurate and systematic. Table 6.2 shows that four of five students (80%) found that using mobile in learning was more accurate and systematic. Table 6.3 shows that two of five students (40%) found that the traditional method was accurate and systematic.

The next keyword, confused, was added to study different areas of concern in the situation. Negative and positive keywords were discussed for this reason. (Table 6.2 & Table 6.3) show that two of five students found that the m-learning technology and the traditional learning method were confusing. A potential reason is that the students did not have enough experience in using a mobile device for learning purposes because they were used to using it for social media. Over time, they would become adept in using their mobile devices for learning purposes, which would decrease their confusion.

Regarding the next keyword, two of five students (40%) found that using mobile technology was risky, and they encountered technical problems. The reason was that they feared they would encounter weak Internet coverage and/or disconnection, which might occur in a few locations in Kuwait. The students who mentioned this keyword might be from such areas.

Only one student mentioned that using a mobile device might be expensive, which is not worth mentioning.

In this group, one from each table of five students found that cultural issues prevented students from using mobile devices, in addition to using the traditional method for learning purposes. Traditional, cultural and religious issues might prevent some males and females from recording their voices or asking some questions. However, this did not occur in this group of students.

Students who used the m-learning technology found that it facilitated collaboration and mutual support. Table 6.2 shows that five of five students (100%) used this keyword positively. As Table 6.3 shows, only two of five students (40

Five of five students (100%) found that using mobile in learning increased control and flexibility. As Table 6.3 shows that in this group, only two of five students found that traditional learning increased control and flexibility. This result indicates that all students in this group (Table 6.2) were convinced that m-learning increased control and flexibility.

The next keyword is simplicity. Four of five students (80%) in this group found that using of m-learning was simple. Table 6.3 shows that three of five students (60%) found the traditional learning to be simple.

6.5.2 Environmental Geology Group

Table 6.4 shows the results of the analysis using the keywords. The data shown in this table were collected from students in group two (environmental geology) after they used mobile devices for learning purposes in this experiment.

TABLE 6.4: Summary of the feedback of the participants who used the m-learning settings categorised based on selected keywords (Environmental geology group).

Main Keyword/themes	Total No. of Respondents	Agree		Disagree	
		Mentions	Percentage	Mentions	Percentage
Interest	5	4	80%	1	20%
Engagement & interaction	5	3	60%	2	40%
Increase understanding	5	4	80%	1	20%
Save time	5	4	80%	1	20%
Accurate & Systematic	5	3	60%	2	40%
Confused	5	2	40%	3	60%
Risky & technical problems	5	3	60%	2	40%
Expensive	5	1	20%	4	80%
Critical and cultural issues	5	1	20%	4	80%
Collaboration & Mutual Support	5	4	80%	1	20%
Increase control & flexibility	5	4	80%	1	20%
Simplicity	5	3	60%	2	40%

Table 6.4 shows information about the qualitative data that were collected from five students in the second group who used the mobile for learning purposes in the experiment. This part is the treatment group. Table 6.5 shows another group of five students in the same module (environmental geology). This group used traditional, face-to-face learning to study the same module (the control group). The results of the two parts were compared according to their different areas of concern.

TABLE 6.5: Summary of the feedback of the participants who used a traditional face to face approach categorised based on selected keywords (Environmental geology group)

Main Keyword/themes	Total No. of Respondents	Agree		Disagree	
		Mentions	Percentage	Mentions	Percentage
Engagement & interaction	5	2	40%	3	60%
Increase understanding	5	2	40%	3	60%
Save time	5	2	40%	3	60%
Accurate & Systematic	5	1	20%	4	80%
Risky & technical problems	5	3	60%	2	40%
Expensive	5	1	20%	4	80%
Critical and cultural issues	5	1	20%	4	80%
Collaboration & Mutual Support	5	2	40%	3	60%
Increase control & flexibility	5	1	20%	4	80%
Simplicity	5	2	40%	3	60%

As shown in Table 6.4, the students in this group became interested in using mobile technology in their learning. Four of five students (80%) were interested in using mobile devices for learning purposes, whereas only one of five students (20%) was uninterested. Similar to the mechanical field group, the environmental geology group of students also used mobile devices in their daily lives. From the researcher's point of view, if students used and always carried mobile devices, then it would be beneficial for them to use these devices for learning purposes.

Regarding the keywords engagement and interaction, Table 6.4 shows that the students in this group might have been afraid of using the mobile technology for learning purposes although they were interested in doing so. Table 6.4 shows that three of five students (60%) were engaged and interacted using mobile devices for learning purposes. Two of five students (40%) found that the mobile devices did not facilitate interaction. Table 6.5 shows that only two of five students (40%) found traditional learning interactive, while three of five students (60%) did not engage in traditional learning. This result reflects the students' need to change from the traditional learning to technological learning, particularly mobile technology, which they always used for social purposes.

The next keywords are increase understanding. Table 6.4 shows that four of five students (80%) agreed that using mobile increased their understanding. Only one of five students (20%) disagreed with this idea. These results indicate the students in this

group were happy with this idea. In contrast, Table 6.5 shows that only two of five students (40%) agreed that the traditional learning increased their understanding. The remaining students (60%) disagreed.

Table 6.4 shows that four of five students (80%) found that using a mobile device for learning purposes saved time. This result indicates that these students were happy with this idea. Table 6.5 shows that only two of five students (40%) found that traditional learning saved time.

The next keywords were accurate and systematic. Table 6.4 shows that three of five students (60%) found that using a mobile device in learning was more accurate and systematic. Only one of five students (Table 6.5) found that the traditional method was more accurate and systematic.

Table 6.4 shows that two of five students (40%) found that the m-learning technology was confusing. The potential reason is that these students were not experienced in using mobile for learning purposes. They used mobile devices for social media. Over time, they would become adept in using mobile devices for learning purposes, which would decrease the confusion.

Three of five students (60%) found that using mobile technology was risky and had technical problems. The reason is that they encounter weakness or disconnection in Internet coverage, which occurs is a few areas in Kuwait. The students who mentioned this keyword might be from these areas. Three of five students (60%)found that traditional learning was risky. The potential reason is that in this digital and technological age, traditional learning has become risky because people need to improve their life experiences by using technology. Therefore, using traditional learning would be risky.

Table 6.4 shows that just one student (20%) found that using mobile technology might be expensive. In addition, one of five students (20%) found that traditional learning was expensive and ineffective.

Within this group, 1 from each table out of 5 found that critical and cultural issues prevented students from using mobile devices and/or using the traditional method for learning purposes. Traditional, cultural and religious issues might prevent some males and females from recording their voices or asking some questions; however, this was not the case in this group of students.

Table 6.4 shows that the students who used m-learning technology found it facilitated collaboration and mutual support. Four of five students (80%) used the keyword positively. However, as shown in Table 6.5, only two of five students (40%) found that the traditional learning method provided collaboration and mutual support. This percentage is lower than that shown in Table 6.4 for mobile technology.

Table 6.4 shows that four of five students (80%) found that using mobile devices in learning increased control and flexibility. Table 6.5 shows that only one of five students found that traditional learning increased control and flexibility. This result indicates that that m-learning increases control and flexibility.

The next keyword is simplicity. Three of the five students (60%) in this group found that m-learning was simple. The other two students (40%) did not find m-learning simple. Table 6.5 shows that only two of five students (40%) found that traditional learning was simple.

6.5.3 Civil Engineering Group.

Table 6.6 shows the results of the keyword analysis. The data shown in this table were collected from the students in group three (civil engineering) after they used mobile devices for learning purposes in this experiment.

TABLE 6.6: Summary of the feedback of the participants who used the m-learning settings categorised based on selected keywords (Civil engineering group).

Main Keyword/themes	Total No. of Respondents	Agree		Disagree	
		Mentions	Percentage	Mentions	Percentage
Interest	5	4	80%	1	20%
Engagement & interaction	5	4	80%	1	20%
Increase understanding	5	5	100%	0	0%
Save time	5	4	80%	1	20%
Accurate & Systematic	5	4	80%	1	20%
Risky & technical problems	5	1	20%	4	80%
Critical and cultural issues	5	0	0%	5	100%
Collaboration & Mutual Support	5	4	80%	1	20%
Increase performance & Competition	5	4	80%	1	20%
Increase control & flexibility	5	4	80%	1	20%
Simplicity	5	3	60%	2	40%

Table 6.7 shows another group of five students (civil engineering students), who used only traditional (face-to-face) learning to study the same module (the control group). The results of the two groups were compared according to their different areas of concern..

As shown in Table 6.6, the students in this group became interested in using mobile technology in their learning. Four of five (80%) students were interested in using mobile

TABLE 6.7: Summary of the feedback of the participants who used a traditional face to face approach categorised based on selected keywords (Civil engineering group)

Main Keyword/themes	Total No. of Respondents	Agree		Disagree	
		Mentions	Percentage	Mentions	Percentage
Interest	5	2	40%	3	60%
Engagement & interaction	5	2	40%	3	60%
Increase understanding	5	1	20%	4	80%
Save time	5	1	20%	4	80%
Accurate & Systematic	5	2	40%	3	60%
Confused	5	3	60%	1	20%
Critical and cultural issues	5	3	60%	2	40%
Collaboration & Mutual Support	5	2	40%	3	60%
Increase performance & Competition	5	1	20%	4	80%
Increase control & flexibility	5	2	40%	3	60%
Simplicity	5	2	40%	3	60%

devices for learning purposes while one of five students (20%) was uninterested. Similar to the mechanical field group, the civil engineering group of students also used mobile devices in their daily lives. However, Table 6.7 shows, only two of five students (40%) were interested in using only traditional learning; hence, 60% of this group of students were interested.

Regarding the keywords engagement and interaction, Table 6.6 shows that most students of this group found using m-learning to be interactive, and they were engaged in this type of learning. Table 6.6 shows that four of five students (80%) were engaged, and they interacted using mobile devices for learning purposes. However, Table 6.7 shows that only two of five students found the traditional learning interactive while three students did not find it interactive, and they did not engage in traditional learning. This result indicates that students would like to change traditional learning to technological learning, especially m-technology, which they already use for social purposes.

The next keywords are increase understanding. Table 6.6 shows that all five students (100%) in this group reported that using mobile devices increased their understanding. However, Table 6.7 shows that one of five students (20%) agreed that traditional learning increased understanding; hence, 80% of the students in this group disagreed.

Table 6.6 shows that four of five students (80%) reported that using mobile devices for learning purposes saved time; one student (20%) disagreed. Table 6.7 shows that only one of five students (20%) found that traditional learning saved time.

The next keywords are accurate and systematic, Table 6.6 shows that four of five students (80%) found that using mobile devices in learning was accurate and systematic, whereas one of five students (Table 6.7) found that the traditional method was more accurate and systematic.

Table 6.6 shows that two of five students (40%) found traditional learning to be confusing. Table 6.7 shows that students did not use these keywords in the m-learning area, which indicates that they did not find m-learning to be confusing.

As shown in Table 6.6, only one of five students (20%) found that using mobile technology was risky, and it had technical problems; hence, 80% of the students in this group did not find that using mobile technology was risky or technically problematic.

Table 6.6 shows that no student had critical or cultural issues in using mobile for learning purposes. Traditional, cultural and religious issues might prevent some males and females from recording their voices or asking some questions; however, this was not indicated in this group of students. However, as Table 6.7 shows, three of five students (60%) reported critical and cultural issues when they used traditional learning.

Table 6.6 shows that the students who used m-learning technology found it that it facilitated collaboration and mutual support. Four of five students (80%) used this these keywords positively. As Table 6.7 shows, one two of five students (40%)found that the traditional learning method facilitated collaboration and mutual support, which is less than that shown Table 6.6 for mobile technology.

Table 6.6 shows that four of five students (80%) found that using mobile devices in learning increased control and flexibility. Only two of five students (Table 6.7) found that traditional learning increased control and flexibility. This result indicates that m-learning could increase control and flexibility.

In the civil engineering group, four of five students (80%) found that m-learning increased performance and competition. As Table 6.7 shows that only two of five students (40%)found that traditional learning increased performance and competition.

The next keyword is simplicity. In this group, three students of five students (60%) found that m-learning was simple. Two of five students found that m-learning was not simple. Table 6.7 shows that only two of five students (40%) found traditional learning to be simple.

6.5.4 Comparing Traditional Learning & the Mobile Learning from the Modules' Instructors Points of view

The instructors of the field modules had extensive experience, and they had used traditional learning techniques in teaching these modules for many years. For this reason,

they were asked for their opinions after they used the new technique of mobile technology to teach the same modules. The instructors' feedback could be very useful for this research study.

6.5.4.1 Teacher twelve

He had taught this module for about two years. The following keywords were collected during the researcher's meeting with Teacher twelve.

Table 6.8: Summary of teacher feedback (Teacher Twelve).

Keyword	Mobile Technology	Traditional Technology
Increase understanding	Yes	No
Save time	Yes	No
Accurate & Systematic	Yes	No
Increase Confidence	Yes	No
Critical and cultural issues	No	Yes
Intrusive	No	Yes
Collaboration & Mutual Support	Yes	No
Increase performance & Competition	Yes	No
Increase control & flexibility	Yes	No
Simplicity	Yes	No
Referencing	No	Yes

6.5.4.2 The key academic person

He had taught this module for about five years. The following keywords were collected during the researcher's meeting with the key academic person.

6.5.4.3 Teacher Eight

He taught this module for about 4 years. The following keywords were collected during the researcher's meeting with Teacher Eight.

6.5.4.4 Teacher Nine

He had taught the civil engineering module for about two years. The following keywords were collected during the researcher's meeting with Teacher Nine.

Table 6.9: Summary of teacher feedback (Teacher Zero).

Keyword	Mobile Technology	Traditional Technology
Interest	Yes	No
Engagement & interaction	Yes	No
Increase understanding	Yes	No
Save time	Yes	No
Accurate & Systematic	Yes	No
Increase Confidence	Yes	No
Critical and cultural issues	No	Yes
Intrusive	No	Yes
Collaboration & Mutual Support	Yes	No
Increase performance & Competition	Yes	No
Increase control & flexibility	Yes	No
Simplicity	Yes	No
Referencing	No	Yes

Table 6.10: Summary of teacher feedback (Teacher Eight).

Keyword	Mobile Technology	Traditional Technology
Engagement & interaction	Yes	No
Increase understanding	Yes	No
Save time	Yes	No
Accurate & Systematic	Yes	No
Confused	Yes	No
Increase Confidence	Yes	No
Critical and cultural issues	No	Yes
Intrusive	No	Yes
Collaboration & Mutual Support	Yes	No
Increase performance & Competition	Yes	No
Increase control & flexibility	Yes	No
Simplicity	Yes	No
Referencing	No	Yes

6.5.5 Comparisons of the Different Groups of students

This section discusses the differences in the concerns among the groups of students. For example, in the mechanical field group, all students were interested in mobile technology, whereas in the environmental geology group four of five students were interested mobile technology. In the civil engineering group four of five students were interested in mobile technology. These results indicate that most students in the three groups were interested in using mobile technology.

TABLE 6.11: Summary of teacher feedback (Teacher Nine).

Keyword	Mobile Technology	Traditional Technology
Interest	Yes	No
Engagement & interaction	Yes	No
Increase understanding	Yes	No
Save time	Yes	No
Accurate & Systematic	Yes	No
Critical and cultural issues	No	Yes
Collaboration & Mutual Support	Yes	No
Increase performance & Competition	Yes	No
Increase control & flexibility	Yes	No
Simplicity	Yes	No
Referencing	No	Yes

With regard to the keywords engagement and interaction, in the mechanical field group, four of five students found mobile technology to be interactive, and they engaged with this technology. In the environmental technology group, only one student found mobile technology to be interactive and engaged with this technology (Table 6.6). In the civil engineering group, four of five students found it interactive. These results indicate that the environmental engineering students did not find the mobile technology as interactive as the other two groups did.

In the mechanical field group, 60% of students found that m-learning increased understanding. In the environmental group, the percentage was 80%. In the civil engineering group, the percentage was 100%. These results indicate that some groups understood the lessons more than other groups did. A potential reason is that the students' academic subject area and their knowledge of technology affected their understanding in m-learning.

All groups agreed that mobile technology saved time. The percentages of agreement were 80% in all groups: mechanical field, environmental geology and civil engineering. These results indicate that m-learning could be effective in these areas.

Most students in the three groups were also happy with the idea that m-learning is accurate and systematic: 80% of the mechanical field group and the civil engineering group; 60% of the environmental geology group.

Some students in the groups found it risky to use mobile devices for learning because they were wary of Internet weakness and connection problems; however, this percentage was low. For example, in the mechanical engineering group, only two of five students

(40%) agreed that the use of mobile devices was risky. Three of five students (60%)in the environmental geology group agreed they were risky. In the civil engineering group, only one of five students (20%) agreed that it was risky. A potential reason for the large percentage of the environmental geology group is that they had experienced more Internet disconnections and weaknesses.

Critical and cultural issues affected some groups. This finding reflects the different traditions and cultures in Kuwait. Some students had Bedouin backgrounds, which affected their work, especially recording their voices. Other students, especially females, did not like to give their personal details, such as telephone numbers and so on, to the other students most of whom were male.

The results showed that mobile technology increased the students' performances and competitiveness, which was evidenced in the students' answers and activities. For example in the mechanical engineering group and the civil engineering group, four of five students (80%) agreed with this idea. In the environmental geology group, this keyword was not mentioned.

Almost all groups agreed that m-learning increased control and flexibility. The reason is that they performed hands-on tasks when they used their mobile devices to write comments and answer questions about their experiments even when they were at home on the weekends. The students' instructors controlled their students' performances even from abroad. However, the keywords control and flexibility were not used to describe traditional learning. For example, in the mechanical field group, five of five students (100%) agreed. In the environmental geology group and in the civil engineering group, four of five students agreed (80%). Flexibility and control were highly appreciated by both the students and the instructors.

Although some found it difficult, most students in the groups found it easy to use mobile devices for learning purposes because they already used them and the WhatsApp application for social purposes. These results indicate that the students in these groups were happy to use mobile devices for purposes other than social communication, especially in m-learning.

In the mechanical field group, some students who used the mobile for learning purposes declared that some questions required them to meet with the instructor face-to-face to discuss a question. However, they elaborated that mobile technology might solve this problem because it allowed chatting with the instructor via the application. In contrast, students who used traditional learning found it hard to work using this type

of learning. For this reason, they showed some inclination to make changes and convert to technology. In this digital age, learning should also be digital.

For example, in the mechanical geology group, three of five students (60%) used traditional learning were interested in using this type of learning. In the civil engineering group, only two of five students (40%) agreed with this idea, which was not mentioned in the environmental geology group.

Regarding the keywords Engagement and Interaction, it was noticed that in the three groups, only two of five students (40%) engaged in and interacted with traditional learning. This finding indicates that some students were bored when they used traditional learning, especially in the field modules.

Most students in the three groups found that the traditional learning did not increase their understanding. Two of five students (40%) in both the mechanical field group and the environmental geology group agreed with the idea that traditional learning increased understanding. In the civil engineering group, one of five students (20

Most students who used traditional learning found that it did not save time. In the mechanical field group and the civil engineering group, only one of five students (20%) found that traditional learning saved time. In both groups, the remaining four students (80%) disagreed that traditional learning saved time. In the environmental geology group, three of five students (60%) agreed with this idea. This percentage is large because the students in this group might have been confused, or they might have they found it good to use traditional learning in their modules.

Regarding the keywords Accurate and Systematic, most students in the three groups did not find traditional technology accurate or systematic. In the mechanical field group and the civil engineering group, two of five students (40%) found that traditional learning was accurate and systematic. In the environmental geology group, one of five students (20%) agreed with this idea.

Regarding the keywords Confused and Boredom, most students agreed that this type of technology was confusing and boring. Risky and technical problems, critical and cultural issues, collaboration and mutual support, control and flexibility and then simplicity, all these keyword got just 20% and 40%.

6.5.6 Researcher's observations during the experiment

a. The results of this experiment indicate that students do not prefer the traditional learning methods. Instead, the findings indicate that they prefer to use technology, especially their mobile devises, which they previously used for social purposes only.

b. Most students were convinced that the m-learning increased control and flexibility.

c. Most students did not find m-learning confusing. However, some students who were not used to mobile devices found them confusing to use in learning.

d. In this experiment, the researcher avoided all the mistakes that happened in the first experiment, which increased the success of the second experiment.

e. The researcher chose instructors who had the motivation and courage to conduct this experiment.

f. The rules and instructions for using the mobile applications increased the security and control of the work.

g. The instructors' supervision and serious participation in the second experiment had positive effects on the performances of the students.

h. The prior training and detailed explanations provided to the students and instructors increased the students' knowledge and performance.

i. The focus on all the mobile application's capabilities ability increased the strength of the experiment.

j. The use of language that suited the students and instructors participants yielded positive results.

k. Accuracy was improved by attempting to solve all the problems that students and instructors encountered.

6.5.7 The key academic person

The key academic person is the only participant who was involved with both experiments (i.e., the previous experiment with the Ourviews software, and the new one with the WhatsApp application). He showed great enthusiasm and motivation through the research. For this reason, it was deemed worthwhile to obtain his feedback, opinions

and reflections about both experiments. The key academic person was the students' instructor during both experiments. The key academic person's feedback is summarised in the following key points:

1. Some software and applications were more intuitive than others, which was easier for the participants, and it saved more time.
2. When groups of students were specialised in the academic subject area, then they showed better results because they knew how and what to do compared with students in other subjects.
3. When the students were seniors and had experience in using technology, then they were able to understand and use the devices and applications.
4. When the students were senior and mature, they followed the regulations of the experiment. For example, they used the application for educational purposes and avoided using slang.
5. When the supervisors stayed close to their students during the experiment while they were doing their job, they accomplished their work properly without any difficulties. The students did better and worked harder, and they appreciated the importance of the experiment for their future progress.
6. When the system worked properly without any faults, then the students enjoyed their the work more, especially when they communicated with each other, because they found it interesting.
7. The students educated themselves by practising during the experiments and they produced professional writing in short and useful messages instead of long and unreadable messages.
8. During dialogues and group chats, some questions could be answered using the students' sentences and words.
9. In the final stage of the experiment, students became more confident and relaxed in their answers because they were experienced and comfortable in the experiment, which made them work harder even during the weekends.
10. When the information, such as pictures and descriptions, was clear, the students did better.

11. Gender and cultural issues were clear in the students' answers. For example, some female students were not comfortable taking part in the conversations.

12. With practice and experience in using mobile technology, the students and instructors learned from their mistakes.

13. In using m-learning, the students and instructors kept in contact with each other everywhere they were most of the time. Similarly, the effects of the GPS were clear.

14. It was clear that the m-learning was more important in the field work and learning than in other types of learning.

15. Higher education students benefitted more from using mobile technology because they had more experience than the other student' had.

16. Mobile learning gave the academics the opportunity to follow the progress of their students, and it gave the students extra assistance, homework and quizzes. Kuwaiti universities should gradually apply m-learning in their classes, and they should have enough technical support.

17. Stakeholders in Kuwait should adopt and encourage people to use the new m-learning technology.

18. Universities in Kuwait are ready to conduct seminars and workshops in the area of m-learning and mobile technology to enhance the knowledge of this kind of technology.

6.5.8 Final remarks

Forty students in three groups participated in the experiment. One objective was to change the students' perceptions of WhatsApp from that of a social networking application to an educational application. This objective was accomplished through implementing and adhering to systematic rules and instructions about the usage of the mobile devices and the WhatsApp application.

In particular, the environmental impact assessment and civil engineering groups benefitted from the advantages of m-learning, which allows for learning anytime, anywhere, and on the move. These results indicated that this experiment enhanced the main definition of the m-learning. For example, in the environmental impact group, the key

academic person continued interactions with his students from a remote location during his conference stay in Italy and then in Oman, as well as on weekends.

In the civil engineering group, Teacher Nine guided and instructed two groups of students based at two remote locations simultaneously although he was physically present at only one group or the other. The students did not have to wait for the instructor to be physically present before they could receive feedback.

A new section, Observations, was added. This section explained the activities of every group of students and instructors during the experimental process from the first week until the last week of the experiment. It reported the students and instructors' activities, engagements and tasks, whether they improved during the week and why. Also reported in the Observations was the reason that some groups stopped working some weeks, followed by suggestions about how to avoid such occurrences in the future.

The following conclusions were drawn:

1. In the digital age, it is worthwhile to convert traditional learning to digital learning.
2. There was some boredom in using traditional learning especially in the field modules.
3. It was clear that most students in the field modules did not prefer the traditional technology.
4. Most students saw this type of technology as confusing and boring.

6.6 Interactivity Analysis

This section presents the results of the analysis of the interactivity among the participants in the WhatsApp groups.

After the total number of responses were listed, the percentages of the responses to the total responses were calculated. The method of calculating the percentage was explained previously in Study 2.

The table shows that the environmental geology group had the greatest number of responses to extension (46.5%). The reason is that the group was very active, especially with the key participant, Teacher Zero.

Table 6.12: The frequencies of different responses.

Given	Environmental Geology	Civil Engineering	Mechanical Engineering (Sabhan)	Mechanical Engineering (Shwaikh)
Comm	0	0	0	0
Req	0	9	5	3
Pos	3	3	2	2
Ques	0	5	0	3
Ans	7	27	12	6
Agr	9	2	0	0
DisA	0	0	0	0
Reinf	0	2	0	0
Alter	16	3	0	2
Ext	47	23	10	7
Crit	13	0	0	1
Eva	6	8	4	4

Table 6.13: The percentage frequencies of different responses.

Given	Environmental Geology	Civil Engineering	Mechanical Engineering (Sabhan)	Mechanical Engineering (Shwaikh)
Comm	0.00%	0.00%	0.00%	0.00%
Req	0.00%	11.00%	15.20%	10.70%
Pos	3.00%	3.70%	6.10%	7.10%
Ques	0.00%	6.10%	0.00%	10.70%
Ans	6.90%	32.90%	36.40%	21.40%
Agr	8.90%	2.40%	0.00%	0.00%
DisA	0.00%	0.00%	0.00%	0.00%
Reinf	0.00%	2.40%	0.00%	0.00%
Alter	15.80%	3.70%	0.00%	7.10%
Ext	46.50%	28.00%	30.30%	25.00%
Crit	12.90%	0.00%	0.00%	3.60%
Eva	5.90%	9.80%	12.10%	14.30%

In the civil engineering group, there was variety in the interactions. At highest number of responses was in this group (32.9%).

In the mechanical engineering Sabhan group, more than one third of the interactivities were answers. This finding shows that there was interaction between the instructor and the students, which is usual in the request and answer relationship.

In the mechanical engineering Shwaikh group, the main response was extension, which comprised one quarter of the interactivities in this group. In this group, the students

participated by sending many photos to the same subject, which is the reason that extension was high in this group. The graph below shows the percentages of the reactions beside each code.

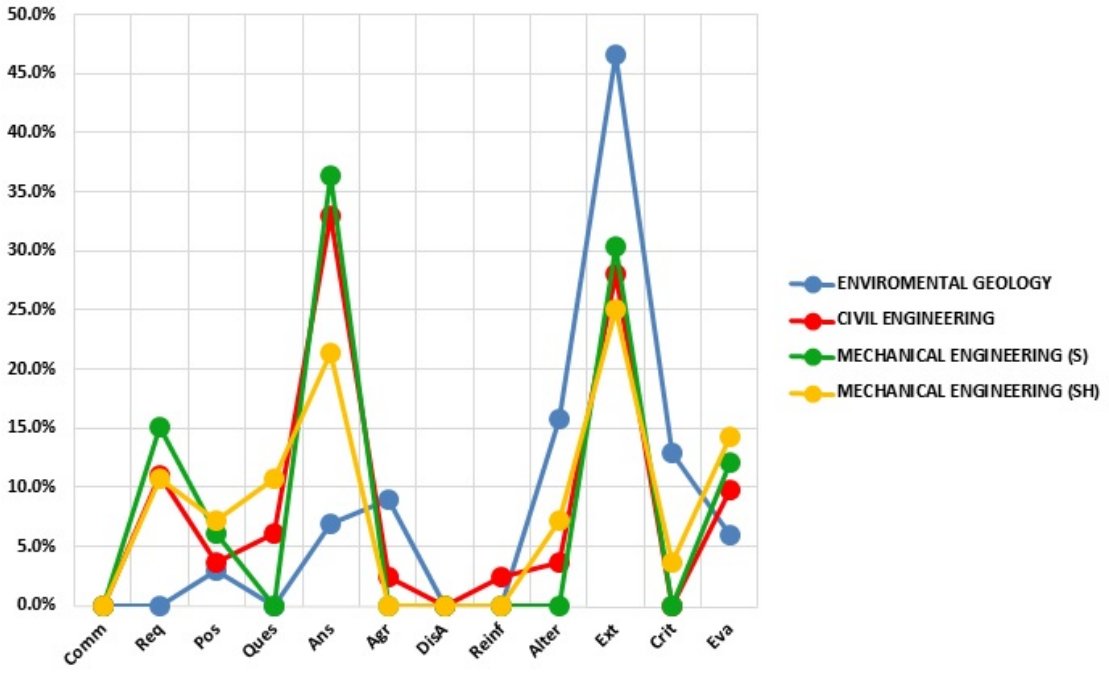


FIGURE 6.26: Graph showing each category percentage of all reactions.

TABLE 6.14: Observed frequency transition table (Environmental Geology - Group 1).

Given	Target												
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva	Total
Comm	0	0	0	0	0	0	0	0	0	0	0	0	0
Req	0	0	2	0	0	0	0	0	0	0	1	0	3
Pos	0	0	0	0	1	0	0	0	3	2	1	2	9
Ques	0	0	0	0	1	0	0	0	0	0	0	0	1
Ans	0	0	0	0	1	4	0	0	1	0	1	0	7
Agr	0	0	0	0	0	0	0	0	1	6	1	0	8
DisA	0	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	0	0	0	0
Alter	0	0	0	0	2	0	0	0	0	9	2	0	13
Ext	0	0	1	0	2	2	0	0	8	27	3	2	45
Crit	0	0	0	0	0	3	0	0	2	2	3	1	11
Eva	0	0	0	0	0	0	0	0	1	1	1	1	4
Total	0	0	3	0	7	9	0	0	16	47	13	6	101

6.6.1 Z-score analysis of second experiment

In Study 3, which is second experiment from the diagrams, the environmental geology group showed the best results because it had the highest z-scores for Question and Answer, Agreement after Answer and Request after Post. There were clear interactivities

TABLE 6.15: Transitional probabilities for responses (Environmental Geology - Group 1).

Given	Target												
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva	Total
Comm	0	0	0	0	0	0	0	0	0	0	0	0	0
Req	0	0	**0.7**	0	0	0	0	0	0	0	**0.3**	0	1
Pos	0	0	0	0	**0.1**	0	0	0	**0.3**	**0.2**	**0.1**	**0.2**	1
Ques	0	0	0	0	**1**	0	0	0	0	0	0	0	1
Ans	0	0	0	0	**0.1**	**0.6**	0	0	**0.1**	0	**0.1**	0	1
Agr	0	0	0	0	0	0	0	0	**0.1**	**0.8**	**0.1**	0	1
DisA	0	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	0	0	0	0
Alter	0	0	0	0	**0.2**	0	0	0	0	**0.7**	**0.2**	0	1
Ext	0	0	0	0	0	0	0	0	**0.2**	**0.6**	**0.1**	0	1
Crit	0	0	0	0	0	**0.3**	0	0	**0.2**	**0.2**	**0.3**	**0.1**	1
Eva	0	0	0	0	0	0	0	0	**0.3**	**0.3**	**0.3**	**0.3**	1

TABLE 6.16: Z-Score table (Environmental Geology - Group 1).

Given	Target											
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva
Comm	0	0	0	0	0	0	0	0	0	0	0	0
Req	0	0	**6.6**	0	-0.48	-0.55	0	0	-0.76	-1.64	**1.07**	-0.44
Pos	0	0	-0.55	0	0.52	-0.98	0	0	**1.51**	-1.53	-0.17	**2.17**
Ques	0	0	-0.18	0	**3.68**	-0.31	0	0	-0.44	-0.94	-0.39	-0.25
Ans	0	0	-0.48	0	0.79	**4.64**	0	0	-0.12	-2.56	0.12	-0.69
Agr	0	0	-0.52	0	-0.8	-0.92	0	0	-0.27	**1.68**	-0.03	-0.74
DisA	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	0	0	0
Alter	0	0	-0.68	0	**1.29**	-1.21	0	0	-1.68	**1.76**	0.29	-0.97
Ext	0	0	-0.4	0	-0.88	-1.41	0	0	0.48	**2.43**	-1.67	-0.57
Crit	0	0	-0.61	0	-0.96	**2.26**	0	0	0.23	-2	**1.51**	0.47
Eva	0	0	-0.36	0	-0.56	-0.64	0	0	0.51	-0.88	0.74	**1.65**

TABLE 6.17: Observed frequency transition table (Civil - Group 2).

Given	Target												
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva	Total
Comm	0	0	0	0	0	0	0	0	0	0	0	0	0
Req	0	0	0	0	8	1	0	0	0	1	0	0	10
Pos	0	6	2	2	13	0	0	0	1	2	0	0	26
Ques	0	0	0	0	3	0	0	0	0	0	0	0	3
Ans	0	1	0	2	0	1	0	0	1	9	0	1	15
Agr	0	0	0	0	0	0	0	0	0	2	0	0	2
DisA	0	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	1	0	0	1
Alter	0	1	0	0	0	0	0	0	0	0	0	1	2
Ext	0	1	1	1	3	0	0	2	1	6	0	6	21
Crit	0	0	0	0	0	0	0	0	0	0	0	0	0
Eva	0	0	0	0	0	0	0	0	0	2	0	0	2
Total	0	9	3	5	27	2	0	2	3	23	0	8	82

between the students and the instructor and among the students, which yielded positive results.

The environmental geology group was successful because the instructor was very excited about the idea, and he believed in the concept of involving m-learning in education. The

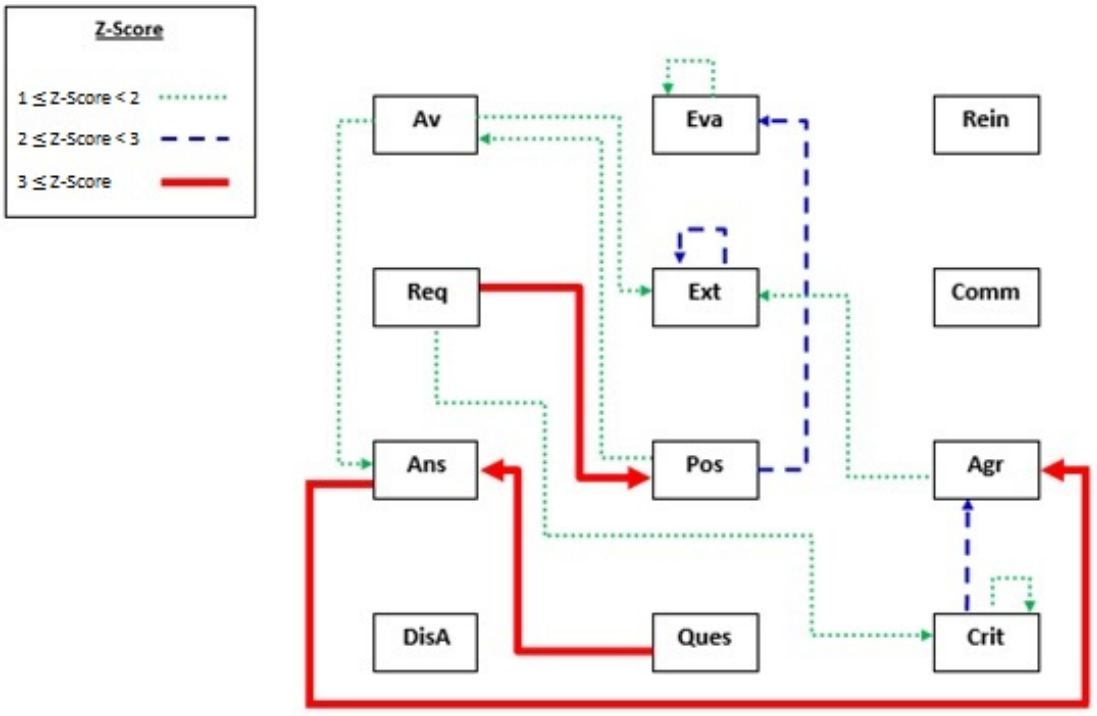


FIGURE 6.27: Z-Score of Environmental Geology (Second Experiment).

TABLE 6.18: Transitional probabilities for responses (Civil - Group 2).

Given	Target												
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva	Total
Comm	0	0	0	0	0	0	0	0	0	0	0	0	0
Req	0	0	0	0	**0.8**	**0.1**	0	0	0	**0.1**	0	0	1
Pos	0	**0.2**	**0.1**	**0.1**	**0.5**	0	0	0	0	**0.1**	0	0	1
Ques	0	0	0	0	**1**	0	0	0	0	0	0	0	1
Ans	0	**0.1**	0	**0.1**	0	**0.1**	0	0	**0.1**	**0.6**	0	**0.1**	1
Agr	0	0	0	0	0	0	0	0	0	**1**	0	0	1
DisA	0	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	**1**	0	0	1
Alter	0	**0.5**	0	0	0	0	0	0	0	0	0	**0.5**	1
Ext	0	0	0	0	**0.1**	0	0	**0.1**	0	**0.3**	0	**0.3**	1
Crit	0	0	0	0	0	0	0	0	0	0	0	0	0
Eva	0	0	0	0	0	0	0	0	0	**1**	0	0	1

instructor had a clear strategy, and he had gained experience since his participation in the first experiment.

The environmental geology group was better than the civil engineering group in the following interactivities: Agreement after Answer and Answer after Question. This result indicates that the instructor answered the students' questions and vice versa. In addition, the environmental geology group was better in terms of the relation between Post after Request. The highest interactivity was achieved in the environmental geology group.

TABLE 6.19: Z-Score table (Civil - Group 1).

Given	Target											
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva
Comm	0	0	0	0	0	0	0	0	0	0	0	0
Req	0	-1.18	-0.66	-0.86	**3.38**	**1.65**	0	-0.53	-0.66	-1.36	0	-1.11
Pos	0	**2.39**	**1.33**	0.41	**2.24**	-0.98	0	-0.98	0.06	-2.8	0	-2.03
Ques	0	-0.62	-0.34	-0.45	**2.52**	-0.28	0	-0.28	-0.34	-1.1	0	-0.58
Ans	0	-0.59	-0.83	**1.3**	-3	**1.17**	0	-0.68	0.69	**3.05**	0	-0.45
Agr	0	-0.5	-0.28	-0.36	-1	-0.23	0	-0.23	-0.28	**2.29**	0	-0.47
DisA	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	-0.35	-0.19	-0.25	-0.7	-0.16	0	-0.16	-0.19	**1.6**	0	-0.33
Alter	0	**1.79**	-0.28	-0.36	-1	-0.23	0	-0.23	-0.28	-0.89	0	**1.94**
Ext	0	-1.06	0.31	-0.3	-2.11	-0.84	0	**2.44**	0.31	0.06	0	**3.37**
Crit	0	0	0	0	0	0	0	0	0	0	0	0
Eva	0	-0.5	-0.28	-0.36	-1	-0.23	0	-0.23	-0.28	**2.29**	0	-0.47

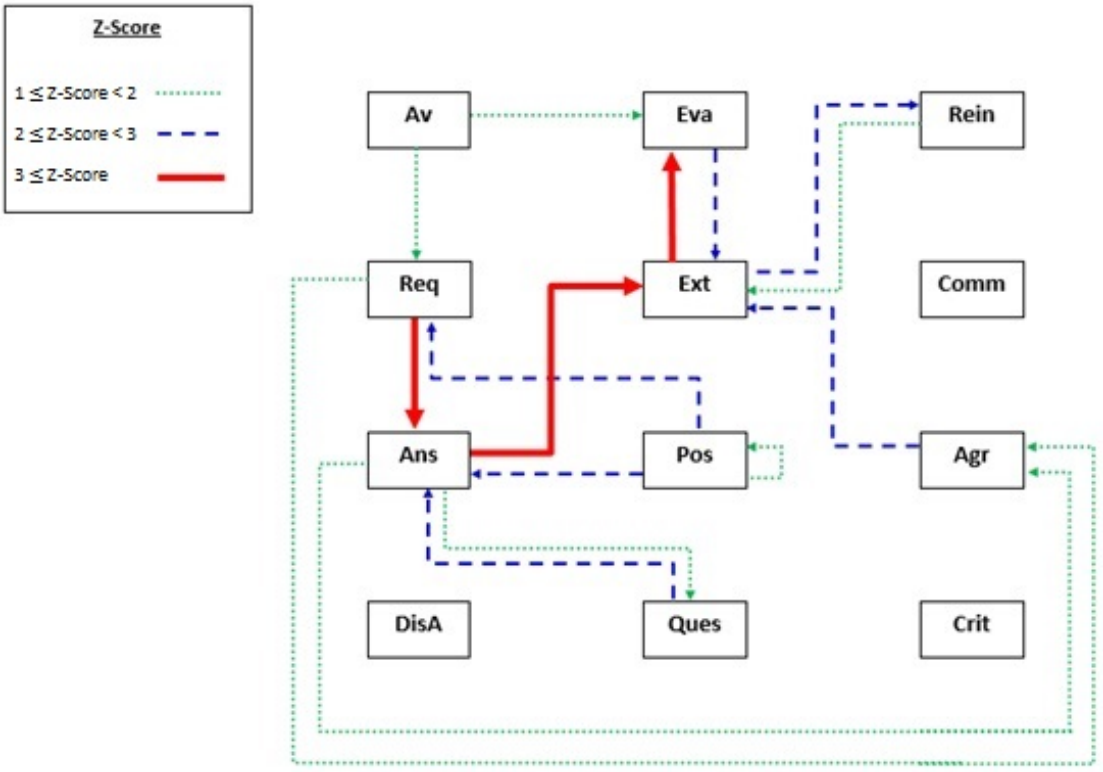


FIGURE 6.28: Z-Score of Civil Engineering (Second Experiment).

Although the environmental geology group showed the best results overall, the civil engineering group's z-scores were higher in Extension after Answer, Answer after Request and Evaluation after Extension. Therefore, the instructor was evaluated after each Extension. When there was a Request, it was followed by an Answer. In general, Extensions followed Answers.

In the mechanical engineering group, although Sabhan z-scores had three red relationships, the Shwaikh group showed variety in the interactivities. Although the Sabhan

TABLE 6.20: Observed frequency transition table (Mechanical (Sabhan) - Group 3).

Given	Target												
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva	Total
Comm	0	0	0	0	0	0	0	0	0	0	0	0	0
Req	0	0	0	0	5	0	0	0	0	0	0	0	5
Pos	0	4	0	0	0	0	0	0	0	0	0	0	4
Ques	0	0	0	0	0	0	0	0	0	0	0	0	0
Ans	0	0	0	0	6	0	0	0	0	4	0	2	12
Agr	0	0	0	0	0	0	0	0	0	0	0	0	0
DisA	0	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	0	0	0	0
Alter	0	0	1	0	0	0	0	0	0	0	0	0	1
Ext	0	0	0	0	1	0	0	0	0	6	0	2	9
Crit	0	0	0	0	0	0	0	0	0	0	0	0	0
Eva	0	1	1	0	0	0	0	0	0	0	0	0	2
Total	0	5	2	0	12	0	0	0	0	10	0	4	33

TABLE 6.21: Transitional probabilities for responses (Mechanical (Sabhan) - Group 3).

Given	Target												
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva	Total
Comm	0	0	0	0	0	0	0	0	0	0	0	0	0
Req	0	0	0	0	**1**	0	0	0	0	0	0	0	1
Pos	0	**1**	0	0	0	0	0	0	0	0	0	0	1
Ques	0	0	0	0	0	0	0	0	0	0	0	0	0
Ans	0	0	0	0	**0.5**	0	0	0	0	**0.3**	0	**0.2**	1
Agr	0	0	0	0	0	0	0	0	0	0	0	0	0
DisA	0	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	0	0	0	0
Alter	0	0	**1**	0	0	0	0	0	0	0	0	0	1
Ext	0	0	0	0	**0.1**	0	0	0	0	**0.7**	0	**0.2**	1
Crit	0	0	0	0	0	0	0	0	0	0	0	0	0
Eva	0	**0.5**	**0.5**	0	0	0	0	0	0	0	0	0	1

TABLE 6.22: Z-Score table (Mechanical (Sabhan) - Group 3).

Given	Target											
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva
Given	Target											
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva
Comm	0	0	0	0	0	0	0	0	0	0	0	0
Req	0	-1.03	-0.62	0	**3.21**	0	0	0	0	-1.6	0	-0.9
Pos	0	**5.05**	-0.54	0	-1.61	0	0	0	0	-1.41	0	-0.79
Ques	0	0	0	0	0	0	0	0	0	0	0	0
Ans	0	-1.84	-1.1	0	**1.23**	0	0	0	0	0.29	0	0.6
Agr	0	0	0	0	0	0	0	0	0	0	0	0
DisA	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	0	0	0
Alter	0	-0.43	**4**	0	-0.77	0	0	0	0	-0.67	0	-0.38
Ext	0	-1.49	-0.89	0	-1.85	0	0	0	0	**2.78**	0	1.09
Crit	0	0	0	0	0	0	0	0	0	0	0	0
Eva	0	**1.42**	**2.69**	0	-1.1	0	0	0	0	-0.96	0	-0.54

group did not show a relation between questions and answers, it was better than Shwaikh.

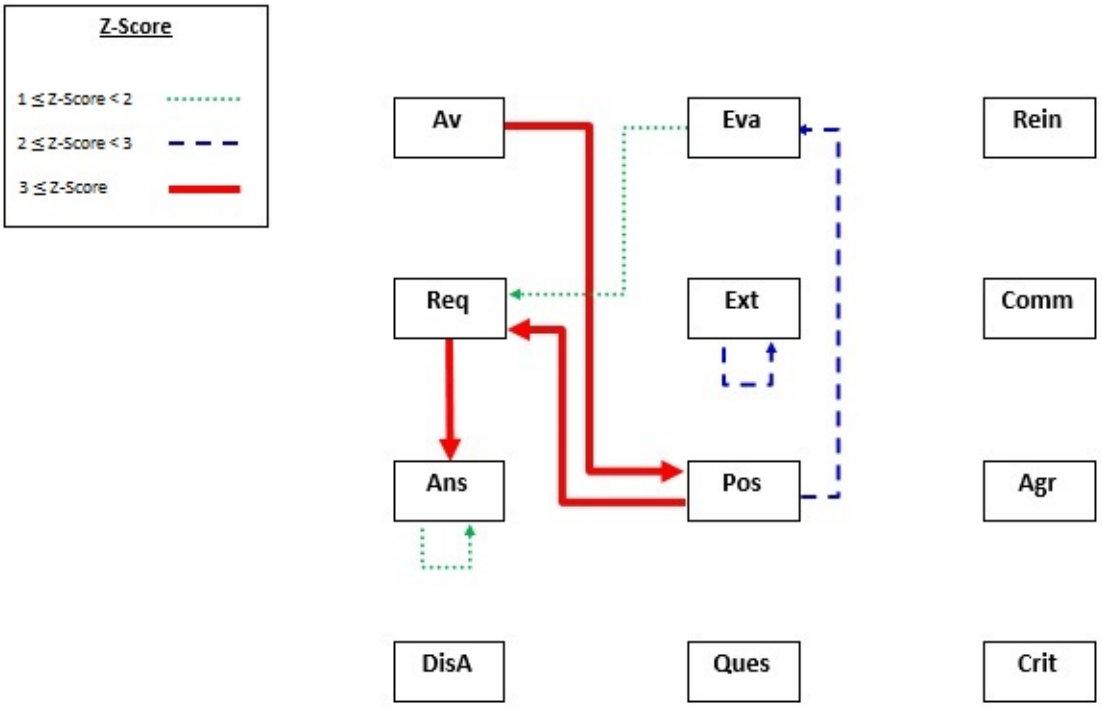


FIGURE 6.29: Z-Score of Mechanical (Sabhan) (Second Experiment).

TABLE 6.23: Observed frequency transition table (Mechanical (Shwaikh) - Group 4).

Given	Target												
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva	Total
Comm	0	0	0	0	0	0	0	0	0	0	0	0	0
Req	0	0	0	0	2	0	0	0	0	0	1	0	3
Pos	0	2	0	2	1	0	0	0	0	0	0	1	6
Ques	0	0	0	0	2	0	0	0	0	0	0	0	2
Ans	0	0	0	0	0	0	0	0	1	6	0	1	8
Agr	0	0	0	0	0	0	0	0	0	0	0	0	0
DisA	0	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	0	0	0	0
Alter	0	0	0	0	0	0	0	0	0	0	0	0	0
Ext	0	0	1	0	1	0	0	0	1	1	0	2	6
Crit	0	1	0	0	0	0	0	0	0	0	0	0	1
Eva	0	0	1	1	0	0	0	0	0	0	0	0	2
Total	0	3	2	3	6	0	0	0	2	7	1	4	28

6.6.2 Comparison of z-scores in Study 2 and Study 3

Based on the results, Study 3 was more successful than Study 2 was. In Study 3, three of four groups attained high z-scores (i.e., red zone above 3). In Study 2, only one of three groups attained a high z-score. No z-score was found for the mechanical engineering group because of its low participation. In Study 3, there were no disagreements among the participants, which indicated the homogeneity of the groups. In Study 2, the highest interactivity was posting. This showed poor interaction among the participants. In

TABLE 6.24: Transitional probabilities for responses (Mechanical (Shwaikh) - Group 4).

Given	Target											
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva
Comm	0	0	0	0	0	0	0	0	0	0	0	0
Req	0	0	0	0	0.7	0	0	0	0	0	**0.3**	0
Pos	0	**0.3**	0	**0.3**	**0.2**	0	0	0	0	0	0	**0.2**
Ques	0	0	0	0	**1**	0	0	0	0	0	0	0
Ans	0	0	0	0	0	0	0	0	**0.1**	**0.8**	0	**0.1**
Agr	0	0	0	0	0	0	0	0	0	0	0	0
DisA	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	0	0	0
Alter	0	0	0	0	0	0	0	0	0	0	0	0
Ext	0	0	**0.2**	0	**0.2**	0	0	0	**0.2**	**0.2**	0	**0.3**
Crit	0	**1**	0	0	0	0	0	0	0	0	0	0
Eva	0	0	**0.5**	**0.5**	0	0	0	0	0	0	0	0

TABLE 6.25: Z-Score table (Mechanical (Shwaikh) - Group 4).

Given	Target											
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva
Comm	0	0	0	0	0	0	0	0	0	0	0	0
Req	0	-0.63	-0.51	-0.63	**2.02**	0	0	0	-0.51	-1.06	**2.94**	-0.75
Pos	0	**2.02**	-0.77	**2.02**	-0.32	0	0	0	-0.77	-1.6	-0.53	0.19
Ques	0	-0.51	-0.41	-0.51	**2.81**	0	0	0	-0.41	-0.85	-0.28	-0.6
Ans	0	-1.16	-0.93	-1.16	-1.75	0	0	0	0.7	**3.86**	-0.64	-0.17
Agr	0	0	0	0	0	0	0	0	0	0	0	0
DisA	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	0	0	0
Alter	0	0	0	0	0	0	0	0	0	0	0	0
Ext	0	-0.96	**1.02**	-0.96	-0.32	0	0	0	**1.02**	-0.53	-0.53	**1.5**
Crit	0	**2.94**	-0.28	-0.35	-0.53	0	0	0	-0.28	-0.59	-0.2	-0.42
Eva	0	-0.51	**2.44**	**1.86**	-0.77	0	0	0	-0.41	-0.85	-0.28	-0.6

TABLE 6.26: Observed frequency transition table (Total).

Given	Target												
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva	Total
Comm	0	0	0	0	0	0	0	0	0	0	0	0	0
Req	0	0	2	0	15	1	0	0	0	1	2	0	21
Pos	0	12	2	4	15	0	0	0	4	4	1	3	45
Ques	0	0	0	0	6	0	0	0	0	0	0	0	6
Ans	0	1	0	2	7	5	0	0	3	19	1	4	42
Agr	0	0	0	0	0	0	0	0	1	8	1	0	10
DisA	0	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	1	0	0	1
Alter	0	1	1	0	2	0	0	0	0	9	2	1	16
Ext	0	1	3	1	7	2	0	2	10	40	3	12	81
Crit	0	1	0	0	0	3	0	0	2	2	3	1	12
Eva	0	1	2	1	0	0	0	0	1	3	1	1	10
Total	0	17	10	8	52	11	0	2	21	87	14	22	244

contrast, in Study 3, highest interactivity was extension, that is, if a subject was started, most of the participants responded.

In Study 3, because a clear strategy had been established, almost all groups showed successful results. Furthermore, in Study 3, the students and instructors were provided with clear instructions in the use of WhatsApp before the experiment, which improved

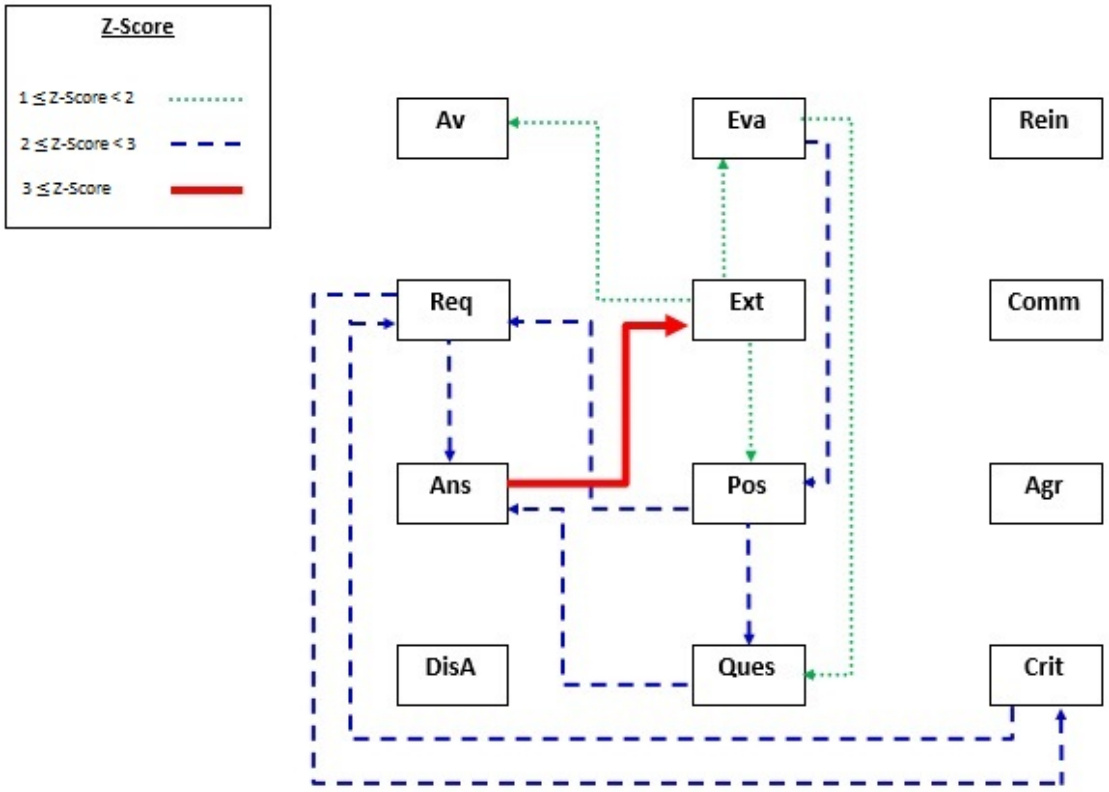


FIGURE 6.30: Z-Score of Mechanical (Shwaikh) (Second Experiment).

TABLE 6.27: Transitional probabilities for responses (Total).

Given	Target												
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva	Total
Comm	0	0	0	0	0	0	0	0	0	0	0	0	0
Req	0	0	0.1	0	0.7	0	0	0	0	0	0.1	0	1
Pos	0	0.3	0	0.1	0.3	0	0	0	0.1	0.1	0	0.1	1
Ques	0	0	0	0	1	0	0	0	0	0	0	0	1
Ans	0	0	0	0	0.2	0.1	0	0	0.1	0.5	0	0.1	1
Agr	0	0	0	0	0	0	0	0	0.1	0.8	0.1	0	1
DisA	0	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	0	0	0	0	0	0	0	0	1	0	0	1
Alter	0	0.1	0.1	0	0.1	0	0	0	0	0.6	0.1	0.1	1
Ext	0	0	0	0	0.1	0	0	0	0.1	0.5	0	0.1	1
Crit	0	0.1	0	0	0	0.3	0	0	0.2	0.2	0.3	0.1	1
Eva	0	0.1	0.2	0.1	0	0	0	0	0.1	0.3	0.1	0.1	1

the use of this application. Consequently, Study 3 was more successful than Study 2 because the latter did not yield the expected results, which was evident in the respective z-scores of the two studies.

TABLE 6.28: Z-Score table (Total).

Given	Target											
	Comm	Req	Pos	Ques	Ans	Agr	DisA	Reinf	Alter	Ext	Crit	Eva
Comm	0	0	0	0	0	0	0	0	0	0	0	0
Req	0	-1.31	**1.31**	-0.88	**5.87**	0.06	0	-0.44	-1.47	-3.09	0.78	-1.51
Pos	0	**5.75**	0.13	**2.34**	**2.18**	-1.61	0	-0.68	0.07	-4.15	-1.12	-0.61
Ques	0	-0.68	-0.51	-0.46	**4.77**	-0.54	0	-0.23	-0.76	-1.85	-0.61	-0.78
Ans	0	-1.28	-1.47	0.59	-0.81	**2.54**	0	-0.65	-0.37	**1.42**	-1.03	0.13
Agr	0	-0.88	-0.67	-0.59	-1.68	-0.7	0	-0.29	0.16	**2.99**	0.59	-1.02
DisA	0	0	0	0	0	0	0	0	0	0	0	0
Reinf	0	-0.27	-0.21	-0.18	-0.52	-0.22	0	-0.09	-0.31	**1.34**	-0.25	-0.31
Alter	0	-0.12	0.45	-0.76	-0.89	-0.9	0	-0.38	-1.27	**1.78**	**1.2**	-0.4
Ext	0	-2.48	-0.22	-1.26	-3.41	-1.08	0	**2.01**	**1.47**	**3.16**	-0.96	**2.23**
Crit	0	0.19	-0.73	-0.65	-1.85	**3.51**	0	-0.32	**1.02**	-1.41	**2.94**	-0.08
Eva	0	0.38	**2.59**	**1.22**	-1.68	-0.7	0	-0.29	0.16	-0.38	0.59	0.11

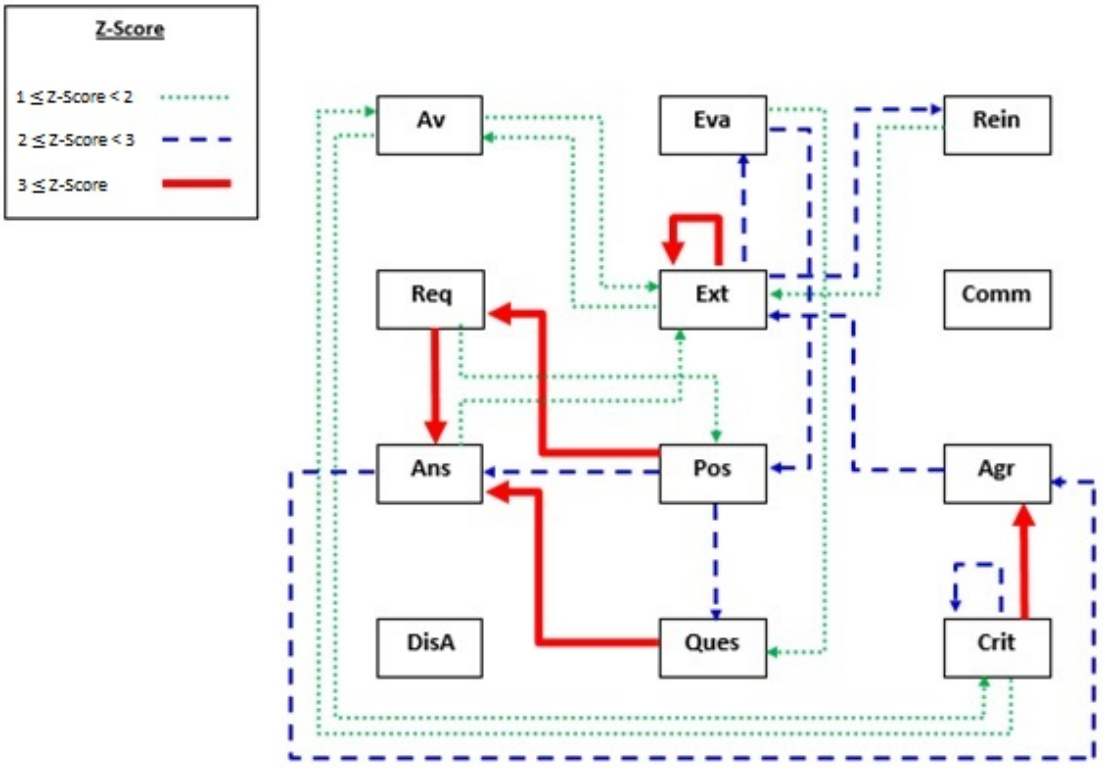


FIGURE 6.31: Totl Z-Score (Second Experiment).

6.7 Comparison with Findings in the Literature

A similar investigation was carried out in a recent study, which was reported in (Al Fawareh, 2016). The study used the WhatsApp application to *"determine whether a social media [application] can be used as a catalyst to motivate students in learning"*. A group of 18 male computer science students comprised a WhatsApp group that was administered by the course instructor. The main difference between this study and the present Study 3 is

that the group did not use the platform for discussion and mutual learning but instead to submit assignments. The instructor posted three questions. Each student had to post the answers to the three questions. The instructor provided simple guidelines to control the interactions in the group. However, these guidelines were much simpler than the guidelines used in Study 3. The students were expected to post their individual answers to the group rather than hold open discussions about the subject.

Because every student was expected to submit answers to the group, the main observation was the amount of time it took the students to submit their answers through their mobile devices compared to the time it took them to submit their hard copies to another set of assignment questions. Most students submitted their answers to the online group within the first couple of days compared to around three weeks when they submitted hard copies. The main findings of this study provided evidence that WhatsApp could be useful as a tool used to encourage students to contribute in university activities. WhatsApp effectively engaged students in learning outside the classroom. Finally, the results indicated that activities related to university studies could be structured for use in social media applications. The results of this study support the findings of Study 3 presented in this chapter.

A similar study was reported in (Alkhezzi and Al-Dousari, 2016), which explored the extent to which m-learning could be useful in teaching new English lexical items to students at KU. These students are required learn at least 120 new lexical items in each course. In this study, two methods were used: a traditional face-to-face method and an m-learning method that used the Telegram Messenger application through which the students were sent new lexical items daily. In addition, the students were divided into two groups with 20 students in each group. Each group used one of the two settings for six weeks before being tested. They then switched to the other method, and they were tested after six weeks. The tests were unified, and the same language instructor taught both groups under both conditions. A main finding of this study was that m-learning increased the learners' abilities to learn and use new vocabulary properly, which then improved their performance in grammar. Moreover, the results also showed that the use of mobile phones to teach students new vocabulary did not significantly affect their performance in writing. The findings of this study support the findings of Study 3 presented in this chapter.

A similar investigation was reported in Barhoumi (2015), which compared two groups of 34 students each. The first group, which was a control group, used only a traditional in-class learning method, while the second group, which was the experimental group, used

a blended learning method that combined traditional in-class learning and an m-learning tool using WhatsApp. The main aim of this study was to explore the effectiveness of using m-learning to support blended learning. The study compared the test results and the attitudes of both groups before and after the experiment. The results clearly showed positive effects of the blended methodology, which were due to the good test results and the positive attitudes of students in the experimental group compared with the students in the control group. Additionally, the students believed that m-learning helped them find solutions and easily construct and share information. Based on these findings, it was concluded that the WhatsApp m-learning was more effective than the traditional teaching when it was used in a blended setting that included a traditional face-to-face component, and that supports my study output.

6.8 Conclusion

The results of the z-score analysis showed that Study 3 was more successful than Study 2. This improvement was due to the construction of a sound strategy and providing clear instructions to the participants. All the participants in the second experiment followed the strategy and the instructions. The results of the Study 3 were used in building the final framework in this research.

Chapter 7

An M-learning Framework for Kuwaiti Higher Education Institutions

7.1 Main Findings of Studies 1, 2 and 3

The findings of Study 1 indicated that at present, there are many challenges and barriers to the implementation of m-learning in Kuwaiti universities. The data collected in the interviews that were conducted in the three Kuwaiti universities identified a wide range of barriers to the implementation of m-learning and the development of a framework for Kuwaiti higher education institutions, as shown in Table 7.1. These challenges included the lack of guidelines and awareness, cultural barriers, specialised training requirements, infrastructure readiness and opposition to change. The findings also revealed the lack of national and institutional strategies in universities and in education sector management to promote the practical use of m-learning in Kuwaiti higher education institutions. The results further confirmed that little training is offered to students and instructors, which has resulted in their unawareness of the benefits of m-learning.

In addition, instructors are reluctant to view m-learning as a complementary to face-to-face learning. However, the majority of the interviewees pointed out that both students and universities could afford the cost of technology and infrastructure, particularly because Kuwait is a wealthy country. However, sufficient funds must be allocated in order

for such programmes to be successful, which could be facilitated by the increased awareness of and support for m-learning by the management team.

Challenges	Justifications
Lack of guidelines for subjects	The absence of clear advice in where and how to implement mobile learning as an educational technology as part of teaching and learning strategy
Lack of awareness	The lack of efforts in promoting the potential uses and benefits in mobile technology in education across different levels; management, regulators, lecturer, students, and community
Culture	These are factors affecting the cultural interactions: such as: Male to female interactions;
	Misconception regards distance learning as low quality learning.
	Lecturers are reluctant in in falling into informal interactions with students outside educational topics [along with social and cultural pressures];
	Smart mobile Devices are viewed by the culture as entertainment devices and not as an educational tool.
Age / old generation resistance	Fear of using new technology and trying new approaches due to the efforts involved, lack of knowledge and due to the digital divide between student and lecturers which makes some lecturers avoid embarrassment and stick to traditional teaching methods.
Training	Lack of institutional training and availability of learning resources on how to know-how to use and manage m-Learning as part of the teaching and learning strategy.
Technical support / and / infrastructure [campus]	Availability of resources and infrastructure hosting, deploying and using the m-Learning initiative such as a LMS, networking, mobile applications, Internet or network connectivity. This infrastructure requires supporting the system and staff / students using the system
Management	Management lack of initiative propagation. Along with the management being composed from an older generation which are resistive to modern technology and are unaware of its potential.

Curriculum and HE Regulations	Curriculum design and regulations have not been modernised to suit current technological standards and teach styles
Student improper use of devices/applications	Availability of mobile data outside the campus
Time consuming	Feeling that trying to implement m-Learning will be very time consuming (all factors relating to m-Learning)
Security of data	The security of the data from improper access and or infrastructure unavailability / System crash
Fear / trust / security	Fear and distrust in the use of technology that it would undermine the teaching. E.g. a lecturer of politics unable to freely give examples from fears of his ideas being misinterpreted or exploited to label them as politically motivated or being upon the opposition.
Suitability of mobile device for m-Learning	Suitability of mobile devices for m-Learning: in general, and in particular to certain disciplines
Financial	Not having a financial capability to implement and higher funding furthermore the device costs concerns involved.
Incentive	Financial & non-financial for staff

TABLE 7.1: The top challenges identified by over 50% response of the sample size

Despite these challenges and barriers (Table 7.1), the majority of the interviewees expressed optimistic views that these barriers could be overcome, and that m-learning could become a reality in Kuwaiti higher education. The results discussed in Chapter 4 showed that 92% of the interviewees answered "Yes" when asked the question, "Can these barriers be overcome?", 8% did not answer the question and none of the participants answered "No". This finding indicates that there is a high possibility that the current research on the feasibility of implementing an m-learning framework in Kuwaiti higher education institutions would be successful.

Study 2 was based on the findings of Study 1. In Study 2, the students used two different applications, namely OurViews/SharedWalk and WhatsApp, which were installed

on their mobile devices during their fieldwork activities. The students used the applications to conduct their fieldwork assignments and to interact with instructors and other students. The students and instructors' feedback, which is summarised Table 7.2, clearly confirmed the findings of Study 1, and it highlights some important facts, such as the demand for training and practice, technical support and administrative change.

TABLE 7.2: Summary of student and teacher feedback on m-learning indicating the themes and nature (agree/disagree) of the answers.

Main Keyword/themes	Total No. of Respondents	Agree		Disagree	
		Mentions	Percentage	Mentions	Percentage
M-learning is Motivating, Effective, Useful, Beneficial	33	22	76%	7	24%
M-learning technology enhances the learning process	33	19	79%	5	21%
Technology plays an important role in education	33	21	78%	6	22%
M-learning increases knowledge	33	30	97%	1	3%
M-learning saves time	33	9	56%	7	44%
No financial problems faced by students acquiring devices	33	8	100%	0	0%
M-learning increases awareness	33	6	60%	4	40%
M-learning faces challenges	33	18	69%	8	31%
More training and practice required	33	17	59%	12	41%
Need for technical Support	33	15	79%	4	21%
Need for administrative changes	33	14	82%	3	18%
There are social barriers to m-learning	33	11	79%	3	21%
M-learning should be a support tool (part of blended learning)	33	21	68%	10	32%
M-learning technology enhances the learning process	33	24	86%	4	14%

The students and instructors' feedback also highlighted some strengths and weaknesses of the two applications used in Study 2. As Tables 7.3 and 7.4 show, the participants who used the OurViews/SharedWalk application appreciated that it was user-friendly, supported privacy and improved learning outcomes. However, the users highlighted some issues in using this application, such as the lack of automatic saving, the inability to edit content, the lack of timeline and chatting features, and more importantly, the high need for training and technical support. Moreover, in addition, the OurViews/SharedWalk application did not support the Arabic language.

Tables 7.5 and 7.6 show summaries of the feedback from the participants who used the WhatsApp application during Study 2. These participants appreciated many features of the WhatsApp application. For example, it was easy to use, saved work automatically, supported the Arabic language and offered library and timeline chatting. However, the participants complained about the lack of privacy of WhatsApp particularly because they had to post their personal phone numbers to be able to join the group. This disadvantage inadvertently highlighted one of the most important findings of this research, which

TABLE 7.3: Summary of OurViews/SharedWalk group interview responses regarding the application's features.

Main Keyword/themes	Secondary Keyword	Agree	Disagree
User-friendly and Simple to use		9	8
Usability	Automatically saves work	2	16
	Allows users to edit content	3	13
	Saves time	14	4
	Ability to resize objects	4	3
	Library and Gallery features	0	18
	Ability to save work	16	2
	Offers timeline/chatting features	0	16
	Access on one device	0	15
Is interactive		11	7
Enhances learning experience		15	3
Encourages reflection		13	5
Improves learning outcomes		11	7
There are social barriers		10	8
There are challenges		10	8
Need for more training		11	7
Need for technical support		7	6
Works on all types of devices		6	12
Supports privacy		13	5

was the strong cultural opposition of some Kuwaitis to direct communication between unrelated males and females through social applications. Some of the female students who were supposed to participate in this study through WhatsApp were prevented from doing so by their families because they would have had to share their personal phone numbers with male participants.

Table 7.7 provides a comparative summary of the participants' comments relating to WhatsApp and OurViews/SharedWalk features. In Study 2, an important observation was the need to establish rules and guidelines regarding the students' usage of a social communication application such as WhatsApp to interact with one another. Such rules and guidelines would specify who had the power to moderate the conversations.

Overall, in Study 2, WhatsApp proved to be more popular and easier to use. In addition, it offered most of the required features, such as GPS data and the support for the Arabic language. Hence, the WhatsApp application was chosen for use in Study 3 despite the two main issues with WhatsApp, namely the lack of privacy and the lack of control and moderation of the interaction between the participants. In order to overcome the latter issue, some rules and guidelines were imposed in order to control the application's use

TABLE 7.4: Breakdown of questionnaire answers by OurViews/SharedWalk group participants.

		Breakdown of Answers				
No.	Question	Often	Occasionally	Twice	Once	Never
B1	How often have you heard of mobile learning before the current experiment?	18%	22%	10%	18%	32%
B2	How often have you previously used m-learning educational programmes?	16%	50%	16%	12%	6%
B3	How often have you received encouragement from your lecturers to use mobile devices for learning purposes?	38%	50%	6%	0%	6%
		Excellent	Very Good	Good	Fair	Bad
B4	How do you rate the OurViews/SharedWalk screen features and its accessibility?	28%	40%	28%	4%	0%
B5	How do you rate taking photos or videos and the registration process via OurViews/SharedWalk?	36%	36%	18%	10%	0%
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
B6	I believe that using OurViews/SharedWalk is better than using traditional education methods alone.	14%	36%	28%	20%	2%
B7	Using OurViews/SharedWalk has made the curriculum easier.	12%	26%	42%	20%	0%
B8	OurViews/SharedWalk supports interaction among students.	32%	28%	32%	8%	0%
B9	I find difficulties in following the additional features of the OurViews /SharedWalk application.	18%	12%	52%	16%	2%
B10	I find difficulties in writing comments to my colleagues.	12%	16%	42%	28%	2%
B11	OurViews/SharedWalk supports interaction between students and their instructors.	28%	40%	24%	6%	2%
B12	OurViews/SharedWalk increases students' knowledge of the curriculum.	12%	24%	42%	20%	2%
B13	Using OurViews/SharedWalk improved my performance.	12%	22%	38%	28%	0%
B14	OurViews/SharedWalk is effective in saving students' time while performing in-class curricular tasks.	18%	36%	30%	14%	2%
B15	Mobile education technology can not only enhance but replace traditional education methods.	18%	30%	32%	16%	4%
B16	I would recommend the use of OurViews/SharedWalk as a helpful tool within this class curriculum to my friends.	14%	44%	28%	12%	2%
B17	I need more training to improve my skills in using m-learning tools.	6%	36%	34%	22%	2%
B18	Kuwaiti society does not approve of contact between males and females to exchange educational information in the context of m-learning applications.	14%	38%	30%	16%	2%
B19	I experience financial difficulties in acquiring new mobile devices such as iPads, iPhones or Galaxy phone.	4%	8%	6%	74%	8%
B20	I will use OurViews/SharedWalk in the future especially for educational purposes.	12%	34%	28%	18%	8%

in m-learning. These rules and guidelines gave the instructor the power to control the interaction between the students, delete inappropriate comments and provide feedback. These rules and guidelines contributed to the success of Study 3, which is in Chapter 6.

The timeline of Study 3 was divided into two periods. In the first period, no m-learning settings or applications were used. In the second period, the students used WhatsApp as an m-learning application that was controlled by the rules and guidelines. The participants were then interviewed about their experiences during the experiments, the results of which are summarised in Tables 7.8 and 7.9. The tables show the feedback from the participants who used the m-learning settings and the feedback from the participants who used traditional face-to-face learning.

These results showed that m-learning improved the understanding, collaboration, mutual support, engagement and interaction of the participants in carrying out their tasks.

During the experiment, some important observations were made, such as the high level of enthusiasm of the students while using m-learning. The findings of this experiment

TABLE 7.5: Summary of the WhatsApp group interview responses regarding the application's features.

Main Keyword/themes	Secondary Keyword	Agree	Disagree
User-friendly and Simple to use		8	2
Usability	Automatically saves work	7	3
	Allows users to edit content	8	2
	Saves time	9	1
	Ability to resize objects	7	1
	Library and Gallery features	10	0
	Ability to save work	9	1
	Offers timeline/chatting features	10	0
	Access on one device	8	1
Is interactive		9	1
Enhances learning experience		4	6
Encourages reflection		5	4
Improves learning outcomes		7	3
There are social barriers		8	2
There are challenges		6	4
Need for more training		7	3
Need for technical support		5	3
Works on all types of devices		8	2
Supports privacy		3	7

indicated the students' need for change from traditional learning methods to technological methods, especially their mobile devices, which they had previously used for social purposes only. Another important observation was that most students were convinced that m-learning increased both the control and the flexibility of their learning. However, the most important observation for the success of m-learning, it is vital to have a key person who is highly motivated and enthusiastic about the concept of m-learning and has the appropriate power to influence others to adopt or at least consider using m-learning.

The key academic person made a vital contribution to the success of this research project. He was enthusiastic about the aim and objectives of the research, and he used his connections and networks to support both Study 2 and Study 3. According to the key academic person, students in higher education institutions would benefit from m-learning more than other students would because of their maturity and familiarity with the technology. He asserted that m-learning also would give academics the opportunity to monitor the progress of their students and provide them with assistance in their homework and quizzes. The key academic person is of the firm opinion that Kuwaiti

TABLE 7.6: Breakdown of questionnaire answers by WhatsApp group participants.

		Breakdown of Answers				
No.	Question	Often	Occasionally	Twice	Once	Never
A1	How often have you heard of mobile learning before the current experiment?	5%	25%	16%	7%	50%
A2	How often have you previously used m-learning educational programmes?	20%	36%	27%	11%	5%
A3	How often have you received encouragement from your lecturers to use mobile devices for learning purposes?	18%	29%	18%	20%	14%
		Excellent	Very Good	Good	Fair	Bad
A4	How do you rate the WhatsApp screen features and its accessibility?	61%	23%	14%	2%	0%
A5	How do you rate taking photos or videos and the registration process via OurViews/SharedWalk?	75%	16%	7%	2%	0%
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
A6	I believe that using WhatsApp is better than using traditional education methods alone.	34%	41%	23%	2%	0%
A7	Using WhatsApp has made the curriculum easier.	48%	27%	16%	10%	0%
A8	WhatsApp supports interaction among students.	66%	21%	9%	5%	0%
A9	I find difficulties in following the additional features of the WhatsApp application.	5%	7%	43%	45%	0%
A10	I find difficulties in writing comments to my colleagues.	5%	18%	20%	57%	0%
A11	WhatsApp supports interaction between students and their instructors.	48%	32%	16%	5%	0%
A12	WhatsApp increases students' knowledge of the curriculum.	27%	41%	23%	9%	0%
A13	Using WhatsApp improved my performance.	27%	34%	25%	14%	0%
A14	WhatsApp is effective in saving students' time while performing in-class curricular tasks.	38%	14%	48%	0%	0%
A15	Mobile education technology can not only enhance but replace traditional education methods.	16%	30%	20%	32%	2%
A16	I would recommend the use of WhatsApp as a helpful tool within this class curriculum to my friends.	36%	40%	20%	5%	0%
A17	I need more training to improve my skills in using m-learning tools.	10%	16%	30%	43%	2%
A18	Kuwaiti society does not approve of contact between males and females to exchange educational information in the context of m-learning applications.	27%	32%	32%	7%	2%
A19	I experience financial difficulties in acquiring new mobile devices such as iPads, iPhones or Galaxy phone.	16%	7%	41%	30%	7%
A20	I will use this application in the future especially for educational purposes.	32%	48%	16%	5%	0%

universities are ready to conduct workshops and seminars to enhance the knowledge of people about m-learning. Moreover, with the appropriate planning and support by decision makers, the future of m-learning in Kuwait is bright.

The comparison of the results of the Z-score analyses conducted in Chapters 5 and 6 showed that because instructions in the use of WhatsApp were provided before starting the experiment, Study 3 was more successful than Study 2, which did not yield the expected results.

7.2 Why Available Frameworks do not work

Only a few conceptual models include guidelines and strategies to implement mobile frameworks in higher education.

TABLE 7.7: Comparative summary of key participant comments relating to WhatsApp and OurViews/SharedWalk features.

WhatsApp	OurViews/SharedWalk
Simple to connect with other users since all that is needed is their phone number.	In order to connect with other users a user account and password are required.
Allows user to easily monitor online/ offline presence of others.	The user cannot see the online/ offline status of others.
The application automatically saves conversations, including text or image/video data, so that they can be retrieved after a sudden Internet disconnection or device shutdown.	All non-saved data is lost when there is a power cut or a device shutdown.
Easy to conduct exchanges with individuals as well as part of group conversations.	It is difficult to contact a single individual as the application is geared towards group interaction.
The application provides reliable message delivery notifications.	The application doesn't provide users with any message delivery notifications.
The power of the application is in its social aspects.	The power of the application is in the context of academic field work.
The application is vulnerable to abuse. For instance, students can send photos/videos from the fieldwork that are in fact archival images taken from an earlier visit or by someone else.	The application is excellent for ensuring photos/videos are posted from the field and thus prevents attempts at cheating.
It is easy to create, edit and remove groups	It is difficult to add new group members.
It is not possible for the user to send different text, image and video information as part of a single message. This can result in misunderstandings and confusion when such sets of messages are exchanged.	The user can post a photo/video with corresponding text comments as a single package which will be easier for other users to access and understand.
The application is easy to download on most mobile devices.	The application currently doesn't work on a number of devices.
The Application has many control features, giving the user greater flexibility.	The application currently has a very limited set of features and options for the user.
The application offers lower privacy because it depends on the telephone number of the user (leading to cultural issues).	The application offers greater privacy, especially as it doesn't require users to provide phone numbers and only allows access to registered users.
The Application is more conductive to user interactions, due to its numerous features such as the timeline.	The Application provides lesser interactivity,due to its limited features and absence of timeline.
The Chat option is a central feature.	There is no live text chat option.
The user can send a text comment when he/she receives a photo/video.	Users cannot add a comment when he/she receives a photo/video on their SharedWalk account.
The application has GPS capability which is important for fieldwork.	The application doesn't have a GPS option.
The application supports Arabic Language writing.	The Application does not support Arabic Language text.
A user cannot easily use the application on more than one device, since a separate phone number is required for each additional device	Registered users can use the application on a number of devices provided they log out and in accordingly

For instance, Cobcroft et al. (2006) asserted that conceptual frameworks for m-learning must take into account "creativity, collaboration, communication and critical engagement", while Naismith and Corlett (2006) suggested that the availability of technology,

TABLE 7.8: Summary of the feedback of the participants who used the m-learning settings categorised based on selected keywords.

Main Keyword/themes	Total No. of Respondents	Agree		Disagree	
		Mentions	Percentage	Mentions	Percentage
Interest	15	13	86.70%	2	13.30%
Engagement & interaction	15	11	73.30%	4	26.70%
Increase understanding	15	12	80.00%	3	20.00%
Save time	15	12	80.00%	3	20.00%
Accurate & Systematic	15	11	73.30%	4	26.70%
Confused	10	4	40.00%	6	60.00%
Risky & technical problems	15	6	40.00%	9	60.00%
Expensive	10	2	20.00%	8	80.00%
Critical and cultural issues	15	2	13.30%	13	86.70%
Collaboration & Mutual Support	15	13	86.70%	2	13.30%
Increase Confidence	5	3	60.00%	2	40.00%
Increase performance & Competition	10	8	80.00%	2	20.00%
Increase control & flexibility	15	13	86.70%	2	13.30%
Simplicity	15	10	66.70%	5	33.30%

TABLE 7.9: Summary of the feedback of the participants who used a traditional face to face approach categorised based on selected keywords.

Main Keyword/themes	Total No. of Respondents	Agree		Disagree	
		Mentions	Percentage	Mentions	Percentage
Interest	10	5	50.00%	5	50.00%
Engagement & interaction	15	6	40.00%	9	60.00%
Increase understanding	15	5	33.30%	10	66.70%
Save time	15	4	26.70%	11	73.30%
Accurate & Systematic	15	5	33.30%	10	66.70%
Confused	10	5	50%	5	50.00%
Boredom	5	1	20%	4	80.00%
Risky & technical problems	10	4	40%	6	60.00%
Expensive	5	1	20%	4	80.00%
Critical and cultural issues	15	5	33.30%	10	66.70%
Collaboration & Mutual Support	15	6	40%	9	60.00%
Increase performance & Competition	10	4	40%	6	60.00%
Increase control & flexibility	15	5	33.30%	10	66.70%
Simplicity	15	7	46.70%	8	53.30%

institutional support, integration, connectivity and ownership were the factors to be considered. In either case, as well as in many others, the technology is at the centre of the proposed model. The following four models are investigated and discussed in detail.

7.2.1 Mostakhdemin-Hosseini and Tuimala's (2005) proposed m-learning framework

Mostakhdemin-Hosseini and Tuimala (2005) proposed a model that identifies three domains as basic components of a framework for an M-learning system: mobile usability, wireless technology and availability of e-learning systems. The main focus of this framework is the technology, the usability and suitability of the mobile devices for M-learning

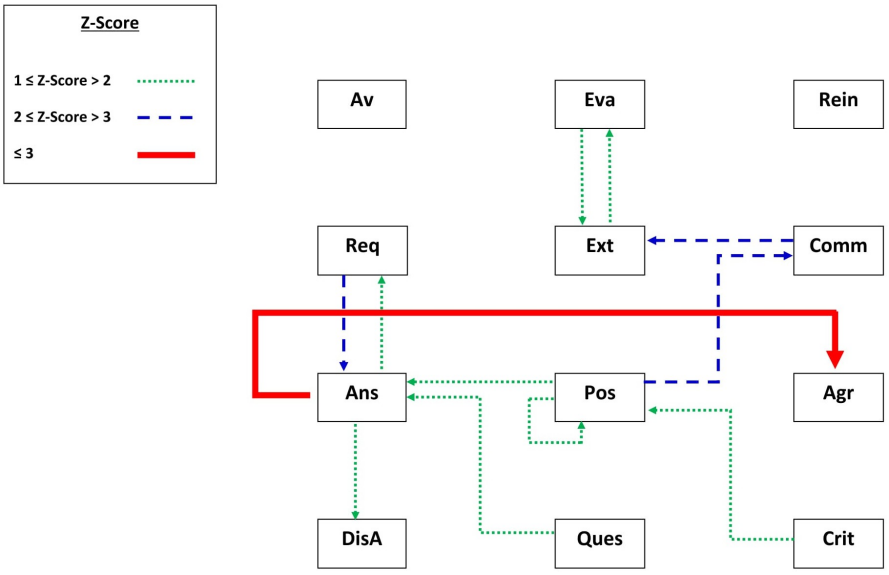


FIGURE 7.1: Z Score Total (Second Study).

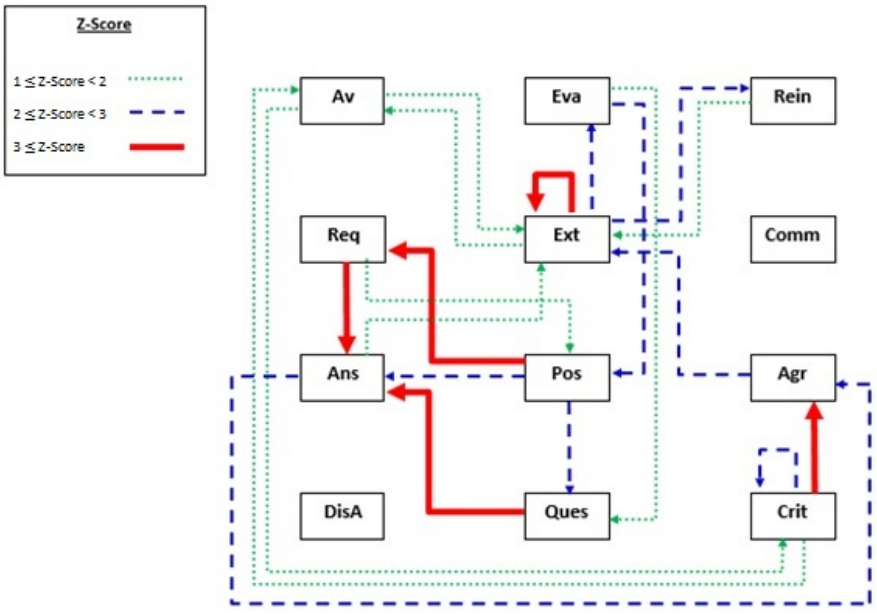


FIGURE 7.2: Z Score Total (Third Study).

in relation to the first component, and the quality and availability of the wireless network in relation to the second component.

7.2.2 Koole (2006)'s FRAME for m-learning

This framework was not created to guide the implementation of m-learning, but to help educators and leaders in assessing the effectiveness of various mobile devices used in distance learning and to guide the development of future mobile devices to support distance learning. The acronym FRAME, which was initially proposed by Koole in 2006 (Koole, 2006) and further developed in 2009 (Koole, 2009), stands for "Framework for the rational analysis of mobile education". This model is an improvement over the model described above. Koole considered not only technological aspects but also human learning abilities and the social interaction between the users of the system (Koole, 2006). The three main components of this framework are as follows: device's usability (technological aspect); learner's capability (learner aspect); and the level of interaction between the users (social aspect). In the improved version of this framework, ((Koole, 2009)) slight changes were made to the device and contextual learning aspects. However, both models do not address the cultural and political issues that might affect a specific cultural contest, such as the Kuwaiti community, which is evident in the results summarised in the previous section. Although the frameworks highlight the social aspect of m-learning, they fail to consider the cultural codes or social rules that might affect the social aspect of m-learning.

7.2.3 Barker et al. (2005)'s Conceptual framework for m-learning adoption in developing countries

This model is specific to the educational context in developing countries where there are many technological challenges to the adoption and implementation of e-learning in general and m-learning in particular. Barker et al. (2005) argued that all stakeholders, including students and instructors, could benefit greatly from employing technology for educational purposes. In this model, the key elements are as follows: the students, the instructors and the families (i.e., the stakeholders); technology (i.e., wireless infrastructure and mobile devices); other factors such as the effects of motivation and collaboration.

Similar to the previous two frameworks, this conceptual framework focuses on the technological aspect and pays little attention to the cultural and social aspects. As previously discussed, in Kuwait, the technological and financial aspects are not significant challenges to the adoption and sustainability of m-learning.

7.2.4 Ng and Nicholas (2013)'s framework for sustainable mobile learning in schools

As indicated by its title, this framework was developed for implementation in schools, not higher education institutions. However, it is included here because, unlike the frameworks discussed above, the components of this framework address some of the issues that were identified in the results of the present research. Ng and Nicholas (2013) reported the results of a three-year study that investigated the applicability and sustainability of m-learning in an Australian secondary school. This framework is human-centred and encompasses all relevant stakeholders—the management, the instructors, the students and the community. An important aspect of this study is that five months before the actual experiment Ng and Nicholas (2013) held a conference to share experiences, build confidence in the users and train them in using the technology. As Studies 1, 2 and 3 in the present research showed, little training is required when a popular social media application is used in m-learning. However, the sharing and disseminating knowledge about the concept of m-learning and its potential benefits promises to be very appealing and useful in the Kuwaiti educational context. In addition, in Ng and Nicholas (2013)'s study, data were gathered from students, instructors, leadership and management using a mixed-methods (i.e., quantitative and qualitative) approach, which was used in the present research.

Ng and Nicholas (2013) identified five components that were necessary to sustain m-learning in Australian secondary schools. In the first component, economic sustainability, a sustainable source of funding for m-learning is important. As explained in Chapter one, because Kuwait among the top five countries in the world in terms of its GDP, this component does not represent an issue provided that the government takes a firm decision to support m-learning over a long period. The second component is social sustainability, which refers to the acceptance and support by the wider community of m-learning. As discussed in the previous chapters, this key area must be treated carefully in the Kuwaiti situation. Some female students, for instance, who come from conservative backgrounds refused to take part in the present research because they did not want to share their personal information with their male counterparts. In the case of Australia, this component refers to the extent to which different shareholders are willing to support m-learning.

A third component, political sustainability, was identified. It refers to "policies to deploy and sustain m-learning programmes" adopted by the schools. In Kuwait however, as the

findings indicated, this could be interpreted as referring to the essential decisions that must be taken by the official authorities to adopt m-learning in the first place. The fourth component refers to technological sustainability with regard to the decisions that need to be taken in order for the users of m-learning to have constant access to high quality technical services. As discussed in Chapter 1, the quality of the mobile wireless networks in Kuwait and of the available bandwidths and mobile devices is among the best in the world. In addition, as the findings of the present research showed, the emphasis on technology mainly concerned the capabilities of the application that is used in the m-learning rather other technological factors. Finally, the fifth component was pedagogical sustainability, which concerns the policies that govern the teaching and learning process. There is an obvious difference between secondary schools and higher education institutions. In the present research, the pedagogical details were left to the instructors, who had the responsibility to create the curriculum and its content. In the present research, some instructors were reluctant to take part in the experiments because they did not want to be in constant contact with their students.

7.3 Design Recommendations

Sharples et al. (2009) have mentioned that, "The use of (mobile) technology is not the target but rather a means to enable activities that were otherwise not possible, or to increase the benefits for the learners" Sharples et al. (2009). The aim of this research is to propose a framework that fosters the use of mobile learning in the higher education sector in Kuwait. However, the findings of Study 2 and Study 3 lead to some implications for the design of mobile learning framework, these findings have been collected as result of using the Ourviews/Sharedwalk and WhatsApp applications in more than one experiment, these experiments have showed more than one benefits and/or limitations which can be concluded as follows:

- OurViews/SharedWalk

  Benefits:
  - User-friendly.
  - Supports privacy.
  - Improves learning outcomes.

  Limitations:
  - The lack of automatic saving.
  - The inability to edit content.

  - The lack of timeline and chatting features.
  - The high need for training and technical support.
  - Did not support the Arabic language.
  - Did not offer a private posting option.

- WhatsApp

  Benefits:
  - Proved to be more popular and easier to use.
  - Saved work automatically.
  - Supported the Arabic language and offered library and timeline chatting.
  - Offered most of the required features, such as GPS data.

  Limitations:
  - The lack of privacy and control.
  - Moderation of the interaction between the participants.

These findings lead to several key components which make more effective design to make it work for Kuwait culture education, which will be discussed in the next section.

7.3.1 Design content of M-learning application in Kuwaiti Higher Education

An important consideration when designing a computer aided learning system is how the content will be presented to the learners. During the study outline in this chapter, the following two areas are identified as being particularly important for developing M-learning application in Kuwaiti:

1. Rules and control

   - Instructors should monitor the use of the application for academic and educational purposes only.
   - The researcher should inform the instructors that they would be sharing their account information (i.e., phone number) with their students. Note that, some instructors use special phone numbers which are just for this activity, and others use their general phone numbers. It depended on the instructors'attitudes and their relationships with their students.
   - The instructor should create a group for the activity, and then invite his/her students to join the group.

- The instructors should be strict and make sure that they are monitoring students'activities properly.
- The instructors should filter any unsuitable activity, and warn and notify his/her students about that. Instructors are responsible for any inappropriate activity from any student.
- The instructors have the right to ask his/her students to take part in an activity, which could involve revealing information such as their locations, or include recording their voices and so on,depending on the task.
- The instructors should give their students information about the activity before it begins and feedback on what happened after the activity is finished.
- The instructors can communicate with any student about problems or difficulties that might occur; this can be done via email or any other communication platform.

2. Specification of Custom M-learning Application
   In Kuwait, a successful m-learning application should "feel, smell and taste" like WhatsApp. The custom m-learning application should provide all features and functionalities of WhatsApp in addition it should overcome the limitations of WhatsApp as detailed below:

   - Provide text and voice messages, pictures, multimedia sharing and GPS services.
   - To be intuitive and easy to use.
   - Provide control within the interaction and chatting that takes place in the m-learning settings.
   - Provide the manager or the instructor of the m-learning module with greater control. The instructor or manager will then have the ability to define an optimal m-learning settings based on the subject.
   - Provide features that allow the m-learning users to post their actual phone numbers and stop any direct communication with users outside of the m-learning groups.
   - It would be helpful using a technology that allows students to interact in a controlled environment using alternative identities.
   -

7.4 A Framework for M-learning in Kuwaiti Higher Education

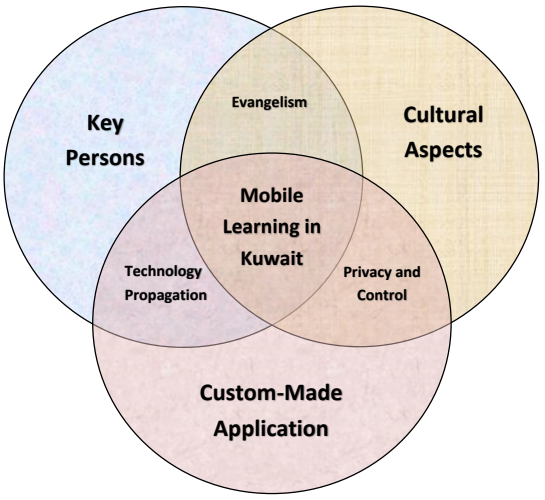


FIGURE 7.3: The suggested framework of this research for m-learning in Kuwait.

7.4.1 Key persons

As the findings of the studies showed, the key academic person (Teacher Zero) played a key role in the success of this research. He firmly supports m-learning, and he has influence over both his peers and the administration. He helped and encouraged other instructors to participate in the experiments. The key academic person promoted m-learning during the experiments. He further offered to arrange seminars and meetings between the researcher and administrators and decision makers in Kuwait to discuss the possibilities of national initiatives to adopt m-learning. The key academic person played vital important role throughout two years of this research. Without him, this research project would have been much more difficult to accomplish.

Key people commonly help engage the community with a certain project, especially in the area of software development. Microsoft, for instance, established the Developer Platform Evangelists (DPE) (Microsoft) through which the company recruits members of the public with specific qualifications to join their worldwide DPE team. This team propagates the company's message and makes a compelling and convincing case for Microsoft's technologies versus those of the competition. The overall goal is to win people's hearts and minds regarding Microsoft products. Similarly, the outcome of the

present research showed that the assistance of strong and effective people such as the key academic person is vital for the success, implementation and sustainability of m-learning in Kuwait. Such key persons would have the overall mission to disseminate the "glad tidings" of m-learning, propagate it and act as references that other people trust and feel encouraged to follow. The key person must be a firm believer in m-learning and able to talk about m-learning passionately, intelligently and enthusiastically to other stakeholders in the higher education sector in Kuwait.

7.4.1.1 Key responsibilities

- Engage the stakeholders and build relationship with them.
- Deliver seminars, presentations and demonstrations about m-learning at various events.
- Propagate a passionate and a compelling case for the potential of m-learning in Kuwait.
- Encourage university management and lecturers to adopt m-learning even if the government does not mandate it.
- Engage other influential people.
- Develop personal knowledge about different features and aspects of m-learning.

7.4.1.2 Qualifications

- Firm belief in the potential of m-learning in Kuwait
- Wide network and connections with several stakeholders in the higher education sector
- Good understanding of technical, social and cultural aspects that affect the implementation of m-learning in Kuwait
- Good ability to act as sales person, especially when talking to decision makers in the higher education sector
- Good persuasion and negotiation skills
- Reasonable knowledge of successful implementation examples in other countries

7.4.2 Cultural aspects

An important finding of the present research concerns the effect of Kuwaiti cultural norms on m-learning. The findings showed that the cultural background of some students includes strict rules about communication between male and female students. This factor is particularly significant in Arab countries in the Middle East, and it does not exist in western cultures. Hence, even when cultural aspects are discussed in the few existing theoretical m-learning models reported in the literature, they do not concern rules of communication across genders. In western countries, the cultural guidelines emphasise gender equality and the importance of making no distinction whatsoever between males and females.

The strict cultural norms of Kuwait with regard to male and female students' interaction must be at the forefront of any m-learning framework for it to have a chance to succeed. One way to work around this is by using a technology that allows students to interact in a controlled environment using alternative identities. In section 7.4.3 below we describe two important features of what could be the ideal m-learning application in Kuwait should look like.

7.4.3 Application specific to m-learning

A major factor that led to the success of Study 3 was the use of the well-known and popular mobile application WhatsApp as the m-learning application. As discussed in Chapter 6, WhatsApp provides the required functionality, such as text and voice messages, pictures, multimedia sharing and GPS services. In addition, WhatsApp is very intuitive and easy to use. Hence, in Kuwait, a successful m-learning application should "feel, smell and taste" like WhatsApp; specifically, it should provide all of the features and functionalities of WhatsApp.

However, the findings showed two main issues in using WhatsApp. The first issue is the lack of moderation and control over the interactions and the conversations that take place in m-learning settings. This issue was identified Study 2, but was mitigated by the set of rules introduced in Study 3, as explained in Chapter 6. Hence, a successful m-learning application should take this issue into consideration and provide a feature or a set of features that integrate such rules into the application, thus providing the manager or the instructor of the m-learning module with greater control. The instructor or manager could then clearly define the optimal m-learning settings based on the subject.

The second issue is related to the discussion in section 7.4.2, which was that users need to join groups using their real mobile phone numbers, which allows any user to directly communicate with any other user outside m-learning settings. This issue represents a huge cultural barrier to some users and prevents them from taking part in m-learning. Hence, in addition to the positive features and functionalities of WhatsApp, a successful m-learning application would provide a feature that allows m-learning without users having to post their actual phone numbers and prevents direct communication between users outside the m-learning setting.

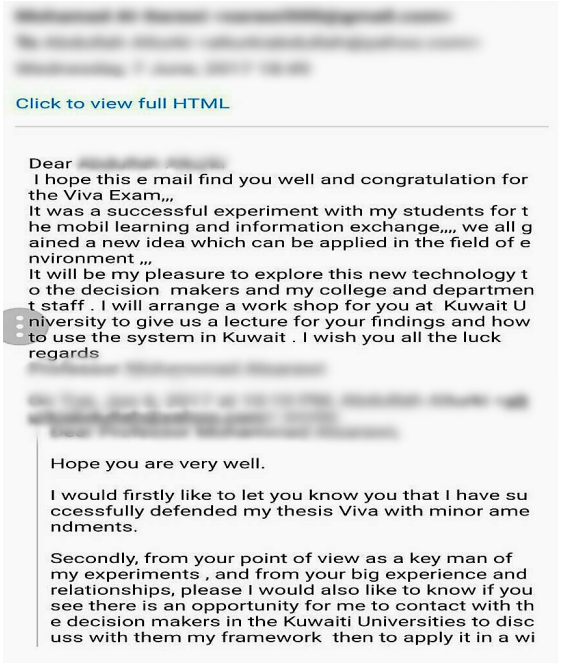
7.5 Framework evaluation

During the two years of this research the key academic person played vital important role (discussed in section 7.4.1), key people commonly help engage the community with a certain project, especially in the area of software development.

This framework was specifically designed to address the issues that emerged from the experiments that were conducted during this research and are specific to the situation in Kuwait. The response of the email from the key person indicates that the framework would be valid to be applied in Kuwait, however this email is not enough to validate the framework but it is a positive response.

For the framework validation, there should be a scheduled plan. This will help confirm that the framework is valid. It is not easy to validate this type of framework, which has both longitudinal and culture/contextual challenges. It may be as difficult as developing the framework itself.

There is no decent framework so far which takes the cultural issues in to consideration and how a integrated culture depends on networking and personal connections in the Gulf region. This is noticeable particularly in Kuwait and the other similar cultural environments such as in Bahrain and Qatar. It is hard to validate this new framework by comparing it with any available frameworks because it will not include the longitudinal and culture/contextual challenges. This has made the validation process incomplete and it will need more time to evaluate. The anticipated work will require more than one process to evaluate and validate this framework. One of the methods is to conduct a workshop for a sample of key people and/or the target audience who may use this framework in the future. They would be allowed to try this specific framework and then we could collect data from them using qualitative and/or quantitative research



Click to view full HTML

Dear
I hope this e mail find you well and congratulation for the Viva Exam,,,
It was a successful experiment with my students for t he mobil learning and information exchange,,, we all g ained a new idea which can be applied in the field of e nvironment ,,,
It will be my pleasure to explore this new technology t o the decision makers and my college and departmen t staff . I will arrange a work shop for you at Kuwait U niversity to give us a lecture for your findings and how to use the system in Kuwait . I wish you all the luck
regards

Hope you are very well.

I would firstly like to let you know you that I have su ccessfully defended my thesis Viva with minor ame ndments.

Secondly, from your point of view as a key man of my experiments , and from your big experience and relationships, please I would also like to know if you see there is an opportunity for me to contact with th e decision makers in the Kuwaiti Universities to disc uss with them my framework then to apply it in a wi

FIGURE 7.4: Email from the key academic person of the experiments

methodologies. The method of collecting data can be qualitative such as interviews and/or quantitative such as questionnaires. We can then analyse the data by using software such as NVivo for the qualitative method, and the SPSS software in case of the quantitative data, this could be one method of validating this framework within the context of the additional cultural and contextual challenges and the feedback will be helpful in enhancing the framework functionality.

Some future research can also help in validating this framework by developing specific regional frameworks that take the cultural and contextual challenges for that region in to consideration. The validation does need more time so that there can be a foundation for research for work in the future. This was one of my main limitations and it will require more time to complete the validation.

However, the responses that this framework had in Kuwait are encouraging. This includes an email from the key academic person approached in the test phase as this was a very positive response (see Figure 7.4). As mentioned in the key persons' email below, he will present the idea to the decision makers in Kuwait which if passed, will help in evaluating the framework. This will assist in assessing the validity of the current framework and also provide key input in to how the framework can be validated.

7.6 Conclusion

Based on the critical discussion of the findings of Studies 1, 2 and 3, this chapter described the proposed framework for m-learning in Kuwait. This framework was specifically designed to address the issues that emerged from the experiments that were conducted during this research and are specific to the situation in Kuwait. The aim was not to provide a generic framework for m-learning that could be applied globally. Instead, the aim was to provide an m-learning framework that is suitable and effective for implementation in Kuwait. Hence, it is acknowledged that this framework might not be suitable in other countries with different cultures, such as western countries. However, it might be implemented in many countries that have cultures and social structures similar to those of Kuwait, such as the Qatar and Bahrain.

Chapter 8

Conclusions

The three studies conducted in this research yielded important findings about the status of m-learning in Kuwait and the factors that affect its adoption, implementation and sustainability. This chapter provides a summary of the main findings, contributions, limitations of the three studies and recommendations for future work.

8.1 Significant Findings

The results of Study 1 revealed that the instructors had little awareness of the benefits of m-learning. The instructors were unable to view m-learning as complementary technology to face-to-face learning. The significant findings further showed that the cost of m-learning technology and its infrastructures do not constitute a challenge for Kuwaiti students and universities. With the necessary allocation of funds, both individuals and institutions could contribute to the success of the programme.

The results of Study 2 revealed the predominantly top-down unidirectional pedagogy used in traditional instruction. Such practices have long ruled Kuwaiti educational culture. Some instructors assume that they are above the level of taking part in such schemes and using a technology that will make them part of students' conversations and enable the students to ask them questions and request feedback outside the boundaries of the classroom.

The findings from the students' feedback showed that the applications WhatsApp and OurViews had both advantages and disadvantages in m-learning. OurViews, for instance, was recognised as better than WhatsApp in terms of privacy because the students were able to use it without having to reveal personal contact information such as their phone numbers. Direct communication was possible but only if the recipient approved the communication. This aspect was crucial because the findings revealed that the gender-based discrimination that is ingrained in Kuwaiti cultural norms would prevent the utilisation of m-learning by female university students in Kuwait. In this research, most female students found that using the WhatsApp application in its current form for m-learning would result the contravention of social norms, such as sharing phone numbers and interfaces with their male counterparts. The students were also hesitant to share photographs and voice and video recordings. However, WhatsApp was highly praised for its ease of use, various useful functionalities and its support for the Arabic language.

Another important finding was that although students and instructors in the Kuwaiti universities seemed to be favourably disposed toward the use of m-learning, some leaders of Kuwaiti higher education were inclined toward the conventional learning process. Based on these findings, it was concluded that both instructors and students have the inspiration and ability to embrace m-learning. However, without the co-operation of the leaders, it would difficult for the Kuwaiti higher education system to provide the qualified instructors and advisers necessary for integrating m-learning into the existing curriculum.

Based on the results of Study 2, Study 3 investigated the use of WhatsApp in m-learning when it was accompanied by rules and guidelines among three groups in higher education institutions. Qualitative evaluation methodologies were applied to evaluate the responses to open-ended questions and the participants' opinions. The findings indicate that using WhatsApp in Kuwaiti higher education institutions would be a viable option. The participants were highly knowledgeable about its usage and various functionalities. The results of the study showed that for most participants, mobile technology has become a necessary element of their daily lives because it is associated with remote communication, convenient communication and a range of exciting features. These features were identified as extremely valuable in increasing the students' motivation, interest and engagement in the educational tasks, activities and modules. Hence, WhatsApp was identified as appropriate to promoting m-learning in Kuwaiti educational institutions. Unlike Study 2, the findings of Study 3 confirmed the vital role of WhatsApp

in changing the perceptions and attitudes of the Kuwaiti students toward m-learning. The students have begum to consider it as an educational application rather than only a social networking application. The WhatsApp application was found to be effective in the implementation of m-learning and could overcome most of its challenges. The findings showed that Kuwaiti higher education institutions are open to the transformation of traditional learning models to a digitalised environment. Furthermore, the experiments convinced the participants of the importance and positive effects of m-learning, especially in the engineering field.

8.2 Contributions of the Research

This research work has provided some unique contributions to the academic study area, which has been identified by the following:

1. The present research provides a conceptual framework that is designed for the adoption and implementation of m-learning in Kuwaiti higher education institutions. This framework is not only an important contribution to the literature for anyone who wants to study the factors affecting m-learning in Kuwait but also provides clear guidelines for the successful implementation of m-learning in Kuwait.

   The conceptual framework itself which was developed depending upon main concepts and factors considering the traditional and cultural issues which are considered as key points in a country like Kuwait. From the researcher point of view, this framework is considered as an addition to knowledge because it will be difficult to implement the m-learning technology in Kuwait and/or some other countries of the region such as Qatar and Bahrain without taking the traditional and cultural issues into consideration which are key points for people of these countries, and this is an original work because there are no researchers who discussed these key points in their previous frameworks.

2. The studies conducted in this research yielded diverse findings that have significant implications and are important contributions to the literature and the understanding of m-learning in Kuwait.

   Study 1 identified a range of barriers and challenges affecting the implementation of m-learning and the development of an m-learning framework for Kuwaiti

higher education institutions. The factors identified included the lack of awareness, cultural barriers, specialised training requirements, specialised infrastructure readiness and opposition to change. The findings also indicated the lack of national and institutional strategies by the administrators of higher education to promote the implementation and use of m-learning in Kuwaiti universities. The findings of Study 1 showed that the instructors' perceptions of m-learning were generally positive and reflected the instructors' willingness to embrace the concepts and the technologies of m-learning as part of their education and learning process.

Study 2 contributes to the literature and the understanding of the factors affecting m-learning in Kuwait by highlighting the significant effect of the cultural norms that govern the interactions between female and male students and instructors. The comparison of two different applications, WhatsApp and OurViews, showed that the participants were happy with certain aspects of both applications. The findings of Study 3 indicate that students in Kuwaiti universities are open to changing their perceptions of m-learning applications, especially those that are similar or are already used for social communication, such as WhatsApp. However, the findings also revealed the need for systematic rules and guidelines to govern the use of social applications in m-learning, particularly with regard to privacy and control. Without such rules and guidelines, an application might fail to achieve the objectives of m-learning. It was concluded that an application that not only "feels, smells and tastes" like WhatsApp but also provides features for privacy and higher control from the module instructors would satisfy the needs of the users of m-learning in Kuwaiti higher education.

3. The key academic person made a vital contribution to the success of this research project. He was enthusiastic about the aim and objectives of the research, and he used his connections and networks to support both Study 2 and Study 3. According to the key academic person, students in higher education institutions would benefit from m-learning more than other students would because of their maturity and familiarity with the technology. He asserted that m-learning also would give academics the opportunity to monitor the progress of their students and provide them with assistance in their homework and quizzes. The key academic person is of the firm opinion that Kuwaiti universities are ready to conduct workshops and seminars to enhance the knowledge of people about m-learning. Moreover, with the appropriate planning and support by decision makers, the future of m-learning in Kuwait is bright.

8.3 Limitations of the Research

The main limitations of the research are the following:

- The limited time and resources available to conduct this research affected the number of studies conducted and the level of investigation and analysis in each study.
- The use of the questionnaire and interview strategies limited the extraction of data on perceptions and probably restricted the answers to the most relevant points. It is possible that the respondents were unable to express their thoughts, attitudes and perceptions in their responses.
- The method of analysis used in the studies might have neglected some key issues because of keywords chosen for the thematic coding.
- Although the three studies used reasonably large samples, the results may not be generalisable to all Kuwaiti higher education institutions. However, larger samples would have led to a more complex data collection and more extensive data analyses.
- The results of studies 2 and 3 were dependent solely upon the responses and actions of students doing fieldwork in three Kuwaiti universities. Thus, the results indicate the challenges and opportunities in using m-learning technology in the fieldwork performed in certain subjects. Hence, the results may not be generalisable to all other types of subjects.
- Restrictive cultural norms and gender-based discriminations affected the participation of some students during the experiments. It is possible that the data gathered from the female students studying at PAEET and KU do not represent their actual feelings and experiences regarding m-learning concepts and applications.

8.4 Recommendations and Future Work

A future study could conduct a comparative quantitative analysis of the deficiencies in the currently available specialised m-learning infrastructure at Kuwaiti universities and the benefits that could be achieved from acquiring the infrastructure. A cost and benefit analysis would demonstrate the opportunities and challenges highlighted in previous doctoral research in relation to the statistics on the face-to-face approach that

are officially published by the educational authorities in Kuwait. These quantitative results would help in assessing the financial investment needed to provide incentives to the faculty members for the successful usage of m-learning as part of the educational process. In addition, the following recommendations are made for future research:

- Develop the application described in section 7.4.3 and conduct experiments in some Kuwaiti higher education institutions to measure the effectiveness of this application in establishing m-learning in Kuwait.
- Find and recruit key persons who could use the results of this research to convince other stakeholders to adopt m-learning.
- Persuade the authorities of higher education in Kuwait to improve the laws and the regulations that restrict the adoption and the implementation of m-learning in particular and e-learning in general in Kuwaiti higher education institutions.
- Perform regular evaluations and reviews to measure the progress of the adoption and implementation of m-learning in higher education institutions.
- As part of the sustainability strategy, provide technical help desks to assist m-learning users in resolving the issues they encounter in m-learning.

8.5 Conclusion

The present research successfully identified the main elements of a conceptual framework for m-learning for higher education in Kuwait. To the best of our knowledge, no previous study proposed such a conceptual framework for m-learning for higher education in Kuwait. However, this research is a single step toward the adoption and implementation of m-learning for higher education in Kuwait. In order for them to be effective, the findings need to be supported and adopted by the decision makers in the higher education sector in Kuwait.

The key academic person who supported this research made a vital contribution to the success of the present research. Because the population of Kuwait is small and it has many traditional cultural norms, the success or the failure of any project in Kuwait is determined largely by key persons and the extent of their networks and personal connections.

This research revealed that the cultural issues that might hinder the adoption and implementation of m-learning in Kuwait could be overcome by using the appropriate tools and strategies. The findings of this research indicate that m-learning could be implemented in Kuwait. It is hoped that the decision makers in the higher education sector in Kuwait will adopt the findings of this research and support it in the same way that they supported e-learning and the blended learning in Kuwait.

Finally, the findings of this research could be adopted in other countries that have similar cultural and social structures, such as Qatar and the Kingdom of Bahrain.

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Appendix A

A.1 Conclusion of Pilot study

1. One of the good things in the mobile technology is that it is portable so we can bring what we want easily.
2. M-Learning and E-Learning help students and colleagues in sharing patents and thoughts.
3. Some academic subjects quite quickly, so m-Learning and E-Learning help update this easily.
4. Applying the M-Learning is still difficult and need more discussions about if students can use the mobile in some cases. It is more suitable while working with groups and field work.
5. Before using the m-Learning, some guidance is important.
6. Because mobile will replace the book, to do the whole lecture through mobile is not easy, and should have experience.
7. There is a disadvantage which is that, if the mobile has software and applications we can use it easily but it is still not perfect because mobile not contains all the needed software and applications.
8. The cost of mobile devices and the different systems will be difficulties and we should think about how to make this easier.
9. The mobile will not be good for the whole lecture but for minutes.

10. If students want to study via Facebook or emails instead of writing, and the traditional technology, that's look destructive because this might let students lose their concentration by watching movies or looking at their Facebook etc.

11. Young people have grown up with mobile phones and iPads.

12. One of the disadvantages and destructions, it can be time consuming and unless you feel very confident it might be undermine your confidence.

13. One of the advantages is that, you can carry one portable device which materials with you.

14. The student who is trying to learn via his/her mobile is different from the student who texts his/her friend and try to waste his/her time which it will be a kind of distraction. But it is good id students do all things without printing any paper.

15. Now everyone is just focusing on his/her mobile and iPad which means there is no opportunity to make friends like before.

16. Sometimes we need technicians to be around and to show us what to do if we are doing wrong, and a good staff to teach what to do.

17. One of the advantages is, linking with such enormous types of sources of information across the Internet in research and we can access it, it is made a wide range of material accessible.

18. One of the disadvantages is that, when technology breaks down, for sure many people will not laugh when the technology breaks down, if it does fail, this is because people don't have plan (B).

19. We should invest our time in technology when we have a good training and practice. It depends on the nature of people and amount of people to meet with.

20. Some people are more developed than others, such as some generations and the next generation. The new generation uses technology more than ours.

21. Some instructors like to use technology but they like to see their students, both are good. They feel there will not be good interaction by using just technology.

22. I have made my research in Kuwait and not in UK because in a developed country like UK there are many researchers who are working in the same subject, and also I wanted to enter the m-Learning to my home country which is still junior in this area and needs this kind of technology.

A.2 Interview data, logging template, and questions template for study one

Each of the following tables shows the list of results extracted from the interviews prior coding but post data extraction (logging from recording). Analysed results are shown in Appendix A.

A.2.1 Interview Collected Data

A.2.1.1 Use of Technology

Candidate	Response	Why
1	I prefer it to be limited, according to each subject	As each subject is different to other. There is a need to define where and how it will be used
2	I prefer but with limitation. Only for mature students	Mature students know what to do and are less likely to misuse the tech
3	Limited depending on the subject	It cannot be used with some topics
4	I support that	students are ready to use it but tutors are not
5	It should not be banned, it currently is part of education but should be controlled and regulated	As not to waste time
6	I am with the free use of technology as long as it doesn't disagree with Culture, Politics and Religion	To avoid any conflict. Freedom is within boundaries outside education
7	Fully engaged but after knowing the objective	It is a life style, thus preparing students for lifelong learning
8	Limited according to the needs	To keep some control and avoid mess
9	I prefer it to be limited	Until the community is able to accept and realize it is a method of education and for entertainment
10	Fully, to be used with utmost freedom	We need to follow more leading countries and institutes and narrow the gap
11	I fully agree with the use of tech to enhance life	Easy to access information and eases distance learning

Continued on next page

12	Yes, it can be used even outside education	To join world leading countries
13	Limited due to culture	
14	Yes, for sure it should be used	My reach did find that it did enhance student's achievements
15	Limited not fully	Not all teachers do trust technology
16	If it can help and made available. It can be used	But cannot replace traditional methods, might help
17	Fully engaged	It should be used as complementary to Face to face is important.
18	Limited	If I need it yes otherwise no need
19	Limited	Limited to avoid misuse by students. It can be used as complementary to traditional teaching.
20	Limited	Face to face interactivity could be lost when using technology in the learning process. Useful as a complementary system as it cannot convey all material correctly.
21	We try it first, but I would guess only limited use	To see the benefits and how effective the outcomes are.
22	Limited	Limited to only necessary applications such as communication, administrative purposes, and delivery of approved notes.
23	Limited use	Full engagement requires communication infrastructure for staff. Culture is not developed in Kuwait enough for full mobile/electronic communication
24	Limited	It is a complementary technology for traditional teaching as a blended learning environment. Humanity studies are very dependent on face to face sessions and thus a blended form is essential rather than a fully engaged. However, in other disciplines it could less limited.
25	Yes, limited as the current blended system is functional	However, I encourage to take a pilot test to evaluate the effectiveness of fully engaged learning
26	Limited	Distrust towards technology reliability and availability.

A.2.1.2 Use of E-Learning Tools

Candidate	Response	Why
1	Not used yet.	Not available at institution.
2	Yes, but not fully available at the college.	Provides fast responses that are better than direct communication.
3	Yes, even I have attended training using E-Learning.	It saves time and cost.
4	Yes, we use E-Learning in managing assignment submission and communication with students.	Part of the university regulations.
5	Absolutely I even take absentees on my iPad.	It makes both students and my life easier.
6	Absolutely I use it daily, I use it to communicate with students and deliver training outside university.	It saves time, effort and is easy to contact students.
7	Yes, indeed we use blackboard and OneSource LMS and wiki.	It is a part of my job and to keep up with new technologies (it is the 21 century).
8	Yes, I have my own web on Google groups.	It gives people an opportunity to access knowledge anytime anywhere.
9	Yes, by all means I used it for search getting photos and keeping up to date.	For teaching preparation and communication with students.
10	Yes, I use emails.	Easy to communicate over emails.
11	Yes, I used it but mainly emails so not extensively.	It is easy to deliver information to student anytime mainly if they did not attend classes.
12	Only emails and SMS messages.	Fast way to communicate.
13	Only for personal use whilst preparing materials.	
14	Yes, I use it in my daily teaching, receiving assignment, bar code for attendance. I have me on my LMS, file sharing and discussion.	Time, flexibility, cost, enhance student's achievements.

Continued on next page

15	Yes, we used it for student's enrollment.	To ease the process.
16	I do not use it. Law teaching needs students to use books.	I like traditional way of teaching. Need students to benefit from the book language.
17	Yes, I use it.	We try to use the latest technology.
18	Yes, I use blackboard.	Part of Kuwait university E-Learning system.
19	Use of OCS (Online Core Systems).	Allows communication with students online and eases delivery of the course online for students.
20	yes.	As a complementary use it its very useful and keep students more entertained and interested in the materials Currently little use.
21	It is used in the engineering department.	There is an incentive in the engineering department.
22	No.	
23	Many services are used in connection with the LMS system.	Daily communication with students. Q/A. etc.
24	Yes, some are used.	First blended learning institution in the gulf AAU.
25	Yes, we do have it part of open university requirement.	As a blended system to support traditional education as part of open university requirement.
26	It is a university policy to use them.	The university encourages and requires the blended model of E-Learning.

A.2.1.3 Attitude towards m-Computing

Candidate	Response
1	Time saving; provides easy of life; important in all aspects of life.
2	Lots of important uses namely in education, easy of data access.

Continued on next page

3	It is necessary as it is part of the global communication revolution.
4	The students should be able to use technologies.
5	Nobody can live without it; it is a necessity.
6	It is important as we're living in a time of globalization and revolution of data, it's our destiny.
7	I agree with using m-Computing in most life aspects.
8	Mobile devices are becoming more than just a phone; they are becoming a source of information.
9	I like to use m-Computing mainly in education it is very important.
10	It is nice but we need to amend culture.
11	I think mobile computing should be used more effectively.
12	One of the tools of latest tech with a plethora of useful applications.
13	New tech Inc. iPhones are a medium of communication and transfer of knowledge.
14	It provides anywhere anytime access, useful for all life styles.
15	It is part of everyday life style.
16	It depends on the person. They are Complimentary devices but not very important.
17	We are one of the countries in the middle east we do use technology.
18	Mobile computing is become main part of human people and cannot be taking out, and very important in daily life and major source of information.
19	Essential tool in life. Future prospects due to fast deployment and wide spread.
20	Very useful generally allowing access to information according to convenience, and has provided a cheaper alternative to printed and traditional material access.
21	It is very important to current lifestyles and can be considered as the new industrial revolution.
22	Recordings and examples being online will limit the freedom of the lecturer when delivering materials.

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23	He mobile devices have moved from basic communication devices to smart mobile devices that harness much processing powers and data communication enabling them to run application similar to PC applications. It enables fast communication.
24	It is a revolution that Eases communication and the retrieval of data. As well as accessibility and time.
25	Computing and technologies are widespread inn all aspects that are moving towards full mobility.
26	Technology is ready for implementing work over mobile devices and maintain connected.

A.2.1.4 Attitude towards m-Learning

Candidate	Response
1	Not ready for implementation.
2	Still in trial in the middle east, it is currently not ready. Still requires time.
3	Mobiles are part of life and are useful for educational purposes at all levels.
4	It is useful for students and universities to manage learning.
5	I am the first to use it in Kuwait and encourage its use in all phases of education.
6	It's also important to access data / info as a medium of data access.
7	I wish it would be available for students. It gives more freedom and ease education.
8	It is an idea imposed by reality and gives people the opportunity to access info anytime anywhere.
9	It is good but in limited use depending on the student and the institution.
10	Very good in education if suitable application is used.
11	Very good method of interaction between students and educators and should be used at all levels of teaching.

Continued on next page

12	It should be used in applications where it is useful for education manly to widen interaction. Students are ready for such a technology hence so should educator.
13	It has a major role in keeping up to date with new theories and methods. I keenly support it.
14	Yes, it is good mainly for young generation.
15	We have plan to introduce that, am the manger for E-Learning, we are now in evaluating the readiness and then we will have the framework to introduce that.
16	Am person who do not see using technology is important. It can be complimentary, but no need for it if you can do your teaching without it.
17	It can be used for announcements.
18	It is very important as traditional education does not suit young generation, and mobile learning is an important source of exchange information, but we lack of using that it Kuwait.
19	Very accessible people are resorting to mobile devices to look for information through them. m-Learning will become a major/essential part of Distant learning and traditional.
20	It is an additional positive factor for the educational process especially for student as they are generally more fluent in the use of mobile technologies than teachers. Hence teachers need to develop themselves.
21	We have not tried it yet.
22	Kills interactivity and traditional education. Especially in subjects such as politics which are philosophical.
23	Facilitate communication between lecturer and student and link the student with other the university systems such as Learning management systems, library, forums assignment etc...
24	Allows Fast, easy, and convenient method that allows looking at date remotely at user's convenience.
25	Very good step forward with E-Learning.
26	Effectiveness of m-Learning is questionable thus perhaps a trial to prove effectiveness.

A.2.1.5 Use of mobile devices and m-Learning in the classroom

Candidate	Response	Why
1	No problem, if it is subject for the subject.	It requires outlines and regulations.
2	I conditionally agree, it offers many advantages.	e.g. in projects it could be used to look for images in art and education.
3	Depends on the subject.	Only when the subject requires it. To provide time saving and accessibility anytime anywhere.
4	Yes, to certain lectures.	According to the suitability of the taught module.
5	They use it when I allow them to take pictures of slide-shows or use the calculator App or record.	I do not allow Internet connections in order not to waste time.
6	I agree conditionally.	If they use it for learning and not for fun, then it is allowed.
7	Yes, I ask students sometimes to use it.	For them to practice m-Learning.
8	Yes, I agree for it to be used at certain times.	I select the class activities.
9	As long as the use does not conflict or clash with cultural aspects and if infrastructure is available.	To avoid clashes and misuse of technology.
10	I agree conditional if it is used for learning under control.	Not to be used for fun.
11	I do not agree.	If the instructor is able to successfully deliver the topic, then there would be no need as it would only be a distraction.
12	Yes, but limited to take photos for example.	Suitable use of technology to avoid misuse.

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13	Conditional agreement, it is very recommended however as long as it does not disagree or conflict with local cultural values.	
14	Yes, I even teach my students how to use it in their future teaching.	To encourage use it in their future job.
15	Not really.	As the subject I teach does not need m-learning.
16	No problem. Why not	As long it helps them in learning no problem. To search for information quickly
17	Not in class room.	Safety in lab and not to lose face to face.
18	Not in class outside yes.	Infrastructure not ready yet in class rooms.
19	At this moment in time No.	Lack of infrastructure and communication speeds are incapable as well as the suitability of current mobile devices for accessing data.
20	Conditional.	As long as students do not misuse the technology and are aware of the technology proper usage.
21	I prefer traditional way, maximum 20% can be used (conditional and partial use).	It is much better for the engineering educational process.
22	Any student showing a mobile device will be dismissed from the class.	Mistrust and Fear of improper use of device or recording. He is a tradition person and feels it is best.
23	No mobile phones. Laptops and other learning devices	Only devices that are useful are allowed. Devices such as mobile phone are mostly used for not useful and destructive when doing face to face sessions. However, devices used for learning purposes are encouraged however if the student is found to be using improperly then they are banned.

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24	No.	In low contact instances (2hrs a week with students) they are not recommended to avoid distractions and personal use.
25	It is hard to do so.	My teaching requires with higher specification than mobiles but perhaps in the future is possible.
26	Yes, why not.	Trust the student, they are mature.

A.2.1.6 Barriers facing m-Learning

Candidate	Barriers	Can barriers be overcome
1	Students might not have the right devices. Availability of connection. Awareness of application use. Student misuse of m-device (entertainment and fun). Management cooperation.	Yes. Training. Awareness.
2	Management resistance. Financial reasons.	Yes. Barriers can always be overcome.
3	Culture. Security.	Yes. Awareness is needed. Secure policies and regulations to ensure security.
4	Old generation resistance. Lack of awareness. Culture (communication with females). Not all students can afford a smart device.	Yes. By changing mentalities of old generation. More awareness.
5	Lack of awareness of proper use of m-Learning. Old generation resistance.	Yes. Making the needed resources available. Improved awareness and regulations.

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6	Security. Old generation Resistance. Lack of clear guidelines. Lack of support staff.	Yes. Introducing policies and guidelines. Making support staff available. Good infrastructure.
7	Old generation resistance. Training. Awareness.	Yes. Enforcement. Training and awareness.
8	Student readiness. Old generation resistance. Lack of awareness and training.	Yes. Training. Awareness. Short courses for students and teachers. Offering old generation incentives.
9	Lack of fund allocation. Old generation resistance. Culture. Management corruption.	Yes. by overcoming mentioned barriers.
10	Old generation resistance.	Yes. Encouragement and imposing that part of the educational process. Offering training.
11	No regulation. Lack of applications. Operational issues.	Yes. Changing regulations. Making applications available. Making sure manpower is available.
12	Lack of awareness. Lack of infrastructure / and devices. Lack of training. Cultural barriers. Lack of regulation. Fear of using new technology. Old generation ways Resistance.	Yes. Training. Awareness. Infrastructure. Clear guidelines. Support.
13	Traditional people resistance. Fear to share their teaching materials. Some cultural aspects.	Yes.

Continued on next page

14	Students are better than tutor. Old Generation resistance. Need for policies. Management issues. Trust. Privacy do not like students to know my mobile contact.	By encouragement and training. Awareness for both students and lecturers
15	Culture. Lack of knowledge about technology. Lack of laws and regulation. Lack Training and awareness.	It needs efforts laws training, awareness. By more training and support.
16	Government lack of vision.	vision.
17	Old generation are out of touch. Managements lack of vision. No guidelines and regulation. Lack of mobile learning standards.	Offering suitable regulations and infrastructure.
18	Fear of using new and unknown technologies. Mobile capabilities might not be suitable. Lack of infrastructure is affecting the current use of m-Learning as accessing information might take a long time. Students can misuse the technologies so it should be regulated.	
19	Many missuses of mobile tech.	Yes, by providing adequate training.
20	Incentive. Technical support.	It needs to be trailed first then start to improve upon it. Especially as a supporting technology.
21	Technology Can be used against lecturer (evidence against lecturer). Unavailability of trust / confidentiality, students can misuse lecturer materials. Could Conflict with traditional teaching methods. Unsuitability towards social sciences. Large emphasis on cultural issues. Each subject type has different needs.	Yes, by causing cultural transformations and establishment of trust between lecturer and all students.

Continued on next page

22	Some regulations are against the full E-Learning, m-Learning. Thus require a strong face 2 face contact. This is based on a cultural idea that students need to have lectures ... etc.	
23	Lack of awareness. Training. Culture. Student improper use of devices/applications (used for non-educational purposes).	Training. Awareness [staff especially].
24	Students needs to be pushed for education, cultural reasons. Time. Old people resistance.	Yes, by changing culture. Giving staff more time.
25	Culture resistant to m-Learning/E-Learning completely (prefer traditional exams). Security of stored data and backup processes. Lack of planning. Lack of awareness and Training.	By providing Destructed regulations.

A.2.1.7 What motivates you to use mobile learning?

Candidate	Response
1	Easy to communicate with students. Interactivity.
2	Moving from old fashioned to new ways.
3	If students ask for it.
4	Time saving factors offered by m-Learning. If it is cheap and easy to use.
5	It makes life for both students and lecturers easier.
6	Availability of devices and infrastructure.

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7	High order thinking skills and long life learning.
8	Fast way to communicate with students. Speed. Price.
9	Support by training from the institute. Clear guidelines.
10	Digitize content and offering the needed applications.
11	I want to see more ways to sharing content between universities.
12	Regulation change. Infrastructure availability.
13	Specialized department to support and update and provide training on new technologies.
14	It is positive impact on teaching. Technical support.
15	Students are behind encouragement as they are very good user and will help in implementing m-learning.
16	Training, development, awareness, regulations also been able to retrieve information and search quickly. Awareness and making needed technology available. Student encouragement.
17	Government or university initiative.
18	Availability of the infrastructure. Regulation easing and developing a flexibility in curriculum interpretation and delivery. Awareness of m-Learning and tools.
19	Speed of connectivity and accessibility of the information online.
20	Develop the educational process for students as it gives them further advanced forms of data access and interactivity during education. Take into account the teachers if u intend to implement m-Learning.
21	Technology to be trailed first to evaluate its effect on the educational process. Furthermore, to have adequate incentives and technical support.
22	The student is more serious and can prove that they are not using mobile devices for unrelated aspects and do not intend to misuse the technology then trust could be established for me to consider m-Learning.

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23	At first there was resistance in the university but when it was required by the university and training was provide staff were motivated to adopt it. Furthermore, if incentive is given it can boost the motivation of use.
24	Fast and effective way of Communication with students which provides an impact on the educational process.
25	Previous positive experience in the use of E-Learning + Training + impact on educational process.
26	Incentives and Positive impact on educational process.

A.2.1.8 Advantages and disadvantages of m-Learning

List of Responses	Advantages	Disadvantages
1	Easy access to information / quick search.	Misuse of communication by some users.
2	Time saving.	Possibility to loosing information.
3	More systematic and organized.	Security issues.
4	Available anytime anywhere.	Clash with cultural values.
5	Reachability and accessibility of materials.	Mobile access speed (slow).
6	Ease lifestyle.	System reliability issues.
7	It enables high order thinking skills and long life learning.	Misuse for cheating.
8	Easy way to keep you up to date.	Technical challenges: screen size, battery, etc.
9	Easy to communicate with students.	–
10	Sharing of resources and materials.	–
11	Paperless.	–

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12	Makes education more flexible.	–
13	Introduce a new breed for student previously not admitted ().	–
14	Complements and extends E-Learning systems and infrastructure.	–
15	Student Engagement (increases).	–

A.2.1.9 Additional points extracted from interviewees

Points list	Response
1	Changes in government and continues reshuffling of government official and top management has negatively affected the education sector (abandoned projects and different visions).
2	The vast majority pointed out the both students and universities do not have issues with cost of technology and infrastructure as Kuwait is a rich country. However, allocation of budget has to be made.
3	Majority of those experienced in e learning do it as "personal effort".
4	AOU(Arab Open University) imposed the use of E-Learning which started with some issues, however now staffs are happy to comply and offer E-Learning services. This was achieved through training and support without financial incentives. AOU are currently restricted in their effort of E-Learning adoption as the current MOE (Ministry Of Education) mandates at least 80% face to face traditional learning.
5	Lecturers currently feel that student are more prepared for the use of technology in learning than the lecturers.
6	Overcapacity of state universities in Kuwait is increasing the load undertaken by staff and lecturers.
7	The vast majority of lecturers and interviewees state that if the use of m-Learning was only optional and not essential, then it would not be used by many lecturers.

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8	Many stress the need an independent committee to evaluate m-Learning areas of use and conclude relating strategies.
9	The majority emphasis the need for national and institutional strategies for the use of m-Learning.
10	Some lecturers fear the use and sharing of their materials online. (they intend to keep it to themselves).

A.2.2 Logging template

The following is the template sheet used to fill in each recorded interview.

Question/Response	Code
Use of Tech in learning, the learning process	Banned Limited Fully engaged
Why	
Use of E-Learning Tools	Yes No
Why	
Attitude towards mComputing	+ – Inconclusive
Attitude towards mLearning	+ – Inconclusive
Student use of mLearning in classroom	Yes No Partial Conditional
Why	
Barriers facing mLearning	Lack of guidelines Lack of awareness Age old generation

Table A.10: Template sheet used to fill in each recorded interview.

A.2.3 Interview Question Template for study one

Dear Participant:
As per your consent to participate in this interview, find below some examples of questions I will ask. The exact form of the questions will vary and will depend on your response. Thank you for your cooperation.

The Following will be explained to make sure participants have the correct understanding of the terms and of the project.

- Brief Explanation of E-Learning, m-Computing, m-Learning and their applications:
- Very Brief Explanation of the project:

The Questions:

Interview demographical data: Simple Demographical Data.

Q1. Technology:

(a) Do you prefer the use of technology in the learning process to be banned, limited or fully engaged?

Q2. E-Learning:

(a) Use of E-Learning: Do you use E-Learning tools in your teaching?

(b) E-Learning Application Use: What tools do you use for E-Learning?

Q3. m-Computing and m-Learning:

(a) Attitude towards m-Computing: What is your attitude towards mobile Computing?

(b) Attitude towards m-Learning: What is your attitude towards mobile Learning?

(c) Student use of m-Learning in classroom: Do you agree or disagree students should be allowed to use their mobile devices inside the classroom to facilitate the learning process?

Q4. Barriers:

(a) Barriers facing m-Learning: What barriers do you see in applying and using mobile devices in the learning process?

(b) Can Barriers be overcome?

Q5. Motivation:

(a) What motivates you to use m-Learning?/What would motivate you to use m-Learning?

Q6. Advantages and Disadvantages of m-Learning:

(a) What are the most important advantages of using mobile computing in education?

(b) What are the most important disadvantages of using mobile computing in education?

Free chat:

A.3 Interview Questions for study two

Below are the two sets of questions used by the researcher in the interviews with teachers and students.

A.3.0.1 Teacher Questions

Age: _____

Faculty: _____

University: _____

Sex: _____

1. What is your opinion regarding using mobile technology in the context of the learning process?
2. Do you think that Kuwaiti Universities are currently in a position to adopt m-learning? If so, why? If not, are there barriers and how can they be overcome? In particular, are there:
   - Financial barriers faced by students?
   - Financial barriers faced by the universities?
3. Do you think that implementing m-learning technology in Kuwaiti HE will be affected by social and educational cultural factors? If so, please:
   - Discuss the cultural barriers.
   - Discuss the social barriers.
4. What are the main requirements for implementing mobile learning in Kuwaiti HE?
5. Do you think students in Kuwait have the ability and motivation to adopt m-learning?
6. As a teacher, how do you assess whether m-learning is appropriate for your curriculum?
7. What do you consider more suitable for your curriculum: OurViews or WhatsApp? Why?
8. Do you think the experiment enhanced your students learning experience?
9. What are the main issues encountered during the experiment in terms of using the m-learning applications and how do you think they can be addressed?
10. Do you have any further remarks you would like to share?

A.3.0.2 Student Questions

University: _____

Faculty: _____

Department: _____

Stage: _____

Sex: _____

1. What is your opinion about mobile devices in general?
2. What is your opinion about using mobile devices in learning?
3. What is your assessment of the m-learning application (OurViews or WhatsApp) you used in the experiment?
4. Did you face any difficulties in using the application (OurViews or WhatsApp)? If so what are the main ones, and how can they addressed in your view?
5. What do you think are the features that the application (OurViews or WhatsApp) requires to meet your needs?
6. Are there any social barriers to using m-learning in a context where males and females share educational information? If so, please explain.
7. If a decision maker at your university raises the possibility of introducing m-learning to the university curriculum, what are the key requirements needed for this initiative to succeed?
8. Do you think that the application (OurViews or WhatsApp) is suitable for your module? If so, can you suggest other modules that would also be suitable for m-learning?
9. If offered the opportunity in the future, would you use the application (OurViews or WhatsApp) in your teaching? If so, please give your reasons.
10. Do you think m-learning can replace traditional learning, or do you believe it works better as a supportive tool?

11. Based on your experience, would you use this application again? Please give your reasons.

12. Would you like to add any further comments or thoughts?

A.3.1 Survey Questionnaires for study two

The following are the survey questionnaires given to participants of the WhatsApp and OurViews/SharedWalk groups, respectively.

A.3.1.1 WhatsApp Survey Questionnaire

University: _____

College: _____

Department: _____

Stage: _____

Gender: Male □ Female□

PLEASE ANSWER THE FOLLOWING QUESTIONS BY SELECTING THE APPROPRIATE OPTION:

A1. **How often have you heard of mobile learning before the current experiment?**
5=Often □ 4=Occasionally □ 3=Twice □ 2=Once □ 1=Never □

A2. **How often have you previously used m-learning educational programmes?**
5=Often □ 4=Occasionally □ 3=Twice □ 2=Once □ 1=Never □

A3. **How often have you received encouragement from your lecturers to use mobile devices for learning purposes?**
5=Often □ 4=Occasionally □ 3=Twice □ 2=Once □ 1=Never □

A4. **How do you rate the WhatsApp screen features and its accessibility?**

5=Excellent □ 4=Very Good □ 3=Good □ 2=Fair □ 1=Bad □

A5. **How do you rate taking photos or videos and the registration process via WhatsApp?**

5=Excellent □ 4=Very Good □ 3=Good □ 2=Fair □ 1=Bad □

DO YOU AGREE WITH THE FOLLOWING STATEMENTS?

A6. **I believe that using WhatsApp is better than using traditional education methods alone.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A7. **Using WhatsApp has made the curriculum easier.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A8. **WhatsApp supports interaction among students.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A9. **I find difficulties in following the additional features of the WhatsApp application.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A10. **I find difficulties in writing comments to my colleagues.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A11. **WhatsApp supports interaction between students and their instructors.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A12. **WhatsApp increases students' knowledge of the curriculum.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A13. **Using WhatsApp improved my performance.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A14. **WhatsApp is effective in saving students' time while performing in-class curricular tasks.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A15. **Mobile education technology can not only enhance but replace traditional education methods.**

5=Strongly Agree☐ 4=Agree☐ 3=Neutral☐ 2=Disagree☐ 1=Strongly Disagree☐

A16. **I would recommend the use of WhatsApp as a helpful tool within this class curriculum to my friends.**

5=Strongly Agree☐ 4=Agree☐ 3=Neutral☐ 2=Disagree☐ 1=Strongly Disagree☐

A17. **I need more training to improve my skills in using m-learning tools.**

5=Strongly Agree☐ 4=Agree☐ 3=Neutral☐ 2=Disagree☐ 1=Strongly Disagree☐

A18. **Kuwaiti society does not approve of contact between males and females to exchange educational information in the context of m-learning applications.**

5=Strongly Agree☐ 4=Agree☐ 3=Neutral☐ 2=Disagree☐ 1=Strongly Disagree☐

A19. **I experience financial difficulties in acquiring new mobile devices such as iPads, iPhones or Galaxy phone.**

5=Strongly Agree☐ 4=Agree☐ 3=Neutral☐ 2=Disagree☐ 1=Strongly Disagree☐

A20. **I will use this application in the future especially for educational purposes.**

5=Strongly Agree☐ 4=Agree☐ 3=Neutral☐ 2=Disagree☐ 1=Strongly Disagree☐

A21. **In the space below, please add any further comments you may have.**

_____

_____

_____

A22. **In the space below, please describe any problems you have faced while using WhatsApp**

_____

_____

_____

A23. **Do you think m-learning is part of your university's future plans?**

_____

_____

_____

A.3.1.2 OurViews/SharedWalk Survey Questionnaire

University: _____

College: _____

Department: _____

Stage: _____

Gender: Male □ Female□

PLEASE ANSWER THE FOLLOWING QUESTIONS BY SELECTING THE APPROPRIATE OPTION:

A1. **How often have you heard of mobile learning before the current experiment?**

5=Often □ 4=Occasionally □ 3=Twice □ 2=Once □ 1=Never □

A2. **How often have you previously used m-learning educational programmes?**

5=Often □ 4=Occasionally □ 3=Twice □ 2=Once □ 1=Never □

A3. **How often have you received encouragement from your lecturers to use mobile devices for learning purposes?**

5=Often □ 4=Occasionally □ 3=Twice □ 2=Once □ 1=Never □

A4. **How do you rate the OurViews/SharedWalk screen features and its accessibility?**

5=Excellent □ 4=Very Good □ 3=Good □ 2=Fair □ 1=Bad □

A5. **How do you rate taking photos or videos and the registration process via OurViews/SharedWalk?**

5=Excellent □ 4=Very Good □ 3=Good □ 2=Fair □ 1=Bad □

DO YOU AGREE WITH THE FOLLOWING STATEMENTS?

A6. **I believe that using OurViews/SharedWalk is better than using traditional education methods alone.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A7. **Using OurViews/SharedWalk has made the curriculum easier.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A8. **OurViews/SharedWalk supports interaction among students.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A9. **I find difficulties in following the additional features of OurViews/SharedWalk**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A10. **I find difficulties in writing comments to my colleagues.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A11. **OurViews/SharedWalk supports interaction between students and their instructors.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A12. **OurViews/SharedWalk increases students' knowledge of the curriculum.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A13. **Using OurViews/SharedWalk improved my performance.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A14. **OurViews/SharedWalk is effective in saving students' time while performing in-class curricular tasks.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A15. **Mobile education technology can not only enhance but replace traditional education methods.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A16. **I would recommend the use of OurViews/SharedWalk as a helpful tool within this class curriculum to my friends.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A17. **I need more training to improve my skills in using m-learning tools.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A18. **Kuwaiti society does not approve of contact between males and females to exchange educational information in the context of m-learning applications.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A19. **I experience financial difficulties in acquiring new mobile devices such as iPads, iPhones or Galaxy phone.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A20. **I will use this application in the future especially for educational purposes.**

5=Strongly Agree□ 4=Agree□ 3=Neutral□ 2=Disagree□ 1=Strongly Disagree□

A21. **In the space below, please add any further comments you may have.**

_____

_____

_____

A22. **In the space below, please describe any problems you have faced while using the application.**

_____

_____

_____

A23. **Do you think m-learning is part of your university's future plans?**

_____

_____

A.3.2 OurViews/SharedWalk student recommendations from study two

The following list is of recommendations made by participants in the OurViews & Shared Walk group regarding possible changes and improvements that can be made to the OurViews/SharedWalk application. These recommendations were later forwarded onto the development team with a view to investigation the possibility of their implementation.

1. As a user I might need to write and post a text only or a voice only without a photo or a video. I can't do this in 'OurViews'.
2. As a user I might need to make one to one chat or room chat with the other user/users by using the 'OurViews' application.
3. It will be much better if I have both the 'OurViews' application and the 'SharedWalk' in the same device or at least I have a link in the 'OurViews' which navigate me directly to the 'SharedWalk'.
4. It will be much better if there is a help and/or a link to open a help tutorial to the 'OurViews' application.
5. There is no internal library or gallery for the 'OurViews' application which helps in saving the photos and/or videos which I have posted before, and there is no link to share my photo and/or video with another application which is in the device such as WhatsApp, 'Instagram' etc. There is also no temporary memory which saves the photos and/or videos for any case such as when I get an Internet disconnection such as in the 'WhatsApp' case.
6. As a user I can't upload photos and/or videos from the mobile device gallery or from anywhere else to the 'OurViews' application and then post them to the group.
7. As a user I can't post a photo and/or a video to just one member in my group but currently all the group members can see this photo and/or video, I can't select the one who can see my video and/or photo, and also the other group should not see my group work. The reason of this, sometimes there is a competition between the

group members themselves inside the same group, and sometimes a competition between my group and the other groups which require privacy in seeing the others work, it depends on the academic module type. It will be good for the users if there are two options, Public and Private, which gives the user the opportunity to send his post as private or public.

8. As a user I don't receive any notification such as an alarm or a sign which notify me when I receive a new post, such as what is there in the emails and 'WhatsApp' etc.

9. As a user I need to see how many one of the group members have seen my photo and/or video, and if there is anyone else have seen the work from outside of my group such as in YouTube and the other applications.

10. There is a need to add GPS option because most of students who use the application are using it for the field work, because of this the confidentiality and credibility is important here, and for more interactivity.

11. As a user while posting a video and/or a photo and I receive a telephone call or a message or I open any other application then when I return back to the 'OurViews' I find it stuck or losing my photo and/or video.

12. As a user I need an option such as 'Like' and/or a rate which increases the users' interactivity and gives an indication regarding the work effect and reflection.

13. There is no timeline option such as in 'Instagram', 'Twitter' and so on.

14. As an Arabic user I can't write a text in Arabic over my post if it is a photo or a video if I want to describe my work in Arabic, and also I don't have Arabic interface for students who are from Arab countries, for this reason I have made a dictionary which contains all the words and phrases which are in both 'OurViews' and 'SharedWalk'. When students write their text and/or titles in Arabic language then they appear as symbols or question marks.

15. As mentioned before, there is a technical problem which is that the application works in some devices such as Galaxy and Apple Mac, and it doesn't work in others such as in most of the iPhones and iPads.

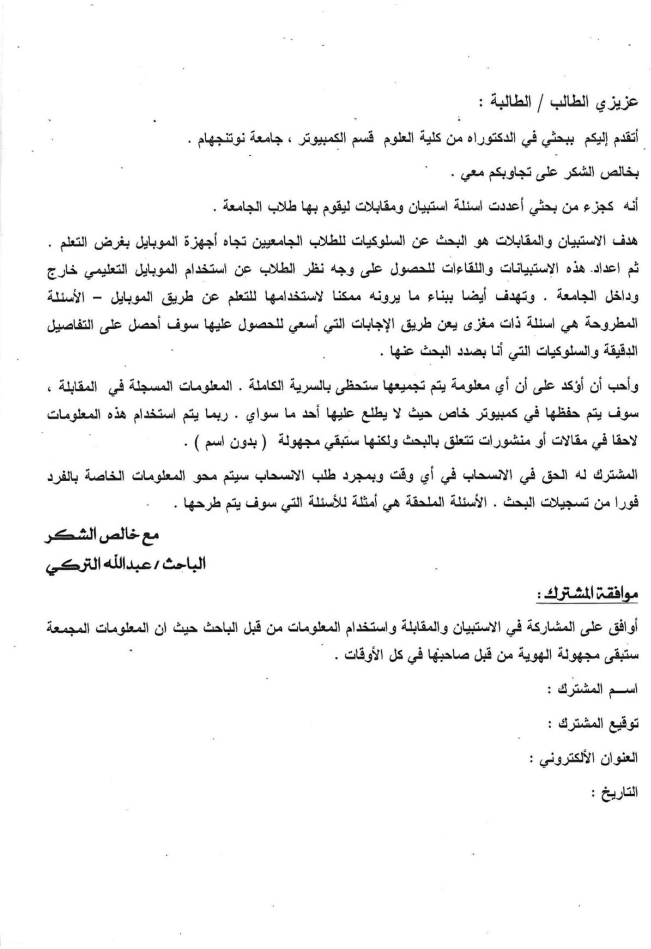
16. The 'OurViews' doesn't have interface features for the photos such as zooming, resolution, colours, pixels effects which helps in posting clear photos.

17. In ‘OurViews’ there is no montage or control, such as cut the bad pieces of video, before I post it like what is there in the ’Instagram’ and the ‘Facebook’ etc.

18. In ‘SharedWalk’, there is no overwriting option when I, as an administrator, add a new member to the Excel file in an available group.

Appendix B

B.1



عزيزي الطالب / الطالبة :

أتقدم إليكم ببحثي في الدكتوراه من كلية العلوم قسم الكمبيوتر ، جامعة نوتنجهام .

بخالص الشكر على تجاوبكم معي .

أنه كجزء من بحثي أعددت اسئلة استبيان ومقابلات ليقوم بها طلاب الجامعة .

هدف الاستبيان والمقابلات هو البحث عن السلوكيات للطلاب الجامعيين تجاه أجهزة الموبايل بغرض التعلم . ثم اعداد هذه الاستبيانات واللقاءات للحصول على وجه نظر الطلاب عن استخدام الموبايل التعليمي خارج وداخل الجامعة . وتهدف أيضا ببناء ما يرونه ممكنا لاستخدامها للتعلم عن طريق الموبايل – الأسئلة المطروحة هي اسئلة ذات مغزى يعن طريق الإجابات التي أسعي للحصول عليها سوف أحصل على التفاصيل الدقيقة والسلوكيات التي أنا بصدد البحث عنها .

وأحب أن أؤكد على أن أي معلومة يتم تجميعها ستحظى بالسرية الكاملة . المعلومات المسجلة في المقابلة ، سوف يتم حفظها في كمبيوتر خاص حيث لا يطلع عليها أحد ما سواي . ربما يتم استخدام هذه المعلومات لاحقا في مقالات أو منشورات تتعلق بالبحث ولكنها ستبقي مجهولة (بدون اسم) .

المشترك له الحق في الانسحاب في أي وقت وبمجرد طلب الانسحاب سيتم محو المعلومات الخاصة بالفرد فورا من تسجيلات البحث . الأسئلة الملحقة هي أمثلة للأسئلة التي سوف يتم طرحها .

مع خالص الشكر

الباحث / عبدالله التركي

موافقة المشترك :

أوافق على المشاركة في الاستبيان والمقابلة واستخدام المعلومات من قبل الباحث حيث ان المعلومات المجمعة ستبقى مجهولة الهوية من قبل صاحبها في كل الأوقات .

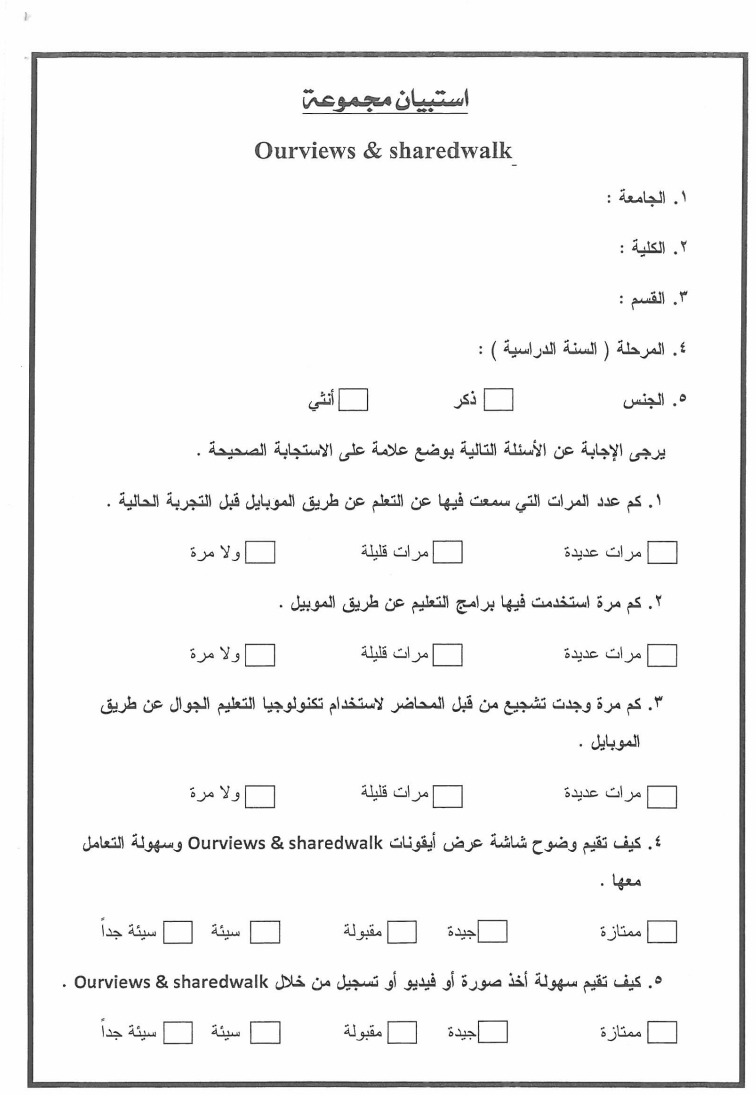
اسم المشترك :

توقيع المشترك :

العنوان الألكتروني :

التاريخ :

FIGURE B.1



استبيان مجموعة

Ourviews & sharedwalk

١. الجامعة :

٢. الكلية :

٣. القسم :

٤. المرحلة (السنة الدراسية) :

٥. الجنس ☐ ذكر ☐ أنثي

يرجى الإجابة عن الأسئلة التالية بوضع علامة على الاستجابة الصحيحة .

١. كم عدد المرات التي سمعت فيها عن التعلم عن طريق الموبايل قبل التجربة الحالية .

☐ مرات عديدة ☐ مرات قليلة ☐ ولا مرة

٢. كم مرة استخدمت فيها برامج التعليم عن طريق الموبيل .

☐ مرات عديدة ☐ مرات قليلة ☐ ولا مرة

٣. كم مرة وجدت تشجيع من قبل المحاضر لاستخدام تكنولوجيا التعليم الجوال عن طريق الموبايل .

☐ مرات عديدة ☐ مرات قليلة ☐ ولا مرة

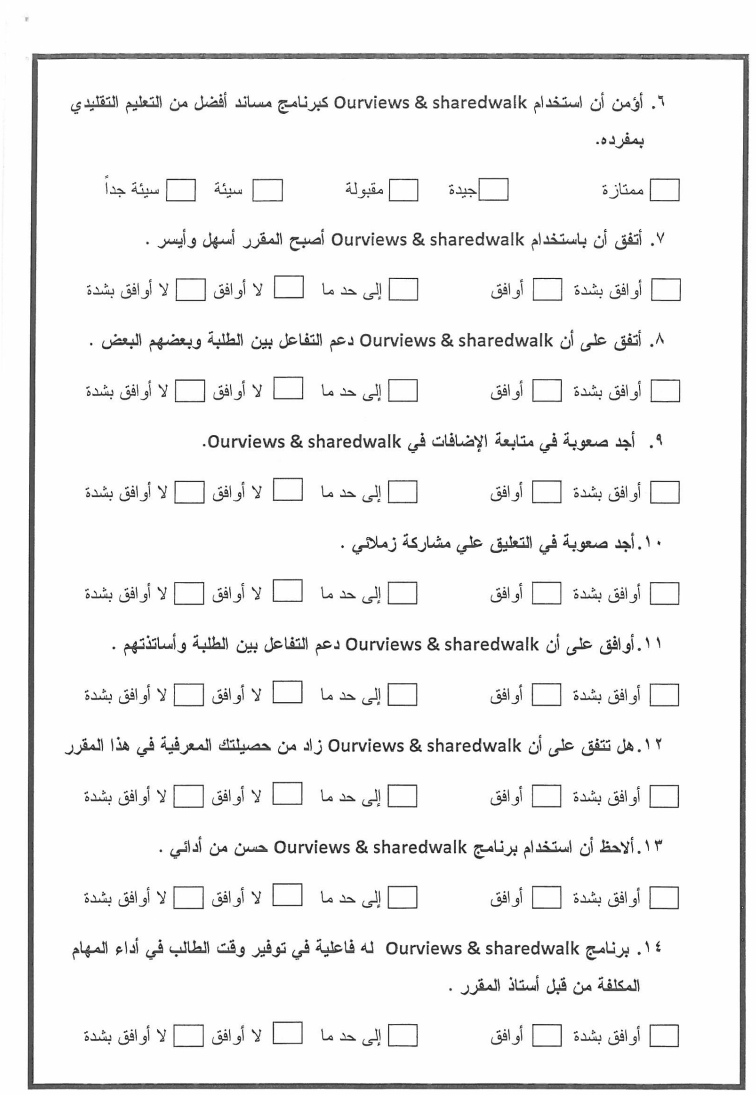
٤. كيف تقيم وضوح شاشة عرض أيقونات Ourviews & sharedwalk وسهولة التعامل معها .

☐ ممتازة ☐ جيدة ☐ مقبولة ☐ سيئة ☐ سيئة جداً

٥. كيف تقيم سهولة أخذ صورة أو فيديو أو تسجيل من خلال Ourviews & sharedwalk .

☐ ممتازة ☐ جيدة ☐ مقبولة ☐ سيئة ☐ سيئة جداً

FIGURE B.2



٦. أؤمن أن استخدام Ourviews & sharedwalk كبرنامج مساند أفضل من التعليم التقليدي بمفرده.

☐ ممتازة ☐ جيدة ☐ مقبولة ☐ سيئة ☐ سيئة جداً

٧. أتفق أن باستخدام Ourviews & sharedwalk أصبح المقرر أسهل وأيسر .

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

٨. أتفق على أن Ourviews & sharedwalk دعم التفاعل بين الطلبة وبعضهم البعض .

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

٩. أجد صعوبة في متابعة الإضافات في Ourviews & sharedwalk.

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

١٠. أجد صعوبة في التعليق علي مشاركة زملائي .

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

١١. أوافق على أن Ourviews & sharedwalk دعم التفاعل بين الطلبة وأساتذتهم .

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

١٢. هل تتفق على أن Ourviews & sharedwalk زاد من حصيلتك المعرفية في هذا المقرر

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

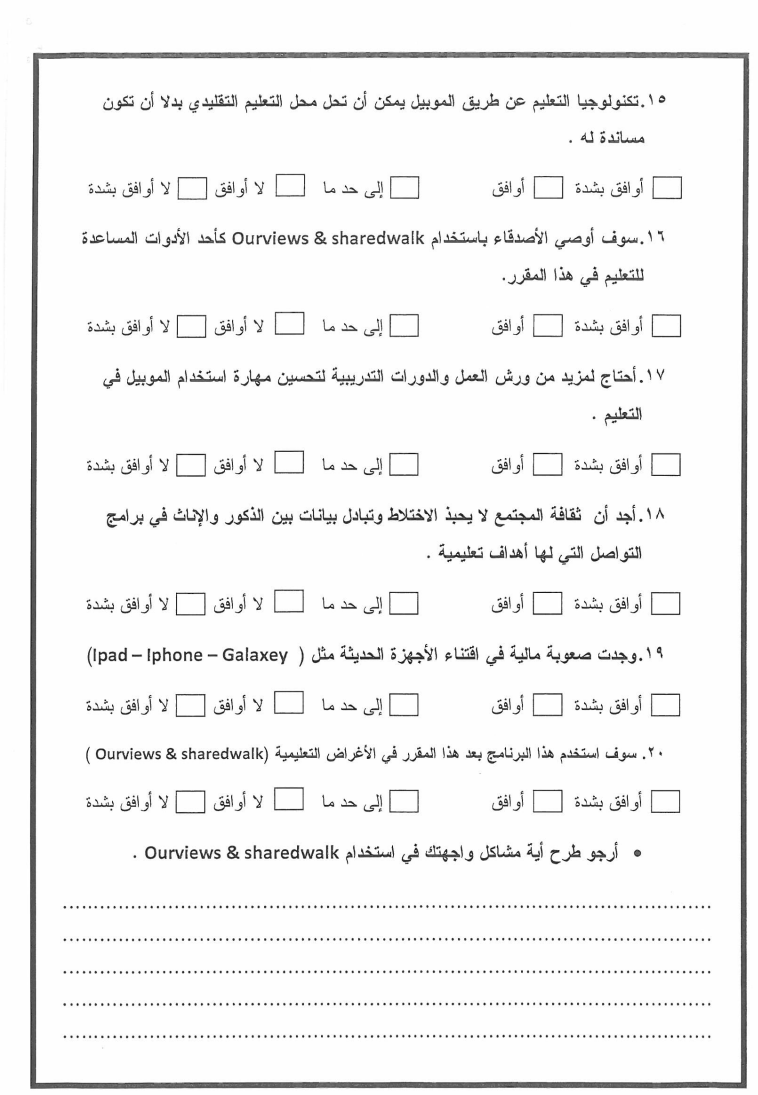
١٣. ألاحظ أن استخدام برنامج Ourviews & sharedwalk حسن من أدائي .

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

١٤. برنامج Ourviews & sharedwalk له فاعلية في توفير وقت الطالب في أداء المهام المكلفة من قبل أستاذ المقرر .

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

FIGURE B.3



١٥.تكنولوجيا التعليم عن طريق الموبيل يمكن أن تحل محل التعليم التقليدي بدلا أن تكون مساندة له .

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

١٦.سوف أوصي الأصدقاء باستخدام Ourviews & sharedwalk كأحد الأدوات المساعدة للتعليم في هذا المقرر.

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

١٧.أحتاج لمزيد من ورش العمل والدورات التدريبية لتحسين مهارة استخدام الموبيل في التعليم .

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

١٨.أجد أن ثقافة المجتمع لا يحبذ الاختلاط وتبادل بيانات بين الذكور والإناث في برامج التواصل التي لها أهداف تعليمية .

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

١٩.وجدت صعوبة مالية في اقتناء الأجهزة الحديثة مثل (Ipad – Iphone – Galaxey)

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

٢٠. سوف استخدم هذا البرنامج بعد هذا المقرر في الأغراض التعليمية (Ourviews & sharedwalk)

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

- أرجو طرح أية مشاكل واجهتك في استخدام Ourviews & sharedwalk .

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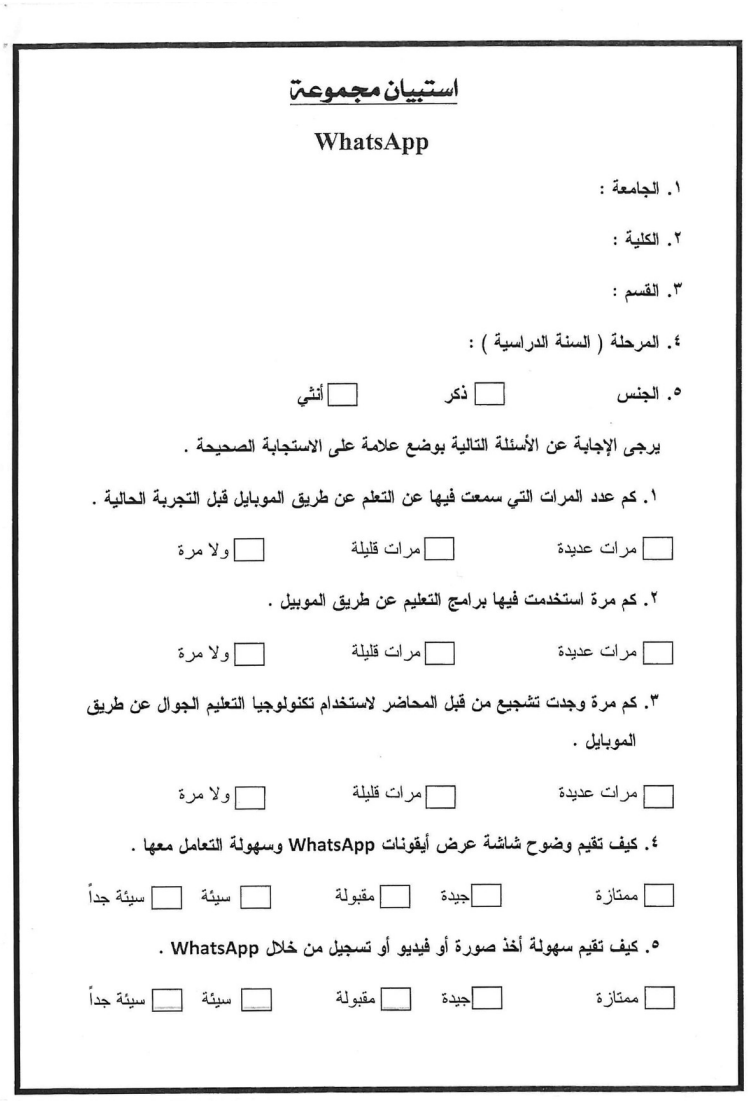
FIGURE B.4



استبيان مجموعة

WhatsApp

١. الجامعة :

٢. الكلية :

٣. القسم :

٤. المرحلة (السنة الدراسية) :

٥. الجنس ☐ ذكر ☐ أنثي

يرجى الإجابة عن الأسئلة التالية بوضع علامة على الاستجابة الصحيحة .

١. كم عدد المرات التي سمعت فيها عن التعلم عن طريق الموبايل قبل التجربة الحالية .

☐ مرات عديدة ☐ مرات قليلة ☐ ولا مرة

٢. كم مرة استخدمت فيها برامج التعليم عن طريق الموبيل .

☐ مرات عديدة ☐ مرات قليلة ☐ ولا مرة

٣. كم مرة وجدت تشجيع من قبل المحاضر لاستخدام تكنولوجيا التعليم الجوال عن طريق الموبايل .

☐ مرات عديدة ☐ مرات قليلة ☐ ولا مرة

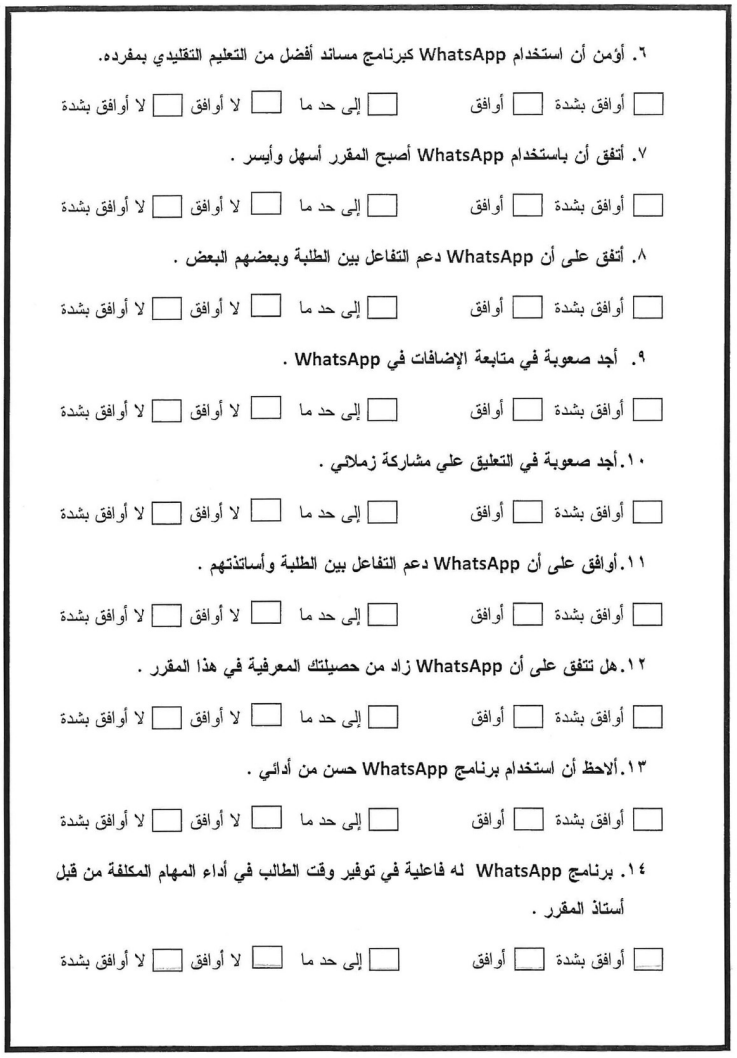
٤. كيف تقيم وضوح شاشة عرض أيقونات WhatsApp وسهولة التعامل معها .

☐ ممتازة ☐ جيدة ☐ مقبولة ☐ سيئة ☐ سيئة جداً

٥. كيف تقيم سهولة أخذ صورة أو فيديو أو تسجيل من خلال WhatsApp .

☐ ممتازة ☐ جيدة ☐ مقبولة ☐ سيئة ☐ سيئة جداً

FIGURE B.5



٦. أؤمن أن استخدام WhatsApp كبرنامج مساند أفضل من التعليم التقليدي بمفرده.

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

٧. أتفق أن باستخدام WhatsApp أصبح المقرر أسهل وأيسر .

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

٨. أتفق على أن WhatsApp دعم التفاعل بين الطلبة وبعضهم البعض .

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

٩. أجد صعوبة في متابعة الإضافات في WhatsApp .

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

١٠. أجد صعوبة في التعليق علي مشاركة زملائي .

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

١١. أوافق على أن WhatsApp دعم التفاعل بين الطلبة وأساتذتهم .

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

١٢. هل تتفق على أن WhatsApp زاد من حصيلتك المعرفية في هذا المقرر .

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

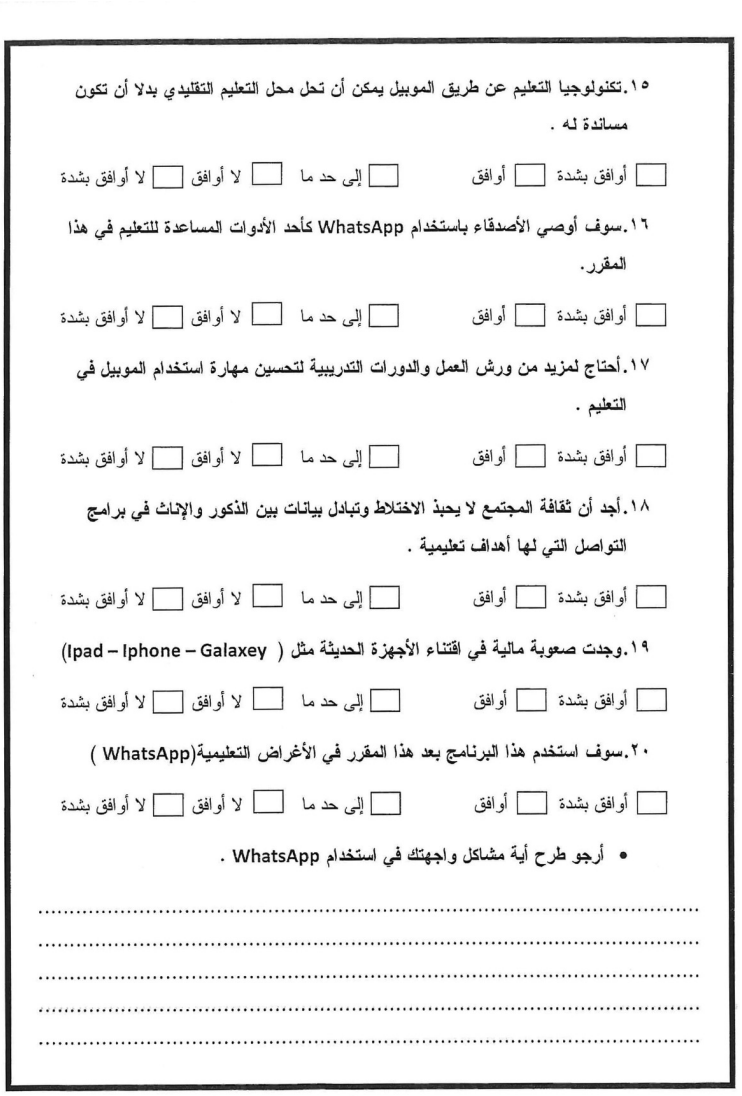
١٣. ألاحظ أن استخدام برنامج WhatsApp حسن من أدائي .

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

١٤. برنامج WhatsApp له فاعلية في توفير وقت الطالب في أداء المهام المكلفة من قبل أستاذ المقرر .

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

FIGURE B.6



١٥.تكنولوجيا التعليم عن طريق الموبيل يمكن أن تحل محل التعليم التقليدي بدلا أن تكون مساندة له .

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

١٦.سوف أوصي الأصدقاء باستخدام WhatsApp كأحد الأدوات المساعدة للتعليم في هذا المقرر.

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

١٧.أحتاج لمزيد من ورش العمل والدورات التدريبية لتحسين مهارة استخدام الموبيل في التعليم .

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

١٨.أجد أن ثقافة المجتمع لا يحبذ الاختلاط وتبادل بيانات بين الذكور والإناث في برامج التواصل التي لها أهداف تعليمية .

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

١٩.وجدت صعوبة مالية في اقتناء الأجهزة الحديثة مثل (Ipad – Iphone – Galaxey)

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

٢٠.سوف استخدم هذا البرنامج بعد هذا المقرر في الأغراض التعليمية(WhatsApp)

☐ أوافق بشدة ☐ أوافق ☐ إلى حد ما ☐ لا أوافق ☐ لا أوافق بشدة

- أرجو طرح أية مشاكل واجهتك في استخدام WhatsApp .

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FIGURE B.7

B.2

إلى الدكتور : المحترم

تحيه طيبة وبعد..

أتقدم إليكم ببحثي في الدكتوراه من كلية العلوم قسم الكمبيوتر ، جامعة نوتنجهام .

بخالص الشكر على تجاوبكم معي .

أنه كجزء من بحثي أعددت اسئلة مقابلات لكى تفضلو بالاجابة عليها بعد أن اقمنا التجربة في مقرركم .

هدف المقابلات هو البحث عن المشاكل التى تواجه تطبيق التعلم عن طريق الموبيل في الكويت .

وأحب أن أؤكد على أن أي معلومة يتم تجميعها ستحظى بالسرية الكاملة . المعلومات المسجلة في المقابلة ، سوف يتم حفظها في كمبيوتر خاص حيث لا يطلع عليها أحد ما سواي . ربما يتم استخدام هذه المعلومات لاحقا في مقالات أو منشورات تتعلق بالبحث ولكنها ستبقي مجهولة (بدون اسم) .

المشترك له الحق في الانسحاب في أي وقت وبمجرد طلب الانسحاب سيتم محو المعلومات الخاصة بالفرد فورا من تسجيلات البحث . الأسئلة الملحقة هي أمثلة للأسئلة التي سوف يتم طرحها .

مع خالص الشكر

الباحث / عبدالله التركي

موافقة المشترك :

أوافق على المشاركة في المقابلة واستخدام المعلومات من قبل الباحث حيث ان المعلومات المجمعة ستبقى مجهولة الهوية من قبل صاحبها في كل الأوقات .

اسم المشترك :

توقيع المشترك :

العنوان الألكتروني :

التاريخ :

FIGURE B.8

B.3 The key measurements

Table B.1 illustrates a detailed breakdown of these answers. Furthermore, Table 5.7 shows the mean values of the answers provided by the participants in the WhatsApp group.

TABLE B.1: Breakdown of questionnaire answers by WhatsApp group participants.

		Breakdown of Answers				
No.	Question	Often	Occasionally	Twice	Once	Never
A1	How often have you heard of mobile learning before the current experiment?	5%	25%	16%	7%	50%
A2	How often have you previously used m-learning educational programmes?	20%	36%	27%	11%	5%
A3	How often have you received encouragement from your lecturers to use mobile devices for learning purposes?	18%	29%	18%	20%	14%
		Excellent	Very Good	Good	Fair	Bad
A4	How do you rate the WhatsApp screen features and its accessibility?	61%	23%	14%	2%	0%
A5	How do you rate taking photos or videos and the registration process via OurViews/SharedWalk?	75%	16%	7%	2%	0%
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
A6	I believe that using WhatsApp is better than using traditional education methods alone.	34%	41%	23%	2%	0%
A7	Using WhatsApp has made the curriculum easier.	48%	27%	16%	10%	0%
A8	WhatsApp supports interaction among students.	66%	21%	9%	5%	0%
A9	I find difficulties in following the additional features of the WhatsApp application.	5%	7%	43%	45%	0%
A10	I find difficulties in writing comments to my colleagues.	5%	18%	20%	57%	0%
A11	WhatsApp supports interaction between students and their instructors.	48%	32%	16%	5%	0%
A12	WhatsApp increases students' knowledge of the curriculum.	27%	41%	23%	9%	0%
A13	Using WhatsApp improved my performance.	27%	34%	25%	14%	0%
A14	WhatsApp is effective in saving students' time while performing in-class curricular tasks.	38%	14%	48%	0%	0%
A15	Mobile education technology can not only enhance but replace traditional education methods.	16%	30%	20%	32%	2%
A16	I would recommend the use of WhatsApp as a helpful tool within this class curriculum to my friends.	36%	40%	20%	5%	0%
A17	I need more training to improve my skills in using m-learning tools.	10%	16%	30%	43%	2%
A18	Kuwaiti society does not approve of contact between males and females to exchange educational information in the context of m-learning applications.	27%	32%	32%	7%	2%
A19	I experience financial difficulties in acquiring new mobile devices such as iPads, iPhones or Galaxy phone.	16%	7%	41%	30%	7%
A20	I will use this application in the future especially for educational purposes.	32%	48%	16%	5%	0%

These results are graphically illustrated in Figure 5.13 (The numbering of the answers [A1-A20] corresponds to that in Table B.1).

A1: Measuring the previous knowledge in m-Learning.

A2: Measuring the previous experience in using the m-Learning.

A3: Make sure if there are any kind of support in the m-Learning technology.

A4: Measuring the User Interface simplicity.

A5: Measuring the simplicity and usability of various WhatsApp options.

A6, A7, A8: Measuring the strength of WhatsApp.

A9, A10: Measuring the amount of difficulty of WhatsApp.

A11, A12, A13, A14: Measuring the strenght of WhatsApp effectiveness.

A15, A16: Measuring if WhatsApp is a comprehensive tool or not.

A17: Measuring the size of training on WhatsApp that the users need.

A18: Measuring the effect of culture issues.

A19: Measuring the effect of the finance towards owing mobile devices.

A20: The effect of the tool towards the future of the educational process.

B.4 Reliability of What's App and OurViews questionnaire result of the second study

B.4.1 Reliability

Notes

Output Created		15-January-2014 17:02:06
Comments		
Input	Data	E:\SPSS Abdullah\Abdullah Analysis.sav
	Active Dataset	DataSet2
	Filter	<none>
	Weight	<none>
	Split File	Group
	N of Rows in Working Data File	94
	Matrix Input	
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on all cases with valid data for all variables in the procedure.
Syntax		RELIABILITY /VARIABLES=a1 a2 a3 a4 a5 a6 a7 a8 a9 a10 a11 a12 a13 a14 a15 a16 a17 a18 a19 a20 /SCALE('ALL VARIABLES') ALL /MODEL=ALPHA.
Resources	Processor Time	00:00:00.02
	Elapsed Time	00:00:00.02

FIGURE B.9: Reliability of WhatsApp and OurView result of the second study

B.4.2 Group WhatsApp

Cronbach's Alpha	N of items
.977	20

TABLE B.2: Reliability Statistics – group WhatsApp

B.4.3 Group OurView

Cronbach's Alpha	N of items
.979	20

TABLE B.3: Reliability Statistics – group OurView

B.5 Sample of interviews in study two and three

Student 10 – Education – Kuwait University

Q1: **How do you see the mobile in general and why you use it?**
Very smart and clever device, it has many free good programs which are very useful. We can't leave it.

Q2: **How did you see the Ourviews/Sharedwalk application and what it needs to be a perfect application?**
I used it one time and I think we need more practice on it to know it more because it's not easy to use, and I also wish that it will have the same options as the WhatsApp to be more useful. It should have conversation, block.

Q3: **Are there any restrictions which control people to use the mobile learning and the mobile technologies such as the social issues?**
Yes, for sure. We as girls don't like to share our chats and telephone numbers with boys. Groups should be isolated because our culture and traditions prevent this.

Q4: **If the stakeholders of the university told you that you should share us in designing a plan for the mobile learning in the university, what do you think the points which should be in this plan?**
The first issue which should be there is the training for the staff and students, and the technical things should be available before.

Q5: **Which modules are suitable for the Ourviews/SharedWalk?**
That have pictures and sounds, but we should not depend 100% on these devices but it should be as secondary and helping teachers in their teaching processes.

Student 11–Mechanical field–Ourviews

Q1: **How do you see the mobile in general and why you use it?** It's very important device and we can't leave it, also mobile in learning is important because you can contact with the doctor easily.

Q2: **How did you see the Ourviews/Sharedwalk application and what it needs to be a perfect application?**
It helps me by taking photos and some other options, however it needs more practice and it's not as easy as the WhatsApp for example. There are many options

which are not in the Ourviews/SharedWalk and they are very useful but we find it in WhatsApp for example. There is no chatting but just I can send pictures, and we can't make upload for an old picture. The application is not as good as other applications such as WhatsApp, and the to write text is also not easy.

The good in using the Ourviews/Sharedwalk is that we work as team and students help each other, groups help each other.

The idea of the application is great but it needs more enhancements and improvements to be suitable to be used for learning purposes.

Q3: **Are there any restrictions which prevent people to use the mobile learning and the mobile technologies such as the social issues?**
I don't see much restrictions or gender issues but sometimes it happens because we are a conservative society and we have traditions and religion which control all our daily life especially if there are females among work or in the learning process.

Teacher Eleven – Mechanical Engineering – OurViews/SharedWalk

Q1: **How do you see the mobile in general and why you use it?**
It's a very good device and it enhances our knowledge in many areas. But for learning purposes I don't think it will be useful.

Q2: **How did you see the Ourviews/Sharedwalk application and what it needs to be a perfect application?**
Really, I didn't use it very much because I found it not easy but my friends sent me pictures and I chose from them which are useful for me. Sometimes the application gets stuck, and it's hard to add voice with picture together but everyone alone.

There should be some enhancements which should be made for the application to be suitable more.

The application should be more flexible when creating new groups especially when these groups are created for learning purposes.

Somehow the application is useful but if there is a new version it will be more useful. I will use the application if there is a new version that have the previous modifications and take into account all our points to be flexible and easier to use.

Q3: **Are there any restrictions which control people to use the mobile learning and the mobile technologies such as the social issues?**

For sure there are some restrictions if there are females with us but at the same time we can do some work with females but not for example give us their telephone numbers and so on. But there are some relationships for learning purposes.

Q4: **If the stakeholders of the university told you that you should share us in designing a plan for the mobile learning in the university, what do you think the points which should be in this plan?**
The plan should have training courses and some special devices.

Student 2–

Q1: **Did you expect to solve all your problems by using WhatsApp for learning purposes?**
Yes we solved all our problems and without any difficulties, the mobile with the WhatsApp was very good.

Q2: **Have you felt that there are some restrictions and barriers when using the WhatsApp for learning purposes?**
I felt shy sometimes when I used WhatsApp to contact with my teacher and colleagues.

Sometimes the time was not suitable to answer the teacher or colleagues questions because we have exams and we want to study and so on, for this reason teachers should give us a sharp time to be ready for their questions and some days.

The advantages of the mobile learning is that if someone asks a question the answer from the teacher or a colleague will be useful for all students in the group.

about the culture it is important to take it into account and I felt shy sometimes and this is from the culture.

The mobile technology experiment was useful for us and we will be happy if we use mobile for learning purposes.

Now there is a group of students refused to use the Ourviews/SharedWalk application at all.

One student of the group her name was Student 12

Q1: **Why you refused to use this application?**
Because our assignment was not pictures but we should use text more and this application didn't help us to write text and send it properly.

Student 13 another student refused to use the application because it was just for pictures and it was hard to write text as well. And I have application which are more flexible such as WhatsApp and Snapchat. The application if it has chatting then it will be easier to use, and we should write comments in a way to be easy more.

Student 14 – WhatsApp group

Q1: **How did you see the WhatsApp application and its use for learning purposes?**

It is easy to be used especially because there are regulations which we should follow, and its options are very good and we were happy to use WhatsApp for something else other than the social purpose.

I find it useful to find the answers of some questions already there from my colleagues or teachers.

It's a very good experiment which we did and it was very useful for us.

I don't think there is any other application which is better than the WhatsApp to use it in the mobile learning.

The English language was good for most of students and not a big restriction.

Student 15 – OurViews

Q1: **How do you see the mobile in general and why you use it?**

Its very important for everyone in this digital age.

Q2: **How did you see the OurViews/SharedWalk and its use for learning purposes?**

It needs modifications to be a good application, we should send sound with the pictures or just send a voice without pictures or just text, and this is not available in this application.

Q3: **In your opinion, are there social restrictions which prevent females to share males in the learning? Is it normal or not?**

I think it is Ok for students of the same class but not students males of the other classes. But as you know there are red lines such as not to give telephone numbers for students males and so on.

Q4: **If the stakeholders of the university told you that you should share us in designing a plan for the mobile learning in the university, what do you think the points which should be in this plan?**

To put clear regulations and make training courses for all staff to have practice and to have good infrastructure for mobile learning.to register easily to the application and to have a good help for the application.

I will use this application if developments happen, such as having text or voice alone without pictures for example.

Student 16 – Kuwait University – Engineering -Ourviews

Q1: **How do you see the mobile in general and why you use it?**

Very useful these days.

Q2: **How did you see the OurViews/SharedWalk and its use for learning purposes?**

It needs enhancement to send things more than just pictures or videos such as voices or text alone, it also gets stuck sometimes.

It will be very useful to have classifications for every item we send.

There are no restrictions if it's just for learning purposes but I don't give my mobile number for anyone, and yes there are cultural restrictions.

There should be a suitable application for learning purposes after doing questionnaire and check students' and teachers' ideas.

Student 17 – WhatsApp

Q1: **Have you found that the things which you expected for the WhatsApp as it is, less or more than you expected?**

All the things I have expected was as it is and fair enough. The WhatsApp was very good maybe because we know it from before and also its options were enough for us. The regulations also were very good to control the things that we write.

Q2: **Have you found anything critical for you as a female and you felt shy from it or from using the WhatsApp and share students males in this?**

Almost no because everyone of us knew his role and also how to deal with each other depending upon the culture and our traditions, and the WhatsApp regulations which you put were very good for us.

Q3: **There was a problem with your voices as females, you refused to record your voices, why?**

This was because in our religion and traditions we as females can't raise our voices or talk with strangers in telephone, for these reasons we refused to record our voices and sent it via WhatsApp.

Q4: **What are the disadvantages that you faced in the experiment?**

The first disadvantage is that the experiment was conducted in a holiday and the time was short.

Q5: **If the stakeholders of the university told you that you should share us in designing a plan for the mobile learning in the university, what do you think the points which should be in this plan?**

Put a schedule with a limited time, training courses for m-learning and to avoid the lectures time because we should attend these lectures.

Student 10 – Education – Kuwait University

Q1: **How do you see the mobile in general and why you use it?**

It has become very important for communication and even the researches showed that the age of people who use the mobile is 11 years old and more. The thing which should be taken into account is to use mobile for learning because every one of students has a smart phone so we should invest in this and use mobiles for learning purposes.

Q2: **What were the main problems you faced while using mobile technology?**

The problems such as some applications which might work with a version and not work with others, I don't think there is a financial problem at the university to apply the m-Learning in Kuwait University.

Unfortunately there are some of the stakeholders at our university don't use smart phones, and this type of people might work against the m-Learning projects but they are very few.

Q3: **If the stakeholders of the university told you that you should share us in designing a plan for the mobile learning in the university, what do you think the points which should be in this plan?**

To have quick Internet access is very important and to have something like good Blackboard or Moodle which can be linked with the mobiles.

Last work was very good, I know my student more, the relationship becomes closer to them, they had more self confidence. I live with them was in —- and contacted with them. I felt my students had responsibilities and when I was in Oman as well I felt that everything useful with the mobile.

- I'm thinking to add this mobile work in the syllabus and put guidelines for their grades, number of projects.

Teacher eight:

What happened before the mobile and after?

Now we get the information more quickly and we save time because before we wait nearly until half of the term time to modify the errors, but with mobile we modify every day. In the previous we couldn't change anything because we were restricted the material but with the mobile we have flexibility and we can bring student earlier or later, change location give information , we do all this any time because we use mobile the flexibility has become more as learning tool, before the App student contacted the field daily and the course leader weekly one or two times a week depends on the doctor less than before.

- The work via mobile and participation different depending on the students, some participation percentage 10%some, 60% some, 90% but the quality is important and I assess student depending upon quality.
- Criteria to make rules and limitation: student must not take just from internet and he should write from his own words if he/she takes from the net then just percentage and put reference.
- The reason of taking cut and paste and not——they should read and then write by themselves.
- Negatives: -take cut and paste without references.
- Some students didn't participate , it depends on the student
- We should put grades for the participation and courage students pin a positive way(20%) of the participants
- We will use it in the future. I will do but I should have guidelines, type frame, increase the amount of participation, discussions in the class and lab after every assignment).

- We will use the mobile application wider in the future because contacts and relationships become more, save our time, we changed some orders, exams, it gave us more time to change by the application there was open time at any time. There is a link between us and the field of the course leader and also the management, before everything use formal and letters which contacts can use, but now every thing become direct and more flexible.
- In the Whatsapp 2 groups
  1. Management.
  2. Students.

Negatives: -WhatsApp has wide abilities and rules to it's use to control it.

Student 18 – Mechanical Engineering (Use Mobile)

Q1: **Have you got the quality of answers as you wish?** I have found it positive because when I would like the answers I got it via whatsApp from my in structure or my colleagues(interest in mobile technology).

My instructor and colleagues correct the answer for me if there is any mistake. You know if there are any unclear questions then I can look for it via internet but in application most of the questions my instructor.

Student 19

Yes and it's so easy to get the answer easily even if the doctor is absent there is no problem. Really it's a very tool because when the instructor is not available there is no problem because I can contact with him via Whats App then any question could be answered.

Student 20

Some of the questions need the instructor and I meet with him face to face for that but also mobile technology is very interesting and useful for me.

Student 21

The idea is very good and it's so helpful and interesting and useful, for example when student ask some questions these questions are not in my mind and then the instructor answers them and this will be very useful for me and our experience increase when I ask

the doctor by the WhatsApp I find very good answer. I think the App is very good and helpful and there is no need for the instructor to be with us.

Do you think there is an activity you prefer to be done in the same way not in the mobile technology method?

When I have video or voice is better than text method.

why you didn't use video or voice?

Because the net was not helpful and more expensive for videos and voice messages, also in the garage it's not preferable to use voice because there is much noise, so face to face might be more helpful here.

But there are new techniques very useful and might save time for recording videos and voice without any noise if we have good internet connection.

WhatsApp was very helpful and the instructor.

Risky technical problems, I agree with student 18, I prefer to learn with video call such as the method of work or to do something I will not understand it without a video call to see the method of fixing -by video call will be very helpful, I prefer video call when I have time and good internet connection.

Student 20: If I have CD which have something like a manual it will be very helpful so I can return back to it when I have any mistake as reference for student, this is the only thing I need. There is a lack in the What App, the most important is to share with others.

Student 21: the mobile technology is very helpful and it's useful, there is no another way to use the — with it when the doctor ask to share the answer with the doctor and the students there is no other way better.

Have you felt shy or in a critical situation when use the mobile technology?

Student 5: No, I didn't feel so because when I ask it doesn't matter what it is and if any one laughing at it , the problem will be in the—, but for me there is no any problem.

Student 6: No any critical situation and we discuss everything without any problem.

Student 7: No thing.

Student 8: I see there is no any critical situation and we ask normally because we learn.

Student 9: with mobile technology no any critical situation but if it's face to face sometimes yes I feel with critical.

Student 5: your idea by mobile learning, the negatives and any — find word?

Positives : there is more contacts, easier, more information because more answers and options, discussions, if there is some —-problem the instructor is absent it will be useful.

Negatives: take more time, if some one with me this will save time, if you lose the mobile you will loose all the information and there will be more options.

When the instructor is there may be very good.

If there is no internet problem it will be unhelpful.

- Do you think sometimes instructor ask in some critical or out of study time?
- Yes sometimes after working time which is critical sometimes.
- Positives: -some —- we need to report more than one time and understand it which is very good in mobile technology.
- If you apply sometimes then you see it and it's negatives , so when another student repeat he/she can avoid this problem.

Student 6:

Positives: very easy to take photos and when it's crowded —- you can work from home and save time.(easier, saving time).

Negatives: less than positives, sometimes telephone attract you more. Sometimes telephone when you would like to send something to the instructor while driving for example it will be risky.

- For the sound, instructors prefer the voice and we feel shy sometimes, I prefer the voice recording than video call because recording the instructor will hear it when he has time but video call need to be live (risky, feel shy).
- Student 7:- useful inside the field if you have any question you ask the doctor directly via mobile but when face to face you look for the doctor and you may

not find him/her, contact the doctor any time even in the weekend, everywhere .I don't see any negatives(flexibility, everywhere, any time).

- We save time and distance by mobile learning for the record sound it was very good.
- *enable the video call is the only thing that is missing the experiment.
- Final words : it's very good experiment

Student 8:

Positives: when there is an argument issue , with me I can check for the text. And the videos, sound is very useful and I can contact with the teacher any time (increase control and flexibility, relationship).

Negatives: When I'm in the car I can't contact with the group9risky.

The voice : I don't; like to record my voice personally because of cultural issue.

The lack: everything is good.

Student 9:

Positives: Every thing good, I don't like to contact with the doctor in the office hours but any time which is suitable.

Negatives: I don't think there are negatives.

The voice: I don't like to record the voice as critical issue, but sometimes face to face.

I don't' like to ask but in the mobile technology I can ask by text which is very useful.

The doctor asks us when we are in the field remotely and we should look for things which is very useful for us.

It was very useful experiment.